



Reinventing the Airport Ecosystem

A new airline industry report



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Foreword

Twenty years from now, the airport environment will be unrecognisable

The aviation industry has always been a leader in development and innovation. Over the years, as the industry has matured and grown, a finely balanced ecosystem has been built through constant activity, growth, change and advancements. This ecosystem, which is comprised of all the players present in the airport environment, has supported tremendous growth in low-cost travel and has met the needs of an ever increasing and diverse number of travellers.

For the major players of this ecosystem, the last decade has shown not only how interconnected their operations are but also how closely their fortunes are intertwined. Like any ecosystem, the key is to continually examine how we can all work more closely together to meet the needs of our customers and, ultimately, the end traveller. The next 10-20 years hold great potential for airports and all those involved in air travel. We expect a rapid pace of development as social change and new technology propel the airport from its current focus of serving passengers for air travel to encompass a far wider existence that provides a greater breadth of services.

The airport has long been a primary point of service delivery for travellers undertaking a 'total trip' which encompasses a wide variety of stages from booking to destination. In this research 43% of travellers told us they wanted to reestablish the 'wonder and magic' that was historically associated with air travel. If this is to be achieved then we need to think differently. Every player in the airport ecosystem must re-examine exactly what tomorrow's travellers will demand and begin to plan to meet those needs, not in isolation, but in conjunction with other companies and organisations.

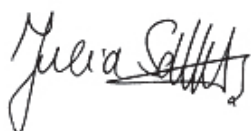
The report provides an independent, expert, perspective about future strategies and models which will help determine the way airlines and airports can deliver a streamlined, stress free and holistic service to their customers. The good news is that travellers have told us they will be willing to spend more time and money at the airport, but only if the airport experience comprises inspiring leisure options and a competitive, enticing retail offer.

The ideas and predictions contained within leave me with great optimism that the airport experience will remain relevant and that airport operations can achieve improved levels of profitability for all organisations that support them into the future.

We hope this report provides you with valuable insight into how advances in travel technology will affect passengers, and also the importance collaboration plays in the future of the aviation industry as it helps to reshape travel in the next decade and beyond. We look forward to participating in the ongoing discussion we hope and anticipate this paper will generate.

Julia Sattel

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Executive Summary

The observations from this report originate from primary field research, conducted in interview format with key representatives from major travel and technology business sectors, and then tested against a large sample of global travellers. The aim of this report is to understand which future strategies and models will help determine the way airlines and airports can provide a competitive response to managing a streamlined total trip experience. Active engagement with passengers and collaboration with all the various players present in the airport ecosystem will help secure business sustainability and profitability in the years to come.

Macro-environment influences on the aviation sector

The airline ecosystem is a fascinating hive of constant activity, change and advancement. As a sector, the aviation industry is very susceptible to influences from the macro environment, and effectively represents a microcosm of the political, economic, social, technological, environmental and legislative trends that shape both developed and emerging economies.

The industry plays a major role in national and international governmental policy-making: the undeniable impact aviation has on our environment, border controls, 'Open Skies', changes in the pattern of wealth distribution and GDP growth, all place the business of airlines and airports at the top of the political and economic agenda.

How the industry operates now and in the future is largely determined by social change and technological evolution which we are witnessing on an unprecedented scale. Population growth forecasts will drive route openings, an aging demographic will lead to new levels of service personalisation, and with 85% of the Earth's population now receiving mobile coverage, global availability of personal mobile technology will change forever the way aviation players interact with and sell to tomorrow's traveller.

How will advances in travel technology affect passengers?

Today, we see biometrics in use at passport control and biomimicry principles driving aircraft design. Five years from now, space travel could feasibly be a reality, with super jet planes flying into earth's lower orbit. They would of course take off and land from state-of-the-art spaceports sporting natural user interfaces at passenger touch points, intelligently in sync with each customer's unique preferences and purchasing behaviour.

The passenger perspective on the future

What is the passenger's take on the pursuit of an efficient and unified airport ecosystem? From the traveller perspective, a stress-free passenger experience is the number one priority. This will require more automated processes which offer speed, convenience and ease of use, all of which are possible with advancements in customer-centric technologies (remote check-in, NFC devices, electronic passports/bag tags). However, the trade-off is relinquishing some control over data ownership in order for airlines and airports to more accurately track and manage passenger expectations.

