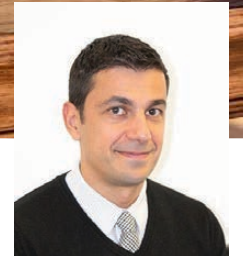# TERMINAL PLANNING IN THE AGE OF AMAZON

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As Bill Gates cites "time is the only commodity that money cannot buy". All of us have certainly realised the truth in this statement, when struggling to plan our days effectively. From the moment our alarm rings in the morning, commuting to work, pick up kids from school, review homework, prepare dinner, to bedtime, a day passes very fast and there is very little time left. At some point, families or individuals need supplies from groceries or food from restaurants; we need to buy new clothes, shoes, furniture, presents for birthdays, Christmas and other special occasions, etc. Do we have time for that?

It is impossible to get more done in a day, yet time is fleeting, and it can soon run out leaving our daily or monthly goals delayed. Hence, time is one of the reasons people perceive shopping as a nuisance. Bill Gates has come up with a list of recommendations about how to manage time optimally. However, there are global companies like Amazon or Uber that have come up to simple and excellent solutions. These companies are the quintessence

of how digitalization and e-commerce can make our lives easier and more time effective.

EXPONENTIAL GROWTH

Consumers have realized the convenience of buying online, in fact e-commerce has grown substantially during the last ten years. According to Eurostat, internet users, who bought or ordered goods or services online, grew by about 35% since 2009. In 2019, retail e-commerce sales amounted to about $3.5 trillion worldwide, with peaks during Black Friday and Christmas season. Likewise, the delivery times have been significantly reduced. We can all recognize that the old delivery times offered by e-commerce retailers, ranging between five and seven days, are today not acceptable anymore. The normal response time accepted by customers has decreased to about one to three days. Can society afford such a competitive service level?

To ensure short response times, companies must ship products from factories to terminals closer to customers.

When customers place an order, these products are picked up in the closest terminal, packaged, consolidated and, finally, shipped last mile. Terminals need to be smartly located in places where last mile delivery times are optimized. In addition, sophisticated technologies are used to improve pick up and packaging times. These terminals might also include some value-added production or processing activities, e.g. postponement activities like kitting, sorting, customizing, labelling, customs operations and dedicated spaces for free trade of goods.

NETWORK COMPLEXITIES

However, storing goods close to customers is not efficient. Complexity of the distribution network increases, meaning that more warehouses and transport must be used. In such a setup, the delivery times decrease, but the inventory costs increase, mostly because the localized demand uncertainty force managers to inflate the number of products in stock. This is a clear inefficiency: products waiting for an order
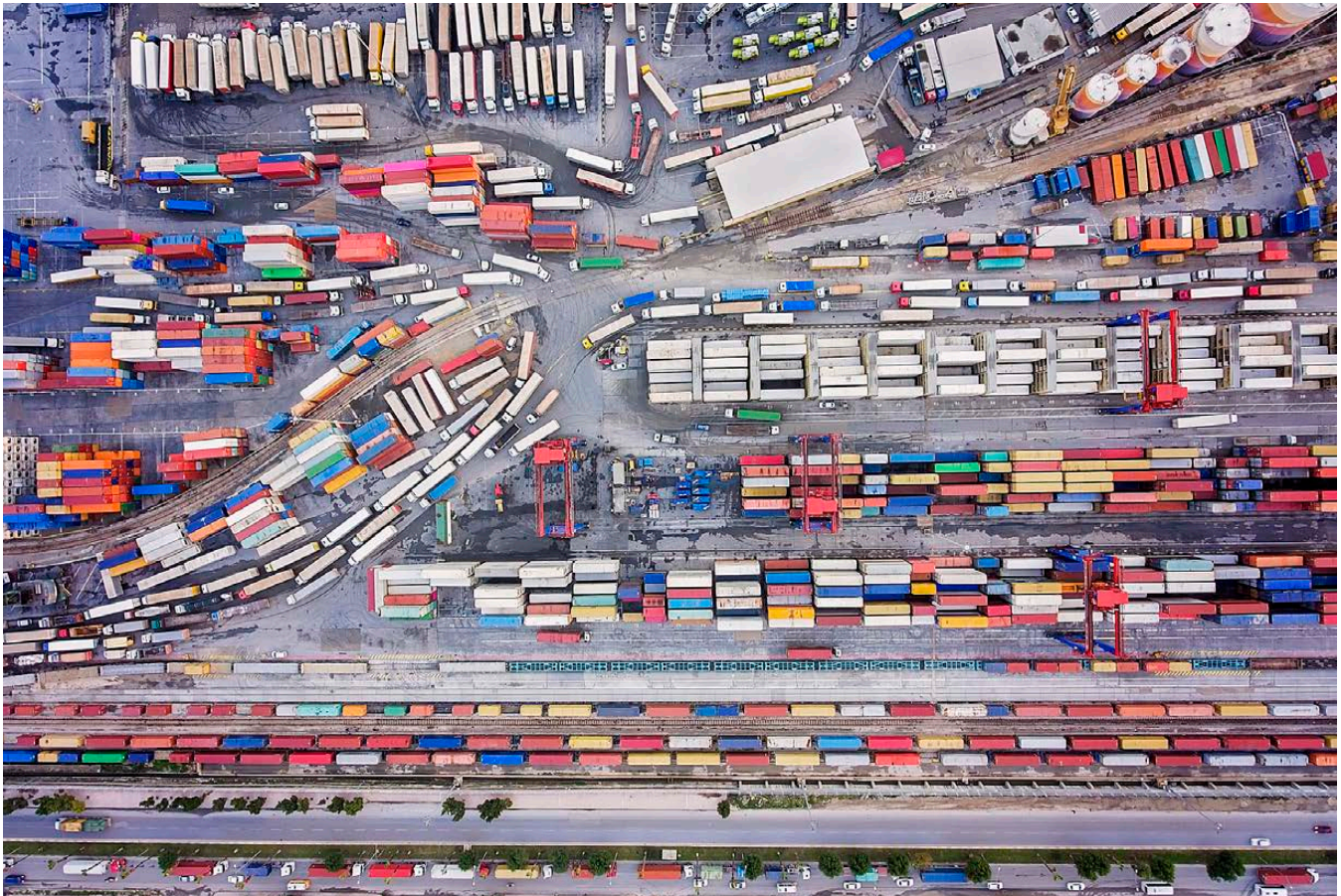
to arrive occupy terminal space, increasing the need for land use dedicated to storage space, but also holding costs. Part of these costs relate to electricity consumption and therefore environmental impacts. Another important issue is the risk for wastes. If the products remain unsold for a certain time, a company needs to decide whether to ship them back, arrange a lateral transhipment or waste them.

