Lessons from Other Network Industries: Should Posts Seek to Collaborate More in the Last Mile?

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1 Introduction

The race for retailers to build and acquire last mile delivery capabilities continues to reshape not only the e-commerce landscape, but the way citizens engage with the digital world. Re-urbanization, changing demographics, evolving customer expectations, and growing infrastructures are concentrating markets. In response, emerging delivery technologies such as new e-commerce fulfillment models, the growth of intermediaries, drone delivery, Uber parcel delivery, infrastructure sharing, and strategic partnerships are forming to meet growing parcel delivery demands in densely populated areas. Set against the backdrop of a sharing economy and a postal industry that has experienced significant letter volume declines that threaten its viability, significant questions need to be faced. Should asset heavy incumbents like postal operators (POs) partner to increase delivery volume density in the last mile? Are POs positioned to capitalize on opportunities in the last mile ecosystem? Do other delivery companies, often more agile and flexible without the legacy burdens carried by POs, have a competitive advantage too strong to overcome? Do new intermediaries innovate too quickly for POs to be good partners?

One interesting approach to answering these questions is to ask whether any lessons can be applied from cooperative models in other network industries to better

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understand whether POs have an opportunity to collaborate within the last mile with the understanding that the competitive environments and other networks themselves are quite different from postal networks.

This paper examines the drivers behind cooperative models in other network industries and offers approaches that POs and regulators might consider for such arrangements to succeed. The next section examines the differences between letter networks and parcel networks that help to explain why lessons from cooperative models in other network industries cannot be simply applied to the last mile. Section 4 explores the importance of considering viable collaborative models as well as scenarios under two regulatory frameworks that address whether posts possess or could acquire the needed capabilities to be the one who facilitates the collaboration in the last mile for parcel delivery networks. Conclusions are presented in Sect. 4.

2 Parcel Versus Letter Network Differences and Other Factors for Consideration

While traditional letter markets exhibit the classic attributes of network industries, parcel networks are different. These differences and the elements parcel networks lack compared to traditional network industries are crucial and illuminate why different strategies are required for each network structure. In other network industries such as energy, cables and pipes create fixed network costs, which create economies of scale and barriers to entry. Coupled with vast mail processing and transportation infrastructures, monopoly protection and a USO, postal letter markets behave in a similar fashion.

For parcels the story is different, especially in the last mile. In many countries, no USO exists. The competition for parcel delivery is fierce, unlike the monopolies that protect firms in the energy, telecommunications, and airline industries. New competitors and intermediaries frequently arise, and the very notion of what constitutes a delivery agent is evolving, as anyone with a vehicle and a smartphone can deliver a parcel. Therefore, while parcel supply chains might resemble letter networks for long-haul transportation, the first and last miles differ significantly. Network duplication is not as great a concern when a parcel delivery firm only chooses to compete in a few metropolitan markets. There are fewer, if any, access restrictions or USO. Therefore, the decision to collaborate or cooperate with a postal and logistics provider will not be driven by the argument that there is a network which a firm cannot duplicate. Instead, a firm will decide to serve a specific geography itself or seek to partner with another provider based on other factors.

In addition to the differences between letter and parcel networks, a variety of forces are shaping the future landscape including urbanization, parcel volume growth, customer expectations, brand and trust, and other environmental factors such as traffic and vehicle congestion. These forces inform the discussion on whether

collaboration and cooperative models in the last mile are viable solutions to growing challenges.

Urbanization is fueling the growth of parcel volumes in the last mile. A 2016 McKinsey report showed the share of the global population living in urban centers reaching 60% by 2030, up from 50% in 2015 (Bouton, Knupfer, Mihov, & Swartz, 2015). As stated in Houck (2018), "this density can benefit POs while generating additional threats. The increasing density amplifies advantageous economies of scale and scope and given the ubiquitous networks of POs, positions them to capitalize in the first and last mile. It does, however, create significant opportunity for entrants to compete for hyper-local population centers, especially those with higher amounts of wealth and purchasing power. In these small population centers, scale is less important when attempting to cream skim profitable segments." (Houck, 2018, pp. 162–163). It is important to build density in the last mile to help contain delivery costs and the composition of that density is perhaps equally important, as it could limit the ability to bundle deliveries. Alternatively, this density creates additional opportunity to offer higher value services, such as late evening delivery or same hour delivery. It is plausible that customers at some point could start to see these elements as standard services and expect them. If delivery providers, however, begin to offer these higher value services, density and quantity considerations will reappear as prices will likely need to decrease as competition increases.