A window of opportunity for non-aeronautical revenues

There is also anticipation that ongoing investment in airport retail, leisure and dining facilities will generate substantial non-aeronautical revenues for airports and their serving airlines, transforming landside and airside space into a hub of diverse activities. Imagine an airport where the retail experience is so impressive you choose to shop there without even flying! Or how about taking a pre-flight swim and sampling some local cuisine sourced from the airport farm? No time to shop - then just use your in-flight app to make purchases in the air which you pick up on the ground? These concepts are all just around the corner! However, collaboration between airports and airlines to forge non-aeronautical, revenue-sharing agreements will be essential for this strategy to succeed.

Innovation, collaboration, engagement - the keys to a successful ecosystem

Airlines and airports will increasingly depend on new revenue models to grow profits and serve an ever-more discerning passenger. The airport environment will evolve to become more operationally efficient, secure, engaging and environmentally responsible.

How this is achieved will depend on the strategic direction each ecosystem partner takes to inter-collaborate on common goals. The resulting 'engagement' models adopted may be minimal or all-embracing, and will be determined by assessing critical elements of the airport management structure - otherwise known as the Ecosystem Architecture. What is the airport trying to 'be' with the resources at its disposal? What facilities are required and how much revenue will they generate? How will customers' needs and expectations be managed? And critically, what investment must be raised, and how, to achieve these goals? An in-depth analysis of these factors is key to understanding each airport's potential.

The future airport models

Twenty years from now, the airport environment will be unrecognisable. We will see mini-city airport 'destinations' emerge which are completely self-sufficient, along-side 'bus-stations' offering minimal services. Revenue will increasingly come from non-aeronautical sources, with profits shared amongst the service providers and airlines who drive passenger footfall. But who will 'own' the customer relationship? The current climate suggests that passengers do not want any single entity to take control of their data or determine the content, volume and delivery of travel-related information.

Airport players of the future must seek to earn passenger trust and work towards a seamless, coordinated platform of communication, the obvious target channel being the passenger's mobile device. The integrated management of such vast volumes of customer information will require an advanced technology infrastructure, sophisticated enough to manage multiple applications in real-time and guarantee data security. This in turn paves the way for the emergence of new IT partners within the airport ecosystem. And finally, to the tricky issue of funding: airports might utilise their evolving 'destination' status to justify their essential impact on local economies. This could lead to funding in the form of community tax levies. Alternatively, ecosystem players may put up finances in return for an equity share and influence in airport decision-making, leading to a co-ownership of assets and shared strategic and financial goals.

One thing is certain - no single model will serve all airport ecosystems, and no single player will have exclusive control over finances, operations and the passenger experience. As the report concludes: **"tomorrow's airport will be a complex environment with the passenger at its heart, collaboration as its lifeblood and innovation as its currency."**

Research methodology

The report draws both on desk research and extensive interviews conducted by Fast Future, a research and consulting firm, with 73 experts from a variety of business sectors including: airlines, airports, industry bodies, architecture, design and technology. A list of the contributors can be found at the end of this report.

The information extracted and conclusions drawn were then tested using a global passenger survey with 838 respondents. The survey sample can be summarised as follows:

- > Top 3 regional contributors: Europe (57%), North America (23%), Asia (9%).
- > Top 5 country contributors: USA (20%), UK (19%), France (16%), Australia (4%), India (4%), comprising 63% of the respondents.
- > Sector split: 12% airports, 11% airlines, 35% industry service providers, 16% consultants, 26% others.
- > Age profile: 18-35 (22%), 36-55 (54%), 56+ (24%).

