

A review paper on Last Mile Logistics operation design, challenges and opportunities in Malaysia

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Abstract

This is a review paper on design, challenge and opportunity of Last Mile Logistics (LMP) operations in Malaysia. As business-to-customer online retail platform (ORP) industry becomes crowded in Malaysia, logistics emerges as prerequisite towards dominance of cyberspace. However, the widely adopted design of distribution model, namely the Hub and Spoke model, is sensitive towards demand spikes. Outsourcing has been identified as an opportunity to address such challenge. From the perspective of the ORP, outsourcing is a non-trivial alternative and if managed haphazardly it would sacrifice both customer service level as well as profitability. From the perspective of the outsourcing entities, namely the third party logistics service providers, emergence and expansion of players have been observed.

Keywords

Online retail platform, Hub and Spoke, Last Mile Logistics, e-commerce, outsourcing, third party logistics

Introduction

Growth of business-to-customer online retail platform (ORP) in Malaysia

Malaysia's e-commerce industry has already reached RM24.6 billion in 2017 (Star, 2017). This figure is expected to grow as Lazada Malaysia reported that it has achieved 100% year-on-year growth in sales in 2017 (Edge, 2018). Others prominent online retail platforms (ORP) players include; Shoppe, Zalora, Lelong and 11street. However, a study by iPrice that categorizes these ORPs by number of clicks provides a glimpse of the degree of competition skewness within the industry (Digital News Asia, 2017).

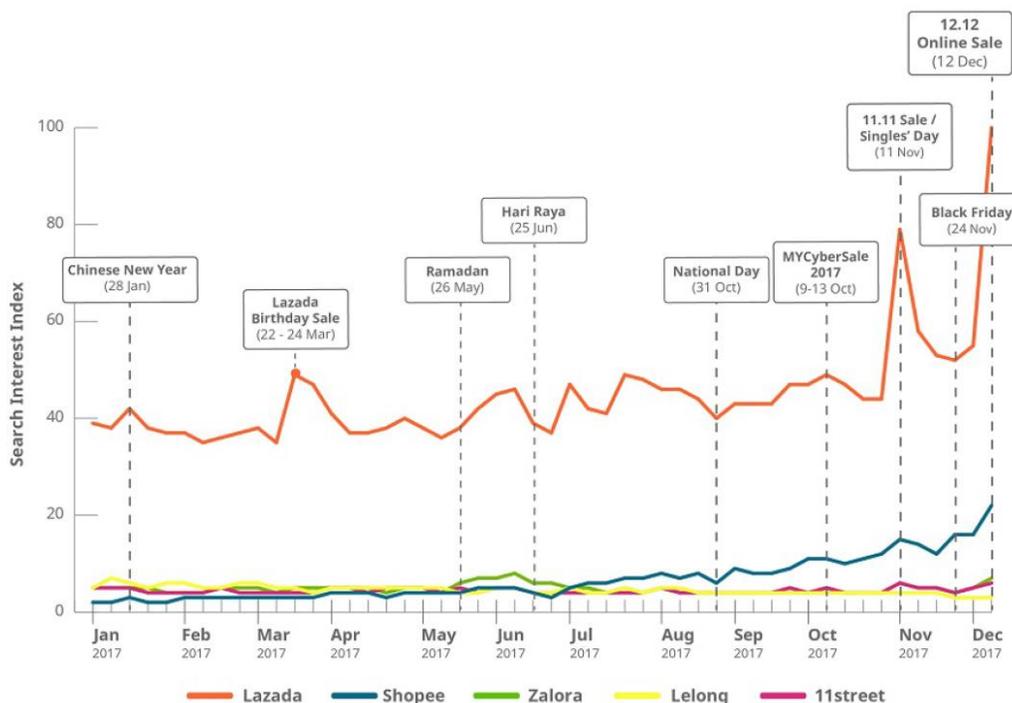


Figure 1 – This diagram published by (Digital News Asia, 2017) in December, 2017 compares number of searches for leading ORP by Malaysians sorted by month. It further indicates that the number of searches spike inline with national holidays as well as sales events. Source: IPrice.

Logistics as competitive advantage

Initiatives taken by leading ORPs suggest that delivery time may to be a competitive advantage for the industry. For example, Lazada initiated its six-hour delivery option within the Greater Klang Valley in 2016 while Amazon in Singapore, offers two-hour delivery option in 2017.

Ensuring such tight delivery service is complex, as delivery time is an aggregated function of production, inventory and transportation management. The key to compete on this front may lies in deeper collaboration among the supply chain entities, namely the ORP, producers and logistics service providers. News on this industry trend is common. For instance, Lazada offering producers storage and inventory management services (Star, 2017) as well as providing deliveries with its in-house fleet. Meanwhile, China's JD.com is reported to have been investing on its own logistics network in Indonesia and Vietnam (Reuters, 2018).

