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# The relevance of parcel lockers in sector policies, Ian Streule, Analysys Mason

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## 1 Introduction

The parcel locker space is becoming increasingly important to the delivery sector, and the pace of its evolution and development is rapid. Automated parcel lockers are being deployed in most countries across Europe and beyond, using various different deployment and operational models. This development and growth will benefit from a largely unregulated ecosystem in which to establish itself. However, market failures and competition issues within such an ecosystem could affect emerging and established players. For governments and regulators, the present moment is the best time to develop targeted, well-thought-through policies and a regulatory framework that could be needed to maximise benefits for competition, for consumers and society as a whole.

This paper examines a range of issues related to parcel lockers and proposes a number of points to confirm the relevance of parcel lockers in sector policies.


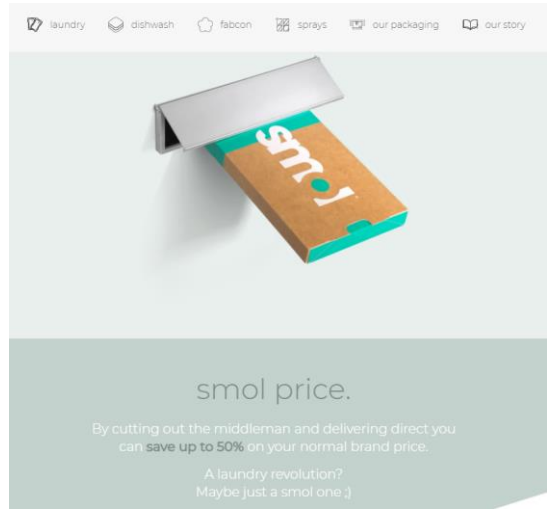

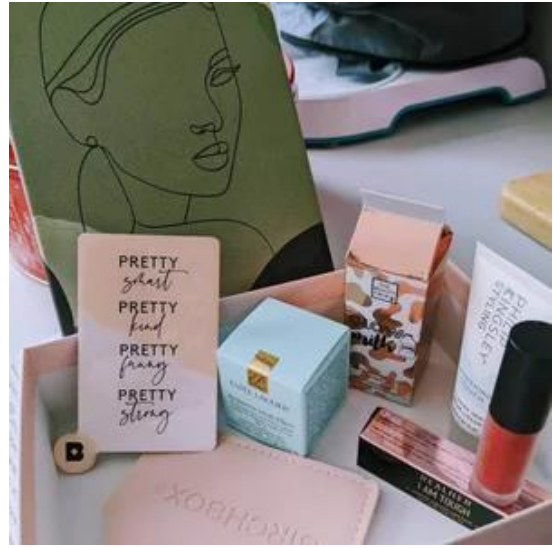
## 2 The parcel market will grow strongly in the coming decade

With sustained annual growth of 5–10% per annum, the parcel markets in many countries are capable of supporting rising competition between traditional and new courier and postal parcel delivery firms. This growth enables players with inbuilt economies of scale to reap significant returns as their share of the market increases. The emergence of automated parcel lockers in the parcel delivery market provides a strong catalyst for sector growth and increased profits. A good example of this is the 2020 performance of InPost, which doubled its revenue and added 11% to its EBITDA margin in one year.<sup>1</sup>

The growth in the parcel market is being driven by changes in buying habits, fuelled by the increasing acceptance of technology and e-commerce across all the economically active segments of society, from teenagers through to the elderly. The effect of this shift on the physical high-street portfolio is visible in both regional towns and major cities across the UK and elsewhere. This growth and shift has only been exacerbated by Covid-19, with many workers spending the day at home and able to order and receive e-commerce items with ease. Free and easy e-commerce returns also provide consumers with increased comfort and satisfaction in the online buying process, as a means to try out sizes or assess the quality of items before acceptance or return.

