L.E.K.

Special Report

The Future of Airport Ground Access

How Airports Can Respond to Disruption

Contents

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Overview

Transport is changing. Digital technology and business model innovations are generating a new breed of ride-sharing and ride-hailing services such as Uber, Lyft, DiDi, Ola and Grab, collectively known as transportation network companies (TNCs).

Together with trends toward car and bike-sharing and the emergence of electric scooters, these "new mobility" options are transforming the way we move around our cities. They are also changing how we get to and from airports.

For consumers and passengers, new mobility increases choice and reduces cost. But the trend brings uncertainty for airport operators and investors, who are already starting to see its effects on financial performance and infrastructure investment decisions.

And the changes we have seen so far are only the beginning. With the rise of electric vehicles, connected and autonomous vehicles (CAVs), and aerial mobility — and the widespread adoption of Mobility as a Service (MaaS) — more technological and business disruption is on the horizon.

If airports are to continue to thrive, managers and boards must see the developments in ground transport as an opportunity, and find new ways to balance operational needs, reputation, commercial health and shareholder returns. Airport investors and TNCs, too, must understand the implications of new mobility for their businesses.

This report

- explores the challenges that new mobility options are creating for airports globally; and

- recommends short and long-term actions that airports should consider in response to mobility disruption.

Nine key actions for airports

Airport stakeholders need not take a passive approach to this changing landscape, but instead can respond in a variety of ways to secure continued success in the future.

In the short-term, airports can:

1. Ensure that ground access and parking pricing is providing appropriate economic signals

2. Differentiate between curbside and other pickup/drop-off areas

3. Develop a more sophisticated parking offering, including dynamic pricing and new products

4. Improve information and communication for the digital age, as a precursor to MaaS

In the long-term, they will need to:

1. See new mobility as an opportunity to improve operational and financial performance and to support reputational considerations

2. Develop tailored strategies based on a robust understanding of passenger responses to mobility options

3. Manage the key trade-offs between operational, financial and reputational implications created by the proliferation of new mobility options

4. Plan for future mobility changes, and incorporate flexibility into infrastructure designs

5. Adopt a broader view of the passenger experience, by considering the journey to — and arrival at — the airport (i.e., "sofa to gate")

The challenges of new mobility

Airport ground transport has remained fundamentally unchanged in its heavy reliance on private cars and taxis[1] since the beginning of mass commercial aviation more than 70 years ago. Until the emergence of TNCs in 2012, private cars, taxis and rental cars represented at least 80-90% of all journeys to and from airports.

Rail links or dedicated rail lines, where in use, typically capture 10-25% of such journeys. Rail is available at approximately 80 of the world's 100 largest airports, and is more important in airport catchment areas where there is heavy road traffic congestion.

In only the past six years however, TNCs have grown rapidly and have taken significant share from all other ground transport modes in most major global markets.

Data from expense reporting service provider Certify on business and travel spending shows that TNCs grew from 8% of U.S. business traveler spending in 2014 to a staggering 62% in 2017 (Figure 1). In one case, two TNCs at San Francisco International Airport (SFO), Uber and Lyft, grew from 4% of drop-off mode share in 2014 to 29% in 2017. In the process of winning nearly one-third of SFO's arriving passengers, these TNCs reduced the share of every other mode — notably, not only taxis and rental cars, but also door-to-door vans and public transport (Figure 2).

Figure 1
Growth of TNC use by U.S. business travelers

Ground transportation mode share for business travelers in the United States (2014-17)
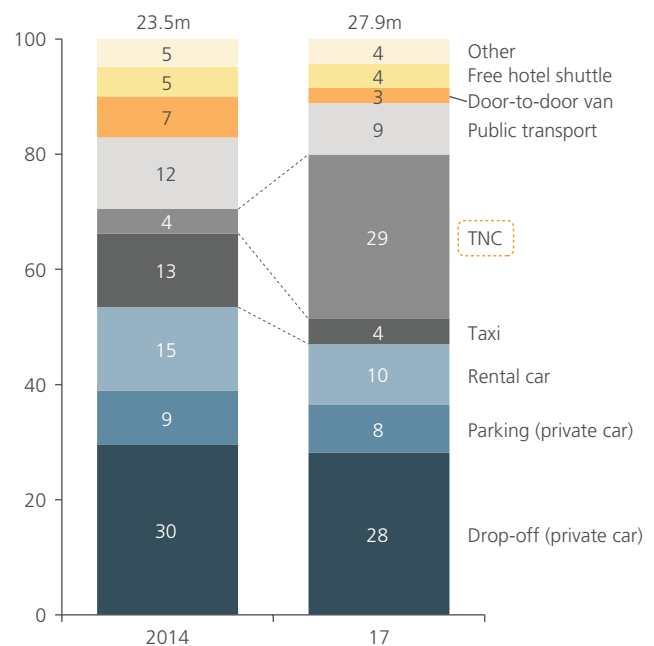Percent
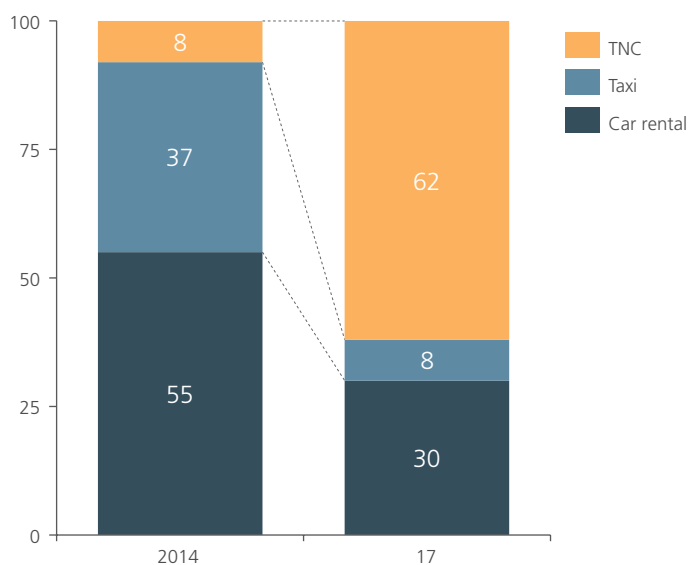
Figure 2
Growth of TNC use at SFO

SFO emplaned passengers by mode of access (2014-17)
Percent

This shift away from established modes to TNCs is affecting airports in three significant ways:

1. Financial performance

2. Infrastructure investment planning, decision-making and return on capital

3. Passenger experience

1. Financial performance

Ground transport is a major source of revenue for airports, with parking and ground access charges typically contributing one-quarter or more of total airport revenues.[2] Yet TNCs generate substantially less revenue per passenger than parking, taxis and rental cars, thus increased use of TNCs may cut into airports' income.

