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white papers from ICF

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About ICF

ICF is a global consulting services company with over 5,000 specialized experts, but we are not your typical consultants. At ICF, business analysts and policy specialists work together with digital strategists, data scientists and creatives. We combine unmatched industry expertise with cutting-edge engagement capabilities to help organizations solve their most complex challenges. Since 1969, public and private sector clients have worked with ICF to navigate change and shape the future.

Introduction



Airports are complex businesses. Success requires balanced and integrated management across a diverse range of financial, physical, organisational, corporate and operational factors.

In this booklet, we focus on just a handful of the many aspects on which ICF is frequently called upon to assist our clients.

We consider future trends for non-aeronautical revenues and charges; we propose an approach to airport planning to help ensure that the infrastructure strategy is aligned with and supportive of the financial strategy, and reflect on the infrastructure needs of changing business models; and we present our thoughts on the future for airport investments in two key potential markets.

Lastly, we include two white papers on subjects we know well and find particularly interesting – the differing patterns of development of aviation in BRIC markets, and the possible implications of self-connecting passengers for not only airports but also airlines and alliances who are vying for the same travellers.

I hope you enjoy these white papers and if you have any questions or comments, please contact me or the authors and we would be delighted to discuss further with you.

A handwritten signature in black ink, appearing to read 'Kata Cserep', with a long, sweeping horizontal flourish extending to the right.

Kata Cserep
Vice President, ICF Aviation

Which Way Are Airport Charges Heading?

By Simon Morris and Natasha Page, ICF

There are two key attractions of infrastructure assets – the first being that their revenues are inflation proofed and the second that high barriers to entry reduce competitive price pressures. This article evaluates that proposition in the context of airports, one of the darlings of the infrastructure investment world. For reasons of data availability, this article focuses on the UK.

So, how have airport revenues stood up to the inflation test? Here, we are interested in the development of 'airport charges' – the bundle of tariffs that airlines pay to access airport infrastructure. A first point is that we are more concerned with "yields" (i.e. revenue from airport charges divided by passengers) than prices here. Whereas airport tariffs (usually in the airport's 'Conditions of Use') continue to appear on UK airport websites, those documents are increasingly a dead letter as airlines agree to off-menu, five or ten-year deals, at least for regional airports. In this context, "yields" provide a more accurate indication of the extent of airport's inflation proofing.

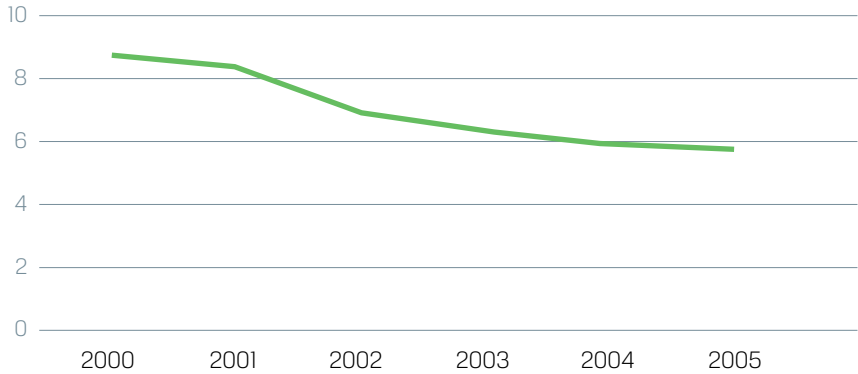




The Low Cost Carriers (LCC) Squeeze on Airport Revenues

From the beginning of the millennium to 2005 there was a sharp decline – a near halving of yields.

EXHIBIT 1. AERONAUTICAL REVENUE PER PASSENGER AT A BASKET OF UK REGIONAL AIRPORTS 2000-2005, £ REAL



Source: LeighFisher UK Airport Performance Indicators

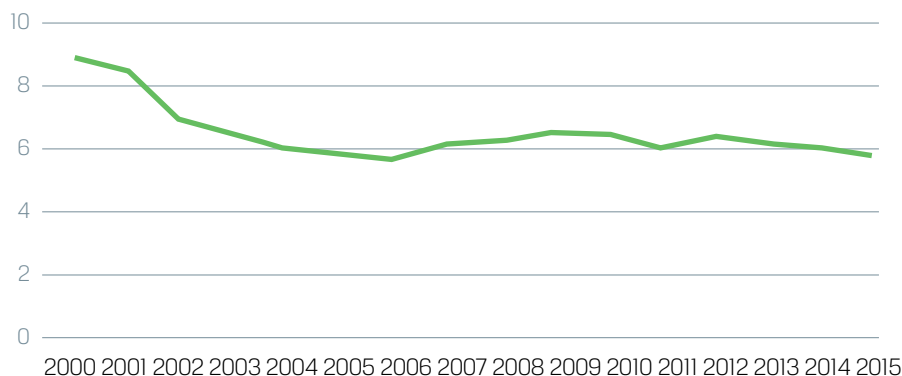
Overall, airport charges yields reduced significantly for these airports in real terms.

It does not take much analysis to understand the chief reason for this decline – for the most part it can be attributed to the rise of LCC. The LCC sector has revived many UK regional airports, and led to high traffic growth rates over a sustained period, but as a corollary airports have found themselves on the wrong end of a highly aggressive approach to negotiation of airport charges. Aside from the negotiation skills of the airlines themselves, for the first time UK regional airports found that they apparently did not command regional monopolies. Operating in a world where a low-cost airline was not weighing up whether to locate aircraft in say Bristol or Birmingham, but rather Luton or Larnaca, airport charges plummeted. But while traffic growth rates were high and unused airport capacity abounded, all parties were happy.

Trend Reversal?

As the LCC revolution matured it might have been anticipated that this pattern would go into reverse, particularly as airports needed to finance new capital investment to expand. Additionally, more LCCs came to subscribe to the theory that airports located in major centres of population commanded a premium over remote airbases (Brussels not Charleroi for example) and it could have been expected that airport operators would be able to exploit that pricing power. However, it did not really turn out like that.

EXHIBIT 2. AERONAUTICAL REVENUE PER PASSENGER AT A BASKET OF UK REGIONAL AIRPORTS 2000-2015, £ REAL



Source: LeighFisher UK Airport Performance Indicators

Similarly, in 2005, Chinese access to North America was focused on large hub airports. There were 12 routes between China and North America, the majority flying between the major hubs in each region (e.g., Beijing and Shanghai to Los Angeles, San Francisco, Chicago, New York, and Toronto). Since then, 27 new routes have opened up—11 of which are operated by Boeing 787s. Of these 11 new services, only two are connecting hub-to-hub airports.

The most favourable interpretation of Exhibit 2 is that the period since LCC maturity (2005) has brought stability to airport yields, with some slight falling off in the last couple of years. However, yields are still at around only 65% of their 2000 real terms level. Over this same period there has been arguably no major capacity added at most UK airports (no runways, no significant terminal additions, although some incremental facilities) so this has occurred in the context of a tightening of supply.

Is This a Changing Traffic Mix Issue?

One objection to this analysis is that there have been traffic mix changes that have had the effect of diluting yields. Structures for airport charges are typically established on the basis that domestic traffic attracts lower charges (and also provides lower levels of commercial revenue) than international. So, if domestic had grown faster over this period, that might provide an explanation. But in fact, the reverse has happened, with the near disappearance of UK domestic air travel outside London to Glasgow and Edinburgh. Higher yielding international traffic has actually grown more strongly, so all things being equal, strengthening yields could have been expected.

Apparently and paradoxically, the trend throughout the period of aeronautical yields at airports subject to the strictures of hardline single till regulation (Heathrow and Gatwick) is very different. Yields have increased at those airports. In the case of Heathrow at least, a major determinant of this trend is the high rate of capital expenditure over the period on projects including T5 and T1/2.



Do Low Yields Undermine Airports' Infrastructure Characteristics?

So why have non-regulated airports not succeeded in restoring previous levels of yields? One answer is that operating relatively fixed cost businesses where commercial revenue has increased alongside passenger numbers, airport owners have maintained profitability whilst yields have fallen.

But where airports have not maintained returns, is this simply the product of a competitive market? As argued above, do airlines increasingly treat all airports within the EU, say, as interchangeable bases to operate from where the only issue is the maximisation of airfare yields? If so, this conclusion would tend to undermine airports' claim to be 'infrastructure' where there are high barriers to entry.

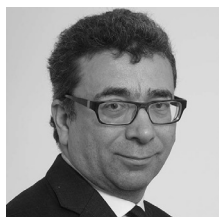
Our sense is that this bleak conclusion is an over-simplification. Although the concept of airports operating as monopolies within a catchment area has been somewhat undermined by the LCC revolution, a more important factor could be that airport owners have not always been brave enough in seeking deals which fully reflect their locational advantage. They have found themselves locked into long-term deals where other parts of the value chain are the beneficiary, perhaps underestimating their negotiating power.

What Next for Airport Charges?

We believe that barriers to entry will increasingly reassert themselves in a constrained planning environment, which increases capacity scarcity and thus airport owners should find themselves in a market where their negotiating position is enhanced. Additionally, the convergence between LCCs and 'Legacy Carriers' should ultimately mitigate the desire of airlines to go to the cheapest supplier of airport capacity disregarding all other factors.

ICF can help airports realise the value of their infrastructure by assisting in the process of negotiating airport charges, structuring charges appropriately and understanding the competitive and market dynamics airports operate in.

About the Authors



Simon Morris has more than 25 years of experience in the aviation industry. His expertise primarily lies in business planning of airport businesses. He leads ICF's Airport team in transaction projects worldwide, building on work in due diligence and comprehensive business and strategic planning for owners, investors, and private-sector interests. Previously, Mr. Morris worked at A.T. Kearney and LeighFisher.



Natasha Page is a Senior Manager in ICF's London Aviation team, with a particular focus on helping airports to maximise profitability through optimising both commercial revenues and operating costs. Ms. Page has led our commercial revenue forecasting work for several recent successful transactions including Copenhagen and London City Airports. Beyond transaction work, Ms. Page has worked with airport managers and investors on a number of projects including corporate strategy, investment analysis and economic regulatory advice. Prior to joining ICF she worked at A.T. Kearney, LeighFisher and as part of Macquarie Capital's airports team.

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U.S. Airport Privatisation 2.0

Is Airport Privatisation in the U.S. Finally Ready to Take Off?

By Eliot Lees, ICF

A New Dawning?

After years of anticipation and disappointments, airport privatisation in the U.S. (commonly referred to as "public-private partnerships" or "P3s") seems finally ready to take off. A number of P3 transactions are currently in the works with the promise of more to come. This has investors, operators and U.S. public sector airport owners sitting up and taking notice.

The history of airport P3 transactions in the U.S. has been disappointing. Over the past 20 years of the Federal Aviation Administration's (FAA's) Airport Privatisation Pilot Program (APPP), only two airports have successfully navigated the process: Luis Munez International Airport (LMM) in Puerto Rico and Stewart Airport in Newburgh, New York. (Stewart reverted back to a publically owned airport in 2003 when it was purchased by the Port Authority of New York/New Jersey.) Several failed attempts at Chicago Midway Airport (MDW) and elsewhere in the U.S. have led to the widespread belief that it cannot happen here.



DID YOU KNOW?

A P3 renaissance is starting in the U.S.

A \$3.6 billion P3 terminal project is under construction at New York's LaGuardia Airport (LGA). The City of Denver (DEN) has just awarded a \$600 million terminal redevelopment project and commercial operating concession. JetBlue is looking for a private sector partner in the development of a new Terminal 6 & 7 at JFK International Airport. Westchester Airport (HPN) is navigating the FAA's APPP and is in the final stages of selecting a preferred bidder. The Port Authority of New York/New Jersey is in the process of two tenders: one for design-build of a new Terminal A at Newark International Airport (EWR) and one for a 15-year management contract to operate the terminal. The City of Saint Louis has applied for a slot in the FAA's APPP, and others are considering the option. All of this activity suggests a P3 renaissance for U.S. airports.

The U.S. is Different

Unlike the rest of the world, where airport privatisation is a proven and widely used approach, the U.S. continues to present unique challenges. The FAA process is limited, burdensome and places too much approval power in the hands of airlines - to gain P3 approval, 65% of the airlines must consent. The experiences of LMM, MDW and HPN show that the airlines need to be offered a really "good deal" in order to approve a transaction - and this airline "cut" changes the deal economics - especially to U.S. public sector airport owners looking to "cash out".

The current FAA APPP grants the airlines ultimate approval rights - experience shows that the airlines receive a "cut" of the sale price in exchange for agreeing to the transaction.