Many fast-moving consumer goods (FMCG) sectors will increasingly see start-ups and established businesses introducing home delivery and in particular subscription models for the supply and consumption of physical items, enabled by regular economical parcel delivery (see Box 1). This increasing volume of business-to-consumer (B2C) parcel deliveries will be negotiated with delivery

companies based on price, speed, handling of larger-sized items and fulfilment value-added services, among others.

Box 1: Examples of new subscription models enabled by home delivery	
Underwear	Household cleaning products
	
Pet food	Cosmetics
	

### 3 The introduction of parcel locker services to the value chain will significantly change the economics and value of delivery services

The traditional parcel and courier value chain is historically focused on delivery of parcels to the recipient's home address, as the primary universally available delivery location identifier; in some countries, there are also letterboxes large enough to accommodate thin parcels and soft packages. The same carriers also delivered, pre-Covid, to office addresses, often to the annoyance of company mailroom staff receiving numerous parcels for office-based employees.

The introduction of automated parcel lockers to the delivery segment provides a potentially significant disruption to the existing natural monopoly of nationwide home addresses. If parcel

lockers are sufficiently ubiquitous, then they will compete with everyone's home and work address for delivery of parcels, delivery of small packages, and maybe eventually for the delivery of high-value letter items.

Parcel lockers also change the per-unit economics of delivery in a number of ways:

- For an **independent last-mile courier**, delivering multiple items to the same parcel locker reduces the average driving time and distance per parcel, although locker usage fees may be added to the costs borne by the courier company. Locker delivery also ensures first-time delivery success, which further reduces the total costs arising from failed and repeat attempts for delivery to the home.
- For the **locker owner**, the fixed cost of locker infrastructure yields a reducing average cost per parcel as utilisation increases: the marginal usage cost is effectively zero. This also facilitates a high degree of pricing flexibility to differentiate between base load and promotional usage. Furthermore, locker utilisation can increase beyond 100% on a daily basis, as cells can be replenished and emptied on multiple cycles per day.
- For an **integrated last-mile delivery and locker company**, the items delivered to lockers can benefit from further efficiencies, such as aggregating items to the same recipient, handling returns deposits, prioritising the drop-off of items to hit peak pick-up preferences, and maximising the economies of scale from delivering multiple items to each locker location. Importantly, an integrated company also avoids incurring the direct costs of locker usage charges which would be levied on independent couriers.
- For **recipients**, there is an incremental cost (e.g. fuel) and opportunity cost of time spent in going to retrieve parcels, unless the pick-up is combined with another unavoidable activity, such as grocery shopping or commuting to work. The recipient typically contrasts these incremental costs with the alternative costs of having to stay at home to receive an item, or the hassle and risk of having a 'safe' place or neighbour take delivery.

Simulations show (e.g. Van Duin et al., 2020)<sup>ii</sup> that total network costs in a parcel growth scenario are lower when the majority of items for delivery in a district are delivered to parcel lockers.

New-entrant integrated last-mile and locker companies can also benefit from the disruptive position of offering locker delivery as the baseline service, with home delivery as a value-added higher-price option. If the majority of items carried are delivered to lockers, then the efficiency benefits are very large. This should be compared with traditional to-the-door courier companies who are typically optimised and incentivised to serve delivery to individual addresses, and who likely face a harder challenge to convert their senders, recipients and delivery drivers to an out-of-home, locker-delivery preference. For traditional parcel players, diverting just a minority of carried items to lockers only provides slight efficiency gains.

However, the introduction of parcel locker hardware to the value chain is only part of the expanded value of delivery services. Two new software elements of the value chain are also fundamentally

important to the value and attractiveness of parcel delivery to lockers, providing extensive additional digital functionality to the conventional physical delivery value chain.

