

## **BAB V**

### **KESIMPULAN DAN SARAN**

Pada Bab V dibahas mengenai kesimpulan dan saran yang didapatkan setelah melakukan penelitian. Kesimpulan akan menjawab tujuan dari penelitian yang telah ditetapkan sebelumnya. Berikut merupakan penjelasan lebih lanjut dari kesimpulan dan saran.

#### **V.1 Kesimpulan**

Berdasarkan hasil perhitungan matematis dan analisis yang telah dilakukan pada bab sebelumnya, maka dapat ditarik beberapa kesimpulan untuk menjawab tujuan penelitian. Kesimpulan yang didapatkan antara lain:

1. Model TWPM yang telah dikembangkan dapat digunakan untuk menyelesaikan masalah penentuan rute perjalanan. Batasan yang harus diperhatikan dalam hasil pengembangan model TWPM antara lain *time window* (jam buka dan jam tutup) setiap vendor serta dimensi kontainer kendaraan (panjang, lebar, dan tinggi) maupun dimensi komponen angkut setiap vendor.
2. Hasil pengembangan model TWPM dengan mempertimbangkan dimensi komponen angkut (*TWPM with Three-Dimensional Loading Constraints*) terbukti dapat meningkatkan utilitas kapasitas angkut kendaraan yang digunakan untuk melayani vendor dalam suatu rute perjalanan. Hal ini disebabkan karena perhitungan kapasitas angkut kendaraan mempertimbangkan dimensi kontainer kendaraan (panjang, lebar, dan tinggi) sehingga total komponen angkut yang dapat diangkut oleh kendaraan lebih banyak.

#### **V.2 Saran**

Penulis memberikan beberapa saran yang dapat dijadikan pertimbangan untuk digunakan dalam melakukan penelitian selanjutnya mengenai TWPM. Saran yang diberikan antara lain:

1. Pengembangan model TWPM selanjutnya dapat mempertimbangkan jenis kendaraan yang berjumlah lebih dari satu dimana setiap jenis kendaraan memiliki ukuran kontainer yang berbeda. Hal tersebut disebabkan karena dalam dunia nyata tidak semua pengiriman dalam melayani konsumen atau vendor menggunakan kendaraan yang homogen.
2. Pengembangan model TWPM selanjutnya dapat mempertimbangkan penanganan VRP *with pick-up and delivery service* secara simultan.

## DAFTAR PUSTAKA

- Aaker, D. A. (1998). Developing Business Startegies 5<sup>th</sup> Edition. New York: Wiley.
- Abate, M. & Kveiborg, O. (2013) Capacity Utilisation of Vehicles for Road Freight Transport. United Kingdom: Emerald Group Publishing.
- Baudin, M. (2004). Lean Logistic: The Nuts and Bolts of Delivering Materials and Goods. New York: Productivity Press.
- Brar, G. S. & Saini, G. (2011). Milk Run Logistics: Literature Review and Directions. In Proceedings of The World Congress no Engineering 2011 Vol I. London.
- Chopra, S., Meindl, P. (2010). Supply Chain Management: Strategy, Planning, and Operation. New York: Pearson Education.
- Cordeau, J. F., Laporte, G., Savelsbergh, M. W., & Vigo, D. (2007). Vehicle Routing. In Barnhart and Laporte (eds) Handbook in OR & MS 2007. Philadelphia: ELSEVIER.
- EI-Sherbeny, N. A. (2010). Vehicle Routing with Time Windows: An Overview of Exact, Heuristic, and Metaheuristic Methods. *Journal of King Saud University – Science*, 22(3), 123-131. doi: 10.1016/j.jksus.2010.03.002
- Environmental Defense Fund. (2018, 18 November). *Walmart Vaults Past Fleet Efficiency Goals Ahead of Schedule*. Retrieved from Environmental Defense Fund: business.edf.org
- Eurostat Statistic Explained. (2019, April). *Freight Transport Statistic – Modal Split*. Retrieved from Eurostat Statistic Explained: <https://ec.europa.eu/>
- Heizer, J., Render B., Munson, C. (2011). Operations Management. Texas: Pearson Education.
- Hifi, M., Kacem, I., Negre, S., & Wu, L. (2010). A Linear Programming Approach for the Three-Dimensional Bin-Packing Problem. *Electronics Notes in Discrete Mathematics*. 36 (2010) 993-1000
- Hugos, M. (2003). Essentials of Supply Chain Management. United States of America: John Wiley & Sons, Inc.
- Kholil, M., Hendri, Mangaraja, R. D., & Yosan, R. B. (2019). Improving the Efficiency of the Milkrun Truck Suppliers in Cikarang Area by Merging the