Until the FAA APPP program is revamped, there are only a limited number of airport "slots" available. The more likely outcome, at least in the short term, is to concession discrete portions of airports in order to facilitate airport upgrades and improvements. This approach does not need airline approval, as demonstrated in terminal P3s happening at LGA, DEN, JFK, and being considered at San Diego, Burbank, Seattle and other airports. While this option lacks one of the key underlying motivations of monetising airport assets, it does satisfy an equally important need: to upgrade and improve aging U.S. airport infrastructure. In their recent Airport Infrastructure Needs publication, ACI North America estimates that U.S. airports require \$100 billion in improvements over the next 5 years, with \$38 billion needed just for terminal buildings.

What is in Store for the U.S.? Our View

The U.S. approach will continue to be different from the rest of the world. Highly experienced investors, operators and lenders who have participated in the U.S. process can attest to the fact that the U.S. is different – both in terms of the tender process and the highly involved bid requirements.

A level of due diligence not seen elsewhere is required to play in the U.S. Bidders must be prepared for the deep technical analysis needed for proposals.

ICF believes that within the next five years, partial privatisations - in the form of P3s - will become commonplace in the U.S. as an important option for U.S. airports to upgrade infrastructure and deliver a better passenger experience. Terminal privatisation, gate privatisation (as was successfully accomplished in Austin), operating contracts with investment requirements (which has been successful in Orlando Sanford, and is being tendered at EWR) and commercial concession operation (MDW) will become the norm.

Over the longer term, ICF believes that Westchester, Saint Louis or other pioneering airports will demonstrate the value of the FAA APPP (after its success in Puerto Rico) and will use sale proceeds to higher purposes: leveraging large transportation infrastructure development (as Nashville is considering), offsetting unfunded pension liability (as Chicago attempted to do with Midway Airport) or shoring up other public sector needs. If the U.S. Congress modifies, expands or liberalises this program, ICF believes that airport privatisation in the U.S. will truly take hold.

About the Author



Eliot Lees leads ICF's airport operational consulting practice, which combines process flow analysis, facility layout, organisational strategies and new technology to improve airport performance and enhance the passenger experience. He has worked extensively with airports and third-party operators in business strategy and strategic planning, transaction due diligence and infrastructure-related development, both in the U.S. and internationally.

Prior to joining ICF, Mr. Lees was an investment banker specialising in municipal and tax-exempt financing. He spent more than 10 years in various finance positions with leading New England financial institutions, including as Vice President at the Bank of New England in Boston, Massachusetts.

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Effective Airport Master Plans

By Rob Rushmer, ICF

Anyone who has worked at a few airports has probably had cause to ask something along the lines of "who on earth thought building that there was a good idea?"

For many airports, especially for the vast majority that are smaller than the relatively large few, there can be pressing business reasons for making a swift decision to capture an immediate opportunity. The concession owner, inevitably, has a fixed horizon with planning and investment decisions that must make financial sense within that timescale, rather than what might be optimum over the extended long term. The smaller airport may also lack a depth of planning experience, and management can be left somewhat exposed to an eventually regretted decision.

In time, those decisions can come back to bite, and not all large airports are free from examples of inappropriate planning either. By contrast, well-planned airports are notable for their evident infrastructural logic, their ability to respond to their inevitably changing marketplace and a portfolio of flexible developments that can be brought forward to best match those changing conditions. It comes down to how well the airport has been planned: its master plan.

What do we mean by an airport's "master plan"? Still valid, if a little dated, ICAO's Airport Planning Manual¹ defines an airport's master plan as *"the planner's conception of the ultimate development of a specific airport. It effectively presents the research and logic from which the plan was evolved and artfully displays the plan in a graphic and written report", and that it "should be the most effective framework within which the individual facilities can operate their separate functions at the highest possible levels of efficiency"*.

¹ICAO, (1987). Airport Planning Manual, Part 1, Master Planning, Doc 9184-AN/902, Second Edition Montreal: ICAO.



Although not within this definition of a master plan, ICAO's manual, correctly, goes on to set the physical master plan within the economics of the airport. Some people refer to the combination of the physical and the financial strategies as the master plan.

This paper concentrates on and refers to an airport's master plan as its physical development strategy, whilst recognising it is an integral component of the financial strategy. Clearly the physical, operational and financial strategies must be aligned. For example, if the infrastructure is too "gold plated" it cannot be afforded by the financial strategy, whilst scrimping on the physical may not deliver the level of services needed to achieve the financial. Ultimately, the master plan must be aligned with the airport's core values expressed in its mission and vision statements.

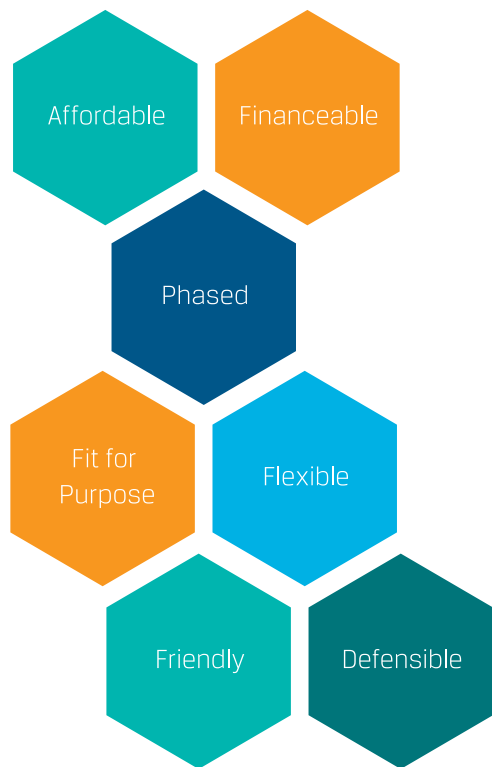
The physical strategy is literally and figuratively the base on which the others are built. The financial and physical strategies share an intimate relationship: the physical strategy enables the financial to be delivered and the financial creates the ability to achieve the physical. If one is out of balance, the other will fail. Collectively, the financial strategy and the physical create the airport and its service embodied in the company's mission and vision.



ICF proposes seven core principles that help shape an airport's master plan. They help ensure that it is effective and provide protection against the changes that all airports and businesses must manage successfully to thrive for the long term. ICF's seven principles of effective master planning comprise fit for purpose, flexible, friendly, defensible, phased, affordable and financeable.

These principles form the basis of ICF's master planning services and of our balanced scorecard health check reviews of development proposals.

7 PRINCIPLES OF EFFECTIVE MASTER PLANS

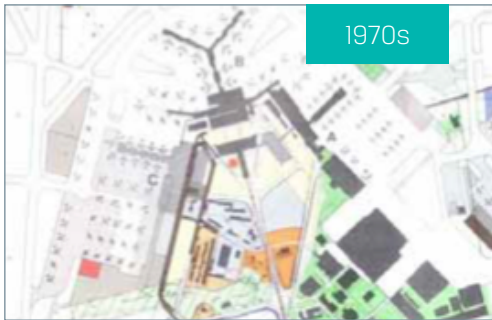


Fit for Purpose, Flexible, Friendly and Defensible

A master plan that is overall fit for purpose must:

- Define appropriate infrastructure within the current and future business contexts of the airport
- Be defensible in public and able to achieve regulatory approvals
- Be environmentally sensitive, meeting regulatory, legislative and policy requirements and aspirations

MASTER PLANNING FOR LEONARDO DA VINCI FIUMICINO AIRPORT ROME (1970s - 2000s)



1970s



1980s



1990s



2000s

It stands to reason that the master plan must be fit for purpose, that it should lay out a suitable infrastructure strategy in the business, market and financial contexts of the airport, all while supporting achievement of its mission.

However, the challenge is to define a master plan today based on a future forecast with all its inherent uncertainties. Therefore, the master plan must also be sufficiently flexible to allow it to adapt to changing circumstances both within and beyond the airport.

That future uncertainty relates not only to traffic volumes but also to the nature of that traffic and to the airport's aspirations over the level of service it offers to its markets. For example, a master plan predicated on a hubbing strategy, enabling substantial transfer flows of passengers and bags, may be inappropriate should the hub carrier cease such operations or the airport change strategic direction driven by market forces.

Whilst it is somewhat inevitable that the master plan is generated at a time when a clear strategic need exists, an effective master plan contemplates a range of future uses and seeks to define infrastructure with the flexibility to accommodate those ranges of use. It is a challenge, but an effective master plan plans for uncertainty and plans for change: the unexpected needs to be considered and accommodations made.

An effective master plan is therefore a menu of options that can be realised in an appropriate sequence appropriately phased, or substituted depending on the future direction. Of course no one master plan can accommodate all potential futures, but the best master plans are noteworthy for the "a la carte" menu that allows future management to make effective investment decisions in their own context minimally constrained by previous decisions.

For example, consider the southern central terminal area at Leonardo da Vinci Fiumicino Airport Rome. The accompanying images show a succession of revisions from one of its earliest versions in the 1970s to the 2000s. Naturally the plan evolved over revisions and inspection of these images shows not insignificant changes, but the fundamental concept remained consistent.

From the outset (the 1970s), the master plan contemplated the horseshoe of terminals accessed from the circulatory highway and central rail station. Each terminal and pier had defined uses (domestic, international, etc.) allowing successive generations of management (from the 1980s to the 2000s) to deploy elements of the master plan that were appropriate for the needs of the business at the time.

The plan was flexible enough to allow management to react to the inevitably unforeseen changes in their market (e.g. the rise of low cost carriers demanding different infrastructure, the change from domestic purely to Schengen and Non-Schengen or the need to provide temporary accommodation to serve the substantial peak in demand from passengers transiting to and from their cruise ships).

This is not to say that those accommodations were simple, but they were facilitated by the master plan, not hindered by legacy infrastructure.

The success of this master plan is twofold. First, an effective master plan was defined. Second, and importantly, the plan was adhered to so that successive developments did not frustrate future expansion. Space was protected for the planned future infrastructure element. It may well have been convenient at the time to have built something in place of the planned development, but to do so would have invalidated part of the planned ultimate build out. This was avoided and the airport is nearing completion of the southern terminal area as it contemplates its longer-term expansion to the north of the site.

Infrastructure planning and construction cycles are long and can be protracted and unpredictable – an inevitable consequence of the elaborate planning systems prevalent in many developed countries. Furthermore, the infrastructure – notably new passenger terminal buildings – will have perhaps a 50-year design life and therefore likely long outlive the operational and commercial view that defined it.

Consider the currently proposed Terminal 6 (T6) at London Heathrow, itself part of the current seven-year process to determine the preferred location for expansion of London's airport capacity – at least for the moment, the culmination of a process that started in the 1960s. T6 is being designed now, but it will only open well into the second half of the 2020s and will likely still be in operation in the 2070s. Its planners cannot possibly anticipate all the changes it will see and need to accommodate. Yet, it has to be fit for purpose and flexible enough to cope with those changes.

This is highlighted, for example, by its retail proposition. Heathrow earns a significant proportion of revenue from non-aeronautical sources and is regulated under a single till. With airline pressure to minimise charges (especially in the context of making Heathrow's expansion affordable, potentially within a "flat real" charging obligation), to be fit for purpose, the master plan needs to optimise and maximise non-aeronautical income. But what will retail look like in 30 years? In 50 years? Will a retail capability that is fit for purpose in 2030 still be appropriate in 2070? The challenge is to design a flexible space today that allows future generations of management to adjust to changing conditions: planned for uncertainty, flexible for change.

The current Heathrow master plan was only adopted following lengthy public scrutiny and analysis by the body specifically established to consider the question of additional capacity for London (the Airports Commission). That hurdle – to be the recommendation of the Airports Commission – was only the first of three hurdles the master plan will have to clear to eventually be granted permission to be built. At each stage, the depth of inquiry increases and the master plan must be able to deliver. It must be defensible against regulatory investigation and public scrutiny.

Much of that defensibility depends on how the master plan manages its environmental impact. By regulation, legislation, the airport company's policy and by public scrutiny, the master plan must be environmentally friendly. For Heathrow, the economic impact of the master plan demonstrated a substantial benefit, but the master plan also set out the means by which its environmental cost will be managed.



Phased

First, an effective master plan avoids, insofar as practicable, large steps in investment, phasing the expenditure and the provision of additional capacity so that delivery can be fine-tuned to the variation in actual demand. Second, it offers a range of capacity elements that can be brought forward in line with demand.

Often, the first aspect cannot be avoided. In many cases, it is the very need for major investment that gives rise to the master planning study. However, it is generally true that the greater the step in capacity, and therefore investment, the greater the risk of inefficiency of inappropriate infrastructure.