*Locker platform software*      The platform software provides functions to maximise the role and utility of the network of delivery points:

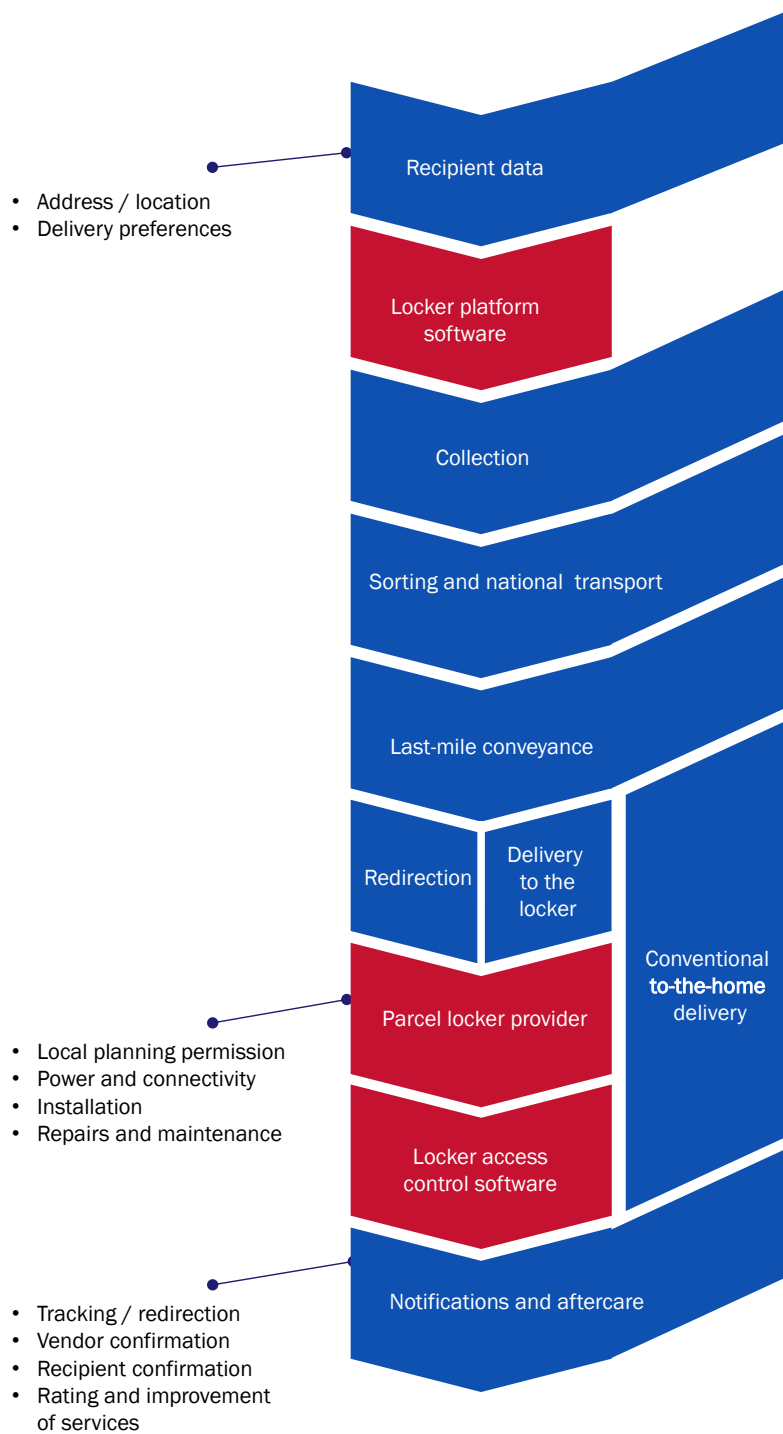
- e-commerce integration
- convenience/choice of locker
- location/proximity database and identification
- recording and recalling user preferences for particular lockers
- capacity management
- acceptance of redirections
- returns handling
- overstay charges
- failed pick-up and item return
- wholesale charging and payments.

*Locker access control software*      The locker network access control software provides effective functioning of the locker estate:

- courier authorisation
- receiver authorisation
- fault management
- monitoring
- notifications.