Figure 3 shows that TNC access charges are lower than charges for taxis or short-term parking at many airports. This suggests airports may be leaving money on the table and creating an inequitable environment for taxi operators and their customers. This depends, of course, on the transport service provided and on the level of access that each transport operator receives. Taxis often have

Figure 3
Taxi access charges remain higher than TNC access charges, on average

Airport pickup fees for taxis and TNCs*
(2018)
USD**
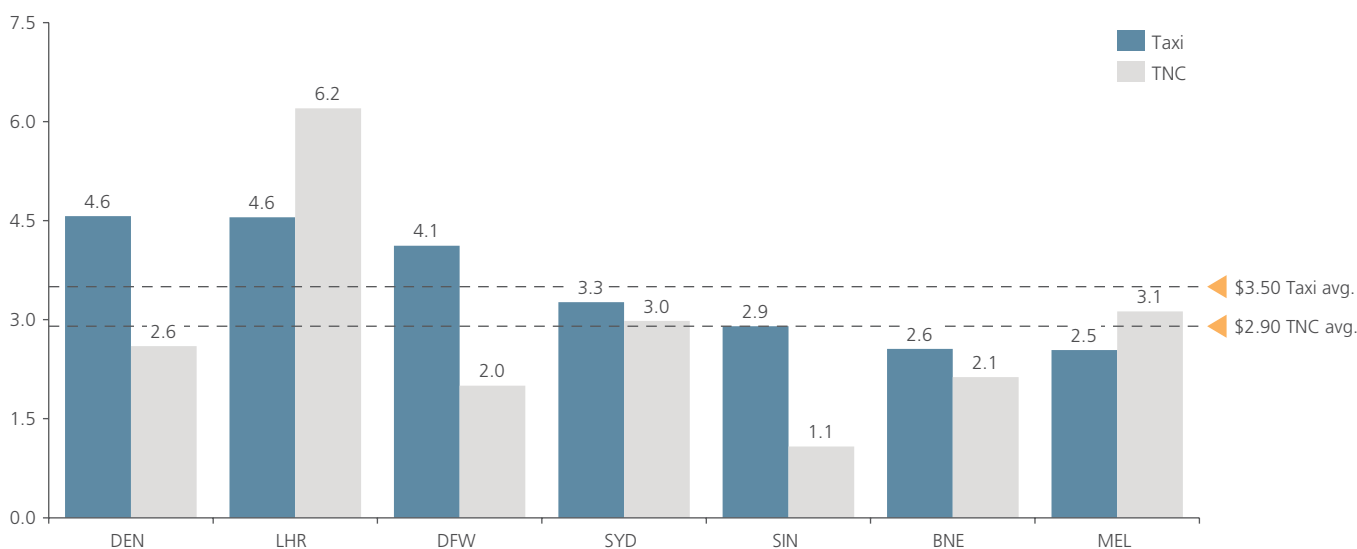
Notes: * Pickup charges across airports were collected and normalized to provide as much of a like-for-like comparison as possible. Normalization included taking the average of various charges where rates differ by time of day, and accounting for all fees paid by the driver from waiting to pickup of customers. ** Exchange rates applied as at 05/10/18: 1 GBP = 1.30 USD, 1 SGD = 0.72 USD, 1 AUD = 0.71 USD.
Source: Uber website; TfL; Taxi Singapore; ACCC Monitoring Report 2017; Fly Denver; Taxi DFW

layover facilities and preferred terminal curbside access for pickups. TNCs, meanwhile, tend to use nearby short-term parking areas. Where all transport operators have the same curbside drop-off option at departures, however, there is no clear justification for TNCs paying less than taxis or other transport operators.

At present, the implication is that the growth of TNCs means passengers are effectively trading down from a higher-revenue parking product or taxi service to a lower-revenue but higher-volume TNC product. This has far-reaching implications: if airports fail to act now, they may face declining financial performance as TNC usage continues to increase.
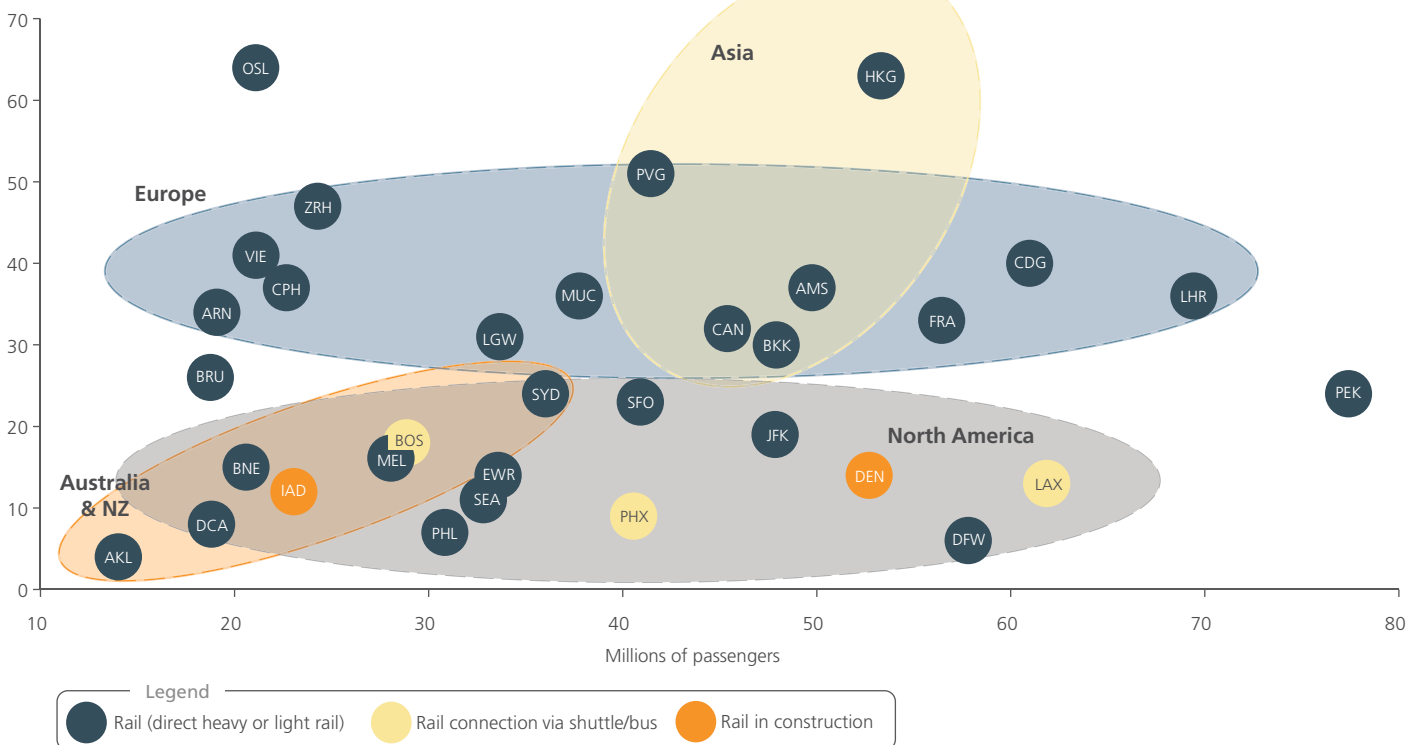
For airports, the shift from parking to TNC revenue may not be entirely negative. TNCs appear to have enlarged the chargeable