Exacerbating the urbanization effects, parcel volumes are growing and show no sign of slowing. A 2017 Pitney Bowes study forecast global parcel volumes growing at 17–28% each year between 2017 and 2021 (BusinessWire, 2017). This does not include the growing challenges presented by parcel returns, which are significant, as "57 percent of shoppers say they would be likely or very likely to use a try-before-you-buy service," which could only exacerbate return volumes in the years ahead (MetaPack, 2018, p. 4). Combining the effects from urbanization and growing volumes presents significant opportunity for entrants to compete for delivery in hyper-local markets, lessening the need to compete in wider areas or nationally with an incumbent PO. For example, in the U.S., 40% of the population is concentrated in 21 metropolitan locations (U.S. Census Bureau, 2015). Such markets create both opportunity and challenges for POs to seek ways to compete with asset-light entrants, possibly through collaboration, which is explored in Sect. 4.

Customer expectations cannot be overlooked, and it is too simplistic to assert customers demand speed, flexibility, and free shipping. A 2018 MetaPack report showed that 50% of shoppers had abandoned online shopping carts because available delivery options did not meet their expectations (MetaPack, 2018, p. 2). Further, 35% of shoppers were willing to pay to get items delivered "when and where they want" (MetaPack, 2018, p. 4). These evolving expectations, combined with the implications resulting from poor delivery performance, suggest "delivery has the power to make or break the online shopping experience" (MetaPack, 2018, p. 2).

Combining the effects of changing expectations with the evolution of the trusted brand image POs enjoyed for many years, the results can be significant. Monopoly privilege and trust assisted POs in maintaining parcel delivery volumes even faced with new entry in the last mile. This was important when POs were the only

delivery firm customers would see each day. However, given the extensive entry in the last mile for parcel delivery, people now see many delivery agents each week. Unfortunately for POs, the establishment and growth of these last mile firms such as Uber, Lyft, and Lasership demonstrate that POs no longer hold the monopoly on trust.

A complicating factor may be the distinction, or lack thereof, between the brand of the retailer and the brand of the delivery agent. Along the value chain, brand exerts an influence across all components which becomes a significant B2C issue when delivery issues arise. Retailers must make the strategic choice with whom to partner as the consumer's choice of delivery agent is not always transparent. As with the Parcel Select product in the U.S., a consumer does not make the explicit choice for USPS to deliver the last mile when purchasing a UPS parcel. The implications of this lacking transparency are significant, especially given how quickly trust can be earned, lost, and transferred to new market entrants in the digital economy. If this trust can be quickly created by new entrants, the growth seen in B2C and B2B startups will likely accelerate.

Lastly, other environmental factors must be considered when evaluating whether POs should seek greater collaboration in the last mile because of urban congestion. In the U.S., delivery trucks "represent up to 7 percent of urban traffic and 17 percent of congestion costs due to wasted hours and petrol" (WEF, 2018, p. 7). Considering the forecast growth in parcels, this is not likely to abate and some cities are already acting. "Metropolitan leaders like London's Mayor Sadiq Khan are looking to reduce freight traffic in a bid to lower congestion and carbon emissions in cities, introducing 'micro-distribution' centers and demand shipment consolidation" (MetaPack, 2018, p. 8). London and Singapore already require steep fees to enter the city center by car. Other cities in Germany and France require stickers that indicate the type of car and whether the vehicle can enter the city.[1] It is likely to assume regulators and legislators will soon consider applying limitations to parcel delivery vehicles, perhaps through specific regulation in the postal and logistics sector. The critical questions to answer are under alternative scenarios where restrictive regulation exists or does not, are POs the best choice as the facilitator of collaborative logistics and delivery in such urban centers? (Panzar, 2015) argue that it is indeed in the USPS's best interest to cooperate with other last mile firms, but who is best positioned to serve as the facilitator in the last mile remains unanswered.

A simple case can be made for POs to seek postal-specific regulation in the last mile. Such a conclusion, however, ignores the critical factors discussed in this Section. Upon closer examination, it becomes clear that such regulation could harm POs and customers. If postal-specific regulation were to proceed, POs would be well positioned to win a tender or respond to new requirements given network coverage and trust. However, traditional PO networks are fixed. If POs are unable to repurpose assets to meet the flexibility demands of new delivery models, their networks would no longer function to their benefit and instead drive up the cost of

[1] At present it appears electric vehicles are the only transportation mode without restriction.

delivery. This could have significant effects on delivery cost containment and the need to preserve low shipping costs for customers.