These additional software activities are significantly more complex than traditional vans and drivers and the conventional daily route-planning activities. The value captured by these software layers can also effectively reduce the locker-delivery conveyance activity to a white-label logistics function which does not have any end-recipient engagement or visibility. This intermediation by the locker platform and masking of the courier activity in the value chain places the locker platform operator in a strong position to control the distribution of value to third-party partners. A complete value chain, including parcel locker hardware and software, is illustrated in Figure 1.

Figure 1: Value chain for packet and parcel delivery [Source: Analysys Mason, 2021]



**4 The parcel locker ecosystem is still developing and a range of different deployment methods and operating models are used – giving rise to different potential issues and unique solutions to problems**

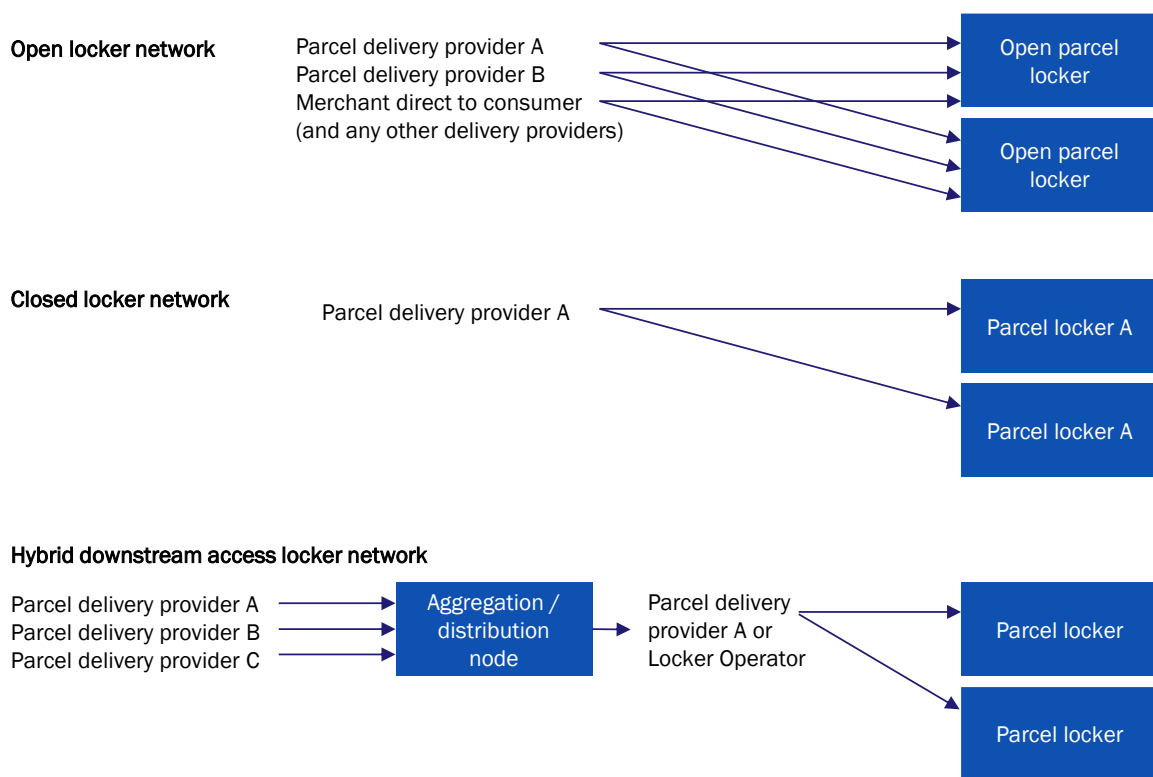
While there are many colourful and unique designs and features of parcel lockers, the deployment model can primarily be classified according to two dimensions:

- open or closed network
- type of leading player.

*Open or closed network*

An **open** – carrier-agnostic – locker network can be used by any courier firm, and potentially also registered merchants, to deposit parcels into a selected locker bank for recipient collection. A **closed** network only permits access for the reserved parcel service provided by the locker operator (or its private choice of logistics partner(s)). It is also possible to consider a **hybrid** downstream access case, where parcel lockers serviced only by the reserved firm accept items from multiple upstream parcel carriers at a regional aggregation or local distribution centre (see Figure 2).