Development timelines

A key mechanism used throughout the report is a development timeline. This explores the likely path of innovation for a particular topic (e.g. impact of social media, passenger communications, retail) over three time periods:

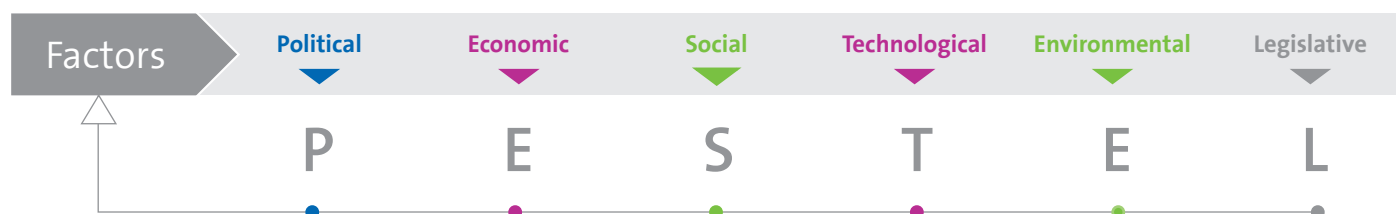
1. Innovative developments already in use today
2. Developments likely to be adopted by pioneer organisations by 2015
3. Developments likely to be in widespread use by 2025

1 Macro Trends and Impacting Factors

The last decade has clearly demonstrated the intrinsic relationship that exists between the forces and factors shaping the external environment, and the fortunes of the air transport industry.

This report examines the major macro influences: geo-Political, Economic, Social, Technological, Environmental and Legislative

(or PESTEL), all of which have a bearing on the industry performance and outlook of the key players in aviation (airlines, airports, ground handlers, air traffic control). In this section, we take a closer look at each of the PESTEL factors, and the impact they have on airlines, their passengers and the airports that service them both.



Political

Economic

Social

Technological

Environmental

Legislative

1.1 Political factors

The economic importance of the aviation industry, coupled with its visibility on issues as diverse as environmental impact and national pride, give this sector a unique significance in national and international political discussions.

Open Skies - can a free market policy become a future reality?

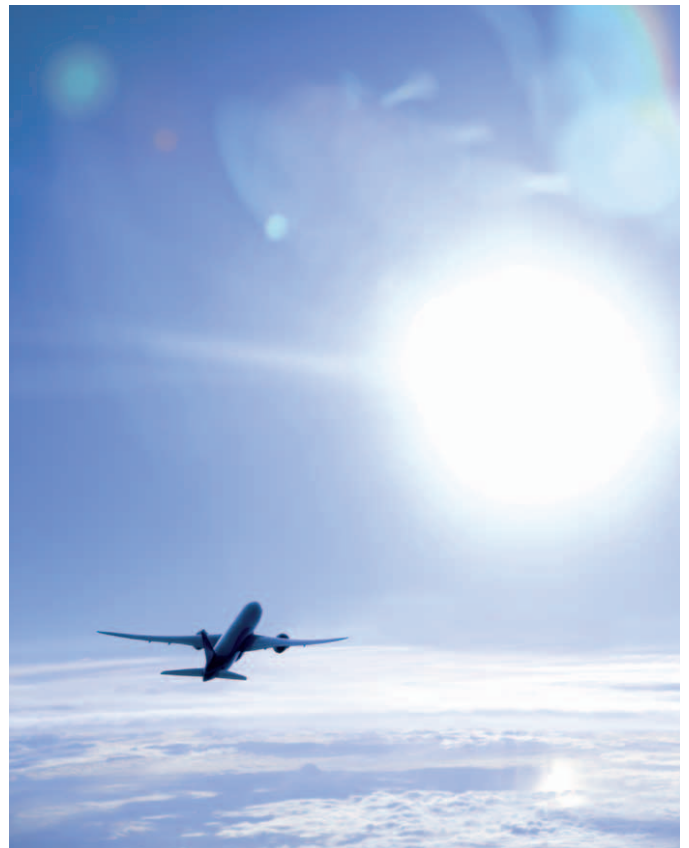
'Open Skies' is an international policy concept which calls for the liberalisation of rules and regulations on international aviation, opening a free market for the airline industry. However, despite marked improvements in international relations and more relaxed visa restrictions, diverse political and economic considerations mean an Open Skies environment is still some way off.

Whilst key geographical areas such as India and the Arabian Gulf are yet to be party to an Open Skies agreement, some regional programmes do look likely to prosper - for example the ASEAN Open Skies agreement, due to come into force in 2015¹.