The differences in network structures between letters and parcels are exacerbated by the factors discussed in this Section and confirm the difficulty in using lessons from other network industries to solve the issue of last mile collaboration. Instead of seeking explicit collaboration or partnering arrangements, several firms have gone the route of acquisition to obtain needed capabilities in the last mile. Target acquired Shipt, a grocery marketplace and same-day delivery platform for $550M USD. Walmart recently acquired New York-based delivery service Parcel for $10M USD and Jet.com for $3B USD, a U.S. e-commerce company, to drive innovation and access to millennial customers. Amazon purchased Whole Foods for $13.7B USD to likely acquire forward warehousing locations that enhance the ability to serve population-dense markets with innovative same-day delivery models.

Acquisitions can be interpreted as de-facto collaboration in the last mile and cooperation is certainly not isolated to these three firms. New membership programs such as LiveUp between Uber, Netflix, and Lazada in Singapore offer combined services that consumers view favorably. "Almost three-quarters (71 percent) of respondents. . .indicated that the idea of joining a scheme involving multiple retailers and brands working together to offer premium delivery services held a strong appeal for them" (MetaPack, 2018, p. 13). While this partnering is already occurring and some delivery network duplication exists, it fails to address the underlying challenges posed in this paper. Specifically, as parcel delivery volumes grow, what capabilities must exist to deliver all volumes most efficiently that meet customer expectations, lessen the impact on traffic and neighborhood infrastructures, and deliver the security and trust needed? Perhaps most importantly, what will the role of POs be in this new landscape, and what rules, regulations, and competencies are required for the PO, or any facilitator in the last mile, to succeed?

3 Exploring Collaboration and Determining Potential for Posts

The case for exploring greater collaboration as a solution to the factors explored in Sect. 2 is rooted in a firm's ability to meet many, if not all, of the requirements that will determine success. As it is not likely a single provider possesses all the capabilities such as network design, the ability to scale delivery agents in near real-time, and the intra-day network flexibility to deliver a ship-from-store arrangement, partnering and collaboration emerge as a viable means to meet these demands. If parcel volumes, traffic, congestion, and delivery costs continue to increase and no greater collaboration occurs, it is likely customer experience will suffer, and that can translate to increased pressures up the fulfillment chain.

For collaboration to be viable, the right incentives must exist. In traditional network industries, participants seek to partner to avoid duplicating the large processing and transportation network infrastructures. The case for parcels and

logistics is quite different, however. While it may be beneficial to outsource part of the fulfillment process such as delivery to selected areas or last mile, the reasons are not likely rooted in network duplication. A delivery company might cooperate with another provider because they do not service a specific area or because the other provider has a superior service level. It could also simply be too expensive to deliver an equal level of service to every location. In each case, the decisions made in these situations will likely be business-driven arguments, not network-driven ones, as network infrastructure elements do not really preclude firms from overcoming barriers to entry.

In any case, the ability to scale delivery networks and offer the flexibility required to meet demanding customer expectations can be addressed by increased collaboration, especially as populations continue to move back to cities. As greater amounts of wealth and purchasing power return to urban centers, the size of a delivery network can be less important, but the ability of a delivery network to meet the intra-day flexibility required from evolving online shopping habits becomes critical. Just as POs and delivery companies shifted transportation volumes from surface to air decades ago to contain costs and increase speed, collaboration in the last mile can control costs and allow participating firms to focus on their core competencies and team with others to address shortcomings. Identifying these efficiencies is critical, as "70 percent of online shoppers say they still expect home delivery to be free and are prepared to wait longer for a delivery if shipping is free" (MetaPack, 2018, p. 5).

There are clearly incentives to increase delivery density for asset heavy incumbents like POs. There can also be economies of scale in delivery production costs for firms, like Uber, who own no assets. However, unlike POs that have fixed fleets of vehicles available for package pickup, crowdsourced delivery platforms significantly reduce the fixed cost, as explored by Bradley, Colvin, and Perkins (2018). As Uber's delivery agents are independent contractors, each agent indeed has incentives to increase volume and density for a given delivery route due to decreasing costs to scale. These costs, in turn, could have an impact on the prices Uber charges for each delivery, regardless of whether operating under a traditional or reverse auction paradigm. Therefore, even different types of agents could have similar incentives to increase density as volumes increase. Whether regulation requires a single delivery provider to service a given location, increasing density per agent has a significant and positive effect on local communities. Most importantly, by increasing the delivery volume per agent, total delivery vehicle traffic can be reduced.