In extremis, consider Montreal Mirabel. A completely new airport is the largest single step in investment. In 1975 Mirabel was conceived to be one of the world's largest airports; by 2004 it had closed. A master plan that more slowly developed capacity may not have avoided the ultimate fate of Mirabel, but it would have limited the financial cost of failure.

A trend seen through the 2000s was the mandating of a master plan by the vendor, usually the government, of an airport for sale. The sale or concession award was the route to financing the master plan. Often though, these master plans were too aspirational. They were not appropriately phased and did not allow the financing risk to be effectively managed. The master plan was not financeable and was therefore not really fit for purpose through a lack of effective phasing.

In cases where large capital investments are unavoidable, the phasing of the development will have an impact on the capital structure of the airport and the differing appetite of equity and debt for brown- or green-field construction risk. An effectively phased master plan, and subsequent capital delivery programme, embodies phasing that is appropriate to the ownership structure of the company and meets the needs of its stakeholders.

Conversely, the Fiumicino master plan contemplated a number of interconnected terminal elements. As a result, these elements were constructed in phases that allowed each element to be attuned to the needs of the market at the time delivering a charter-focused terminal, a low-cost-focussed terminal and progressive expansion of more conventional short-haul Schengen and long-haul Non-Schengen capacity. The plan embodied effective phasing and appropriate flexibility within the confines of a single master plan.

Affordable and Financeable

The master plan must be affordable. It must deliver the revenue-earning capability to support the capital investment. It must also be financeable, delivering the return on capital that equity is seeking and appropriately managing the risk to debt.

Without any criticism intended, the master planning stage is a key time for focus from management. As the UK Government's guidance² to the public sector makes clear, scheme promoters are systematically inclined to over-estimate benefits and under-estimate costs. Master planners are no different. This is not to say that the promoters/master planners are ineffectual, just to note that they are human and subject to the human bias in favour of the case that they are advocating.

²HM Treasury (2013). The Green Book: appraisal and evaluation in central government. London: TSO.

Similarly, the private sector is not so different from the public. Equity and debtholders can provide some counter-balance, but they have imperfect knowledge. So, it remains incumbent on management to plan effectively and deliver a master plan that embraces both the physical and financial factors.

Conclusion

The master plan must be aspirational. It must look beyond the next incremental development but not be unrealistic. The global financial crisis has, for now, put an end to unrealistic master plans; concessions necessarily restrict the concession owner's horizon; and not all owned airports always plan for the long term. In all these cases, it would behove management, owners and consultants to establish master plans that are prudent, affordable and financeable whilst being balanced against the owners' aspirations.

A master plan must deliver the business benefit it is designed to achieve. It can best do that if it is fit for purpose, flexible and appropriately phased. Flexibility allows variation as the financial conditions change. Effective phasing helps to de-risk the use of capital.

Ensuring the master plan performs against ICF's seven principles of effective master planning does not guarantee success, but it provides an appropriate framework and allows management, owners and consultants to maximise the success and longevity of the master plan.

About the Author



Rob Rushmer specialises in master planning and multi-disciplinary airport projects with complex financial, commercial, regulatory and engineering interfaces. His airport experience has involved all aspects of strategic planning, business planning, master planning and airport development. Mr. Rusmer's particular expertise is the preparation and assessment of strategic development scenarios and the interaction of financial, planning, environmental, regulatory and licensing requirements. His view of airport planning is that the master plan is the physical embodiment of the business plan.

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Win or Lose: The Airport Opportunity in the Growing Self-Connecting Passenger Market

By Kata Cserep, ICF

Today over 55 million passengers a year worldwide make self-connections, almost all of them including at least one flight on a low cost carrier (LCC). ICF forecasts that with the next stage of facilitation by airlines, OTAs and airports, this number will double in the next five years.

This emerging self-connecting passenger market transformation is driven by:

- **Passenger needs and wants:** Self-connecting passengers are generally experienced at connecting and eager to avoid higher fares, find routes where no direct flight or traditional connecting option exists or obtain a preferred schedule.
- **Technology advances:** Self-connection route opportunities are more easily visible and bookable.
- **The explosive growth of LCCs and subsequent retreat of many traditional network airlines from short-haul services:** LCCs do not typically offer connections on either their own network or across partners' networks, in contrast to traditional online, codeshare and interline services.

In this white paper, ICF outlines some of the latest self-connecting market developments and explores the question of who will be the main beneficiaries of this trend in the next five years.

Self-Connecting Passenger Defined

To avoid higher fares, find routes where no direct flight or traditional connecting option exists or obtain a preferred schedule, a self-connecting passenger purchases two or more separate tickets, often on two different airlines. The self-connecting passenger makes their own connection at an airport either with or without assistance from a third party.



New Connecting Options for Passengers

Passengers who need to connect en route from their origin to their final destinations have a wide range of options, which are summarised in the following table.

	Self-Connecting	Virtual Hubbing	Airport Hosted Transfers	LCC Connection	Traditional Connections
Who facilitates the process?	Passenger	Online Travel Agency (OTA)	Airport	Airline	Airline
How does it work?	Passenger researches and books separate flights and airlines (using separate airline websites) and rechecks at hub airport	Passenger books single journey via an OTA who provides insurance to cover the connection at the hub; passenger may have to recheck hold luggage	Airport provides customer booking interface (via existing IT solution provider) as well as supporting infrastructure and processes (baggage transfer and customer service)	LCCs provide interlining between flights on their own network at certain hubs only; bookings made only via airline's website; needs supporting airport infrastructure	Passenger books either directly with airline or through an OTA; all interlining managed by the airline and/or codeshare partners
How is the passenger processed at the hub?	Passenger must go landside to recheck baggage and re-enter through security	Passenger must go landside to recheck baggage and re-enter through security	Passenger stays airside; baggage transferred to next flight; standard transfer processes	Passenger can stay airside; baggage transferred to next flight; may use standard transfer processes (if hub infrastructure allows)	Passenger stays airside; baggage transferred to next flight; standard transfer processes
Industry examples?	15 million passengers annually in Europe alone	Content provided from niche OTAs (e.g. Kiwi.com); search provided by meta-search engines (e.g. Kayak, Skyscanner)	Gatwick Connect and ViaMilano	Own network: e.g. Southwest, Air Asia, Norwegian, Ryanair (S17); Cross-network: e.g. Value Alliance	This segment accounts for the majority of connections today; some examples include flows over the major carriers' own hubs
Expected next steps?	Total market size increases as technology makes search and booking easier, but the majority of passengers move towards hosted solutions	Larger online brands entering the market; continued consolidation between search and OTA providers	Common standards emerging; more airports offering hosted services and protected connections	More long-haul to short-haul partnerships between carriers	Value of traditional alliances continues to erode; airlines seek further tactical opportunities with new partners

The way passengers choose to search for and book their flights will typically determine the way airports host them during their layover. 'Airport Hosted Transfers' are a relatively recent but increasingly visible innovation in this area. These transfer services target the self-connecting passenger and generally offer a level of support and security that is not available to the DIY 'Self-Connecting' passenger.

Airports are not the only players who are exploring the potential benefits offered by these new connections. LCCs are increasingly looking to take a share of this market opportunity by offering connections on their own network and exploring connections with other airlines (outside of traditional alliance, codeshare or interline protocols).

And at the beginning of the passenger journey, search providers and OTAs are building and offering new connecting itineraries to rival that of traditional connections.

New Market Opportunities for Airports Today

With several possible stakeholders competing for the LCC self-connecting passenger, why are some airports investing in these services?

Traditionally, airports have not catered specifically to self-connecting passengers and simply treated them as a subset of local passengers. Most airport operators do not know how many passengers make their own self-connections in their terminals and that with some attention and investment, their self-connecting passenger market numbers could grow and bring further benefits to their airports.

The growth in LCCs at both primary and secondary airports has led to the growth in complementary networks, which are ripe for new connecting opportunities for passengers. As shown in the table below, since 2010 the number of viable connecting market opportunities using an LCC on at least one leg of the journey has grown by more than 50%; the market for long-haul flights has grown over 80% during this same time period. Further connecting options have also been added to existing flows as carriers have increased frequencies reinforcing the connection potential at each of these airports.

Growth in Viable LCC Connecting Options (Number of Markets) 2017 versus 2010

	2017 versus 2010
Long-haul flights	+83%
Short-haul flights	+36%
Total	+53%

Source: ICF analysis of global airline schedules using ICF's Self-Connection Tool

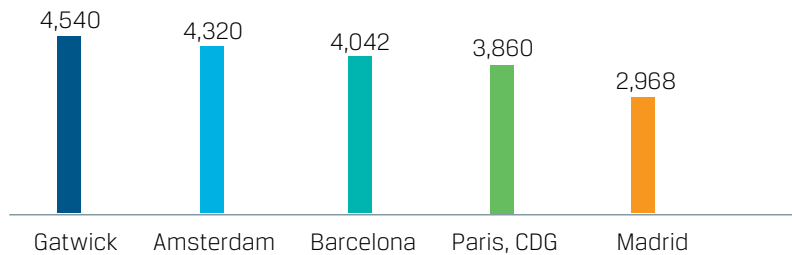


Potential Benefits for Airports from Targeting LCC Self-Connections

- Greater passenger numbers
- Enhanced passenger satisfaction and experience for the connecting passenger
- Increased air service development, especially for long-haul, by demonstrating the potential passenger flows to new services
- Larger non-aeronautical revenues through food and beverage, duty free and other commercial spending
- Additional ancillary revenues through advertising, insurance and brand partnerships

The following chart identifies European airports with the greatest potential for viable LCC connections.

Number of European Markets Served by LCC Self-Connections in 2017



Note: This is only a fraction of the hypothetical number of markets that could be connected. For example, many markets have been excluded because they would result in long routings. ICF's Self-Connection Tool uses a systematic filtering process to locate markets that meet minimum thresholds including circuitry, frequency and connection time.

Source: ICF

Currently, Gatwick provides the greatest number of potential markets in Europe creating a 'virtual hub' with more than 4,500 markets served meeting the criteria applied within ICF's Self-Connection Tool.

Other European hubs with scale and significant LCC presence closely follow Gatwick: Amsterdam, Barcelona and Paris all offer around 4,000 unique markets.

Whilst the number of self-connecting opportunities is significant, it is often overshadowed by the number of markets served via traditional connections at Europe's largest hub airports. These traditional connection flows will continue to account for the vast majority of connecting traffic at least in the medium term. However, opportunities will grow for those airports where LCCs offer significant network scale, provide new connecting opportunities and reinforce current connections served by legacy carriers.

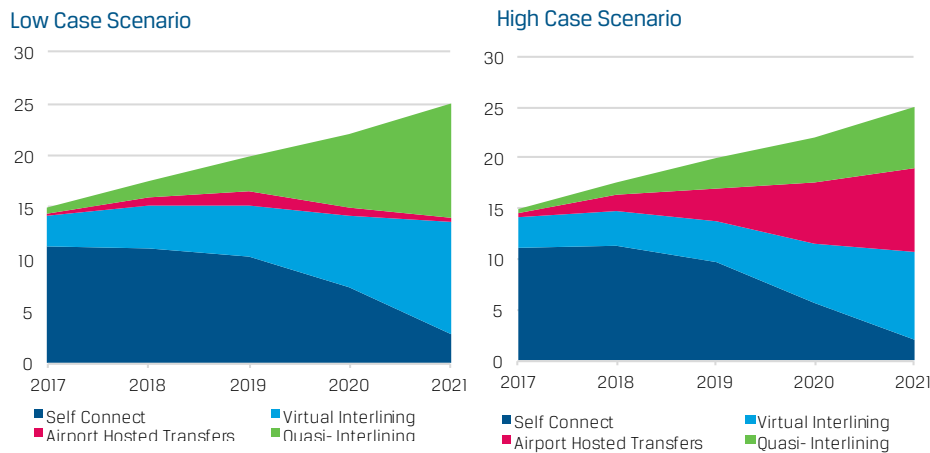
Airport Market Share Forecasts

ICF expects the next five years to bring even more change as technology, competition and passenger appetite work together as a tailwind for these non-traditional transfer services. As with any innovative product or service in its relative infancy, it is difficult to know exactly how things are likely to play out and who will emerge as the winners and losers from this disruption. However, ICF is confident about the following:

- **Competition for passenger attention—as well as spending—will continue**, with new players in the distribution space (including OTAs and airports) competing with the established brands and the airlines' own direct channels.
- **Some common practices or standards are likely to emerge**, driven either by market leaders or by collaboration in the industry. This will help raise the profile of these services and further increase take-up by passengers.
- **Airports' role in facilitating connections will remain** even though airlines, OTAs and possible other big names enter this space.

As depicted in the following charts, ICF forecasts a wide range of possibilities for airports' market share in the LCC connection segment via 'Airport Hosted Transfers'.