Figure 2: Different locker access models [Source: Analysys Mason, 2021]



*Type of leading player*

A diverse range of players are leading the deployment of parcel lockers in different settings, cities and countries, and at least five different classifications can be observed for the lead player in locker deployment:

1. National postal operator
2. Parcel carrier(s)/courier(s)
3. E-commerce platform
4. Government department
5. Independent private locker operator.

A number of examples are highlighted in Figure 3. This illustrates that the parcel locker ecosystem and industry has not, as yet, developed a universal approach; and the characteristics of individual countries and their operators drive key differences in the choice of deployment model for the main players.

Figure 3: Deployment examples in different countries [Source: Analysys Mason, 2021]

	Closed network	Open network
Postal operator	Packstation (Germany)	Naerboks (Denmark)
Courier	InPost (Poland)	Parcel Lock (Germany)
E-commerce	Amazon Locker	
Government		Pick (Singapore)
Independent		Parcel Santa (Singapore)

## 5 Availability, ubiquity, competition and market impacts

*A dense network of nationwide parcel lockers will have the ability to compete directly with home delivery services*

Most countries across Europe have 2–4 parcel locker operators, although in some cases deployments are at a very early stage. Early-stage deployments are unlikely to attract significant interest from the general population, and upstream senders of items will not have significant desire to integrate delivery into a limited utility parcel locker network due to the small proportion of population served.

Some form of near-national or full-regional availability (actual or at least credibly committed) is likely to be required to achieve interest from major senders, and hence enable effective integration with e-commerce and B2C high-volume senders. A nationwide availability also provides awareness of convenient delivery for a majority of the receiving population, along with flexibility around choice of parcel locker, e.g. near work or near home.

Claiming nationwide availability is not the only criteria to stimulate the take-up of parcel lockers. The density of deployment also has a major impact on its utility to recipients, and hence the economics and attractiveness for senders when providing the (nearest) parcel locker as a convenient delivery alternative to the home or office address. Density also has an environmental dimension, because if the courier deposits the item at a local locker, recipients must then travel to retrieve their parcels, and this could be done by walking, driving or combining pick-up with an existing, planned or regular excursion. There is a trade-off between the courier’s effort/cost and the recipient’s



effort/convenience, in addition in some cases to effectively shifting the carbon footprint from courier to recipient.

Referring again to Van Duin et al. (2020), we note that the simulation is based on a high density of deployments, with one locker deployed per ~750 residents, with estimated availability less than 5 minutes' walking distance. This 5-minute walking *high* density (~400m distance) can be compared with findings of Guiffrida et al. (2016)<sup>iii</sup> which conclude that in urban areas, ~1km is the limiting distance for environmental system benefits from the use of parcel lockers for delivery (system = couriers plus customers). This 1km distance will also equate to less than 5 minutes of driving, parking, etc. in the urban setting.

It can be argued that parcel lockers could become a natural monopoly, as only one parcel locker network deployed at high density is needed nationwide to provide a ubiquitous and efficient alternative to home address delivery. The availability and ubiquity of parcel lockers in a country however may be divided between multiple parcel locker operators.

In cases where the deployment is split between providers:

- if the multiple networks are open access networks or integrated into a single software platform and hence sharing access volumes, then an efficient outcome can still be achieved
- if the multiple networks are closed, and competing independently for upstream parcel volumes, then each network cannot provide the maximum utility to users, and utilisation efficiency may also be reduced compared to a single network.

In some markets where it operates, Amazon has rolled out a network of closed lockers; the numbers of units deployed is not generally publicised. It is possible that the Amazon Locker service is well utilised, by virtue of its large volumes and ability to leverage user data. However, the closed nature of the system reduces the network benefits which would be achieved if Amazon's parcel lockers were accessible to all parcel originators, and hence to all end recipients.

