Optimization of Order Picking Cycle in the Fulfilment Center Leg of an E-Commerce Supply Chain

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Abstract

The *Fulfilment Center* is the heart of an e-commerce supply chain and also the origin of the outbound flow of a customer order. *Order Picking* in a Person to Goods Fulfilment center is a labor intensive process and also extremely critical as the entire order flow further downstream is directly dependent on successful and optimized picking. It constitutes of ~14% of the *Order to Dispatch* lead time, ~17% of the labor cost in the pre-dispatch cycle and contributes ~80% towards product quality. The sensitivity of the performance of the order picking has a non-linear impact on all the three metrics of the FC: *Speed, Cost* and *Quality* and hence order picking if done effectively can positively affect the aforementioned three metrics and eventually customer experience.

The efficiency of order picking is dependent on a few variables which depict the demand and supply cycles in a fulfilment center. Influential *Demand* variables include *order density*, *category mix*, *unit to shipment ratio*, *physical layout area* of the fulfilment center among others. *Supply* variables which affect order picking consist of p*ut-away logic* (zone based, chaotic, cube), *pick-zoning*, *batching*, *routing*, *bin size* and *effective utilization rate*, *layout design* (drop zone, pick zone aspect ratio), *inventory density* and the effects of *automation* implemented in the fulfilment center. All of these Demand and Supply variables are closely interdependent and their relationship can have a bi-directional impact on the performance of an FC, directly impacting efficiency of order fulfilment.

This paper sheds light on the interplay between the demand and supply variables in the order picking cycle. It identifies and examines the parameters which influence the behavior of these variables. Furthermore, it explains the sensitivity of each demand and supply variable towards each of these parameters and provides a mapping of the interdependency of the variables in a fulfilment center environment.

The correlation between the aforementioned variables helps in focusing on the optimized *zone* within a fulfilment center for order picking and thus moving the activity to the next level of optimality. A use case of Order picking in a person to goods fulfilment center has been analyzed in detail to provide insights into the impact of each variable on the fulfilment center metrics and the weightage of each parameter on the variable in an elaborate manner.

Biography

Rohit Kunal heads the Fulfilment Center Design at Flipkart.com, India's largest online marketplace. His core strength areas are Supply Chain Innovation, Industrial Engineering, Service Excellence and New Product Development. He has graduated in Mechanical Engineering from Cochin University of Science and Technology, Kochi, India and has earned his Post Graduation from SP Jain Institute of Management - Mumbai, India in Operations Management. He began his career from Mahindra & Mahindra Ltd in New Product Development and has been associated with the Manufacturing industry in Supply Chain ever since. He has published over 7 papers in SAE and Supply Chain Design Simulation in the automotive industry and the e-commerce industry. He also serves on the panel of peer reviewers for multiple SAE publications.

Ananth Rangarajan is a Manager-II in the Fulfilment Center Design team at Flipkart.com, India's largest online marketplace. His focus areas are Industrial Engineering and Supply Chain Innovation. He earned his Bachelor in Industrial Engineering from the University of Pune, India and has graduated from the Postgraduate Program in Management at the Indian School of Business with concentrations in Finance and Operations Management. Ananth has served with Mercedes-Benz India in Assembly Line & Plant Management, Logistics & Supply Chain Management and Production Planning. He has been involved in academic research since his deputation to the University of Windsor, Ontario, Canada as an Undergraduate Exchange Scholar. He has been associated with the IEOM society since the inaugural conference in Dhaka'10 where he was the youngest delegate. He has published conference and journal articles on financial modelling, simulation, service sector process flows, urban transportation, healthcare, back office operations and e-commerce. He also serves on the panel of peer reviewers for multiple international journals and conferences.