Advocates of Open Skies argue that a free market promotes competition and innovation as it opens the way for carriers to enter new markets with additional city pairs, bringing greater route frequency and choice. In fact, studies by IATA on European liberalisation have shown that increased competition has cut European fares by a third and doubled the rate of growth¹.

State capitalism - political and economic nationalism may restrict foreign investment

Another key political consideration going forward will be the willingness of governments to allow foreign investment in national airlines and airports. For many emerging markets, the State is a prime investor in the aviation sector and therefore reluctant to open up to foreign investors.



When formulating your strategy, you might want to consider:

- > What national, regional and global political scenarios are being considered by airlines, airports and other players in the ecosystem for the next 10-20 years?
- > How clearly do local politicians understand the global dynamics of the aviation sector and the role of airlines and airports in local economic development?

¹ <http://www.airlineleader.com/regional-focus/saudi-aviation-liberalisation-could-trigger-gcc-open-skies>

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1.2 Economic factors

A near 'perfect storm' of instability, debt, uneven GDP growth expectations, a shift of economic power from west to east, the emergence of new trading blocs and changes in the pattern of globalisation suggest that the next two decades will see major economic upheavals. Hence, the aviation sector can no longer rely on macro-economic stability to drive future growth. The emphasis is shifting to innovation and internally driven strategies for value creation. What factors will be shaping the world economies of the future?

Economic outlook – global instability the only certainty for the next two decades?

There are clear imbalances in the structure of the global economy and major concerns that factors such as unmanageable public debt could drive further recessions at regular intervals. These factors could in turn hinder the capacity for airports to invest.

Global growth – a growing reliance on emerging economies

In the face of a turbulent outlook for developed nations in particular, hope is being placed on global economic growth driven primarily by the emerging economies, to provide a much needed stimulus. Forecasts for average global growth range from 3-4% per annum up to 2030. These headline figures mask major regional differences. The EIU estimates that the 2012-2030 period could see average annual growth of 6.6% in India, 5.7% in China, and 5.4% in Indonesia, whilst growth in the US may amount to 2.7%, Germany 1.9% and Japan 1.0%².

Wealth distribution - a long term transfer of global economic power is taking place

The Asian Development Bank (ADB) highlights that the transfer of economic power is not a recent development. The Asian economies have increased their share of global GDP (PPP - Purchasing Power Parity) from 27% in 1995 to 34% in 2009³. In fact, The Economist predicts that by 2014, Asia's PPP share of the world economy will exceed that of America and Europe combined.

Centre of power - global realignment is creating powerful new 'Trading Blocs'

The transfer of global power, coupled with local economic development, is yielding major new trading blocs that could play a significant economic role in the decades to come. For example, the Gulf Cooperation Council (GCC) States⁴ are projected to have a combined economy of \$2 trillion by 2020⁵. The International Monetary Fund (IMF) projects that the ASEAN⁶ nations could grow from \$1.8 trillion in 2012 to become a \$5 trillion⁷ economy by 2030⁸, whilst Africa's combined economy could be worth some \$2.6 trillion by 2020, up from \$1.6 trillion in 2008⁹.

Economic globalisation – developing markets are driving the next wave of multinationals

Whilst airlines and alliances operate across multiple geographies, to date there are few models of truly globalised airport groups. The issue is whether more global operating models would create significant benefits from an owner and operator perspective. Historically, globalisation came mainly from Western firms extending their footprint, culture and business models across the world as new markets opened up to them. The rapid development pace of emerging economies is now creating new market opportunities for these multinationals.

² <http://country.eiu.com/All>

³ <http://www.adb.org/publications/asia-2050-realizing-asian-century>

⁴ The GCC is a political and economic alliance involving six countries in the Middle East - Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. <http://www.gcc-sg.org/eng/>

⁵ <http://www.arabianbusiness.com/gcc-economy-hit-2tn-in-next-decade-ncb-9526.html>

⁶ ASEAN is the Association of Southeast Asian Nations – a political and economic alliance comprising <http://www.aseansec.org/>

⁷ <http://asc.iseas.edu.sg/about-us/home/item/66-developing-an-enduring-strategy-for-southeast-asia>