EUROPEAN AIRPORT HOSTED TRANSFERS (MILLIONS OF PASSENGERS)



Source: ICF

If the airport industry as a whole takes a proactive approach and develops services and passenger awareness, airports' share of this business could grow tenfold. On the other hand, if airports remain passive and simply process whoever turns up at their airport, other players such as airlines and OTAs are likely to 'own' the passenger relationship, reducing the contact, insight and incremental revenue available to airports. In any event, the total market size will grow and lead to more connecting passengers at airports generally.

At the individual airport level, airport operators who enable and support the self-connecting experience will gain positive reputations and additional traffic at the expense of those who leave their passengers to fend for themselves, whether the booking is done via OTAs, airlines or airports.

Conclusion

LCC connections will not become significant at all airports. The growth of this segment will depend on the network points served and how the viable connections over an airport compare to all the other ways of getting from A to B. As is already being seen, some airlines are set to introduce their own connecting products to enable them to compete on a wide range of market flows.

However, some airports have the potential to add incremental traffic and revenues by recognising their unique opportunities early, identifying a clear and grounded path forward and quickly implementing products and services that meet the needs of their particular passenger segment to help establish their airport as a strong connecting hub.

Partnerships with airlines and OTAs are likely to be an airport's best path forward to effectively reach passengers at the point of search and booking.

Features of Strong LCC Connecting Airports

- Scale (i.e. breadth) of network
- Strong LCC presence and some long-haul service
- Available capacity to handle more passengers
- Competitive airport charges
- Favourable aviation taxes
- Geographic advantage for connecting relatively underserved markets

To take advantage of this opportunity, airport operators need to determine:

- 1. Strengths and weaknesses** of their individual airport as a strong LCC connecting airport (see accompanying text box)
- 2. Size** of potential self-connecting market (ICF offers a self-connection tool for sizing these opportunities at any airport worldwide)
- 3. Alignment** of potential growth with strategic goals
- 4. Infrastructure accommodations** for airside self-connecting baggage transfer, if required, or an airside arrivals customer service capability
- 5. A business case** considering additional revenues from aeronautical (e.g. passenger charges) and non-aeronautical sources (e.g. food & beverage) against required infrastructure and staff investment

Early adopter airports have the opportunity to become front of mind for LCC passengers and airlines, who will be driving the rapid expansion of this new transfer segment. As traditional hubs have already demonstrated, scale and momentum are prerequisites for further network expansion, and thus these LCC self-connection flows can form an important pillar of an airport's air service development as well as non-aeronautical revenue strategy. On the other hand, failure to ensure that an airport can provide the required facilities and technology to effectively host these new connecting flows may mean it is bypassed in favour of other airports.

About the Author



Kata Cserep leads ICF's airports practice and regularly advises airports with longer term strategic advice relating to traffic, pricing, regulations, incentives and transactions. She is an expert at communicating the key demand and supply issues facing airports and their implications for business planning.

She joined ICF in 2005 and has delivered a wide variety of high value projects, including airline diagnostics and business planning, detailed market studies including socio-economics and tourism, and due diligence of airline and airport transactions.

In recent years Ms. Cserep's focus has been on the strategic aspects of airport development, including the interplay between policy, business planning and economic development, including the continued evolution of the airline-airport business relationship.

Ms. Cserep has both a master's degree and a bachelor's degree in Economics from the University of Cambridge, Trinity College in the United Kingdom.

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Keeping Up with the Customers

How Effectively Are Airports Adapting to Changing Retail Trends?

By Natasha Page, ICF

The high street retail market has undergone significant change over the past decade, in large part driven by the explosion of online shopping and digital media. For example, the e-commerce share of U.S. retail sales has increased at a compound annual growth rate (CAGR) of 12.0% since 2005. Despite much rhetoric, airports appear to have been slow to capitalise on these changes, with many still offering products and layouts not too dissimilar to what would have been in place at the turn of the century.

At the same time, with downward pressure on aeronautical yields as a result of the low-cost carrier (LCC) revolution, profits from commercial revenue sources have become increasingly important to operators and investors.

In this article, we explore how customer expectations are changing and consider what more could be done—taking into account the unique operating constraints faced by airports—to further capitalise on the commercial potential of passengers.





Bricks and Mortar: The Airport High Street

For many years, the most revolutionary change to an airport's retail offer was the introduction of a walk-through duty-free shop positioned immediately after a (preferably) centralised security check-point. Advocates of this approach argue that by ensuring all passengers walk through a single unit, the airport increases the potential to make sales. Certainly, many airports have achieved sizeable increases in sales.

However, a common customer reaction to walk-through shops is one of frustration and tunnel vision. The similar design styles adopted across airports with typically low ceilings and 'yellow brick roads' encourage passengers to pass through as quickly as possible rather than browse and ultimately spend.

Some more recent airport developments have adopted the concept of a 'de-stress' zone between passenger search and the walk-through duty free shop. This typically includes units providing 'essentials' including a pharmacy, newsagent, coffee shop, and currency exchange. Prominent flight display units are provided to give passengers information on how much time they will have before needing to go to the gate, because "theoretically" passengers are most likely to shop and make impulse purchases when they have low levels of stress. However, immediately post passenger search is cited as one of the highest stress points on a passenger's journey through an airport, making it an unsuitable placement for an airport's highest earning retail unit.

Whilst the 'de-stress' zone is undoubtedly an improvement on traditional departure lounge layouts, airports still appear to overly rely on physical infrastructure—the equivalent of the retail high street. This is reflected in the long-standing optimal space sizing approach to airport terminal design, with the metric 800-to 1,200 square meter (sqm) per million annual passengers frequently cited. Yet extra space does not guarantee extra revenue, and clearly not all retail concepts or locations are able to earn the same level of sales per sqm. Furthermore, adding additional space to airports is not typically an easy goal to achieve, often requiring costly terminal extension programs.

New Trends within the Wider Retail Industry

The key question is whether airports can further improve their retail offering by learning from trends observed in the wider retail industry. Notably, there has been a move across the retail sector away from a pure brick-and-mortar approach to greater use of online digital platforms. In the U.S., the market share of e-commerce has increased at a CAGR of 12.0% since 2005.

In addition, retailers are increasingly considering the preferences of new generations of consumers, with an emphasis on the demands of Millennials and Generation Z, the first generations growing up alongside the internet.

The perception is that these groups will favour digital channels over more traditional retail points of sale. Certainly, these groups are helping to drive the growth of e-commerce with consumers increasingly expecting convenience, choice, and high customer service levels. The success of online retailers such as Amazon and Asos has been driven by a combination of competitive pricing, accessibility, convenient delivery options, and wide product offerings.

EXHIBIT 1. KEY SPENDING HABITS OF MILLENNIALS AND GENERATION Z

Millennials Born 1980-2000	Generation Z Born post 2000
<ul style="list-style-type: none"> ▪ Price sensitive ▪ Utilise internet for peer reviews ▪ Personalised experience ▪ Use loyalty programs ▪ Utilise smart phones 	<ul style="list-style-type: none"> ▪ Prefer in-store purchases ▪ Influenced by peers ▪ Quick delivery ▪ Personalised experience ▪ Limited brand loyalty ▪ Direct purchases from social media ▪ Impulse purchases

Notably, industry surveys repeatedly find that the majority of consumers still prefer in-store purchases. This is reassuring for airports which ultimately hold a captive audience within a defined physical space.

Digital platforms primarily serve to influence, compare, and validate purchases. In particular, the popularity of social media platforms—such as Instagram—have put an emphasis on aspirational lifestyles with consumers becoming increasingly influenced by peers.

The question is: How can airports leverage new digital technologies applied across the wider industry to best address changing consumer expectations and ultimately increase sales within the departure lounge?

A Slow Response to Changing Trends

The 'de-stress zone' goes some way in recognising that the passenger experience needs to be put front and foremost in airport design. However, it is not yet evident that wider retail trends are being readily addressed at airports.

The area in which airports appear to have got closest to replicating the success of online retailers is in car parking where dynamic yield management and online booking is well established. This has been a key driver behind improving car parking yields.

Below, we consider some of the reasons why airport retail may have been slow to respond to changing consumer demands:

- 1. Cost of Investment.** The introduction of new commercial initiatives (be it infrastructure or digital) often requires investment that may not be readily available or deemed to generate a high enough return.
- 2. Terms of Existing Retail Contracts.** Contracts often have long terms, limiting an airport's flexibility to implement changes and proactively respond to changes in the industry. Furthermore, contracts may offer concessionaries exclusivity over the provision of certain services or products, limiting the options to bring in one-off retailers.
- 3. Passenger Mix.** It is well established that different passenger segments behave in different ways and this has in the past made it hard to cater for all audiences. Yet the dynamism of digital approaches helps to provide the flexibility to address this issue.
- 4. Regulations and Policies.** The change to security regulations, in particular restrictions on liquids and airline one-bag policies, have had an impact on retail sales. In addition, there may be restrictions on the use of online platforms and services, particularly in relation to customs.
- 5. Management Style.** Commercial teams at airports may not have wider high-street or e-commerce experience, limiting their knowledge of current industry trends and best practice.
- 6. Earnings Per Sqm.** In space constrained sites, airports will seek to maximise revenues per sqm. It is not clear that on a per sqm basis high street retailers are performing better.

How Can Airports Better Serve Customer Demands?

One size does not fit all, and an airport's approach to retail must consider the specific demands of its customer base and the potential returns on investment. It is neither feasible nor necessary to completely redesign an airport's retail offering to respond to changing trends. However, through the adoption of a select number of targeted solutions, airports can achieve real improvements in commercial performance and significantly improve the overall passenger experience.

ICF Aviation is working in partnership with ICF Olson, our digital customer experience agency, to help airports develop targeted, customer-focused solutions. We highlight examples of potential solutions:

EXHIBIT 2. ILLUSTRATIVE RETAIL SOLUTIONS



Delivery and collection options - Airports have been slow to offer robust shop/click-and-collect service offering despite consumer demands for convenience and accessibility. This approach would be particularly advantageous for increasing sales by outbound passengers with hand-luggage or connecting flights.



Price comparison platforms - Consumers are increasingly price savvy and want to check that in-airport products offer a genuine saving on high street prices. Outlets should price competitively, but they can also facilitate comparison, for example, by providing dedicated price comparison apps or in-store computer access for customers.



Time-of-day merchandising - The closest equivalent to car parking yield management, outlets can attract customers by changing displays and prices at different times of day to meet the demands of different customer segments. This can be assisted by using technology such as digital displays.



Targeted offers through digital platforms - To target price-sensitive customers and encourage impulse purchases, airports can use apps and loyalty programs to send targeted promotions to customers, both prior to and during their journey through the airport.



Customer-focused outlet designs - Consumers increasingly expect a personalised and unique shopping experience and the design of in-terminal retail outlets needs to reflect this. In addition, consumers expect variety and change—use of pop-up retail can help maintain the interest of frequent travelers.

About the Author



Natasha Page is a Senior Manager in ICF's London Aviation team, with a particular focus on helping airports to maximise profitability through optimising both commercial revenues and operating costs. Ms. Page has led our commercial revenue forecasting work for several recent successful transactions including Copenhagen and London City Airports. Beyond transaction work, Ms. Page

has worked with airport managers and investors on a number of projects including corporate strategy, investment analysis and economic regulatory advice. Prior to joining ICF she worked at A.T. Kearney, LeighFisher and as part of Macquarie Capital's airports team.

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New Airport Retail Concepts

- Luxury vending
- At-seat vending
- Time-of-day merchandising
- Click-and-collect
- Loyalty programs
- Pop-up retail
- Showroom concepts
- Airport apps
- Digital advertising
- In-flight service

About ICF Olson

ICF Olson is a full-service marketing services agency purpose built for the new realities facing clients. With more than 800 employees across 14 offices in the U.S., Canada and India, ICF Olson is one of the world's top 50 agency companies. It boasts uniquely broad and deep expertise across the entire spectrum of marketing services, having been recognised as a "leader" in loyalty and CRM by Forrester Research, Adobe Marketing Cloud's North American Partner of the Year, and Public Relations Agency of the Year by PR Week. ICF Olson's individual brand campaigns have won 27 Effie Awards, the marketing industry's highest accolade for effective marketing.

Saudi Arabia's Changing Aviation Landscape

By Abbas Mirza, ICF

The Kingdom of Saudi Arabia has been the subject of important economic and social change – a process thrown into focus by Vision 2030, the Kingdom's blueprint for future prosperity led by Crown Prince Mohammad bin Salman bin Abdulaziz Al-Saud.