The question of access to parcel lockers has been examined in some countries. In Germany, for example, the national regulatory authority concluded that there was no need to mandate access to the incumbent's parcel lockers due to high competitiveness of the parcel segment, and that there was no indication of market power (ERGP, 2019).<sup>iv</sup>

The deployment of a sufficiently dense network of parcel lockers nationwide has the ability to compete directly with delivery services to home and office addresses, and has the potential to capture the majority of parcel and potentially packet delivery volumes. Ultimately this could reduce door delivery to a minority and premium-priced service compared to lower-cost and more efficient parcel locker deliveries.

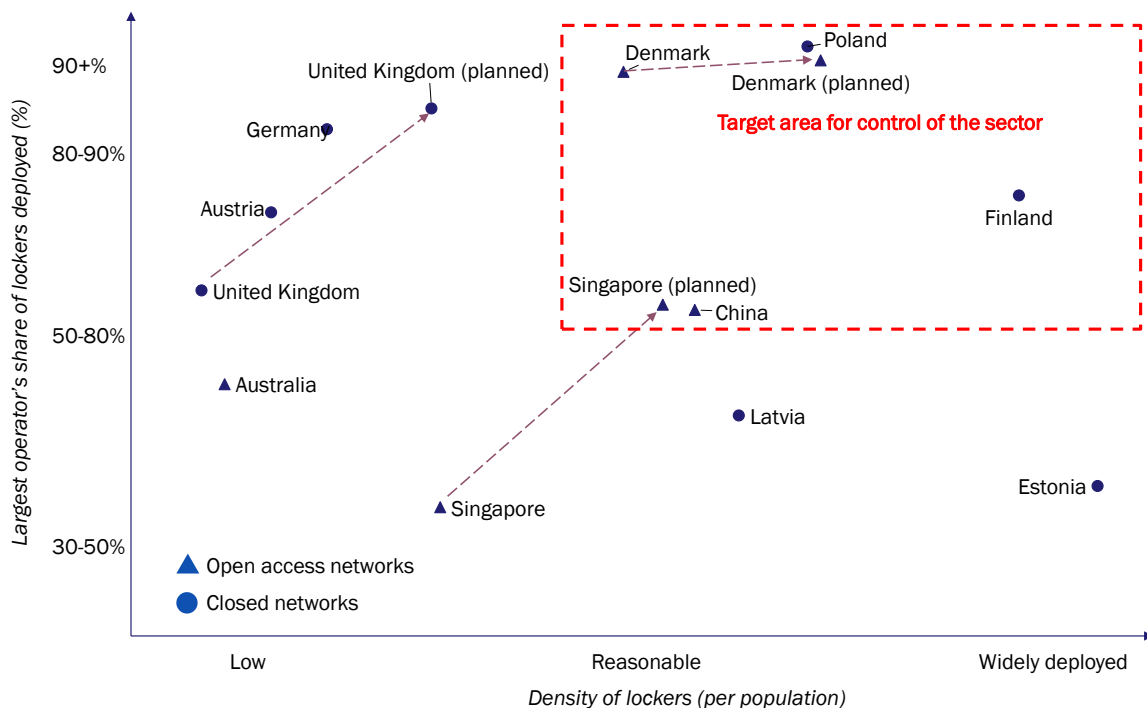


*The target trajectories of actual and planned locker deployments indicate that market failures and competition issues could affect emerging and established players*

Publicly available statistics on locker networks in a number of countries can be used to observe some key market trajectories and the evolution of the competitive landscape as parcel locker deployment progresses and matures. As shown in Figure 4, the largest parcel locker operators are typically targeting a market outcome in which the largest operator controls more than 80% of lockers nationwide, most likely in a widely deployed national network. This provides the largest operator with control in two ways:

- For open access networks, all delivery providers can utilise the widespread locker deployment, and proximity is maximised for end recipients. At the same time, a competing locker deployment is unlikely to emerge as there is no significant benefit which an alternative network can provide, unless the main network is technologically weak with evident service deficiencies. Even with open access, there is the potential for a monopoly parcel locker network to earn excessive profits.
- For closed networks, an extensive locker operator may be in a position to leverage a strong position in the locker segment into the delivery conveyance segment and secure a significant share of packet and parcel volumes, potentially foreclosing the delivery market through unreplicable economy-of-scale benefits and/or a dominant position.