ground transport market by taking share from non-revenue-generating pickup/drop-off modes such as private vehicles. For example, Denver International Airport reported that from 2015 to 2017, parking revenue fell by about 1%, or $2.5 million, to $176 million. However, over the same period, ground transport revenue, including fees collected from TNCs, rose 29%, or $2.8 million, to $12.4 million.[3] This represents a net increase of about $0.3 million in combined parking and ground transport revenue.

However, the risk still remains that if airports do not appropriately monetize TNC access, they will be left with a revenue gap. The impact of TNCs on an airport's ground transport revenue will depend on how much the airport relies on parking revenue — and the degree to which passengers utilize mass transit instead (Figure 4).

Figure 4
Public transport mode share varies regional

Public transport mode share as a function of passengers*
(2008)
Public transport mode share (%)

Legend
- Rail (direct heavy or light rail)
- Rail connection via shuttle/bus
- Rail in construction

Note: * Passenger numbers as of 2011; public transport mode share as of 2008
Source: PTUA; Global BRT Data; L.E.K. research and analysis

The market share held by mass transit — which is generally not monetized directly by the airport — is another factor driving the observed variation in ground transport revenues. Figure 4 highlights regional differences and the impact of rail availability on public transport mode share.[4]

Airports in North America and in Australia and New Zealand (ANZ) may be the most exposed to risks from falling car parking revenues. Because they tend to have much lower shares of public transport modes than their counterparts in Europe and Asia, they typically generate more ground transport revenue per passenger than do airports in other regions.

Historically, this has been a strength, but in the context of rising TNC use, it now appears to be a potential weakness. North American airports in particular are greatly exposed to disruptions, with parking revenues accounting for about 23% of total airport revenues in 2016, compared with 13% for ANZ airports, 7% for Europe and 3% for Asia.[5]

Several Australian airports have already seen a decline in short-term parking transactions that can be attributed primarily to the rise in use of TNCs. Melbourne Airport saw a decline of about 20% between 2013 and 2017, while Brisbane Airport saw a fall of about 30% over the same period.[6]

2. Infrastructure investment planning, decision-making and return on capital

In addition to being a source of airport revenue, ground transport options are a driver of infrastructure investment, requiring parking facilities, access roads and curbside pickup/drop-off areas. These assets are capital intensive and have long life spans, which puts them at risk of disruption from changes in passenger behavior and mobility trends.

Already TNCs are beginning to change the relative utilization of each of these ground transport areas. This is affecting not only how airports plan for future infrastructure, but also the return on capital for these investments.

Pittsburgh International Airport is embarking on a $1 billion facility improvement program, which initially included the construction of about 5,000 additional parking spaces. After a more thorough review, however, the airport decided to scale back to 3,500 spaces because of the increasing use of TNCs.[7]

TNCs can also connect passengers to mass transit and solve "first and last mile" personal mobility issues, thus affecting airports' ground transport planning and decision-making. Public transport authorities are increasingly seeing TNCs as means of feeding mass transit corridors, particularly when they can be incorporated into a MaaS ecosystem.

For instance, passengers can use a TNC to access the train that allows them to travel directly to the airport, saving money and beating road congestion. In the future, these kinds of multi-modal trips will likely be planned and purchased in a single MaaS app; such services already operate in several cities around the world, such as Helsinki.

We are witnessing a mobility evolution that is leading to greater complexity and uncertainty for forecasting mode shares. And TNCs are only the first new mobility option to emerge. Although autonomous vehicles, aerial mobility and widespread MaaS usage are some years away still, these options are likely to arrive within the life spans of ground transport infrastructure assets constructed within the past 10 years (or being built now). These future mobility options could pose further threats to airport revenues, and they raise crucial questions about how to future-proof infrastructure (e.g., parking garages).

L.E.K. Consulting has seen this phenomenon play out in several projects with major global airports, where we helped reforecast expected parking requirements based on declining parking usage and concerns around the long-term demand for parking in light of future mobility trends.

For a major European airport, L.E.K. analysis illustrated how airport access mode shares change based on the distance a passenger must travel to reach the airport. The analysis revealed that TNC/taxi use drops significantly after 10-25 km, while curbside pickup/drop-off and short-term parking maintain share regardless of distance; both long-term parking and public transport shares grow with distance (Figure 5).

This research shows that passenger decision-making reflects not only the relative economics of each option (as expected) and the greater convenience of taxis for short distances, but also the greater affordability of long-term parking, public transport or curbside service for longer distances.

Bringing new mobility into the equation, this analysis suggests that nearby catchments (short-distance trips) are more at risk from ongoing TNC disruption (i.e., taxi for curbside service and car for short-term parking). Both nearby and more distant catchments (longer trips) are more exposed to long-term trends in autonomous vehicles, electric vehicles, aerial mobility and MaaS.