- Payload Cycles and Optimizing the Milkrun Route Using the Saving Matrix Methods. *Journal of Physics*, 1175, doi: 10.1088/1742-6596/1175/1/012201
- Kong, J. Jia, G., & Gan, C. (2013). A New Mathematical Model of Vehicle Routing Problem Based on Milk-Run. *International Conference on Management Science and Engineering 20<sup>th</sup> Annual Conference Proceedings*. doi: 10.1109/icmse.2013.6586310
- Laporte, G. (1992). The Vehicle Routing Problem: An Overview of Exact and Approximate Algorithms. *European Journal of Operational Research*, 59(3), 345-358. doi: 10.1016/0377-2217(92)90192-c
- Levi, D. S., Kaminsky, P., & Levi, E. S. (2000). Designing and Managing the Supply Chain: Concepts, Strategies, and Cases. New York: McGraw-Hill.
- Mahendra, B. T. & Wahyuningsih, S. (2013). Analisis Kerja Algoritma Tabu Search pada Vehicle Routing Problem with Backhaul (VRPB) dengan Perbaikan 2-OPT.
- Malandraki, C. & Daskin, M. S. (1992). Time Dependent Vehicle Routing Problems: Formulations, Properties, and Heuristic Algorithms. *Transportation Science*, 26(3), 185-200. doi: 10.1287/trsc.26.3.185
- Margareta, J. (2012). Understanding Michael Porter: The Essential Guide to Competition and Strategy. Massachusetts: Harvard Business School Publishing.
- Martello, S., Pisinger, D., & Vigo, D. (2000). The Three-Dimensional Bin Packing Problem. *Operations Research*, 48(2), 256-267. doi: 10.1287/opre.48.2.256.12386
- Masudin, I. (2017). Supply Chain Management and Reverse Logistics (An Overview and Review for Future Research Direction). Malang: UMM Press.
- Nasution, M. N. (1996). Manajemen Transportasi. Jakarta: Ghalia Indonesia.
- Nemoto, T. & Rothengatter, W. (2012) Efficient Green Logistic in Urban Areas: Milk-Run Logistic in the Automotive Industry. *Transport and Sustainability*, 319-337. doi: 10.1108/s2044-9941(2012)0000003017
- NEO – Networking and Emerging Optimization. (2013, 7 Januari). *Capacitated VRP*. Retrieved from NEO – Networking and Emerging Optimization: neo.lcc.uma.es

- NEO – Networking and Emerging Optimization. (2013, 7 Januari). *Split Delivery VRP*. Retrieved from NEO – Networking and Emerging Optimization: neo.lcc.uma.es
- Nugraha, D. C. & Mahmudy, W. F. (2015). Optimasi Vehicle Routing Problem with Time Windows Pada Distribusi Katering Menggunakan Algoritma Genetika. Seminar Nasional Sistem Informasi Indonesia (SESINDO) (Januari 2015)
- Nojiri, W. (2005). Japanese Physical Distribution – Distribution Transformation and Space Structure. Tokyo: Kokon Shoin.
- Patel, M. B. & Patel, D. (2013). Optimization Approach of Vehicle Routing by a Milk-Run Material Supply System. *International Journal of Scientific Research & Development*, 1(6), 1357-1360.
- Pillac, V., Gendreau, M., Gueret, C., & Medaglia, A. L. (2013). A Review of Dynamic Vehicle Routing Problems. *European Journal of Operational Research*, 225(1), 1-11. doi: 10.1016/j.ejor.2012.08.015
- Pires, S. R. I. & Aravechia, C. H. M. (2001). Measuring Supply Chain Performance. *Proceedings of the Twelfth Annual Conference of the Production and Operations Management Society, POM-2001*
- Purnomo, A., (2010). Analisis Rute Pendistribusian dengan Menggunakan Metode *Nearest Insertion Heuristic* Persoalan *The Vehicle Routing Problem with Time Windows* (VRPTW) (Studi Kasus di Koran Harian Pagi Tribun Jabar). In: Prosiding Seminar Nasional Teknik Industri UNISBA, Pemberdayaan Rekayasa Industri Berbasis Eco – Efficiency pada Era Perdagangan Bebas. Bandung 24 November 2010.
- Sandhya, & Kumar, V. (2013). Issues in Solving Vehicle Routing Problem with Time Window and Its Variants using Metaheuristic – A Survey. *International Journal of Engineering and Technology*, 3(6)
- Shuai, Y., Yunfeng, S., & Kai, Z. (2019). An Effective Method for Solving Multiple Travelling Salesman Problem Based on NSGA-II. *System Science & Control Engineering*, 7(2), 108-116. doi: 10.1080/21642583.2019.1674220
- Srour, A., Othman, Z. A., & Hamdan, A. R. (2014). A Water Flow-Like Algorithm for the Travelling Salesman Problem. *Advances in Computer Engineering*, 2014, 1-14. doi: 10.1155/2014/436312

- Sutapa, I N., Widyadana, I G. A., & Christine. (2003). Studi Tentang Travelling Salesman dan Vehicle Routing Problem dengan Time Windows. *Jurnal Keilmuan dan Aplikasi Teknik Industri*
- Tjiptono, F. (2000). Strategi Pemasaran, Edisi Kedua. Yogyakarta: Penerbit Andi.
- Tsai, R. D., Malstrom, E. R., & Kuo, W. (1993). Three Dimensional Palletization of Mixed Box Sizes. *IIE Transactions*, 25(4), 64-75. doi: 10.1080/07408179308964305
- Turban, Rainer, Porter, R. E. (2004). Information Technology for Management 4<sup>th</sup> Edition. New Jersey: John Wiley & Sons, Inc.
- Toth, P. & Vigo, D. (2002). The Vehicle Routing Problem. Philadelphia: Society for Industrial and Applied Mathematics.
- Toth, P. & Vigo, D. (2014). Vehicle Routing: Problems, Methods, and Applications, 2<sup>nd</sup> Edition. Philadelphia: Society for Industrial and Applied Mathematics.