Figure 4: Example market trajectories [Source: Analysys Mason, 2021]



When observing the trajectories of planned or actual locker deployments, and in accordance with the economics, availability and access issues mentioned, a range of potential market failures and competition issues affecting emerging and established players could arise. These are:

- Complete geographical absence (e.g. due to planning constraints)
- Partial geographical absence (e.g. due to poor economic zones)
- Abusive pricing (e.g. exertion of market power leading to predatory pricing/excessive pricing; economies of scale leading to monopolisation)
- Dominance from adjacent sector (e.g. e-commerce platform)
- First-mover occupancy/land banking
- Failure to reflect externalities (impact on public space, environment, congestion, road safety).

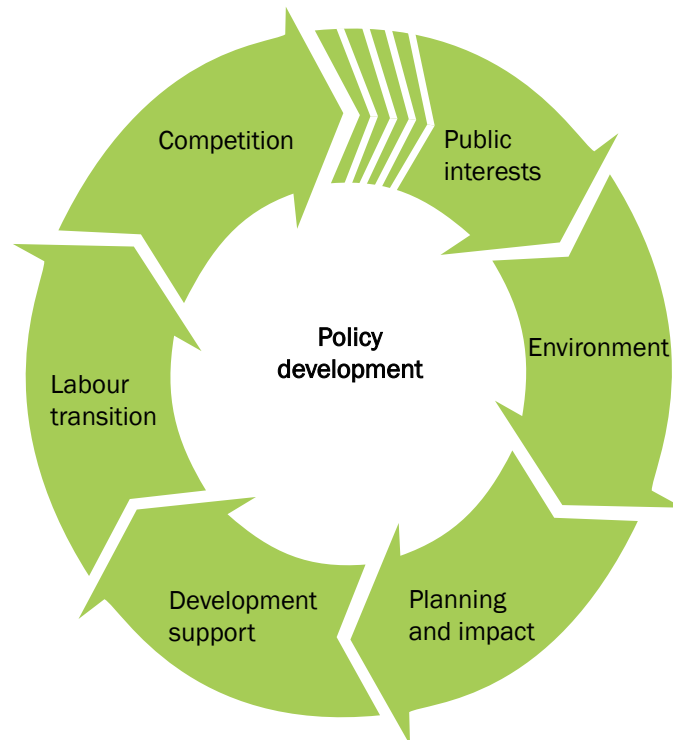
## 6 The relevance of parcel lockers in sector policies

The economic and market issues mentioned in Section 5 may need to be considered for national circumstances and potentially addressed in broad industrial policies, sector strategy and the development of a regulatory framework targeted generally or directly at identified problems. Key concerns are typical of those affecting network industries, including:

- the presence of bottlenecks
- utilisation of scarce resources – in this case the public realm
- promotion of positive externalities while reducing negative externalities
- equity and access concerns which tend to affect more deprived areas and societal groups.

We see a range of policy themes which are relevant for the development of effective parcel locker solutions. These themes are illustrated in Figure 5 and discussed in more detail below.

Figure 5: Policy development for parcel lockers [Source: Analysys Mason, 2021]



*Public interests*

There is a general public interest driver behind the deployment of parcel lockers in a country. Consumers value local choice and convenience. Elected officials and policy-makers also strive for distribution of benefits through equitable access, avoiding not-spots and underserved areas, hence supporting economic benefits in lower-wealth areas. Similar to many universal services, such as cash ATMs, it is worthy to avoid the poorest in society having the fewest options (for parcel delivery) while facing higher prices for services, when wealthier areas benefit from lower prices and better choice.