The findings highlight the essential value of airports being able to analyze their catchments to understand current trends and anticipate future changes.

Figure 5
Mode share changes based on passenger distance to airport

Departing passengers airport access mode by distance from the airport

INDICATIVE
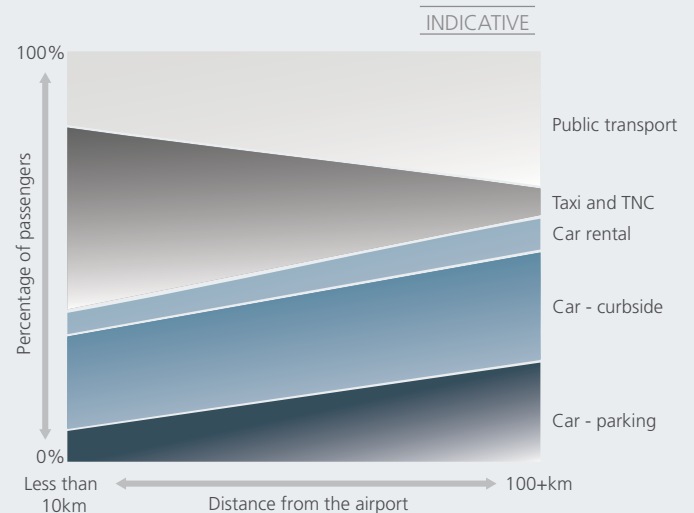
Source: L.E.K. survey

3. Passenger experience

New mobility options can improve the passenger experience. TNCs are making point-to-point travel cheaper and easier, and are introducing new features such as driver reviews, trip-time estimates, and location sharing with friends and family.

However, TNCs also have the potential to worsen the passenger experience. TNCs can increase congestion at curbside pickup/drop-off areas if they take mode share from private vehicles that otherwise would have gone to parking areas or from mass transit options. Indeed, many airports have already begun to introduce strategies to mitigate congestion. Heathrow and Sydney airports direct TNC pickups into short-stay car parks rather than curbside areas, though TNCs still add to precinct and road congestion.

Furthermore, multi-airport systems such as Los Angeles, Paris and Chicago will need to consider how pricing and congestion are affected by new mobility options across their broader catchment areas.

New mobility ground options are changing two principal criteria that passengers consider when choosing the optimal airport for their travel plans: cost-to-access and travel time to the airport. This may alter the competitive dynamic in dual-airport systems. It also raises questions about how airports can retain and expand their catchment areas — and about what ground transport infrastructure and incentives are necessary as part of achieving that goal.

Airports will need to consider how TNCs and other new mobility developments are likely to affect (i) vehicle flow within airport precincts, (ii) ground transport operations and (iii) the passenger experience. Airports need to ensure they can capitalize on these changes and enhance their reputation by providing greater choice and improving the customer experience.

How airports can respond in the short-term

The growth of TNCs and the relative decline of parking means airports must think of their ground transport businesses more broadly as ground access businesses instead. Any declines in car parking or taxi revenues must be compensated by other ground access revenues.

The good news is that airports can take short-term tactical steps to protect — and even grow — revenues, enhance the passenger experience and position themselves for the future. These measures include:

1. Ensure that ground access and parking pricing is providing appropriate economic signals

2. Differentiate between curbside and other pickup/drop-off areas

3. Develop a more sophisticated parking offering, including dynamic pricing and new products

4. Improve information and communication for the digital age, as a precursor to MaaS

1. Ensure that ground access and parking pricing is providing appropriate economic signals

Traditionally, pricing of parking or ground access has been based on achieving a reasonable rate of return for ground transport

infrastructure such as parking garages and roads. This is known as commercial pricing. However, this approach misses an opportunity to use pricing signals to influence behavior and demand.

Increasingly, airports must consider the role and impact of pricing as a demand management tool. For instance, airports can use pricing to reduce terminal curbside congestion by directing private vehicle pickup/drop-off traffic (e.g., "kiss and drop") to different parking areas, improving use of remote car parks or encouraging mode share shifts to suppress vehicle congestion (Figure 6).

This introduces a deeper need to segment and understand the ground transport market, where passenger preferences and willingness to pay can be balanced against the need to manage on-site congestion and asset utilization (Figure 8). For most airports, this represents a paradigm shift.

In practice, such an approach would imply the following:

- **Consider the demand management challenge at vehicle unit, regardless of operator.** A car represents a single unit of congestion. Buses and other large vehicles excluded, all passenger vehicles and light commercial vehicles entering an airport site — or certain high-demand areas of an airport, such as the curbside areas — effectively cause the same amount of congestion. Therefore, the same pricing signal is appropriate.

Figure 6
Pricing can help manage demand across options according to quality and amenity
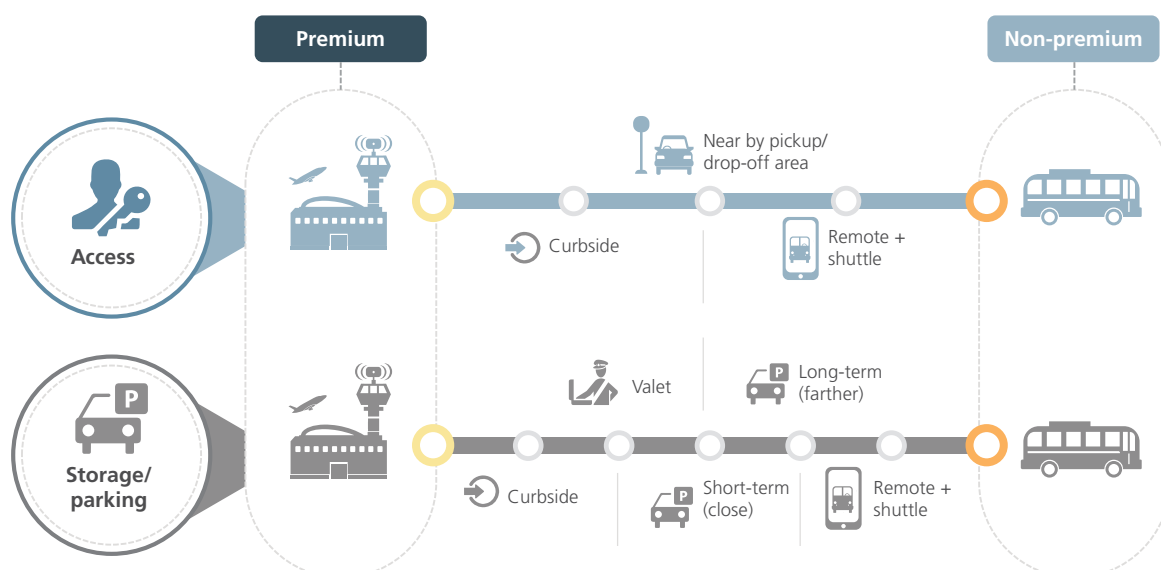
Airport passengers and transport operators can choose from a spectrum of both access options (e.g., curbside vs. remote pickup/drop-off) and storage options (e.g., valet vs. free parking). The key is in setting the right pricing signals to maximize financial outcomes, asset utilization and customer choice while also managing congestion.

