

ABSTRAK

Persaingan industri manufaktur menuntut perusahaan untuk meningkatkan efisiensi lintasan produksi melalui penerapan *line balancing*. Penelitian terdahulu telah membuktikan efektivitas metode *Ranked Positional Weight* (RPW) dan *Large Candidate Rule* (LCR), namun umumnya hanya menerapkan satu metode atau membandingkannya pada proses produksi yang relatif sederhana. Belum banyak penelitian yang mengkaji perbandingan kedua metode pada lintasan produksi manufaktur logam dengan lebih dari satu bottleneck, seperti pada produksi *box traffic light*. Penelitian ini bertujuan memperbaiki lintasan produksi box traffic light di CV XYZ yang mengalami ketidakseimbangan beban kerja sehingga realisasi produksi selama Juli–Desember 2025 hanya mencapai rata-rata 95% dari target. Hasil *stopwatch time study* menunjukkan bahwa proses Pengecatan Spray (1.812 detik) dan *Bending* (1.807 detik) merupakan bottleneck utama. Kondisi awal lintasan memiliki *line efficiency* sebesar 69,53%, *delay time* sebesar 30,47%, dan *smoothness index* sebesar 31,69. Perbaikan dilakukan dengan membandingkan metode RPW dan LCR. Hasilnya, metode RPW meningkatkan *line efficiency* menjadi 77,26%, menurunkan *delay time* menjadi 22,74%, dan menghasilkan *smoothness index* sebesar 23,97. Sementara itu, metode LCR memberikan hasil yang lebih baik dengan *line efficiency* sebesar 86,21%, *delay time* sebesar 13,79%, dan *smoothness index* sebesar 14,38. Berdasarkan hasil tersebut, metode LCR dipilih sebagai usulan perbaikan karena mampu meningkatkan efisiensi lintasan, mengurangi idle time, dan menghasilkan distribusi beban kerja yang lebih merata. Penelitian ini memberikan bukti empiris bahwa metode LCR lebih efektif dibandingkan RPW pada lintasan produksi dengan dua bottleneck dominan.

Kata Kunci: *Line Balancing*, *Ranked Positional Weight*, *Large Candidate Rule*, *Box Traffic Light*, Efisiensi Lintasan.

ABSTRACT

Increasing competition in the manufacturing industry requires companies to improve production line efficiency through the implementation of line balancing. Previous studies have demonstrated the effectiveness of the Ranked Positional Weight (RPW) and Largest Candidate Rule (LCR) methods; however, most studies have either applied a single method or compared both methods in relatively simple production processes. Limited research has examined the comparative performance of these methods in metal manufacturing production lines with multiple bottlenecks, such as the production of traffic light boxes. This study aims to improve the production line at CV XYZ, where workload imbalance among workstations caused production output to reach only an average of 95% of the production target during the period of July–December 2025. Stopwatch time study results identified the Spray Painting process (1,812 seconds) and the Bending process (1,807 seconds) as the primary bottlenecks. The initial production line performance showed a line efficiency of 69.53%, a delay time of 30.47%, and a smoothness index of 31.69. To improve the production line, the RPW and LCR methods were comparatively evaluated. The RPW method increased the line efficiency to 77.26%, reduced the delay time to 22.74%, and achieved a smoothness index of 23.97. Meanwhile, the LCR method produced better results, with a line efficiency of 86.21%, a delay time of 13.79%, and a smoothness index of 14.38. Therefore, the LCR method was selected as the proposed improvement because it provides higher production line efficiency, minimizes idle time, and achieves a more balanced workload distribution among workstations. This study provides empirical evidence that the LCR method is more effective than the RPW method for production lines characterized by two dominant bottlenecks.

Keywords: Line Balancing, Ranked Positional Weight, Largest Candidate Rule, Traffic Light Box, Line Efficiency.