Saudi Vision 2030 has clearly articulated the need to restructure the government's strategy and to diversify the Kingdom's economy to reduce its reliance on oil revenues such that it can sustain, expand and create a more productive economy. In line with this, the country is considering a number of steps to:

- Transform Saudi Arabia's strategic location into a global hub connecting three continents, Asia, Europe and Africa.
- Utilise resources more efficiently.
- Expand into new economic sectors to become an economic powerhouse.
- Privatised government services.

The aviation industry is seen as playing a key role in this strategy.

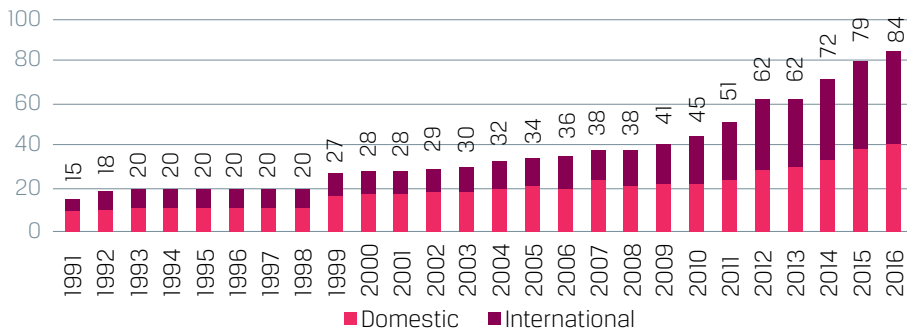
The Kingdom of Saudi Arabia has long recognised the aviation sector as a means to drive economic growth and talent development, whilst elevating the Kingdom's position on the regional and global stage. However, only recently, and partly driven by Saudi Vision 2030, has the pace of liberalisation and regulatory reform truly gained momentum. One key initiative behind this growth has been increased private sector participation (PSP) activity through the privatisation of the Kingdom's airports.



Overview of the Saudi Aviation Market

Over the last two decades, the aviation market in Saudi Arabia has grown substantially. Following a noticeable growth acceleration over the past five years, the Kingdom's airports in 2016 handled more than 84 million passengers.

EXHIBIT 1. TOTAL PASSENGER TRAFFIC AT SAUDI ARABIA'S AIRPORTS (MILLIONS)



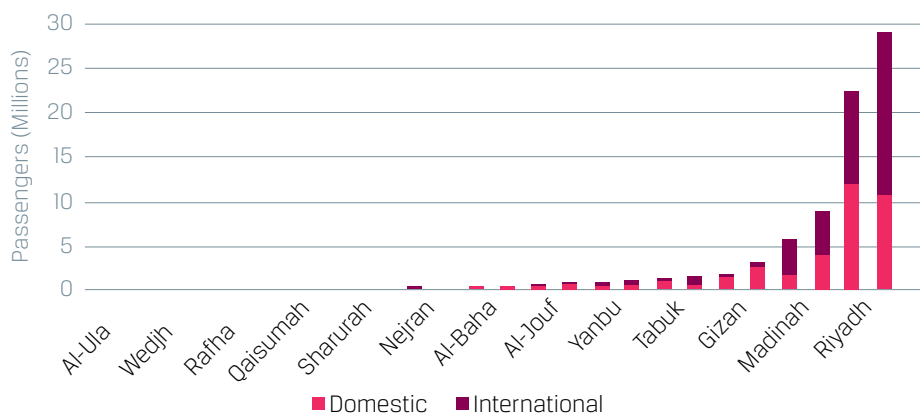
Source: ACI, GACA, ICF analysis

CAGR	1991-1995	1995-2000	2000-2005	2005-2010	2010-2016
International	9.6%	3.0%	5.4%	11.2%	11.7%
Domestic	4.6%	9.8%	4.1%	1.1%	10.4%
Total	6.7%	7.0%	4.6%	5.4%	11.1%

Saudi Arabia's population is heavily concentrated in a few large cities, and the concentration of traffic among airports shows a similar pattern. The top four airports, namely Jeddah, Riyadh, Dammam and Madinah, presently account for more than 80% of the passenger traffic.

As the total air traffic expands further, however, we would expect a progressive sharing of growth with the regions as a wider range of services become viable. Saudi Arabia regards this increase in regional access as an important element in its overall goal for better intra-country connectivity and mobility.

EXHIBIT 2. DISTRIBUTION OF TRAFFIC BETWEEN AIRPORTS IN SAUDI ARABIA



Source: ACI 2015

Factors Contributing to Recent Growth

Several favourable factors have contributed to the dynamic growth of the Saudi market:

- **Economic growth:** The country's real GDP has doubled from the height of the previous oil boom in 1980 to 2016.
- **Migration:** The growing economy has attracted significant net migration and the population of the country has doubled since 1990 and is currently over 32 million people.
- **Domestic Fare Cap:** General Authority of Civil Aviation of Saudi Arabia (GACA) took positive steps toward reforming the domestic fare cap in 2015 when it allowed domestic carriers to lift ticket prices within 10 days of departure. More recently, consensus rests on less regulatory intervention and the phasing out of price controls, so airlines have far more flexibility and freedom in how they set prices based on market drivers.
- **New Airlines:** Several new GCC based carriers, namely flyadeal, Nesma Airlines and Saudi Gulf Airlines, have commenced operations in Saudi Arabia since 2016.
- **Open Skies:** The liberalisation trend is expected to continue towards an eventual open skies regime which de facto exists with a few countries already.

Saudi Arabia's Airport Privatisations

Experience worldwide has made clear that rapid air traffic expansion is only possible if the airport infrastructure can respond effectively to the new demands. Saudi Arabia has responded with a programme of privatisation that would have been unthinkable even a decade ago.

In 2017 alone:

- A consortium of Turkey's TAV Group and Saudi Arabia's Al Rajhi Holding Group were awarded the concession rights to develop and operate three international airports: Yanbu, Hail and Al-Qassim. These 30-year concession awards build on TAV and Al Rajhi Holdings Group approvals for a 25-year concession in 2012 to develop and operate Prince Mohammad bin Abdulaziz Airport (PMIA) in Medina, alongside contractor Saudi Oger. The PMIA privatisation process took over 14 months to complete whilst the more recent airport privatisations were concluded within four months.
- GACA recently awarded Consolidated Contractors Company, Flughafen Munchen – the operator of Munich Airport – and Asyad Holding Group to develop a new international airport in the city of Taif, near Mecca. The new airport is expected to open towards the end of 2020.
- Singapore's Changi Airports International (CAI) won the rights to operate King Abdulaziz International Airport (KAIA) in Jeddah, which is the main gateway to Mecca, for a 20-year period. GACA will bear the \$7.2 billion cost of the ongoing expansion works to transform the customer experience and cater for future passenger growth.



Of note in recent transactions is that "traffic risk guarantees" are not included in the contractual arrangements as they were for PMIA. To an extent, GACA's decision not to include this contractual clause implies their confidence that the underlying fundamentals are in place for robust future traffic growth without market share cannibalisation between airports.

Future Prospects for Saudi Arabian Markets

Looking ahead, GACA has set itself the ambitious target of privatising all of its 27 airports by 2020 as a means to raise revenues, encourage best in class international operators, manage the passenger travel chain and seek private sector investments to fund capital expansion plans.

Over time, from a governance perspective, each airport will be transformed into an operating company with its own board responsible for all operational and financial performance. Each airport company will be owned by the Public Investment Fund (PIF) which will be responsible for future privatisations. PIF will, over time, become the world's largest sovereign wealth fund and take over Saudi Civil Aviation Holding, which will act as an umbrella company for the airport operators. Privatisations may take the form of initial public offerings and equity stake sales.

Riyadh's King Khaled International Airport will be the first entity to undergo this transformation. It is intended that a minority stake sale (value yet to be determined) in the newly formed Riyadh Airport Company will take place towards the latter part of 2017 or the beginning of 2018.

Expansion of the holy sites of pilgrimage and connected infrastructure is expected to remove some of the existing bottlenecks, which is, in turn, expected to allow further growth of pilgrim traffic. In line with the Saudi Vision 2030 strategy of increasing religious traffic to meet its responsibilities to the Islamic world as a whole, two major programmes have been set in hand:

- A \$27 billion expansion programme began in 2011 at Mecca with the ultimate aim of more than doubling the capacity of the Grand Mosque to 2 million peak capacity.
- A \$7 billion programme at the Prophet's Mosque in Medina to enable its current peak capacity of 1 million worshippers to increase by 60%.

Finally, optimism in the aviation sector is further demonstrated by the government's intention to not only enhance the current infrastructure but to build new airports over time. Initial approval has been granted for two new airports in the Riyadh region to serve northern and southern provinces, thus making regional cities more connected with the overall aim of better serving the Saudi citizen.

In addition, plans are being formulated by GACA to assess the feasibility of a new airport in the Mecca province which would be business-based as opposed to the new Taif Airport whose primary objective is to serve the profitable religious traffic segment.

Conclusion

In conclusion, the Kingdom's political will is redrawing the aviation landscape at a pace never seen before. This is being shaped not only by Saudi Vision 2030 but also the pressing economic need to adjust to the challenging economic realities of low oil prices for the foreseeable future and less reliance on state funding.

Private sector participation in the Kingdom's airports are not only alleviating the downward pressure on capital expenditure budgets but also introducing world-class airport operators to enhance the passenger experience.

From once being trapped in a relatively static and conservative government-driven paradigm, Saudi Arabia is in the process of rapid transformation. Indeed, by 2020, the Kingdom's aviation market system will be ahead, in some respects, of many countries in Europe and North America.

About the Author



Abbas Mirza, Vice President with ICF's Aviation Group, is a former head of commercial at Heathrow Airport, BAA, and brings over 20 years of commercial and financial experience to his assignments. Mr. Mirza is a leading expert in financial modelling of airport revenues and costs for airports with a remit to maximising asset values. In addition to his commercial and retail expertise, Mr. Mirza has significant experience in the airport transaction arena, working and preparing material for governments, civil aviation authorities and private investors on airport privatisations.

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Reimagining the Passenger Experience:

The Importance of Building a Customer-Centric Strategy

By Eliot Lees, Stephen Freibrun, and Mark Drusch, ICF

Across the globe, an air travel renaissance is happening: more passengers are flying on airlines and moving through airports than ever before. However, despite new investments and technological advancements, passengers still perceive the travel experience as having deteriorated.

The expectations of customers and, by extension, aviation passengers have changed dramatically in the past decade. While companies like Uber, Blue Apron and Netflix have raised the bar for customer experience by providing customers with what they want, when and how they want it, airports and airlines have struggled to keep pace.

Airports and airlines no longer get credit for delivering on the basics; they need to exceed expectations through innovative, useful, and usable customer-centric solutions. To reap the financial benefits of this cultural shift, airports and airlines must examine today's travel experience through the same customer-centric lens and work collaboratively to design and implement creative solutions.

Divergent Interests: Passenger Interests vs. Airline/Airport Interests

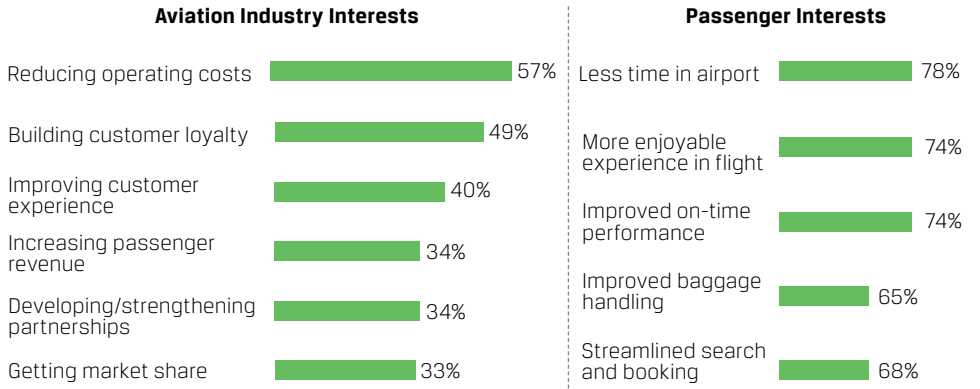
The pressures of ongoing passenger growth and delivering more with less have negatively impacted air travel. Increasingly, there is a misalignment between the passenger's needs and the airport's/airline's needs, and customer experience has suffered. As seen in the graphs on the following page, the goals of airports and airlines are to generate more revenue, reduce operating costs and increase asset utilisation—all while simultaneously strengthening customer loyalty.





The goals of passengers are different. Passengers want to spend less time in airports, arrive at their destination on time and have a comfortable experience on board.