As discussed in the previous Section, parcel deliveries significantly contribute to overall vehicle traffic and congestion costs in city centers. With the recent focus on smarter city models where local authorities are seeking to reduce overall vehicle traffic, it is likely to assume incentives or explicit vehicle regulation will force greater collaboration among delivery agents in the last mile. WEF (2018) argues global parcel volume growth, among other factors, will continue to create strain on urban infrastructures which will result in increased negative externalities for many participants from traffic safety, transportation cost, e-commerce customer experience, and vehicle emissions. Therefore, the need for increased collaboration in

the last mile is clear, as many factors, as those addressed in Sect. 2, show no signs of abating.

The critical question for consideration is in a world of greater cooperation and collaboration in the last mile, what role should the PO play? POs are already the asset-heavy incumbents with infrastructures and can immediately contribute to solving the scale challenge without likely building out greater delivery capacity. However, one must take a closer look at the characteristics of their delivery capacity. While total capacity is important, the ability for the infrastructure to offer the intra-day flexibility to enable new innovative delivery models such as ship-from-store is equally important. Same-day delivery and ship-from-store models require the network to flex to handle peak load delivery volumes in real-time; furthermore, these are not flows characterized by static routes. As many POs still do not operate separate parcel and letter delivery networks, this flexibility does not currently exist. Hence, network duplication is less of a concern when exploring partnering models since the required network attributes do not already exist. Indeed, it is likely POs will have to partner to acquire this flexibility to meet the high demands of these new delivery models.

Delivery capacity is only one of several important considerations that must be evaluated including the ability to partner, trust and brand, and interoperability. If one cannot directly apply lessons from other network industries, we consider the differences between two scenarios to determine the options for POs and their resulting effects: one where regulation requires a single last mile delivery provider to operate in an urban area, and one without such strict regulation.

3.1 Scenario 1: Regulation of the Last Mile

If one considers the emerging smart city models where local authorities, such as London and Singapore, are working to reduce total vehicle traffic in urban locations, it is likely only a matter of time before severe rules are applied to the postal and logistics sector for parcel delivery. Absent a USO for parcel delivery which reduces the likelihood of market failures through exorbitant delivery prices or failure to service certain geographical markets due to profitability concerns, it is likely that environmental considerations will shape the regulatory landscape for delivery vehicles in the years ahead. Other considerations such as cost control and customer expectations will probably not be compelling enough to force regulators to act.

Significant concerns arise in this scenario including the provisions granted in the regulation itself, customer expectations, and the ability to partner. If regulators were to monopolize parcel delivery in the last mile and grant exclusive rights to a single carrier, clear rules are required to ensure the market functions. If only one company could deliver, some controlled network access for other firms would be required considering that, as discussed in Sect. 2, no single provider possesses the assets and capabilities to service a given metropolitan segment. Partnering models are likely to

be the only means for offering all available delivery models to a given market, but this does not solve the underlying challenges of traffic and congestion.

A key challenge for regulators lies in defining what customers need or want, now and in the future. Delivery market needs are developing quickly. In city centers many business customers demand high quality, individualized service and pick-ups and deliveries within given time windows with varying service features. Given the myriad expectations both for individuals and businesses in the last mile, it is difficult to see how regulation could address or foresee all market demands.

If such innovative demands are not within the regulated delivery provisions, one must consider if and how smaller competitors would still be allowed to perform same-day and 1-h deliveries. For example, if regulators believe only standard delivery service plus an additional element is required such as evening deliveries or specific time windows, much of the innovation in delivery models would be eliminated. As lack of partnering will not lead to the desired reductions in traffic and congestion, strict regulation could both detrimentally affect delivery quality and stifle innovation. Regulators should evaluate whether actions are required, and they must do so carefully. They must ensure that any public tenders or provisions allow such flexibility to exist for innovation to continue to benefit all members of the ecosystem including citizens, retailers, established POs, and new entrants. If regulators would issue a public tender for such last mile arrangements, it is important to consider how POs could contribute to the solution. POs do possess the facilities to consolidate shipments and sizeable vehicle fleets to service deliveries within typical workday hours. It is unclear, however, whether POs could offer cheaper prices relative to other firms. Competitors might have more flexible labor contracts and cheaper labor compared to POs, especially given the significant amount of delivery labor that is collectively bargained. Having POs perform higher value services such as flexible, late evening deliveries could quickly become cost prohibitive. Therefore, regulators must carefully consider partnering arrangements to offer all innovative delivery services. There is likely no scenario where a single PO can provide or add new services in any regulatory regime that would both reduce traffic and be responsive to customer needs.