• **Set charges to specific airport areas based on passenger willingness to pay.** Some airports effectively discriminate between transport operators in allowing access to terminal curbside areas for pickups. Taxis generally operate at premium curbside areas, while TNCs are often relegated to more distant passenger pickup areas.

However, what if a TNC passenger is willing to pay more for curbside access? Then the airport should monetize that desire. If instead, a TNC passenger wants the lowest possible price, he or she can meet the ride at a short-term parking area or remote area. The key point: The airport, not the operator, should offer differentiated pickup/drop-off options to the passenger.

Careful consideration will be required to execute these changes in a way that minimizes reputational and commercial risk. In the U.K., for example, to mitigate the community's potential negative reaction, Edinburgh, Stansted, Glasgow and Manchester combined the announcement of new charges on pickup/drop-off areas with a variety of official statements, discount schemes and community grants.

2. Differentiate between curbside and other pickup/drop-off areas

Curbside access is the most valuable ground transport asset, yet it is often congested and rarely monetized. Furthermore, as airports grow and become even more congested, these areas risk becoming a bottleneck and damaging the customer experience.

Instead, airports can use branding and pricing signals to differentiate between high-value curbside areas, near-terminal pickup/drop-off areas and remote pickup/drop-off areas with shuttle bus services to terminals. In fact, remote drop-offs may become the norm for passengers at many airports, with curbside access treated as a premium paid product. Indeed, at a number of airports around the world, we are already observing this trend toward instituting curbside access charges in combination with a remote pickup/drop-off offer (Figure 7).

Benefits of successful differentiation of pickup/drop-off areas include greater profitability and demand management of ground access areas.

Figure 7
Airports can differentiate ground access and storage offers
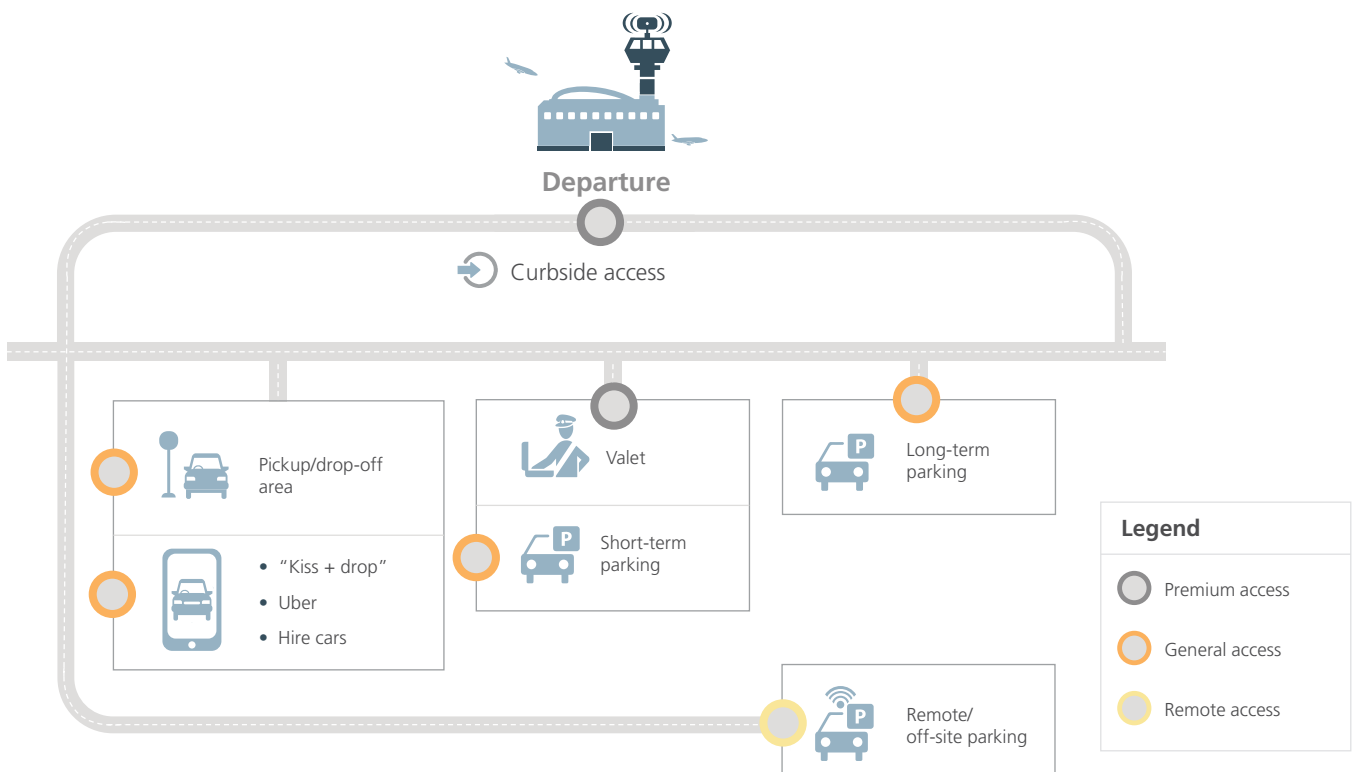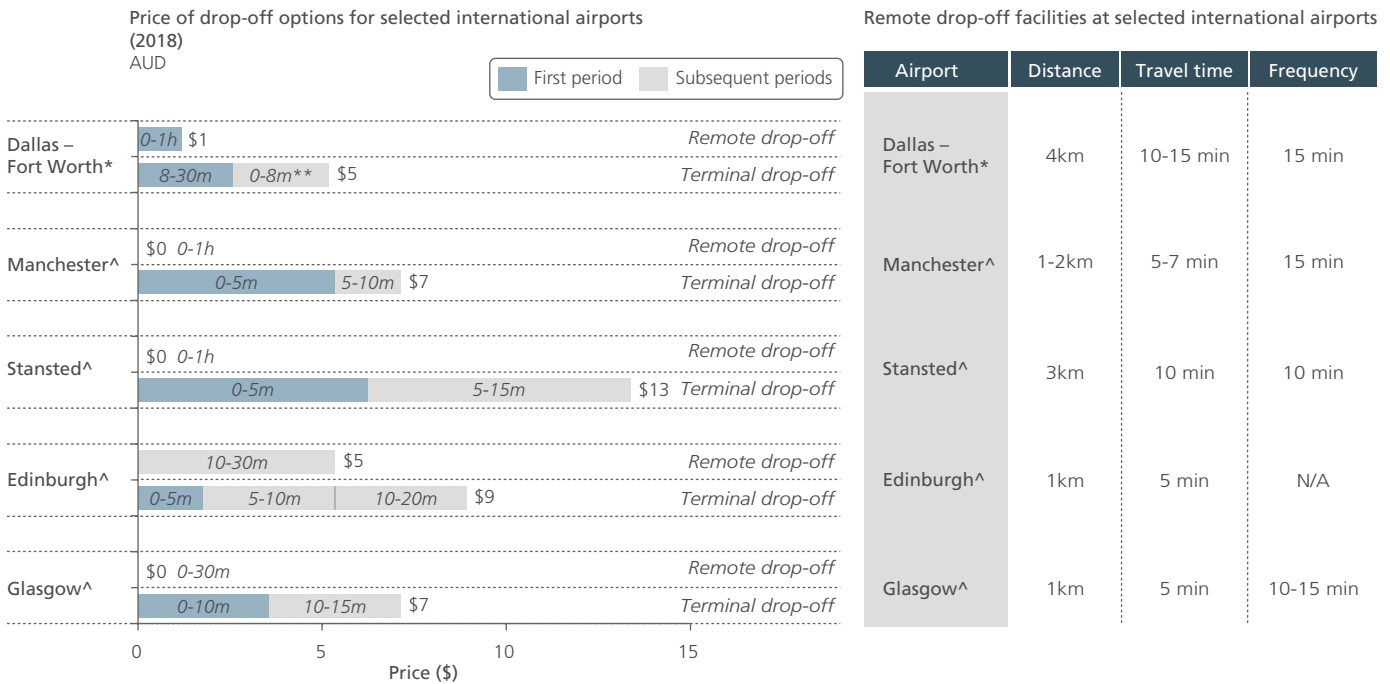