AVIATION INDUSTRY AND PASSENGER DIVERGENT INTERESTS



Source: Economist Intelligence Unit, 2015

While divergent interests will continue to exist, investing in an extraordinary customer experience translates directly into dollars. If an airport or airline can successfully execute an innovative, customer-centric strategy, the enhanced customer experience will translate into measurable financial benefits.

For an airport, an efficient and well designed journey for passengers from the curb should provide a passenger more predictability in the time required to reach their departure gate. This may result in the passenger engaging more with airport vendors, yielding more revenue for the airport. Recognising that the passenger journey is from curb to curb, which often includes connecting itineraries and service disruptions, improving all aspects of the journey will lead to higher customer satisfaction and positive economic benefits. Optimising the configuration of airport terminal space leads to a balanced passenger flow and more efficient space utilisation, thus requiring less capital investment.

Examples from other industries around customer experience indicate that even minor enhancements and improvements can boost performance:

- **Strengthen loyalty:** By building multiple sales and marketing channels (e.g. online, in-store and phone), fashion retailer Superdry saw an 80% increase in customer retention. They also noted that omnichannel customers spend 2.6 times more than those who only used a single channel.
- **Reduce costs:** The UK's Government Digital Service created digital services that were "simpler, clearer and faster" to use. This resulted in savings for the UK government of £3.5 billion between 2012 and 2015.
- **Increase revenues:** In making its B2B tools significantly easier to use, Facebook saw a 56% increase in ad revenue in the quarter following the change.

The new passenger mindset demands that airports, airlines and other aviation stakeholders work together in new ways to offer a seamless customer-centric experience. Even though airports and airlines may view their respective roles in the travel chain quite differently, the customer views all phases of air travel as a single journey. For this reason, to successfully transform customers' perceptions, an integrated design of information and communications is required to provide one dependable voice to the customer.

It does not matter whether customers experience frustrations at the airport or on the airplane—both contribute to a negative experience overall. To combat this, aviation stakeholders from across the travel chain must work together in new and innovative ways. Stakeholders must improve performance measurement of discrete elements of service delivery. They must employ new strategies, processes and technologies that provide the information for coordinated decision-making, rethinking service delivery and organising staff in more efficient ways. Embracing engagement with passengers, as customers, will result in better customer-centric offerings.

A Human-Centric Approach to Solving Customer Experience Problems

Adopting a customer-centric approach requires tactics and action plans that speak to the traveller as an individual, provide a better overall travel journey and empathise with the needs of passengers. Solutions should focus on the mental, physical and emotional needs of the traveller.

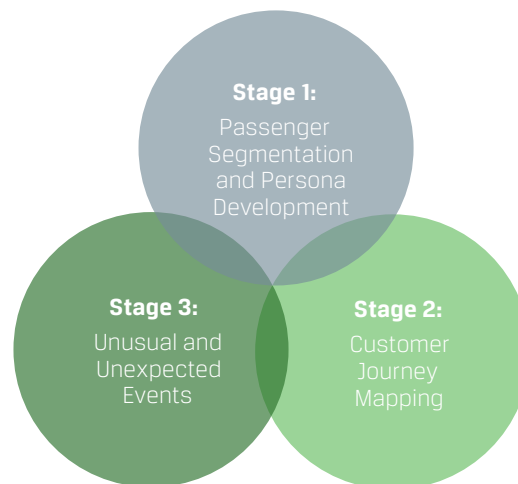
- **Mental wellbeing: Providing real-time information to ensure a stress-free experience.** From long security queues to inclement weather, traveling can often be an anxiety-ridden experience. Passengers' expectations are influenced by the experiences of others, whether that is from a personal experience on a prior trip or from a social media post of a friend who had a poor experience. Airports and airlines must understand, assess and react to the various information channels currently utilised by their passengers.
- **Physical wellbeing: Awareness that physical design can contribute to a positive travel experience.** With more passengers traveling than ever before, both aircraft capacity and terminal capacity are reaching their limits. Given the large capital investment required for infrastructure renovations, airports and airlines must understand and rethink how passengers interact with their environment. There is an opportunity to tailor amenities and services such that limited space is optimised, making cramped quarters more enjoyable.
- **Emotional wellbeing: Empathy toward the stress commonly associated with travel.** Traveling can trigger a range of emotions. A first time flier might feel both apprehension and excitement. A vacationer embarking on a family vacation might feel more relaxed. And the same individual will experience different emotions depending on their traveling



circumstances: a business traveller trying to navigate a crowded airport for a one-day trip might feel stress and frustration, but when they return to the same airport as a vacationer preparing for a family visit, they might feel happiness and relaxation. The most successful airports and airlines will be those that can anticipate the diverse needs and desires of their travellers and create positive experiences for each of them for each of their unique traveling circumstances.

An improved airport/airline experience does not start with the solution; it starts with the customer. And a one-size-fits-all approach simply will not do. It must be custom-tailored and targeted to the unique expectations of the airport's or airline's particular market. To help airports and airlines improve their customer-centricity, ICF has built a holistic approach to understanding the passenger experience unlike anything else in the industry:

HOW TO IDENTIFY CUSTOMER-CENTRIC CHALLENGES



Stage 1: Passenger Segmentation and Persona Development

Just as there is no common person, there is no average traveller. Each individual who steps into an airport and onto an airplane possesses a unique set of beliefs, perceptions and desires. However, through a blend of stakeholder workshops, customer interviews and social media analysis, airports and airlines can begin to segment their market. They can identify the desires and expectations common among different groups of individuals and get to the heart of what drives these traveller typologies. Whether that's the family journeyer, the weekend warrior or the business commuter, airports and airlines can better uncover memorable and issue-free experiences for each type of traveller. They can identify what specific experiential components will help boost loyalty, increase revenues and support lower costs.

Stage 2: Customer Journey Mapping

An effective journey map for each persona unveils any issues or perceptions (positive or otherwise) along one's travel path. An infrequent traveller's journey map may bring to light how well an airport conveys distance-based information, while a journey map for a person with disabilities or a senior citizen traveller may reveal the difficulty in quickly locating access to assistance, if needed. A journey map for the former would not reveal key issues for the latter or vice versa, which is why it's important to complete journey maps for each customer segment. By identifying the different demographic profiles common within a certain airport or flying a certain airline, specific plans can be created that reach and address each of these customer segment's behaviors, attitudes and needs.

Stage 3: Unusual and Unexpected Events

Too many consultants build solutions only for the ideal case. However, the airport and airline experiences remembered and talked about most are the ones that are handled well during the less-than-ideal situations. Whether it is addressing the fallout from a lost bag, cancelled flight or hour-long security wait, solutions need to be designed that answer these challenges, too. These solutions will differ by persona, and they will differ by airport or airline. What a major metropolitan international airport requires will differ greatly from what a rural regional airport needs.

Collaborative Customer-Centered Solution Examples

The goal of any customer experience strategy is to bridge the divide between what airports and airlines want and what customers value, ensuring that the passenger's needs are a high priority in every solution. The airport's or airline's job is no longer about getting people to buy and do what *we* want, but rather helping people buy and do what *they* want.

Innovations that put the passenger at the heart of solution design include:

- **Dynamic Queue Management:** As seen in the table on the next page, airport and airline queues are one of the greatest complaints of passengers. But airports have yet to address how time of day and time of year affect staffing requirements and, in turn, passengers' travel experiences. Using new technology, proactively measuring performance, changing responsibility for managing queues and working with airlines to ensure staff understand and comply with relevant protocols can have a profound impact on the customer experience through the travel journey.



TRAVEL EXPERIENCE PRIORITIES RANKED BY PASSENGERS

Areas of importance while traveling	North American passengers ranking	Global passengers ranking
Waiting time in check-in queue/line	1	1
Ease of finding one's way through the airport (wayfinding)	2	2
Waiting time at security inspection	3	5
Cleanliness of washroom/toilets	4	3
Internet access/WiFi	5	4
Comfort of waiting/gate areas	6	8
Availability of washrooms/toilets	7	9
Restaurant/eating facilities	8	16
Feeling of being safe and secure	9	7
Courtesy and helpfulness of security staff	10	11

Source: Economist Intelligence Unit, 2015

- Innovative Mobile Apps:** According to SITA, a UK-based air transport communications and technology company, 83% of passengers carry smartphones. Airports must be equipped with mobile applications that are usable and useful. Using a model similar to popular apps like Pokémon GO, airports could leverage smartphone cameras and GPS to overlay additional contextual information onto the airport's physical environment, enabling passengers to select navigation to key locations (e.g. nearest toilet or restaurant) and follow Google Map-like directions. Airports could address language barriers by integrating technology such as Google Translate to relay loudspeaker announcements and transcripts. Airports could work with airlines to ensure these mobile apps are useful to passengers by also providing desired data that only the airlines can provide, such as gate changes and flight delays.
- Increased Staff Presence:** Not all solutions must be technological. In fact, process improvements are often easier and less costly to implement and can lead to near-immediate change. Adding airline helpers equipped with the right information and the right attitude at potential check-in bottlenecks helps relieve passenger anxiety, keeps queues and other high-traffic areas clear and leads to a more efficient process. Adding duty-free concessions staff who speak multiple languages results in greater sales among foreigners who would otherwise choose not to shop due to communication anxiety.
- Security Fast Track:** Airports could enable any passenger to opt-in to an expedited processing lane for security and customs. Some customers (e.g., passengers pressed to make a connection) may be inclined to purchase access to a "fast lane," if offered and if they could do so via an airline's or airport's mobile app. This revenue could be shared by both the

airline and airport. Moreover, airports could embrace variable, demand-based pricing to increase the cost of the fast lane when the general processing lines are longest, similar to high-occupancy vehicle/toll lanes on roads.

Conclusion

Airlines and airports share the need to develop customer-centric strategies to improve the passenger experience in all phases of air travel. If done thoughtfully, core business objectives can be met by improving revenue generation and customer loyalty, while driving down costs.

The challenge for both airlines and airports is to meet the needs of the passenger by developing customer-centric solutions that align with core business objectives. If customer-centric solutions do not improve revenue, strengthen loyalty or reduce costs, there is little incentive for change.

ICF is uniquely positioned to address the challenges associated with implementing customer-centric solutions. Our domain expertise in airports and airlines, combined with our experience in customer behavior across multiple market segments (including travel and hospitality), addresses all perspectives of this complex issue. This enables us to design integrated, holistic customer experience solutions that provide best-in-class and next-in-class solutions that are specific, actionable and customer-focused.



About the Authors



Eliot Lees leads ICF's airport passenger experience service line and specialises in applying technology and business intelligence to improve passenger experience through improved operational performance, optimised capital investment and enhanced airport management decision-making. For more than two decades, Mr. Lees has advised airports, governments, investment banking firms and operators regarding airport transactions, as well as strategic planning and implementation. He brings experience managing large, complex projects with multiple workstreams and developing pragmatic client solutions. Prior to joining ICF, Mr. Lees was an investment banker specialising in infrastructure finance. He spent more than 10 years in various finance positions with leading New England financial institutions, including serving as Vice President of the Bank of New England. Mr. Lees has an M.B.A. from Boston University and a B.A. in economics from the University of Massachusetts.



Stephen Freibrun brings more than 30 years of management and real estate experience in the public and private sectors. He assists airport clients, airlines and airport investors with concessions projects, property management and facilities planning. His responsibilities have included the evaluation, definition and coordination of concessions facility implementation to meet client goals of balancing improved

customer service and revenues to the airport. He has seen many clients almost double their sales per enplanement after implementation of their concession master plan including Miami, Richmond and Anchorage. Mr. Freibrun has an M.A. in International Management from Thunderbird - American Graduate School of International Management and a B.A. in Political Science from University of Illinois.



Mark Drusch helps identify and implement new market and revenue opportunities, restructure and transform operations to achieve higher profitability and integrate management teams to maximise results and minimise cross-company inefficiencies. In the 15 years Mr. Drusch served as Senior Vice President at Delta Air Lines and Continental Airlines, he led transformations in commercial airline

strategy and execution, revenue management, route planning, scheduling, alliances, loyalty, distribution, regional carriers and catering. Mr. Drusch also offers experience building customer facing platforms from the ground up, integrating airline and hotel systems and digitally interfacing with businesses' clients globally. Mr. Drusch has a B.A. in Political Science and International Relations from Northwestern University.

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BRIC Countries: Destiny Fulfilled?

An Overview of the "BRIC Countries" in the 15 Years Since the Acronym Was Coined

By Dan Galpin, ICF

For private industries looking to invest in the BRIC countries, ICF brings valuable insights into the risks, opportunities and nuances of each.