3.2 Scenario 2: No Regulation of the Last Mile

Evaluating the case against explicit regulation for monopolizing the last mile is interesting given the underlying challenges and speed at which the landscape is changing. Efforts to regulate the quality of customer experience citizens must receive is a substantial challenge, especially when considering the heterogeneity of parcel delivery models and number of firms that already exist in the last mile. Not only are the current expectations diverse, the speed at which expectations evolve is significant, which greatly limits the ability to predict the types of models in the future. As an example, over just the last 5 years, parcel delivery models have grown to include new asset-light intermediaries such as Lasership, Deliv, Zipments, Uber,

and Lyft that are all driving innovation today. The growth of these firms and the variety of delivery models offered have increased overall customer value and has occurred without explicit regulation. The success of these firms demonstrates how trust can be quickly created in the digital economy, it is transferrable to parcel delivery, and POs no longer hold the monopoly on this trust.

Given the heterogeneity of market forces, explicit postal or logistics regulation may not be required to create incentives for cooperation and collaboration. Once there is cost pressure, regardless of its origin, cooperative models will develop. This also creates competitive pressure such as we see in parcel lockers. Currently, DHL has a significant number of lockers in Germany, but it does not share these lockers with other companies. One can imagine if UPS, DPD, FedEx, and Amazon each had its own locker system, not only could confusion develop, but this solution would not be in the best interest of customers. Instead, if all delivery companies except DHL used the same system, it could create convenience for customer and thus a competitive advantage over DHL. Here, collaboration is occurring outside explicit postal regulation due to these cost pressures and illustrates how someone, DHL in this case, can be left out and harmed from an inferior strategy.

This cost pressure, specifically in fuel, has already forced POs to act to improve their net financial position. Most POs have adopted strict environmental goals of reducing greenhouse gas emissions (GHG), as GHG is a proportional measure to the cost of operations and delivery. Between 2016 and 2017, USPS reduced postal fleet petroleum use by 2.1%, "focusing on initiatives that use new technologies that will accommodate a diversifying mail mix, improve safety and service, reduce emissions and produce operational savings" (USPS, 2017, p. 14).

This cost pressure might also be an indirect one, as it might be free or much easier to enter city centers with non-polluting vehicles. In a similar manner, new delivery models would develop outside postal-specific regulation. For standard delivery services, fixed routes with no added value can serve the market need. Cooperation among partners can make sense, in that efficiency gains can be realized and innovation can also happen, mainly to speed up service through better routing. However, if one firm can address all the market need, partnering might not be required.

For all other services, flexibility is needed to build the services demanded by the market, not postal-specific regulation. If there are restrictions, such as electric-only vehicles in a city center, companies must seek innovation and come up with new solutions such as drones and crowd-sourced bicycle delivery. The market will adapt to these general rules, but sector-specific regulations might attempt to force companies to bundle their delivery activities and have the inverse effect, undermining innovation in delivery methods and service levels.

Regarding non-postal-specific regulation, evidence has shown that cooperative models can develop once local governments enact city restrictions, such as total vehicle traffic or emissions. When governments introduce special vehicle fees, this puts upward pressures on delivery costs as companies attempt to pass portions of these increased fees onto end consumers. This is particularly challenging given consumers' demand for free shipping. Faced with such pressures, it is likely that

delivery companies will autonomously try to reduce the number of vehicles entering the city to reduce costs. It is also likely POs, who are strong in more traditional parcel delivery, will have an opportunity to obtain additional volumes from other delivery companies for standard deliveries between 9 AM and 5 PM. In addition, it would be possible for POs to hand over volumes for late evening delivery to a private express company, as they could have more flexible labor contracts and thus greater capabilities to deliver outside regular work hours. For same-day and ship-from-store models it might be a third company who delivers, perhaps working with delivery robots, drones, and crowdsourced models to meet these specific market needs.

The challenge facing policy makers is how to solve the negative externalities question posed by the evolving consumption habits from citizens in urban locations. Even if politicians are willing to impose taxes on both businesses and private drivers to resolve traffic congestion, one must evaluate whether voters are also willing to accept the implications of their bloated shopping behaviors in the form of higher prices. Higher taxes and fees might solve the externality issue and can also create a barrier to entry. It is unclear whether such actions would suppress future delivery model innovation, but they could lead to an increase in innovations in adjacent areas such as urban consolidation centers as explored by Borsenberger (2018).

