

ABSTRACT

PT XYZ is a coal mining company located in South Sumatra that experiences export shipment delays due to relying solely on truck transportation to port SDJ, which requires an 18 hour barge sailing time to the Tanjung Muara Kampeh anchorage point. During the period from August to November 2024, out of five buyers with a total demand of 244,935 tons, four experienced delays of up to 13.8 days. This resulted in a penalty cost of IDR 4,824,831,000, with a fine rate of USD 10,000 per day. To address this issue, the company plans to add rail transportation to port TAA, which has a shorter sailing time of only 2.5 hours to the anchorage point. This study designs a distribution system using a Mixed Integer Linear Programming (MILP) approach to determine the optimal allocation of coal shipments from the PIT using two transportation modes: 200 trucks (30 tons/unit) and 90 railcars (50 tons/unit). The model considers transport capacity, travel time, operational hours, barge loading capacity of 1,500 tons/hour, and the specific deadlines of each buyer. The results show that all shipments can be completed on time without exceeding export deadlines. The total distribution cost in the existing system is IDR 34,828,132,265, while the proposed system incurs a cost of IDR 19,487,053,431. Therefore, the proposed system achieves a cost saving of IDR 15,341,078,834 and eliminates potential delay penalties, significantly improving PT XYZ's distribution efficiency.

Keywords: *Coal distribution, Mixed Integer Linear Programming (MILP), truck, railway, port SDJ, port TAA, shipment delay, export deadline, penalty.*