⁸ http://www.mindef.gov.sg/imindef/news_and_events/nr/2012/feb/05feb12_nr.html

⁹ <http://www.nepad.org>

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Airline profitability – volatile has become the new ‘normal’

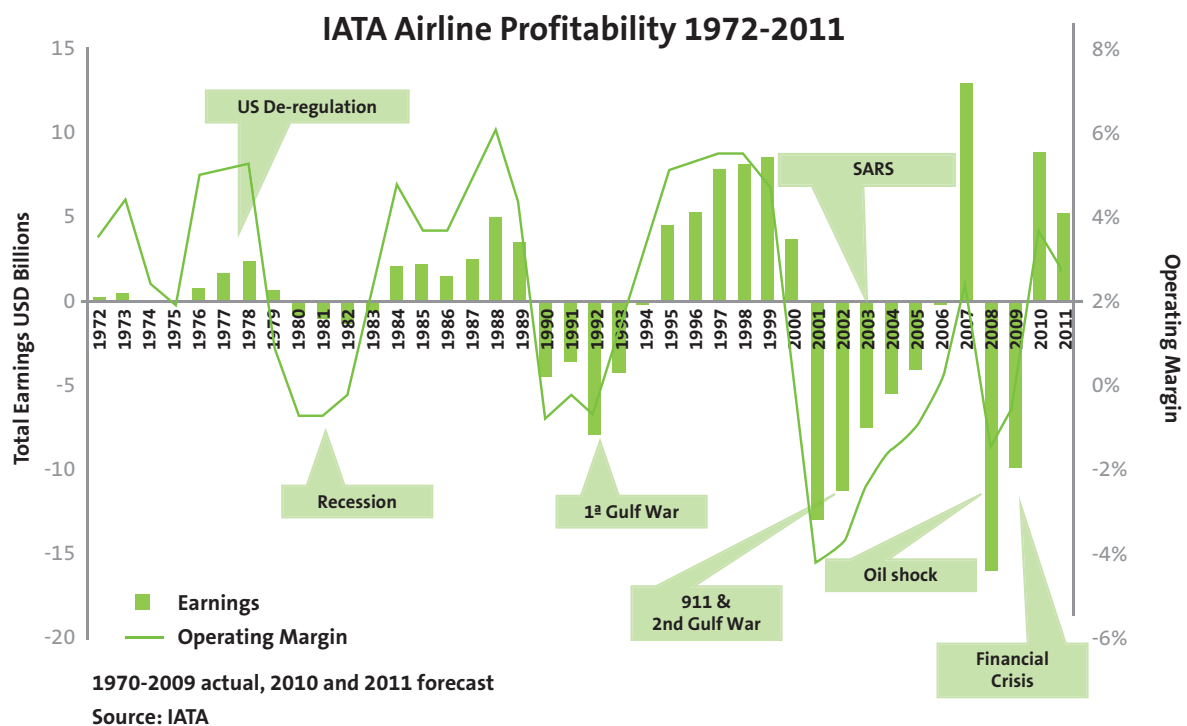
Sustainability of airline profitability will remain a prime long-term concern for the entire airline ecosystem as it influences carrier strategies, tactics and priorities. Whilst other players in the travel value chain have maintained relatively consistent profitability levels, IATA (figure 1) found that the airline industry as a whole has only generated a surplus of income over expenditure in 4 of the previous 12 years.

In response to the pressures on airline profitability, some airports are adopting their own pricing strategies. For example, Malaysia Airports have held landing and parking charges constant for the last 19 years¹¹.

When formulating your strategy, you might want to consider:

- What impact will economic uncertainty have on the viability of airline route portfolios and the choice of hub airports?
- What new financing, revenue and operating models need to be explored across the airport ecosystem in the face of uncertain government support?

Figure 1. Global Airline Profitability 1972-2011 - Source: IATA¹⁰



¹⁰ <http://cchairways.com/blog/wp-content/uploads/2010/11/IATA-Graph1.jpg>

¹¹ <http://www.asianaviation.com/articles/172/MAHB-to-raise-aeronautical-fees>

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1.3 Social factors

The size, geographic distribution, age profile and wealth of tomorrow's global population are critical to the airline industry and the airports that serve them. Route and service planning, pricing and market targeting all demand genuine insight into who might travel, where they live, where they are going, what their needs are and how much they might spend. From an operational point of view, geographic location, education levels, quality of the skill base and local salary benchmarks are of key importance to airlines and airports alike. These factors all have a significant bearing on where to recruit future staff from, and where to locate key functions such as technology management, marketing, maintenance and repair.

