ABSTRAK

Arya Adhitya Aldinata. Nim 5202550003 : Perhitungan Produktivitas Alat Berat *Excavator* Dan *Dump Truck* Pada Galian Tanah *Basement* Proyek Gedung Onkologi Terpadu Rsup H. Adam Malik

Pekerjaan galian tanah *basement* pada Proyek Pembangunan Gedung Onkologi Terpadu RSUP H. Adam Malik Kota Medan menggunakan *excavator* sebagai alat gali-muat dan *dump truck* sebagai alat angkut. Berdasarkan pengamatan di lapangan ditemukan adanya waktu tunggu (*idle time*) pada *excavator* akibat ketidaksesuaian jumlah *dump truck* yang melayani proses pemuatan material. Penelitian ini bertujuan untuk menghitung produktivitas *excavator* dan *dump truck* serta menentukan kombinasi alat berat yang optimal. Penelitian dilakukan melalui observasi langsung di lapangan dengan pengukuran waktu siklus alat berat pada Zona 1 pekerjaan galian *basement*. Pengamatan dibatasi pada lapisan tanah biasa berpasir dengan kedalaman 0–2 meter. Alat yang diamati terdiri dari *Excavator* Hitachi ZX210F kapasitas *bucket* 0,90 m^3, *Excavator* Sany SY75C kapasitas *bucket* 0,32 m^3, dan *Dump truck* Mitsubishi Fuso 4x2 HD kapasitas bak 8 m^3 (10 ton). Hasil penelitian menunjukkan bahwa produktivitas *Excavator* Hitachi ZX210F sebesar 116,20 m^3/jam dan *Excavator* Sany SY75C sebesar 59,00 m^3/jam. Produktivitas *Dump truck* Mitsubishi Fuso 4x2 HD berturut-turut sebesar 19,48 m^3/jam, 18,54 m^3/jam, 15,38 m^3/jam, dan 21,79 m^3/jam. Produktivitas alat dipengaruhi oleh waktu siklus, kapasitas alat, kondisi material tanah dan efisiensi operasional. Analisis *match factor* pada kondisi eksisting menghasilkan nilai 0,48 pada *Excavator* Hitachi ZX210F dan 0,34 pada *Excavator* Sany SY75C yang menunjukkan kondisi *under-trucked* sehingga *excavator* mengalami waktu tunggu. Berdasarkan simulasi kebutuhan alat berat diperoleh kombinasi yang lebih optimal, yaitu 1 unit *Excavator* Hitachi ZX210F dilayani oleh 6 unit *Dump truck* Mitsubishi Fuso 4x2 HD dengan nilai *match factor* 0,96 dan 1 unit *Excavator* Sany SY75C dilayani oleh 3 unit *Dump truck* Mitsubishi Fuso 4x2 HD dengan nilai *match factor* 1,02. Kombinasi tersebut menghasilkan kondisi kerja yang lebih seimbang sehingga waktu tunggu *excavator* dapat diminimalkan.

Kata Kunci: Produktivitas Alat Berat, *Excavator*, *Dump truck*, *Match factor*, Waktu Tunggu

ABSTRACT

Arya Adhitya Aldinata. Nim 5202550003 : Productivity Calculation of Excavators and Dump Trucks for Basement Excavation in the Integrated Oncology Building Project at RSUP H. Adam Malik.

Basement excavation work at the Integrated Oncology Building Construction Project of RSUP H. Adam Malik Medan uses an excavator as a digging-loading equipment and dump trucks as hauling equipment. Based on field observations, idle time was found in the excavator due to an imbalance in the number of dump trucks serving the material loading process. This study aims to calculate the productivity of excavators and dump trucks and to determine the optimal combination of heavy equipment. The research was conducted through direct field observations by measuring the cycle time of heavy equipment in Zone 1 of the basement excavation work. The observation was limited to ordinary sandy soil layers with a depth of 0–2 meters. The observed equipment consisted of a Hitachi ZX210F Excavator with a 0.90 m^3 bucket capacity, a Sany SY75C Excavator with a 0.32 m^3 bucket capacity, and Mitsubishi Fuso 4x2 HD Dump trucks with an 8 m^3 (10-ton) loading capacity..The results showed that the productivity of the Hitachi ZX210F Excavator was 116.20 m^3/hour and the Sany SY75C Excavator was 59.00 m^3/hour. The productivity of Mitsubishi Fuso 4x2 HD Dump trucks was 19.48 m^3/hour, 18.54 m^3/hour, 15.38 m^3/hour, and 21.79 m^3/hour, respectively. Equipment productivity was influenced by cycle time, equipment capacity, soil material conditions, working area conditions, and operational efficiency. The match factor analysis under existing conditions resulted in values of 0.48 for the Hitachi ZX210F Excavator and 0.34 for the Sany SY75C Excavator, indicating an under-trucked condition that caused excavator idle time. Based on the heavy equipment requirement simulation, a more optimal combination was obtained, where 1 unit of Hitachi ZX210F Excavator was served by 6 units of Mitsubishi Fuso 4x2 HD Dump trucks with a match factor value of 0.96, and 1 unit of Sany SY75C Excavator was served by 3 units of Mitsubishi Fuso 4x2 HD Dump trucks with a match factor value of 1.02. This combination resulted in a more balanced working condition, thereby minimizing excavator idle time.

Keywords: Heavy Equipment Productivity, Excavator, Dump truck, Match factor, Idle time.