

**MODELLING OF DISTRIBUTION SYSTEM IN  
A FACTORY WAREHOUSE USING ARENA**  
(Pemodelan Sistem Pengedaran Gudang Kilang Menggunakan Arena)

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*ABSTRACT*

Warehousing represents material storage and physical management processes as well as the methods used by these processes that include all material movement and storage. Distribution system or logistics is a combination of processed functions to manage materials and products from manufacturer to consumer. This research focuses on the study of the warehouse distribution system of a cement factory. The processes involved in this system are modelled using simulation to study the operation in the factory warehouse. Data for building the model were collected through interviews and observation of the whole operation in the warehouse. A computer simulation model is designed, built and run using Arena. Results obtained from the simulation model were analysed to identify the weaknesses of the current system and improvement models were proposed. A total of five improvement simulation models were investigated. The effects of models on customer average waiting times at the various checking points and the model output are analysed. Overall, the best improvement model has succeeded in reducing the average customer waiting time and increased the total customers served in the daily operation of the system very significantly.

*Keywords:* Arena; simulation; distribution system; cement factory; improvement model

*ABSTRAK*

Pengudangan merupakan proses penyimpanan bahan dan pengurusan fizikal serta merangkumi kesemua kaedah dalam pengurusan pergerakan dan penyimpanan barangan. Sistem pengedaran atau logistik merupakan gabungan fungsi-fungsi yang diproses mengurus barangan dan hasil daripada pengeluaran kepada pengguna. Penyelidikan ini tertumpu kepada kajian sistem pengedaran gudang sebuah kilang simen. Proses yang terlibat dalam sistem pengedaran gudang kajian dimodel menggunakan simulasi untuk mengkaji sistem di gudang kilang tersebut. Data untuk pembangunan model simulasi diperolehi melalui kaedah temu ramah dan pemerhatian ke atas keseluruhan operasi di gudang tersebut. Suatu model simulasi komputer direka bentuk, dibina dan dijalankan menggunakan Arena. Hasil yang diperolehi dari model simulasi dianalisis untuk mengenal pasti permasalahan dalam sistem sedia ada dan model penambahbaikan dicadangkan. Sebanyak lima model simulasi penambahbaikan telah dikaji. Seterusnya dianalisis kesan model penambahbaikan ke atas tempoh masa menunggu pelanggan di pelbagai titik semakan dan output model. Secara keseluruhannya, model penambahbaikan terbaik telah berjaya mengurangkan purata masa menunggu pelanggan serta meningkatkan bilangan pelanggan yang dilayan dalam operasi harian sistem dengan sangat bererti.

*Kata kunci:* Arena; simulasi; sistem pengedaran; kilang simen; model penambahbaikan

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