

INTISARI

Pengoperasian bandara perlu memperhatikan aspek kebandarudaraan. Menurut Direktorat Jenderal Perhubungan Udara, kebandarudaraan ialah hal yang berkaitan dengan penyelenggaraan bandara dalam melaksanakan beberapa fungsi, salah satunya ialah pemberian fasilitas layanan kendaraan pengantar penumpang. Terminal 3 Bandara Soekarno-Hatta memberikan layanan kendaraan mobil listrik bernama *buggy car* yang baterainya telah menjadi satu set dengan mobil. Saat ini, Universitas Gadjah Mada mengembangkan inovasi mobil listrik GATE menggunakan baterai *swap* yang dapat dilepas pasang. Kedua mobil listrik tersebut masih memiliki beberapa batasan, sehingga diperlukan perencanaan yang tepat. Oleh sebab itu, penelitian ini dibuat dengan tujuan untuk melakukan perencanaan kebutuhan mobil listrik pengantar penumpang di bandara.

Perencanaan kebutuhan mobil listrik dilakukan dengan beberapa tahap, yaitu: (1) pembuatan studi kasus berdasarkan hasil uji mobil listrik, (2) peramalan jumlah penumpang yang harus diangkut mobil listrik, (3) perhitungan kebutuhan dan total kapasitas mobil, (4) perhitungan jumlah kebutuhan mobil listrik dengan memaksimalkan *service level*, dan (5) perhitungan biaya sewa mobil listrik. Tahap nomor 4 dilakukan dengan membuat model matematika kelas *mixed-integer linear programming* menggunakan metode *branch and bound*, sehingga diperlukan proses verifikasi model.

Berdasarkan hasil penelitian, didapatkan peramalan jumlah penumpang yang harus diangkut mobil listrik untuk bulan Januari 2021 sebesar 449 penumpang, bulan Februari 2021 sebesar 459 penumpang, dan bulan Maret 2021 sebesar 454 penumpang. Kebutuhan mobil listrik GATE untuk Bulan Januari 2021 hingga Maret 2021 berjumlah 1 mobil dengan total kapasitas sebesar 690 penumpang, sehingga didapatkan *service level* sebesar 100%. Total biaya sewa mobil listrik GATE sebesar Rp270.000.000,00. Sedangkan kebutuhan *buggy car* sebanyak 3 mobil dengan total kapasitas sebesar 720 penumpang, sehingga didapatkan *service level* sebesar 100%. Total biaya sewa *buggy car* untuk 3 bulan sebesar Rp810.000.000,00. Sehingga disimpulkan bahwa penggunaan mobil listrik GATE akan membutuhkan lebih sedikit jumlah mobil sehingga biaya sewa akan lebih rendah dibandingkan penggunaan *buggy car*.

Kata kunci: Perencanaan, optimasi, mobil listrik, kendaraan bandara, *service level*.

ABSTRACT

Airport operations need to pay attention to airport aspects. According to the Directorate General of Civil Aviation, airports are matters relating to the operation of airports in carrying out several functions, one of which is the provision of passenger delivery vehicle service facilities. Terminal 3 of Soekarno-Hatta Airport provides an electric car service called a buggy car whose battery has become a set with the car. Currently, Universitas Gadjah Mada is developing the GATE electric car innovation using a removable swap battery. Both electric cars still have some limitations, so proper planning is needed. Therefore, this study was made to plan the need for an electric car to deliver passengers at the airport.

Planning for electric car needs is carried out in several stages: (1) making a case study based on the results of an electric car test, (2) forecasting the number of passengers that should be transported by electric car, (3) calculating the need and total capacity of the car, (4) calculating the number of the electric car needs to maximize the service level, and (5) calculating the cost of renting an electric car. Stage number 4 is done by making a mathematical model for the mixed-integer linear programming class using the branch and bound method, so a model verification process is needed.

Based on the results of the study, it was found that the forecasting results show the number of passengers that should be transported by electric car for January 2021 was 449 passengers, February 2021 was 459 passengers, and March 2021 was 454 passengers. The need for GATE electric cars from January 2021 to March 2021 is 1 car with a total capacity of 690 passengers so that a service level of 100% is obtained. The total cost of renting a GATE electric car is IDR 270,000,000.00. Whereas, the need for a buggy car is 3 cars with a total capacity of 720 passengers so that a service level of 100% is obtained. The total cost of renting a buggy car for 3 months is IDR 810,000,000.00. So it is concluded that the use of the GATE electric car will require fewer cars so that the rental cost will be lower than the use of a buggy car.

Keywords: Planning, optimization, electric car, airport vehicle, *service level*.