Pricing is another element that warrants consideration if different firms with largely heterogeneous underlying production costs are serving different delivery segments choose to collaborate. Asset heavy POs handling delivery volumes during regular business hours could likely charge prices as they do today. However, if a portion of the delivery volume must now be expedited for same-day delivery and the PO cannot meet that expectation, the PO can choose to give the delivery to a collaboration partner. However, the underlying economics in the crowd sourced delivery space are quite different. New intermediaries such as Lyft are likely willing to accept lower compensation for delivery because their comparative marginal costs are lower with no significant legacy infrastructures. Therefore, an interesting question that arises is whether the facilitating PO should pursue a reverse auction model for these volumes to decrease overall PO delivery cost yet maintain quality of delivery service? As Houck mentioned concerning these crowdsourced delivery volumes, "one can imagine a reverse auction paradigm will emerge, fueled by online platforms that allow any agent to bid on a given delivery, where the highest quality delivery service could well be the cheapest" (Houck, 2018, p. 167).

The implications of pricing regimes cannot be understated and will fuel the success of collaborative logistics in the last mile. Each firm has an incentive to control costs while maintaining delivery quality and meeting customer expectations. Further research is required to explore the resulting effects for different pricing structures and the incentives such structures create for the partnering firms in the last mile ecosystem.

Regardless of the regulatory regime, trust and security are important considerations for widespread collaboration to work. As stated in MetaPack (2018), "technology investments to ensure networks are agile and fast will be a priority for handling growing volumes and combating new market entrants" (p. 19). Such collaboration will require technology to build and ensure the trusted brand status

POs enjoy in letter and parcel delivery can be merged with the trust gained from new market entrants such as Uber and Zipments. Moreover, the collaboration must be seamless to consumers as the underlying infrastructures, service models, and delivery cost structures will determine the number of hand-offs among partners and the associated charges incurred to perform such a delivery.

To make this collaboration and trust transparent to consumers, POs should build platforms utilizing technologies such as blockchain to meet the growing needs of last mile customers. As many studies have confirmed, most notably by USPS OIG RARC, security, trust, transparency, and track-and-trace capabilities will become increasingly critical in the years ahead for parcel delivery. Whether the PO plays the role of buyer, auctioneer, coordinator, facilitator, or provider of last resort, failure to meet these expectations will likely result in the failure or underutilization of such a collaboration platform, marginalizing the potential benefits.

4 Conclusion

Lessons from other network industries cannot be directly applied to last mile parcel delivery. The incentives that shape partnering in the telecommunications, electricity, and airline industries such as network sharing of costly infrastructure, while applicable in letter networks, are quite different for parcels. As a result, the incentives that shape the actions of firms in the last mile will be driven by other factors including service levels and profitability rather than network driven factors.

POs that have high quality and flexibility in parcel delivery and the respective infrastructure and facilities are in a good position to partner with other firms in the last mile for a variety of services. This is important, as evidence suggests that no single provider has all the capabilities required to meet current expectations and confirms how critical collaboration will be in the last mile. It is indeed possible select POs will have to build and acquire additional capabilities or contract with other delivery companies to even meet the immediate needs of consumers.

In any case, it is almost certain that increased environmental and political pressure will drive governments to push for greater collaboration and consolidation in the last mile to reduce traffic and congestion. Regulators must be careful to ensure any such regulation does not stifle the continuing innovation in last mile delivery models from POs, established delivery companies, and new business startups. If regulators seek to reduce traffic and congestion, regulation should not choose single service providers with monopoly protections for last mile delivery. Clear rules and flexibility is required to ensure the market functions and the network can be accessed by ecosystem partners. Efforts to resolve the negative externality issues through taxes and fees should carefully weigh any potential barriers to entry they may create that can curb innovation and collaboration.

POs themselves will be called to make a choice concerning last mile collaborative logistics. They can lead from the front, play the role of the silent partner, simply contribute excess infrastructure capacity in vehicles and warehouses, or lend

their trusted status to technology platforms created by business partners. Given the factors presented in this paper, POs should lead from the front and seek greater collaboration. They still possess key competitive advantages that can be utilized to play the role of primary facilitators in the first and last mile in nearly every densely populated geography. However, it is not going to be easy. POs must seek this increased collaboration not because of the mortal danger of losing significant parcel volume density. Rather, they must act because in an increasingly digital world, the opportunity for increasing the role they can play not only in the last mile but in citizen lives overall is too great a prospect to overlook.

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