Global population - growth and distribution impact on route planning and airport location

Over the next 40 years global demographics will be driven by two key factors: a lower overall birth-rate, and increased general health leading to greater life expectancy.

In the medium term to 2025 (Figure 2), most regions expect to see population growth, with Africa showing the largest projected proportionate growth. Over the same period, Asia is forecast to add the equivalent of 77% of Europe's current population and 160% of North America's.

The location of these populations will have an important bearing on future airline route planning, airport location, capacity and supporting infrastructure. The UN projects that by 2030, 59% of the world's inhabitants will live in urban areas, up from around 50% in 2010¹². Airbus predicts that by 2030, 91% of long-haul passengers will be travelling between heavily populated 'aviation mega cities', with around 70% of traffic flying between these expanding regions¹³.

Figure 2.

Population Totals in 2010 Compared to 2025 Forecasts			
Region	2010 (000's)	2025(000's)	% Increase
Africa	1,033,043	1,417,057	37.2
Asia	4,166,41	4,730,130	13.5
Australasia	35,838	44,651	24.6
Europe	732,759	743,890	1.5
Latin America	588,649	678,788	15.3
North America	351,659	388,472	10.5

Source: UN Population Division (using medium growth variant)¹⁴

Passenger numbers - headline forecasts present a positive long-term outlook

Current industry strategies are based on assumptions of strong and continuous passenger growth as these sources indicate:

- > Scenarios from ACI (Airports Council International) 2011, suggest average annual growth in passenger numbers in the 2010-2030 period will be in the range of 3.7% to 5.2%¹⁵.
- > China has 0.3 seats per head for each of its 1.3 billion people, whilst India's has only 0.1 seat per head for its 1.1 billion population. Should Asians ever travel at the same rate as U.S citizens, this could triple global passenger numbers¹⁶ (Figure 3).
- > In *Travel Gold Rush 2020*, a report developed by Oxford Economics for Amadeus in September 2010, it suggests that looking forward to 2020, Asia could account for one third (32 %) of global travel spend, up from only 21% in 2010.

¹² <http://www.un.org/en/development/index.shtml>

¹³ Airbus GMF 2011-2030 delivering the future - full book, accessed via <http://www.airbus.com/presscentre/corporate-information/key-documents/>

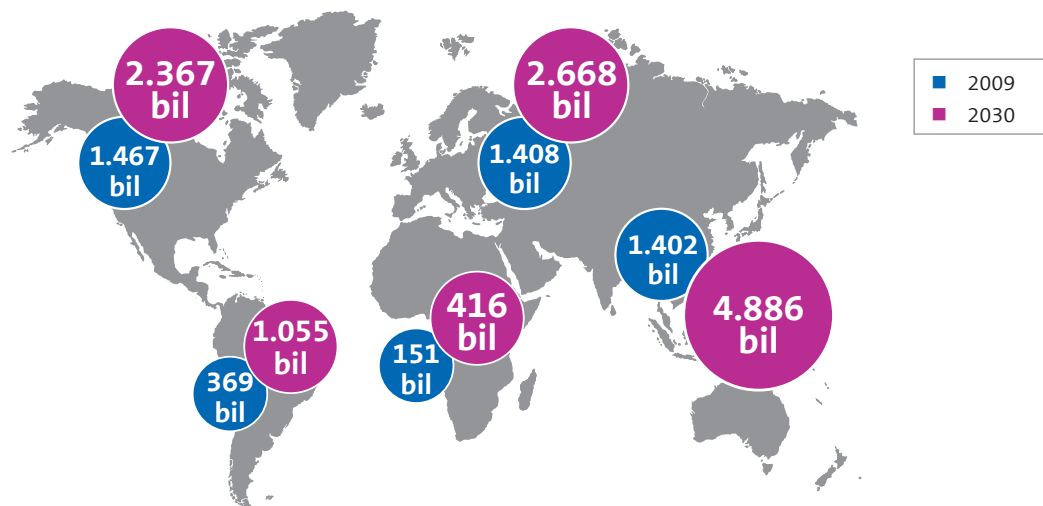
¹⁴ <http://www.un.org/en/development/index.shtml>