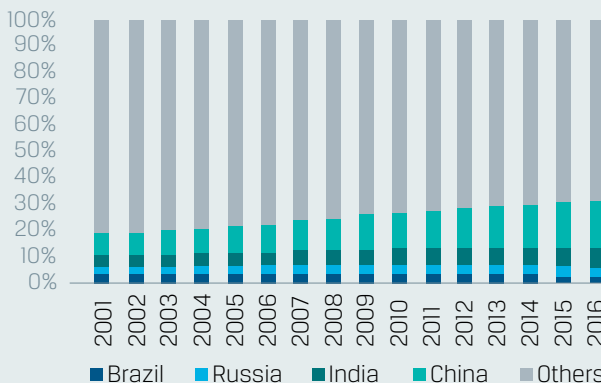
BRIC Countries Fulfilling Their Promise

In 2001, Jim O'Neil of Goldman Sachs coined the term "BRIC" as an acronym for Brazil, Russia, India and China – the four leading emerging economies at the time. The BRIC economies accounted for 19% of 2001's world economy (on a PPP basis) and 44% of the world's population. Fifteen years on, the BRIC economies have, at a high level, fulfilled their promise – they now account for over 30% of the world economy and 42% of the world's population.

These countries continue to shape and change the world economy, and as their economies evolve and grow, the aviation markets are sure to follow.

ICF has worked extensively in each of these fascinating markets, and in doing so has gained invaluable insight into the risks, opportunities and nuances in each.

GDP PPP WORLD SHARE



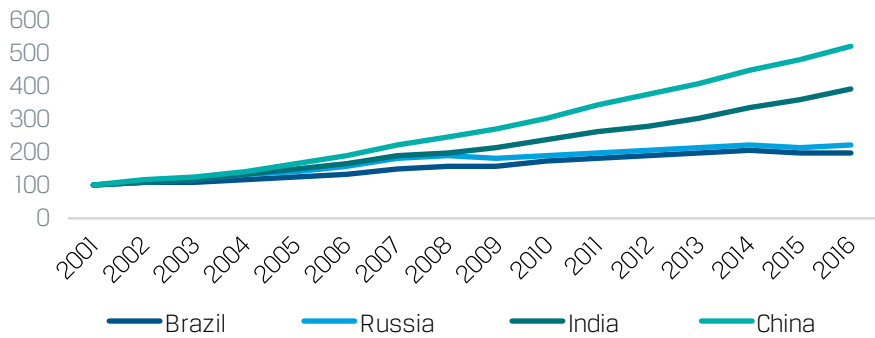
Source: IMF WEO April 2017



But to Varying Degrees

While the four BRIC countries are still the largest four developing economies in the world, there is little else that binds them together. India and China are – by far – the two largest countries by population, each with over 1.3 billion (bn) people. Russia (143 million) and Brazil (206 million) are large in a global context but a fraction the size of India and China. Moreover, while India and China's populations have grown by roughly 350 million (m), combined, in the last 15 years, Brazil's population has grown by just 30m and Russia's has actually shrunk over the same period.

GDP PPP, INDEXED 2001 = 100



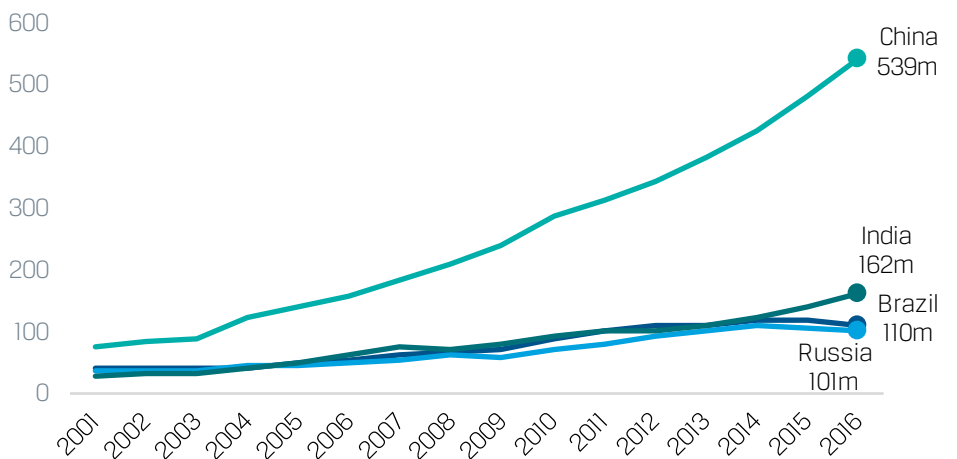
Source: IMF WEO April 2017

China Leading the Way in Aviation

As shown in the graph below, the Chinese aviation market was around 75m¹ passengers in 2001, compared to 25-40m in the other three BRIC countries. Since then, the Chinese market has grown to 539m at a 15-year CAGR of 14.3%. Meanwhile, India, starting at a much smaller base in 2001, has overtaken Brazil and Russia to reach 162m (CAGR 12.8%). However, much of this growth differential can be attributed to the different economic growth rates experienced, as the table opposite illustrates.

So, relative to GDP growth of 11.6% p.a., the growth in Chinese passenger segments is actually the lowest of the BRIC countries at just 1.23x multiplier, while Brazil's 7.2% p.a. (the lowest of the BRIC countries) actually implies the highest ratio to its rather sedate 4.4% GDP growth.

AIR PASSENGER GROWTH (MILLIONS) - BRIC COUNTRIES



Source: China: CAAC, India: AAI, Brazil: ANAC, Russia: THC, World Bank

¹Origin and destination journeys

The relationship between economic growth and air passenger demand (often referred to as the "income elasticity") has been the subject of numerous studies, and these ratios are actually fairly typical of trends seen in more developed countries. One might expect that the economic growth in developing countries - where vast swathes of the country simply can't afford to fly - would have a higher multiplier effect than in developed markets. However, the numbers do not always bear this out. For example, the UK Department for Transport estimated the income elasticity of UK air demand to be 1.3 (some segments were considerably higher). Developments in airline business models and the opening up of markets have contributed to growth being sustained in even the most mature markets.

CAGR², 2001 TO 2016

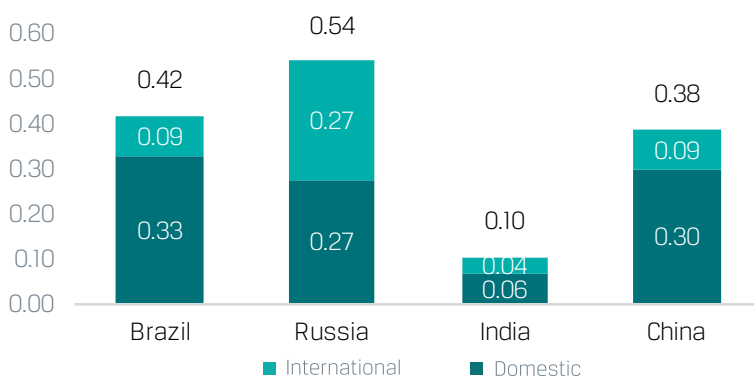
	Pax	GDP	Ratio
Brazil	7.2%	4.4%	1.62x
Russia	7.7%	5.3%	1.47x
India	12.8%	9.5%	1.35x
China	14.3%	11.6%	1.23x

And There's a Long Way to Go

In general, the BRIC aviation markets do not (yet) reflect their economic standing in the world. China recently surpassed Ibn airport passengers, but is still second to the U.S., a country with a population a quarter the size of China's and an aviation market that exceeds 700m passenger segments. India's aviation market is smaller than Germany's, despite a population 16x the size. Brazil and Russia fare no better in world rankings.

Correcting for population size illustrates some interesting differences between the BRIC countries. Brazil, Russia and China – despite their differences (remember the GDP per capita in Russia is 60% higher than China) – all have a similar domestic propensity to fly (O&D passengers per capita). Russia has by far the higher propensity for international travel – 3x higher than Brazil and China and almost 7x as high as India. This is likely a consequence of (amongst other things) the country's deep cultural and economic ties with the former Soviet Republics that surround the country. India's propensity to fly is far lower than any of the other BRIC countries, belying its relatively low per-capita economic power.

O&D PASSENGER SEGMENTS PER CAPITA, 2016



Source: IATA PaxIS, IMF

²Compound annual growth rate

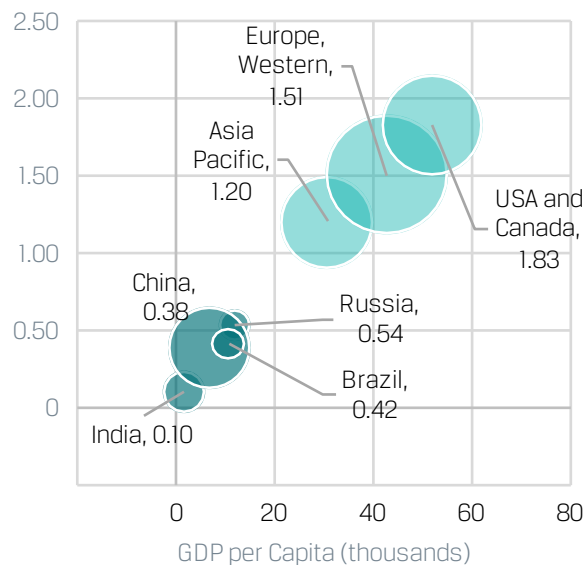
Further correcting for the spending power of individuals within the countries reveals a distinct pattern of increasing propensity to fly compared with GDP per capita. Not only does this help explain India's low propensity to fly, but it provides invaluable insight into how these markets will develop as their economies continue to grow. Still, GDP per capita cannot tell the whole story – income inequality, geographies and multi-modal competition (e.g. high-speed rail) all play key roles in determining the ultimate market size.

Open for Business?

Like much of the world, aviation in BRIC countries in 2001 was largely state-run. Over the past 15 years, the BRIC countries have embraced liberalisation to varying degrees and with varying success. Incentivised by the prospect of a more commercial management process, releasing equity or securing investment, each of the BRIC countries now has some level of private sector involvement in the management or ownership of its airports.

Brazil recently awarded management concessions to 6 of the top 20 airports in the country. The country has commenced the concession process for 4 more airports. In each case, concessions were accompanied by a commitment to invest in the infrastructure.

O&D PASSENGER SEGMENTS PER CAPITA, 2016

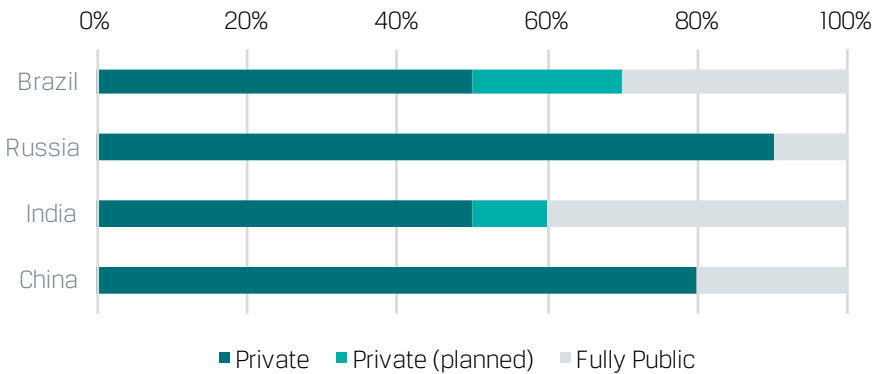


Size of bubble represents passenger market size
Source: IATA PaxIS, IMF

This is similar to the situation in India in which the two largest airports – Delhi and Mumbai – were awarded as concessions with conditions that required considerable investment in facilities. The Indian government has also sought private investment in building greenfield airports (e.g. Goa Mopa and Navi Mumbai). China has taken a different approach – whilst all airports are owned and managed by local or state entities, most also have some level of private investment. The law prevents management or ownership of more than 25% by a foreign entity, but this has not prevented foreign companies from being brought in to advise on management or to invest in minority stakes. Finally, Russia is the only country in which a significant number of airports are privately owned (although

in most cases the government retains ownership of the runways). Moscow-Domodedovo and the Novoport Airport Group (which owns 13 regional airports across Russia) are notable examples. All compare favourably with the EU (47% of airports have some private involvement).