Departure

Curbside access

Pickup/drop-off area

• "Kiss + drop"
• Uber
• Hire cars

Valet

Short-term parking

Long-term parking

Remote/ off-site parking

Legend

⬤ Premium access

⬤ General access

⬤ Remote access

Figure 8
Charging differentials for terminal vs. remote drop-offs

Price of drop-off options for selected international airports (2018)
AUD

Legend: First period | Subsequent periods

Dallas – Fort Worth*	0-1h $1	Remote drop-off
	8-30m 0-8m** $5	Terminal drop-off
Manchester^	$0 0-1h	Remote drop-off
	0-5m 5-10m $7	Terminal drop-off
Stansted^	$0 0-1h	Remote drop-off
	0-5m 5-15m $13	Terminal drop-off
Edinburgh^	10-30m $5	Remote drop-off
	0-5m 5-10m 10-20m $9	Terminal drop-off
Glasgow^	$0 0-30m	Remote drop-off
	0-10m 10-15m $7	Terminal drop-off

Price ($): 0 5 10 15

Remote drop-off facilities at selected international airports

Airport	Distance	Travel time	Frequency
Dallas – Fort Worth*	4km	10-15 min	15 min
Manchester^	1-2km	5-7 min	15 min
Stansted^	3km	10 min	10 min
Edinburgh^	1km	5 min	N/A
Glasgow^	1km	5 min	10-15 min

Passengers are incentivised to use free alternatives by pricing the premium option at c.$5 for the first period

Shuttles have a minimum frequency of 15 minutes and a travel time of 5-10 minutes

Note: * Converted from USD to AUD using CY18 average exchange rate 1 USD = 1.30 AUD. ** DFW charges more for 0-8 minute trips than for 8-30 minute trips to discourage commuter traffic from entering. ^ Converted from GBP to AUD using CY18 average exchange rate 1 GBP = 1.78 AUD.

3. Develop a more sophisticated parking offer, including dynamic pricing and new products

Airports have made significant improvements in the sophistication and (as a result) profitability of parking businesses over the past two decades. However, TNCs present new challenges that necessitate a review and revision of parking products, positioning, pricing and customer engagement.

Parking solutions will vary by airport, but components may include:

- Dynamic pricing (e.g., by hour, by day, weekend vs. workday)[8]

- Premium parking (e.g., closest to terminal)

- Valet parking

- Reserved spaces

- Loyalty and partner programs (e.g., in conjunction with toll road operators)

- Remote parking

- Free remote parking (to send pricing signals and to manage reputational objectives)

Airport stakeholders will need to think carefully about how their parking portfolio fits together, how it meets various customer segments' needs and willingness to pay, how it influences behavior, and how it influences demand and asset utilization. Airports also need to be prepared to react quickly to emerging business models, such as peer-to-peer car-sharing networks.

4. Improve information and communication for the digital age, as a precursor to MaaS

Over the past decade, as passengers have become digital natives, many airports have not kept pace.

The emergence of TNCs, mobile flight bookings and mobile boarding passes are just a few proof points showing how comfortable — and reliant — passengers have become with mobile technology as a means of gathering information, planning travel and making bookings. Yet the quality, availability and user-friendliness of airport information have, for the most part, fallen behind.

Airports are missing the opportunity to share ground transport options with passengers and, in turn, to influence the use of different transport modes and the uptake of parking offers, all while improving the reputation of the airport.

In addition, being unable or unwilling to keep up leaves airports out of a future MaaS ecosystem, which will be entirely digital and will rely on high-quality, real-time information sharing.

