

The Hong Kong University of Science and Technology
Dept of Information Systems, Business Statistics
and Operations Management

Frontiers in Operations Management Workshop



Dimensioning On-demand Vehicle Sharing Systems
by

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Date : **3 December 2021 (Friday)**
Time : **3:00 - 3:30 PM**
Venue : **Room G012, LSK Business Building, HKUST**



Abstract: We consider the problem of optimal fleet sizing in a vehicle sharing system. Vehicles are available for short-term rental and are accessible from multiple locations. The size of the fleet must account not only for the nominal load and for the randomness in demand and rental duration but also for the randomness in the number of vehicles that are available at each location due to vehicle roaming (vehicles not returning to the same location from which they were picked up). We model the system as a closed queueing network and obtain a closed form approximation of the optimal fleet size (the minimum number of vehicles needed to meet a target service level). The approximation is remarkably accurate and highly interpretable with buffer capacity expressed in terms of three explicit terms that can be interpreted as follows: (1) standard buffer capacity that is protection against randomness in demand and rental times; (2) buffer capacity that is protection against vehicle roaming; and (3) a correction term. Our analysis reveals important differences between the optimal sizing of standard queueing systems and that of systems where servers roam.

Bio: Dr Shining Wu is an Assistant Professor in the Department of Logistics and Maritime Studies at the Hong Kong Polytechnic University. His research interests include sharing economy, strategic consumer behavior, queueing theory and its applications, and data-driven optimization. He received his Ph.D. degree in Industrial Engineering and Logistics Management from the Hong Kong University of Science and Technology, and B.S. in Statistics from Peking University, China. His research has appeared in Operations Research and Management Science.

All interested are welcome!
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