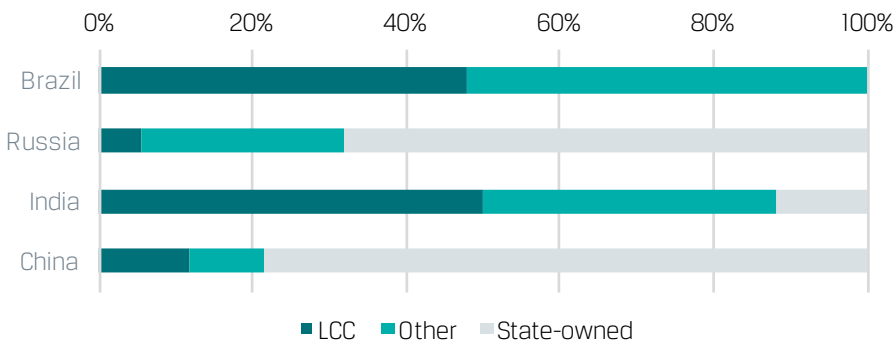
PROPORTION OF TOP 10 AIRPORTS WITH SOME LEVEL OF PRIVATE INVOLVEMENT



Note: "Private" includes minority shares, private ownership and concessions
 Source: ICF

Much like the airport sector, the airline industry has also become more open in BRIC countries in recent years. Brazil is operated entirely by private airlines and has recently removed a cap on foreign ownership which is intended to spur greater foreign investment and competition. Russia, in contrast, is dominated by Aeroflot, the state-backed airline, and its subsidiaries. Private airlines do exist, notably S7, but are niche and focus on charter or regional flying.

SEAT CAPACITY BY CARRIER TYPE



Source: OAG schedules, August 2017

India opened its doors to private investment in airlines in the early 1990s but restricted competition to the domestic market in order to protect state-owned Air India. The market developed further with the introduction of LCCs in the mid-2000s and is now dominated by private operators. Following years of heavy losses and government subsidies, the government is now looking to divest its interest in Air India. Further evidence of a relaxation of policy towards private operators is the recent removal of the "5/20 rule" which required airlines to operate for five years and have 20 aircraft before flying internationally.

ICF BRIC Country Experience

ICF have been using its knowledge and experience from BRIC markets together with a global context to assist investment communities and aviation stakeholders around the world in understanding the risks and opportunities in emerging markets. Recent examples include:

- Buy-side due diligence on recent Brazilian airport privatisations
- Vendor side market analysis and business plan modelling for a portfolio of regional Russian airports
- Technical advisor on nine Indian transactions, including supporting the winning bidders (GMR) for India's greenfield airport GOA Mopa
- Concession planning at China's Xiamen Airport
- ICF's airline, aerospace and aircraft practices broaden our experience base to every element of the aviation industry from fleet planning for Air China to a strategic review of maintenance processes at Russia's UTair

China relaxed rules on airline ownership in January 2004, resulting in the creation of several private airlines to compete with the state-owned airlines that dominate the market. Hainan is the largest privately-owned airline, but still only accounts for 6% of seat capacity. Since 2004, each of the three largest state-owned airlines (China Southern, China Eastern and Air China) have joined an alliance, indicating an increasingly global outlook. China Eastern recently went one step further, entering into a partnership with fellow SkyTeam member Delta in which Delta acquired a small stake in the Chinese airline.

Conclusion

Much has changed over the past 15 years – BRIC countries have added over 740m passenger journeys. At current growth rates, China could overtake U.S. as the largest aviation market in 3 to 4 years. It appears private industries will play a significant role in financing the considerable investment required to support continued growth in these markets. China has been the exception so far, but for how long remains to be seen. Governments are understanding the value of a vibrant and competitive aviation market but struggling with how to balance it with the desire to protect homegrown industries. The most mature aviation markets in the world are still struggling to strike this balance.

Understanding the past is critical to projecting the future and its many risk factors including political instability, multi-modal competition, ailing national carriers and capacity constraints, all of which have precedents around the world that can provide further insight.

About the Author



Dan Galpin specialises in traffic forecasting, airline network planning, scheduling, pricing and revenue management. He is experienced in a variety of aspects of the aviation industry, having worked for NATS (the British Air Navigation Service provider), as well as Virgin Atlantic Airways. Mr. Galpin has extensive first-hand experience in airline revenue management and was also involved in the introduction of Virgin's domestic feeder network which provided valuable insight into network strategy and planning. He has a background in complex data analysis and modelling and its application to the aviation industry.

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Airport Infrastructure Lite – What Are the Next Investment Opportunities After TCR?

By Simon Morris, ICF

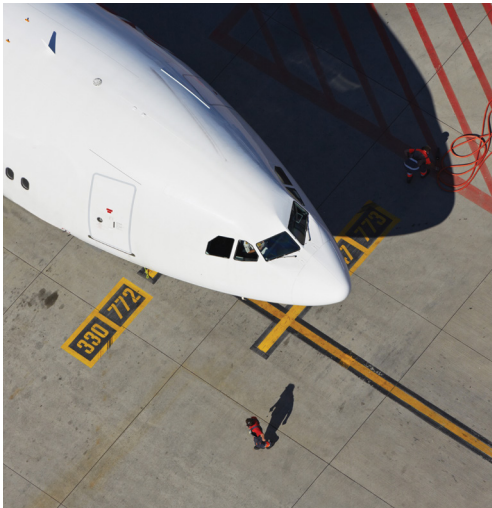
Abstract

With growing competition and a limited pipeline of airport transactions, airport investors are increasingly turning to ancillary airport businesses as a means to accessing the aviation asset class.

The 2016 sale of TCR, a ground service equipment leasing provider, attracted significant interest from both private equity and infrastructure investment firms. Ultimately, the company was acquired by 3i and Deutsche Alternative Asset Management—both investors associated with more traditional infrastructure investments. The type of investor TCR attracted indicated that it was considered to have the potential to offer infrastructure-like return characteristics.

As the market leader in its sector, the TCR opportunity could be considered a "one-off". However, the success of this transaction indicates that other similar transactions may follow. In this white paper, ICF explores the infrastructure characteristics of the TCR case and considers other businesses associated with airports that could attract infrastructure investors.





Airports – A Saturated Asset Class?

For the last two decades, airports have gained prominence and acceptance as infrastructure assets though they do not initially appear to meet all the characteristics of a "classic" infrastructure investment. Airports are protected by high barriers to entry, robust cash flows and sound regulatory safeguards, but they are also at risk from airline collapses, modal competition and price erosion. Despite these risks, their success as a class of infrastructure asset is apparent from the line of investors that forms around any new airport transaction opportunity and the high multiples of EBITDA (and multiples of RAB) that are paid.

The shortage of airport investment opportunities and fierce competition for airport assets has caused many investors to consider related types of assets. Current thinking indicates that such businesses may slip under the radar of more orthodox funds and for that reason constitute relative bargains in a sellers' market.

This thinking explains why TCR attracted such intense investor interest.

What Defines "Infrastructure Lite" Business Investments?

While TCR demonstrated many infrastructure investment characteristics (e.g. barriers to entry and a strong market leading position), these characteristics were set against intense competition and low margins in the ground handling sector. This type of business is better defined as "infrastructure lite".

The TCR Case Study

TCR is a Belgian-based entity that specialises in leasing ground support equipment (GSE) to ground handlers—the unglamorous tugs, tractors and ground power units that keep an airport's ground operation functioning. When considering whether or not TCR could be considered infrastructure, we found that the company presented a balance of attributes that both met and did not meet traditional infrastructure characteristics.

Is TCR Infrastructure?



Yes: TCR grows with worldwide aviation demand and is itself closely linked to GDP. Additionally, to maintain and operate GSE, TCR enjoys airside access to airports. Because that access is scarce—limited by security, regulation or governance at most airports—it creates a barrier to entry for others. TCR also holds a strong market leadership position where "pooling" of GSE is demanded by airports because of environmental and traffic considerations. TCR actually pioneered the concept of fleet pooling at Heathrow in 2004. By collectively owning and renting back an airport's GSE, pooling effectively creates a single GSE operator at the airport.



No: TCR's association with the ground handling business appears at the outset to be unhelpful as a sector where cutthroat price competition and low margins are endemic. GSE asset lives are typically short and the acquisition cost of individual GSE assets is low (not usual features of infrastructure businesses).

Clearly, TCR is not a pure infrastructure asset, making it harder for investors to build a business case to justify paying infrastructure multiples. However, the company does offer a sufficient number of attractive infrastructure characteristics to be considered "infrastructure lite", explaining why it attracted competitive bids from multiple infrastructure investment players.

Identifying Airport Ancillary Business Infrastructure Lite Investments

Following the successful 2016 sale of TCR, investors will be considering what other types of business at an airport could be classified in the same way. We have used a four-step process to consider this question.

Step 1: Determine Airport-Related Activities

The first step is determining what other ancillary businesses operate at an airport. Not surprisingly, there is a vast range of undertakings, even just considering the immediate terminal and airfield context before taking into account MROs, hotels, cargo terminals and other freestanding activities. Exhibit 1 provides some examples.

EXHIBIT 1. EXAMPLES OF AIRPORT-RELATED ACTIVITIES



Terminal

- Baggage handling systems
- Lifts, escalators and walkways
- Jet bridges
- Terminal seating
- Common Use Terminal Equipment (CUTE)
- Flight Information Display Systems (FIDS)



Airfield

- Airfield lighting and signage
- Pre-conditioned air
- Fire and rescue
- Meteorological services
- Vegetation management
- Ground Service Equipment (GSE)

Step 2: Identify Target Companies

The second step is to identify the companies operating in each of the ancillary business areas. ICF has conducted this exercise, producing an extensive database (longer than it is possible to present in this paper). Interestingly, many of the businesses identified are already private equity owned, and given that the path for TCR was from private equity to infrastructure fund, private equity ownership could be regarded as a first step in "re-rating" businesses as infrastructure.

However, for various reasons, the list of realistic potential targets is much shorter. Many airport ancillary businesses can be excluded on the basis of lack of scale. Additionally, a significant sub-set of businesses operate across sectoral boundaries (e.g. a lift manufacturer may have great contracts at international airports, but aviation as a subset of its overall activity is immaterial) thus complicating its value as an aviation asset.

What type of airport ancillary business might make good infrastructure lite investments?

Investors should look for airport service businesses that go beyond a one-off sale to sales which benefit from an ongoing relationship and may involve maintenance, asset renewal or even potentially operation of an activity at an airport.

Step 3: Assess Their Potential for Long-Term Airport Relationships

Possibly the most important step is to question whether ancillary businesses have "stickiness" with respect to the airports they serve. In other words, investors should be on the lookout for businesses that go beyond a one-off sale to arrangements constituting an ongoing relationship. This may involve maintenance, asset renewal, or even potentially operation of an activity at an airport.

For example, after an airfield lighting manufacturer makes the initial sale of a system to an airport, it has a privileged position for airfield lighting asset renewal. Not typically vulnerable to generic replacement of system parts, this arrangement could be associated with a long-term maintenance contract on the airfield lighting system. This supplier is well placed to achieve such continuity, but many airport ancillary businesses are not.

Step 4: Question Infrastructure Characteristics of the Business

From the winnowed-down list, the next question is: Does this business display infrastructure characteristics? In an investment and academic context, the definition of "infrastructure characteristics" appears extremely malleable but often boils down to the elements described in Exhibit 2.

EXHIBIT 2. INFRASTRUCTURE CHARACTERISTICS



In Exhibit 3, ICF has matched the infrastructure characteristics identified above to selected airport-related areas and confirmed that activities such as baggage handling and fuel farms meet many of the infrastructure characteristic boxes and therefore could strongly be identified as airport ancillary business infrastructure lite investments.

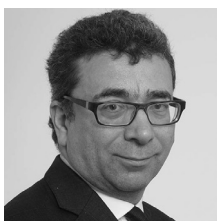
EXHIBIT 3. INFRASTRUCTURE CHARACTERISTICS OF AIRPORT-RELATED BUSINESSES

	Barriers to entry	Long duration assets	High upfront costs	Long-term, stable cash flows	Inflation related contract
Baggage Handling Systems	•	•	•	•	•
FIDS	•			•	•
CUTE	•	•		•	•
Jet Bridges	•	•			
Airfield Signage	•		•	•	
Fire and Rescue	•	•	•		
FBO	•	•	•		
Fuel Farms	•	•	•	•	•

This process provides a potentially promising shortlist of investment opportunities. The relevant entities that are currently in private equity hands may potentially be considered ripe for "re-rating" and infrastructure fund interest. For others, particularly those in private hands, the case needs to be made that access to infrastructure fund capital and networks provides opportunities for capital and geographical growth, as was the case with TCR.

ICF expects the airport ancillary business sector to provide many interesting opportunities for infrastructure funds in the coming months and years. We expect the "airport infrastructure lite" asset class to gain more prominence and acceptance, as airports did only a couple decades ago.

About the Author



Simon Morris has more than 25 years of experience in the aviation industry, and his expertise primarily lies in business planning of airport businesses. He leads ICF's Airport team in transaction projects worldwide, building on work in due diligence and comprehensive business and strategic planning for owners, investors, and private-sector interests. Previously, Mr. Morris worked

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