For broader changes in ground transport options to be effective, airports will need to invest in improving information sharing. Website, mobile app and integration upgrades (e.g., with MaaS and TNC apps) will make it easy for passengers and employees alike to find information about, make decisions on, and buy parking or other transport options. Airports will need to succeed in communicating the positioning, availability, and attractiveness of each product in a way that reaches the right customer segments and achieves potential uptake.

Airports will also need to be clear about which marketing channels to use and how to maximize sales. For instance, to maximize the value of providing online and app-based information (and MaaS integration), airports will need to drive pre-bookings for parking.

Pre-bookings will help airports gather information on demand that can be used for predictive pricing and data analytics. Then, to maximize the value of sales to drive-up parking customers, airports will need to improve signage, wayfinding and product description so customers have enough information to select their preferred parking option. Otherwise, the airport will lose out on the benefits of customer segmentation.

Additionally, airports can use digital tools to encourage higher vehicle occupancy to mitigate congestion within the airport precinct and on arterial roads. Gatwick Airport has recently launched Faxi, a carpooling app for staff that offers preferential parking for carpoolers and aims to reduce congestion, emissions and parking infrastructure requirements.

Changing mindset: long-term strategies

New mobility options need not be viewed as a threat. Indeed, the changes they bring offer opportunities to improve the health of the business, increase returns, reduce congestion, enhance the passenger experience over the long-term and support reputational considerations.

This starts with a mindset shift, and continues with robust analysis and strategic decision-making to manage important trade-offs. In general, it requires that airport stakeholders step back and rethink their commercial model for ground transport.

Strategic activities that airports can use over the long-term include:

1. See new mobility as an opportunity to improve operational and financial performance and to support reputational considerations

2. Develop tailored strategies based on a robust understanding of passenger responses to mobility options

3. Manage the key trade-offs between operational, financial and reputational implications created by the proliferation of new mobility options

4. Plan for future mobility changes, and incorporate flexibility into infrastructure designs

5. Adopt a broader view of the passenger experience, by considering the journey to — and arrival at — the airport (i.e., "sofa to gate")

1. See new mobility as an opportunity to improve operational and financial performance and to support reputational considerations

Airports must make an effort to be proactive rather than reactive. Stakeholders should be asking themselves **now** how to profit from new mobility options, including those further into the future (such as autonomous vehicles and aerial mobility).

There is no way to stop or reverse new mobility trends. Airports must operate as part of the new mobility ecosystem, and resist the impulse to ignore change or seek to control it through enforcement or regulation. The TNC experience offers many lessons in this respect.

Instead, airports should see ongoing mode shifts and emerging mobility options as opportunities that should replace — or improve on — historical ground transport profitability and returns.

2. Develop tailored strategies based on a robust understanding of passenger responses to mobility options

Airports will need tailored strategies to deal with the changes new mobility brings. Given the many differences across cities and countries in existing mode shares, geography, catchments, wealth and airport competition, blanket recommendations will fall flat.

Further, if we rely on preferences as they are revealed, it will be too late.

Airports will need to conduct robust analysis and research based on their own unique situation, and must address the implications of ongoing fundamental changes in passenger behavior. For example:

- A passenger on a three-day business trip is dropped off at the airport near her autonomous vehicle, which then returns home, rather than using the premium valet parking that she used in the past. This results in:

  – loss of parking revenue, which could be partially offset by airport precinct/curbside charges; and

  – potential increase in curbside congestion, and an additional trip from the airport and associated congestion as the autonomous car returns home.

- An inbound leisure passenger arrives at an airport and uses a peer-to-peer car-sharing network to pick up (for two weeks) a vehicle that was dropped-off earlier that day by an outbound passenger. This results in:

  – loss of long-stay parking revenue from the outbound passenger, which could be replaced by short-stay parking revenue — or no revenue at all, if the two passengers are able to coordinate their schedules and meet at the free pickup/drop-off area; and

  – loss of rental car revenue from the inbound passenger, who otherwise would have rented a car for two weeks.

Over the next decade or so, airports will need to develop the predictive capacity to understand and model such fundamental passenger behavioral changes and associated mode share shifts. Analytics will be imperative to ensure that appropriate operational, pricing and investment decisions can be made.

3. Manage the key trade-offs between operational, financial and reputational implications of changes created by the proliferation of new mobility options

Many airports are being challenged like never before to manage trade-offs between ground transport revenues, operational efficiency and reputation. For airport operators, financial and operational outcomes have always been top of mind, but now reputation is becoming increasingly important given the wide stakeholder ecosystem and the growing influence of social media.

For an airport, reputation is influenced by several factors: customer journey (e.g., travel times, congestion), environment (e.g., noise, carbon footprint), disruption to the local community, and perceptions of safety and monopolistic behavior. There are inherent connections between financial, operational and reputational outcomes, and some links are stronger than others.

For example, poor operational performance can affect both finances and reputation. Delays, congestion and confusion about getting to the terminal can affect customer experience, discouraging passengers from spending in the terminal (reducing income per passenger) or, even worse, deterring them from using the airport or from flying altogether.

From a reputation perspective, poor operational performance drives the perception of shareholders and other stakeholders regarding the airport's ability and intentions. This, in turn, can have tangible financial outcomes through reducing future negotiating leverage.

Any future strategic change should be assessed against each of these dimensions. The importance of each will vary according to the airport's unique operating context, ownership structure and revenue model.

4. Plan for future mobility changes and incorporate flexibility into infrastructure designs

Airports need to plan now for further mode share shifts and for the emergence of more advanced mobility technologies — most notably, autonomous vehicles, MaaS and aerial vehicles — in order to incorporate these plans into infrastructure design and timing. Wherever possible, airports also must incorporate flexibility into infrastructure plans.

Parking facilities in particular need to be considered for potential alternative uses, because airports may need to plan for fewer parking spaces per passenger over time. Given their long life span, these types of infrastructure would provide a measure of risk mitigation if they were designed as possible mixed-use facilities that could transition over time to aerial vehicle landing pads, offices, residences or hotels (Figure 9).

5. Adopt a broader view of the passenger experience, by considering the journey to — and arrival at — the airport (i.e., "sofa to gate")

The passenger experience starts long before travelers step inside a terminal. Airlines and other travel industry participants have long embraced a holistic view of the passenger experience. Airports need to do the same.