*Environmental*

Policies which support environmental objectives are becoming increasingly necessary, and both reduced urban pollution and CO<sub>2</sub> reduction are relevant in the parcel locker space. The choice of ‘carrot’ vs ‘stick’ (or both) incentives should be considered, along with the key issue of avoiding displacement from courier to recipient. This displacement factor is likely to be particularly relevant in suburban and rural areas where the recipient is most likely to drive to a parcel locker.

*Planning and impact*

The installation of parcel lockers in the public realm, even if sited on private land such as forecourts, would ideally be covered by carefully designed planning rules which are cognisant of the operations and impacts of parcel lockers, including both courier replenishment and recipient pick-up. As the density of lockers increases, encouraging open access to reduce (or potentially prohibit) duplication is likely to improve societal acceptance through the management of visual and space impacts in the public realm. Associated considerations for planning include congestion and road safety, particularly in urban areas.

*Development support*

In some countries, or in some regional areas, development support may be needed to stimulate investment in sufficient parcel locker facilities. This could entail consumer-orientated national policy guidance and plans, similar to national broadband programmes where uneconomic areas are supported through government intervention and subsidy. As seen in telecommunications, such interventions are accompanied by difficulties in identifying the required area-vs-subsidy, and accompanying rules surrounding open access. This policy aspect is not widely adopted at the present time, except for particular examples, e.g. in Singapore.

*Labour transition*

In the longer term, we anticipate a transition of labour from home delivery methods to parcel locker deliveries. This transition could involve a significant reduction in effort required to serve home and address deliveries, combined with an increase in logistics resources needed to deliver a higher volume of parcels more efficiently to out-of-home locations, including parcel lockers. While such a

transition is not problematic in its own right, traditional postal operators with a substantial employment base and unionised labour force may face challenges in adapting to this shift.

The distribution of items to parcel lockers is also a particularly relevant application for autonomous vehicles, given the fixed location and uniform scheduling of logistics needed, and this could have a further long-term impact on labour employment models.

### *Competition*

Competition policy makers can decide to rely on competition law and the work of the competition authority to consider anti-competitive complaints and merger activity in the packet and parcel delivery sector. However, it is possible for national policy to target the parcel locker segment more directly, for example with new policies geared towards the potential to introduce ex-ante regulation. Such policies could follow those taken in the telecoms sector, relying on for example the three-criteria test to determine whether markets exhibit characteristics relevant for ex-ante consideration. This could be followed by market analysis leading to potential ex-ante remedies focused on market failures arising from a dominant position, e.g. mandated wholesale access, non-discrimination, transparency. These ex-ante regulations, if they were to be introduced, would represent a significant stiffening of controls on competition and would place new players in this sector in potentially unexpected regulated circumstances.

### *Returning to public interests*

Ultimately, the development of healthy competition is in the long term public interest. Hence an overall policy and regulatory framework enabling a virtuous parcel locker sector from emergence to maturity should be the goal for all nations.

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- i InPost Integrated Annual Report 2020; available at <https://www.inpost.eu/sites/cffcom-ir/files/investors/financial-results/2021/IAR-Inpost-2020.pdf>
  - ii Van Duin, J.H.R., Wiegmans, B.W., Van Arem, B. and Van Amstel, Y. (2020), 'From home delivery to parcel lockers: a case study in Amsterdam', *Transportation Research Procedia*, Volume 46, pp.37–44; available at <https://www.sciencedirect.com/science/article/pii/S2352146520303616>
  - iii Giuffrida, M., Mangiaracina, R., Perego, A. and Tumino, A. (2016), 'Home Delivery vs Parcel Lockers: an economic and environmental assessment'. *Proceedings of the 21th Summer School Francesco Turco, Naples, Italy*, pp.13–15.
  - iv ERGP Report, June 2019, 'On the development of postal networks and access practises regarding infrastructure related to the parcel market', ERGP PL I (19) 10, pp. 1–45.