Greater collaboration and infrastructure investment are important steps in building dominance in delivery services. Similarity, emphasis should be place on distribution network and operational framework as they dictate how infrastructure can be utilized to enable fast and efficient deliveries.

Parcel distribution network

A variety of distribution network could be utilized to transport a parcel from its source to its intended final destination. From the context of ORP, sources are the origin of parcels. This may include; warehouses, manufacturing plants and retailers. On the other hand, final destinations are

locations specified by online customers where handover of parcels occur. These destinations may take forms as an address or a collection point.

Intuitively, Direct Shipment would be most straightforward distribution approach from the perspective of management. However, the widely adopted network is a hybrid between Hub and Spoke and Last Mile Logistics (LML). Rodri' guez et al. (2007) highlighted that the Hub and Spoke design aims to reduce cost by achieving economic of scale on transportation between hub to depot.

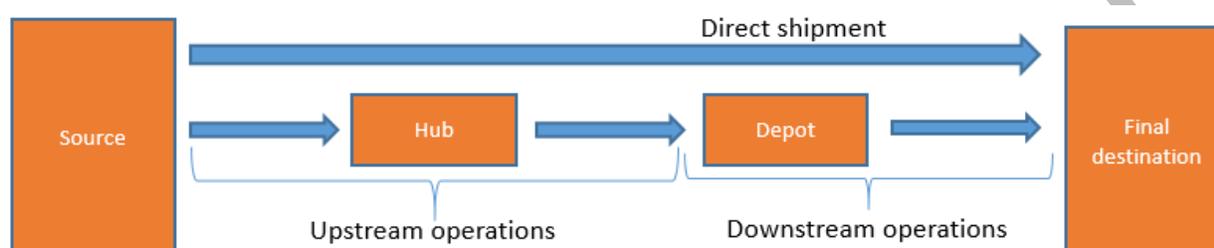


Figure 2 – This figure illustrates physical flow of parcels from source towards final destination. The Hub and Spoke network (on bottom) is shown in contrast with the Direct Shipment approach (on top).

The Hub and Spoke distribution network

The Hub and Spoke network is a two tiered distribution network (Andrew Greasley, 2012) . First, goods listed on an ORP are transported from various sources towards a hub. A hub is typically a large facility. It serves as a consolidation and storage point, especially for fast moving goods. Upon confirmation of final destination, purchased goods are picked and packed as parcels. These parcels are sorted and subsequently transported to their designated depot. These operations are known as the upstream operations.

A depot serves as a transshipment facility for all parcels which final destinations are located within its boundary. Boundary of a depot may be defined by a radius or maximum travel time between the depot and the final destination. In short, depots serve as the capillary networks of hub and spoke network. On the other hand, the last stretch of operations to deliver parcels from depot to their final destinations is known as the Last Mile Logistics (LML) (Xuping Wang, 2014).

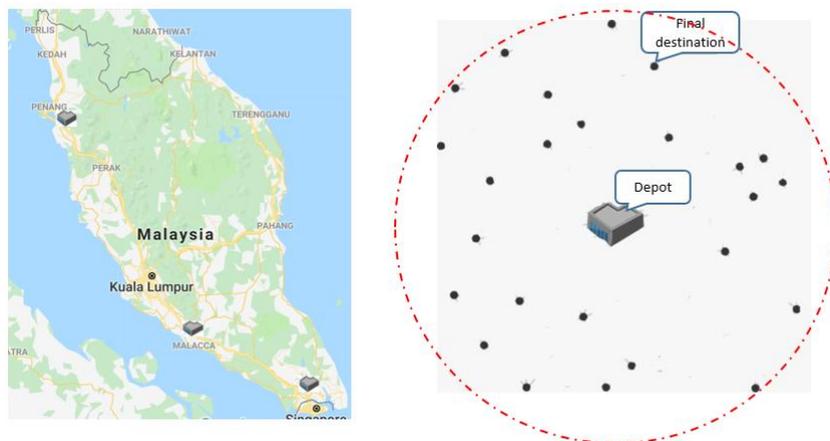


Figure 3 – On the left is an illustration of a Hub and Spoke configuration where the hub located at Kuala Lumpur is supporting three depots located at Penang, Melaka and Johor. On the right is an illustration a circular boundary of a depot. A boundary could be set by radius where the depot is at its center.

What is Last Mile Logistics?

