

Reinventing retail

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To maximise their bottom line, online retailers must integrate digital business data with physical product flow, according to researchers from Singapore Management University.

We shop a little differently nowadays. Groceries, clothes, luxury goods and all manner of products can be bought online with a few quick taps on a smartphone screen. These days, physical brick-and-mortar stores are constantly competing with the huge influx of e-commerce retailers for attention—and sales.

The e-commerce industry is especially thriving in the Asia-Pacific, says Associate Professor Lim Yun Fong of the Singapore Management University (SMU) Lee Kong Chian School of Business, who specialises in the study of operations management.

"In 2015, the total e-commerce sales in the region hit US\$900 billion, and by 2018, it will balloon to US\$1.8 to 2 trillion," Professor Lim says, adding that the tectonic shift towards online shopping is precisely what attracted him to the subject matter in the first place.

From 'add to cart' to the delivery van

Traditional retailers looking to hold their own among e-commerce retailers have started selling their products online or through mobile apps, Professor Lim shares.

But this shift online is proving to be very challenging, he says, as

retailers tend to offer more product varieties to generate more sales, complicating their inventory management. In addition, delivering goods on time can get quite complicated and expensive if customers order multiple items online, each stored at physical stores or warehouses in different neighbourhoods.

"The question is, when I have demand from online channels and it competes with the demand from physical stores, how should I fulfil them? How do I better integrate my inventory, processes and manpower to satisfy these two streams of demand?" he asks.

According to Professor Lim, a holistic fulfilment scheme that takes into consideration demand from both online and brick-and-mortar stores is needed. For example, he proposes that orders placed online within a five kilometre radius of a store be fulfilled from the store instead of a warehouse. "This new way of fulfilment, called ship from store, is more economical for the company," he explains.

Together with colleagues, he has developed algorithms to help companies identify inventory policies that reduce their operations cost over many different products. The study is described in a paper titled "Inventory Management Based on Target-oriented Robust Optimization", which was recently accepted for publication in *Management Science*.

You sell it, Amazon delivers it

To stay ahead of the online retail curve, retail giant Amazon is making great strides into providing logistics services for online sellers. In a 2015 paper, titled "Consignment Contracts with Revenue Sharing for a Capacitated Retailer and Multiple Manufacturers" and published in the journal *Manufacturing and Service Operations Management*, Professor Lim dissects the company's Fulfillment by Amazon programme, which

provides warehousing, delivery and aftersales services for independent sellers.

In the study, Professor Lim and colleagues found that for Amazon's business model to work, in many cases the company only needs to charge a commission for each item sold instead of charging the sellers for storage. "If the products have very similar cost parameters, Amazon doesn't have to charge a storage fee to be profitable," he says.

Unfortunately, not all online sellers have the luxury of hiring a third-party logistics provider. For them, last-mile delivery—sending goods from the warehouse to the customer—is still a very expensive operation.

As one solution for lowering the last-mile delivery cost, Professor Lim and colleagues propose the idea of urban consolidation centres in an article titled "A Rolling Horizon Auction Mechanism and Virtual Pricing of Shipping Capacity for Urban Consolidation Centres", which was published in a 2015 book titled Computational Logistics.

In the article, he proposes that e-commerce companies ship their goods to an urban consolidation centre, preferably near the city area, for delivery to stores and customers in the city. In doing so, fewer delivery trucks are on the roads, easing congestion in the city while delivering goods in the most efficient way possible. He also details how retailers can bid for delivery services from a small pool of delivery trucks, operating on a first-come-first-serve basis.

The 'uberisation' of e-commerce

Now, the question that remains is: Who will operate these urban consolidation centres? "A recent trend is the 'uberisation' of last-mile delivery," Professor Lim notes. "Retailers send goods to the centres, post the delivery tasks on websites or apps, and people like students or

retirees deliver these goods for a small fee. This significantly reduces costs for the companies."

The idea of urban consolidation centres is not new: Japan's Tenjin Joint Distribution System, which operates in Fukuoka City, is one example. La Petite Reine in Paris, France, goes a step further—the centre's delivery vehicles are zero-emission cargo tricycles and electric vans.

Even the world's most valuable company, Google, has jumped on board the logistics bandwagon. "Google just acquired a logistics company; they now have a [delivery](#) service called Google Express," Professor Lim says.

And while the growth of e-commerce is forecasted to be on an upwards trajectory, many e-commerce companies still struggle with fundamental parts of the behind-the-scenes operations, such as how to effectively marry the constant stream of online data with the movement of physical goods.

Solving the "big picture" won't be easy and will require the contributions of many people, Professor Lim says with a smile. Very much like his subject matter, he is collaborating closely with colleagues at LKCSB and the Fujitsu-SMU Urban Computing and Engineering (UNiCEN) Corp. Lab to pool resources for the reinvention and integration of retail and logistics.

Provided by Singapore Management University

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