



INTISARI

Program percepatan kendaraan bermotor listrik berbasis baterai (KBLBB) di Indonesia merupakan salah satu skenario yang ditetapkan oleh Pemerintah Indonesia dalam rangka mengurangi emisi gas rumah kaca dan impor minyak mentah. Dalam pelaksanaannya, masih terdapat beberapa kendala yang menyebabkan kurangnya minat masyarakat untuk beralih ke kendaraan listrik salah satunya adalah kurangnya infrastruktur pengisian daya listrik atau *charging station*. Selain itu, akibat adanya wabah Covid-19 target pembangunan *charging station* menjadi tertunda sehingga menyebabkan target yang telah ditetapkan oleh PT PLN (Persero) sebagai penyedia infrastruktur pengisian daya listrik untuk KBLBB di Indonesia tidak tercapai.

Untuk mendukung program percepatan KBLBB di Indonesia, penelitian ini membahas permasalahan *multi-objective* untuk menentukan lokasi pembangunan, jumlah, dan tipe *charging station*. Adapun tujuan yang ingin dicapai pada penelitian ini adalah memodelkan permasalahan *multi-objective* untuk meminimalkan *total cost* dan memaksimalkan kualitas pelayanan *charging station*. Pencarian solusi optimal diperoleh dari penggunaan *goal programming* dan *preemptive goal programming* yang diselesaikan dengan *add-in* What'sBest!17.0.

Penelitian ini berhasil membangun model matematis permasalahan *multi-objective* dengan memberikan rekomendasi dua kondisi perhitungan dengan metode *goal programming* dan *preemptive goal programming* dimana hasil *running* dengan dua metode tersebut memunculkan *trade-off* antara *total biaya* dengan *electricity accessibility*. Pada penelitian ini, hasil dari *running* model dengan metode *preemptive goal programming* dengan prioritas *total cost* menunjukkan hasil yang sama dengan metode *goal programming*. Selain itu, hasil dari perubahan parameter *penetration level* kendaraan listrik berbanding lurus terhadap hasil kedua fungsi objektif yaitu *total cost* dan kualitas pelayanan sedangkan, perubahan parameter jumlah kendaraan yang dilayani oleh satu *charging station* berbanding terbalik dengan *total cost* dan kualitas pelayanan. Selanjutnya, perubahan parameter waktu pelayanan *charging station* berbanding lurus terhadap kualitas pelayanan tetapi tidak memberikan pengaruh terhadap *total cost*.

Kata kunci: *charging station*, mobil listrik, *fast charging station*, *ultrafast charging station*, *multi-objective optimization*, *goal programming*, *total cost*, *electricity accessibility*, *facility location*.



ABSTRACT

The acceleration program for Kendaraan Bermotor Listrik Berbasis Baterai (KBLBB) in Indonesia is one of the scenarios set by the Indonesian Government in order to reduce greenhouse gas emissions and crude oil imports. In its implementation, there are still several obstacles that cause a lack of public interest in switching to electric vehicles, one of which is the lack of infrastructure for charging stations. In addition, due to the Covid-19 outbreak, the target for the construction of the charging stations was delayed, causing the target set by PT PLN (Persero) as the provider of electricity charging infrastructure for KBLBB in Indonesia is not achieved.

To support the KBLBB acceleration program in Indonesia, this study discusses multi-objective issues to determine the construction location, number, and type of charging stations. The objectives to be achieved in this study are modelling multi-objective problems to minimize total costs and maximize the quality of charging station services. The finding for the optimal solution was obtained from the use of goal programming and preemptive goal programming which was completed with the What'sBest!17.0 add-in.

This study succeeded in building a mathematical model of a multi-objective problem by providing recommendations for two calculation conditions using goal programming and preemptive goal programming methods where the results of running with these two methods led to a trade-off between total costs and electricity accessibility. In this study, the results of a running model using preemptive goal programming method with total cost priority show the same results as the goal programming method. In addition, the results of the change in the penetration level parameter of the electric vehicles are directly proportional to the results of the two objective functions, namely total cost and service quality, while changes in the parameters of the number of vehicles served by one charging station are inversely proportional to the total cost and service quality. Furthermore, the change in the service time parameter of the charging station are directly proportional to the quality of service but do not have an effect on the total cost.

Keywords: charging station, electric car, fast charging station, ultrafast charging station, multi-objective optimization, goal programming, total cost, electricity accessibility, facility location.