LML is a set of operations which include; unloading inbound parcels from hub and loading of parcels to delivery vehicles. However, at the core of these operations is the route creation process. A route is a sequence of final destinations to be served by an assigned delivery vehicle. Route creation is a non-trivial decision as it must fulfill a host of constraints which include:

- All vehicles must leave and return back to depot.
- Travel is permissible only on road (or arc) that connects subsequent destination.
- Each final destination must be visited only once.
- Parcels must adhere to carrying capacity of their assigned vehicle, both weight and volume.
- Number of route must be less than or equal to number of vehicle available.

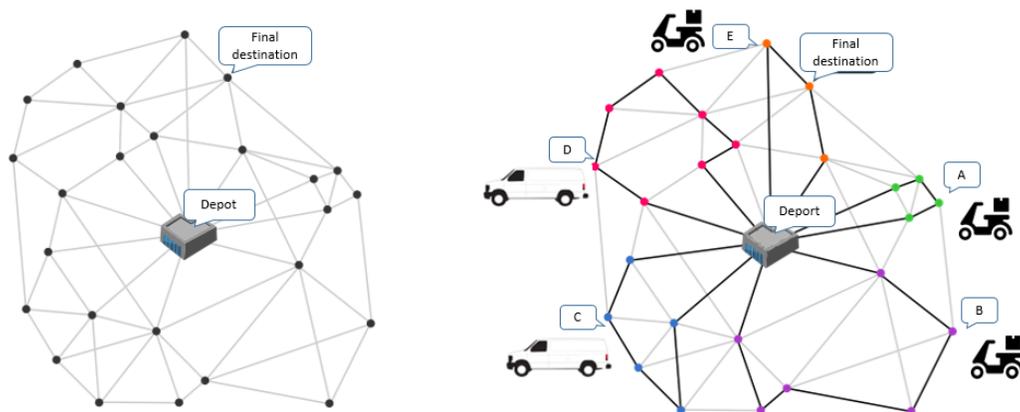


Figure 4 – On the left is an illustration of 25 final destinations with respect to the depot's location. Connectivity among final destinations and depot is dictated by existing road infrastructure, shown here as arcs. Arcs are typically measured by distance or expected travel time. On the right is an

illustration of five routes created for the 25 final destinations. Route A, B and E will be assigned to three unique motorbikes, whereas route D and C are assigned to two vans which have higher delivery capacity.

Tradeoff customer service and profit due to routing

A set of haphazard routes would produce a non-balanced tradeoff between delivery cost per parcel (CPP) and percentage of parcel delivered on time (POTD). From the perspective of ORP, a direct approach to define delivery cost per parcel (CPP) could be the sum of total fixed cost + total variable cost divided by total parcel delivered. Where, total fixed cost can be estimated with a function of total number of vehicle dispatched, whereas, variable cost with a function of total distance travel by all vehicles. By creating only one route, where all parcels are assigned to an extremely large capacity vehicle, CPP is minimize. However, this strategy risk increasing POTD.

Challenge due to spike of parcels demand

As discussed, route creation is at the core of LML. It maintains the intricate balance between CPP and POTD. However, this balance is disturbed when number of parcel to be delivered exceed existing delivery capacity. As spike occurs, excess parcels would need to be delivered on the subsequent day. Such spike could be due to unexpected events or cycle of holidays as well as sales seasons.

However, a continuous spike would cause parcel to build up at depot and subsequently increasing the POTD, if delivery capacity cannot be increase with short notice. Although, POTD can be managed by increasing the promised lead time to online customers, this option would cause ORP to temporary relinquish its logistical competitive advantage.

Alternatively, excess parcels can be outsourced to third party logistics entities, however at a premium CPP. Nevertheless, outsourcing requires delivery cost for each parcel to be estimated a priori. The motivation of such requirement is to minimize the tradeoff between CPP and POTD by outsourcing parcels with high delivery cost while using internal delivery capacity to fulfill parcels with lower delivery cost.

Opportunity of LML service providers in Malaysia

Malaysia's logistics industry is expected to grow in tandem with its ORP industry. This trend is further highlighted by Alibaba's decision to double their investment to \$4 billion for a controlling stake of Lazada as well as its subsidiary, the Lazada Express (Reuters, 2018). Founded in 2013, Lazada Express is Lazada's internal logistic provider serving Malaysia, Thailand, Vietnam, Indonesia, Philippines and Singapore with its dedicated hubs, depots and delivery fleet. On the other hand, third party logistics service provides, such as RedBox and Ninja Van have separately emerged in 2014. Although not strategically tied to any ORP, Ninja Van has been reported to be delivering 4 million parcels a day and raised \$34 million in 2018 for its expansion endeavor (Tech In Asia, 2018). Hence, active study in LML, particularly in route creation with consideration of outsourcing, would enable creation of modeling tools that support a vibrant market space for outsourcing. This would in turn improve business environment for further investment and ultimately growth in Malaysia's online retail as well as logistics industry.

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