Unfortunately, it seems that wasting a product is more economically advantageous than paying the cost to return it. The environmental bill includes now the energy used to manufacture the products, the shipment to the terminals and absurdly the waste of the products.

Apart from the terminal inefficiencies, there are also the well-known challenges of last mile transport. Typically, there is a lot of pressure put on logistics providers like FedEx or UPS in order to deliver faster and in some occasions asking their employees to work with night shifts. In addition, the usage of resources like pallets and vehicles become more difficult to optimize, leading to additional costs- and environmental-inefficiencies.

RESEARCH AND EXPERIMENTATION

Research is looking at new models and technologies to reduce the gap between customer service levels, costs and sustainability impacts. For instance, the city of Madrid is experimenting the usage of "micro-hubs" or "motherships" combined with bikes and electric vehicles to ship last mile. This approach is proving to save both costs and CO2 emissions. Next, additive manufacturing could transform terminals into "virtual warehouses", where products are manufactured on-demand, reducing holding costs and the produce-to-waste phenomenon.

Research is moving to reduce printing time (in the future allowing mass customization), complexity, e.g. printing more intricate shapes, and usage of multiple materials in the same product. Apart from the technical challenge, management research needs to redefine the portfolio of upstream suppliers and ultimately the structure of the entire distribution network and the role of its terminals. Finally, the hyperloop technology, which promises to ship people and cargo at high speed, could facilitate the delocalization of terminals to remote areas. In this aspect, there could be possibility to improve land use and rural development in scarcely populated areas; remove vehicles from roads, reduce road accidents and pollution. This without affecting response time and the e-commerce actors, which without question are making our lives and societies much better and time effective.

ABOUT THE AUTHOR

Luca Urciuoli is Associate Professor at KTH Royal Institute of Technology, he is also Adjunct Professor at the MIT - Zaragoza Logistics Center (Zaragoza, Spain), and research affiliate at the MIT Center for Transportation and Logistics (Boston, US). In the past, he has worked for the Volvo group as a project manager developing telematics services in the areas of transport and logistics optimization, security, and uptime management and diagnostics. He also led the research of the Cross-border Research Association in Switzerland and collaborated in several consultancy and research projects, with a focus on topics like e-Customs, trade facilitation, supply chain security, waste and postal supply chains. Dr. Urciuoli's publications have appeared in several prestigious peer-reviewed journals and he has been an invited speaker to several conferences and roundtables organized by international organizations like the World Customs Organization, the World Bank Group, etc. His research interests include supply chain management, transport security and risk management, trade and logistics, biomass supply chains.