This means thinking of the ground transport experience as part of the airport's passenger experience: the ease and efficiency of arrival at the terminal, the quality of signage and wayfinding within the airport precinct, the fluidity of traffic circulation, the availability and quality of staff to direct traffic, and so on.

Airports that are more advanced in this line of practice may need to take some ownership of the passenger experience from the moment the passenger leaves home — or even earlier, during the ground travel-planning phase.

Figure 9
Designing future parking systems

Aerial vehicle landing areas
Future parking facilities may be used as landing, disembarkation and parking areas for aerial vehicles.

Electric vehicle charging stations
Charging stations are increasingly popular in airports and are considered a simple way to increase overall customer satisfaction.

Robotic parking valets/stacking
Robotic parking valets are becoming increasingly popular as a way to improve user experience and optimize space in areas of high demand.

Adaptable parking facilities
Car ownership may peak in coming decades with more consumers relying on a variation of ride-sharing rather than their own vehicles. This decreases demand for parking spaces in the near future. Parking facilities will be developed with the future intention of turning the space into residential and commercial areas

"One of the great changes in the next 20 years is going to be redevelopment of parking garages."

Christopher Leinberger, George Washington University, April 2017
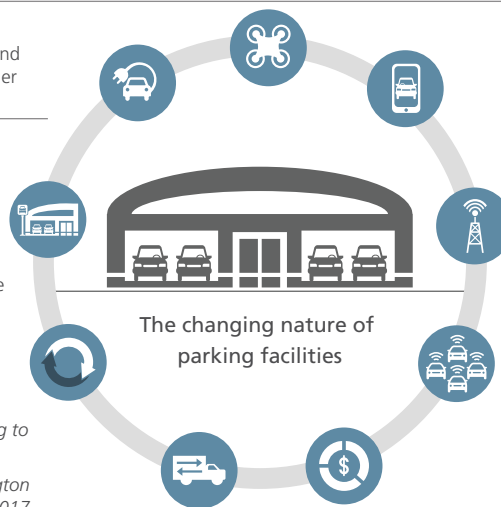
CAV parking facilities
Future parking facilities that exclusively park CAVs will be redesigned for such a purpose without stairs/ elevators and narrower parking spaces.

Smart parking apps
There will be a rise in smart parking apps that allow drivers and vehicles to search for free spaces using in-build computers and GPS. CAVs may also park in people's driveways and move themselves if the driveway is in use.

Fleet-owned CAV
CAVs may be owned by communities or corporations. This would increase their utilization and decrease the demand for parking facilities due to the vehicles continuously being on the move and being fleet-owned. It is estimated that up to 90% of parking spaces may be eliminated due to CAVs.

The changing nature of parking facilities

Parking facilities become mobility hubs
Car parking developments may evolve into a mobility hub, in which the location becomes a transit stop and provides options to individuals such as parking, last-mile bike-sharing or retail.

Parking will become a luxury product
Parking will become a luxury product as only individuals wealthy enough to afford their own CAVs will use parking facilities. A higher level of service will be expected (e.g., valet, EV charging, ANPR, autonomous cleaning, contactless payment). This will lead to a more efficient process for the consumer, while increasing revenue for the operator.

Source: Navigant Research; Property Council of Australia; Gensler; LA Times

This would have been nearly impossible a decade ago. But smartphones and mobile apps mean airports can engage with customers at all stages of travel: pre-journey, en route and post-trip. Passengers use a mix of apps to determine how to get to and from the airport (e.g., travel planning, maps, MaaS, TNCs), opening up many ways for airports to get involved. For instance, a light-touch involvement might include providing information to other services (e.g., TNC, MaaS apps), whereas a deeper involvement could see an airport developing its own MaaS platform or even participating directly in service provision via a fleet of shared automated vehicles that manage pickup/ drop-off.

Conclusion

New mobility is already affecting airport ground transport businesses around the world, and this is only the beginning. The advent of autonomous vehicles, aerial vehicles and MaaS will bring even greater changes. Airport leaders must be proactive in breaking their activities into short-term tactical measures and long-term strategic goals.

In the short-term, airports can ensure that their pricing structure sends the right economic signals, differentiate between curbside and other pickup/drop-off areas, develop more sophisticated parking offerings, and improve communication with passengers.

In the long-term, airports should see new mobility as an opportunity. They should conduct robust analysis, manage key trade-offs, incorporate flexibility into infrastructure designs and take a more holistic view of the passenger experience. Only thoughtful, tailored strategies will enable airports to thrive commercially, operationally and reputationally.

Yet new mobility has implications beyond airport management. Boards will have a responsibility to understand and take a position on the potential of these trends to impact their businesses. Airport investors will need to estimate investment risk and return profiles, and to assess airport management's response to disruption. Meanwhile, TNCs will need to work with airport management to agree on financial and operational terms that balance the interests of the airport, the TNC and the passenger.

It is an exciting but also highly uncertain time for airport ground transport businesses. The nine key steps outlined in this report highlight the potential for airports to benefit from financial, operational and reputational improvements. However, missteps, poor planning, or reactionary management will leave airports, passengers and transport operators worse off. Airports around the world must begin assessing their unique situation now, and planning their response to disruption from new mobility.

Editor's note: For more information about this report, contact strategy@lek.com.

Endnotes

[1] In this report, the term "taxi" includes limos and hire cars/town cars.

[2] Ground transport revenue varies by airport but generally comes from car parking, charges for access to pickup/drop-off areas and rental cars.

[3] Denver International Airport 2017 Financial Report, p.13.

[4] The variation in observed rail share reflects several factors, including travel time and travel time reliability relative to competing surface transport options, connectivity into the airport catchment (particularly the central business district), and terminal access to and from the airport station(s).

[5] ATRS 2018 Airport Benchmarking Report Part 1, pp. 61-66.

[6] ACCC Monitoring Reports 2013-2017 (https://www.accc.gov.au/publications/airport-monitoring-reports/airport-monitoring-report-2016-17); Bureau of Infrastructure, Transport and Regional Economics (https://bitre.gov.au/publications/ongoing/airport_traffic_data.aspx).

[7] CAPA (Sept. 24, 2018) and CNBC (Sept. 23, 2018).

[8] To function effectively, dynamic pricing requires an ecommerce pre-booking sales channel with significant share of total parking.

About the Authors

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