

ABSTRACT

Laterite nickel mining operations require an appropriate configuration of heavy equipment to maintain production continuity and achieve production targets. At the study site, ore production had not reached the company's target of 10,000 tons/day, achieving only 51.43% of the cumulative production target. This condition indicates the need to evaluate heavy equipment requirements to improve productivity and ensure production target achievement. This study aims to determine the optimal number of heavy equipment units required for ore getting, ore loading, and ore hauling activities, compare the results with the actual equipment fleet, and evaluate equipment requirements under different weather conditions. A descriptive quantitative approach was employed using analyses of work efficiency, equipment productivity, equipment requirement, match factor, and weather-condition scenarios. The results showed that the equipment work efficiency was 61%. Under optimal conditions, the recommended equipment configuration consisted of five ore getting excavators, two ore loading excavators, and eleven ore hauling dump trucks, resulting in an estimated production of 12,062.96 tons/day. The same equipment configuration was also capable of meeting the production target under normal clear and light rain conditions. Under heavy rain conditions, the required fleet increased to six ore getting excavators, two ore loading excavators, and eleven ore hauling dump trucks, with an estimated production of 10,697.68 tons/day. The findings indicate that the existing equipment fleet is insufficient, particularly for ore getting and ore hauling activities. Therefore, adjustments to the number of equipment units, supported by cycle time control, haul road maintenance, and haulage cycle management, are required to maintain production target achievement under various weather conditions.

Keywords: heavy equipment, productivity, cycle time, match factor

INTISARI

Operasi penambangan nikel laterit memerlukan konfigurasi jumlah alat berat yang sesuai agar kontinuitas produksi dapat terjaga dan target produksi tercapai. Pada lokasi penelitian, realisasi produksi ore belum mencapai target perusahaan sebesar 10.000 ton/hari dengan capaian hanya 51,43% dari target kumulatif, sehingga diperlukan evaluasi kebutuhan alat berat untuk meningkatkan produktivitas dan menjamin ketercapaian target produksi. Penelitian ini bertujuan untuk menentukan kebutuhan jumlah alat berat optimal pada kegiatan *ore getting*, *loading ore*, dan *hauling ore*, membandingkannya dengan jumlah alat aktual, serta mengevaluasi kebutuhan alat pada berbagai kondisi cuaca. Penelitian menggunakan pendekatan kuantitatif deskriptif dengan analisis efisiensi kerja, produktivitas alat, kebutuhan jumlah unit, *match factor*, dan skenario kondisi cuaca. Hasil penelitian menunjukkan efisiensi kerja alat sebesar 61%. Pada kondisi optimal, kebutuhan alat yang direkomendasikan adalah 5 unit *excavator ore getting*, 2 unit *excavator loading ore*, dan 11 unit *dump truck hauling ore* dengan estimasi produksi sebesar 12.062,96 ton/hari. Komposisi alat tersebut masih mampu memenuhi target produksi pada kondisi cerah normal dan hujan ringan. Pada kondisi hujan lebat, kebutuhan meningkat menjadi 6 unit *excavator ore getting*, 2 unit *excavator loading ore*, dan 11 unit *dump truck hauling ore* dengan estimasi produksi sebesar 10.697,68 ton/hari. Hasil penelitian menunjukkan bahwa jumlah alat aktual belum memadai, terutama pada kegiatan *ore getting* dan *hauling ore*. Oleh karena itu, penyesuaian jumlah alat yang didukung pengendalian *cycle time*, pemeliharaan jalan angkut, dan pengaturan ritase diperlukan untuk menjaga pencapaian target produksi pada berbagai kondisi cuaca.

Kata kunci: alat berat, produktivitas, *cycle time*, *match factor*