¹⁵ http://www.aci.aero/aci/aci/file/2011%20Events/Statistics_and_Forecasting_Workshop/TEYSSIER_Narjess_Presentation_2nd%20part.pdf

¹⁶ IATA, February 2010 <http://www.iata.org/pressroom/speeches/Pages/2010-02-01-01.aspx>, additional reporting by Bay Area Travel Writers 'Travel Trends: Asia Eclipses America in Aviation Markets — by Lakshman Ratnapala,' March 2010 http://www.batw.org/news/industry-news/travel-trends_mar-2010/

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Figure 3. Air passenger traffic - Source: ACI



Ageing population – older travellers create personalisation challenges and opportunities

Insight into the age profile of target markets can help determine the service expectations, specialist needs and price sensitivity of potential travellers. Globally, population ageing is unprecedented, a process without parallel in the history of humanity. Incredibly, by 2047 the UN projects that the number of older persons could exceed the number of children on the planet for the first time¹⁷.

To continue attracting this growing customer segment, airlines and airports alike will need to demonstrate genuine responsiveness and provide services tailored to the priorities and concerns of older travellers. Australian company, Air Travel Companion, provide an example of such service personalisation, offering door-to-door transfer of an elderly person by a professional nurse. Increasingly, passengers will look to either the airlines or airports to provide a customisable and seamless range of air travel-related services from home to destination¹⁸.

Global middle class - Asia's consuming classes will become a prime target for airlines

The World Bank predicts China and India will account for two-thirds of the expansion of the global middle class. Homi Kharas of the OECD (Organisation for Economic Co-operation and Development) estimates that by 2020 more than half the world's middle class could be in Asia, with Asian consumers accounting for over 40% of global middle class consumption¹⁹ as illustrated in Case Study 1.

Case Study 1

Responding to the Rise of Asian Travellers – Incheon Airport

The operator of Seoul's Incheon airport is planning a \$3 billion resort to attract Chinese tourists to the area. Incheon Airport, located 50 kilometres (31 miles) west of Seoul, also plans to provide medical centres, malls, entertainment facilities and luxury-goods outlets to lure more Chinese and Japanese travellers, who in 2011 accounted for 45% of duty-free sales. Outlets targeting Asian shoppers enabled Incheon to surpass Dubai and London Heathrow to become the world's biggest airport in terms of duty-free sales in 2011. The operator generates about 65 percent of sales from shops, hotels and other businesses not directly related to flying. This enables a reduction in landing fees which helps attract airlines and passengers to the airport.

When formulating your strategy, you might want to consider:

- > What are the assumptions about population location, age distribution and wealth profile that underpin current strategies?
- > How well do we understand the buying influences and service expectations of our target markets?

¹⁷ <http://www.un.org/esa/population/publications/WPA2007/ES-English.pdf>

¹⁸ www.airtravelcompanion.com.au

¹⁹ <http://www.oecd.org/dataoecd/12/52/44457738.pdf>

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1.4 Technological and Scientific factors

This section explores how key advances in science and technology could impact the passenger journey.

Evolution of personal mobile ecosystems - the 'digital bubble'

The growth of personal mobile technology is ushering in a new era of customer-centric services and products. To put this phenomenon into perspective, Ericsson estimates that in 2011, up to 85% of the Earth's population had mobile coverage and 1 billion had broadband access. As such, companies are redesigning their offerings as apps and cloud-based services to meet the digital operating environment of today's consumers. For airports and airlines, this brings the opportunity to drive down fixed asset costs by making use of the customer's portable infrastructure.

Delivery of information and communications to the mobile device

From the passenger's perspective, airlines and airports should focus their attention on the mobile channel to deliver relevant, time-critical procedural information on events impacting their journey, before earning the right to extend and monetise the mobile relationship. Importance is given to the provision of essential airport and flight information, notification of gate opening and flight boarding, offering alternate routings on flight cancellations and compensation offers and coupons.

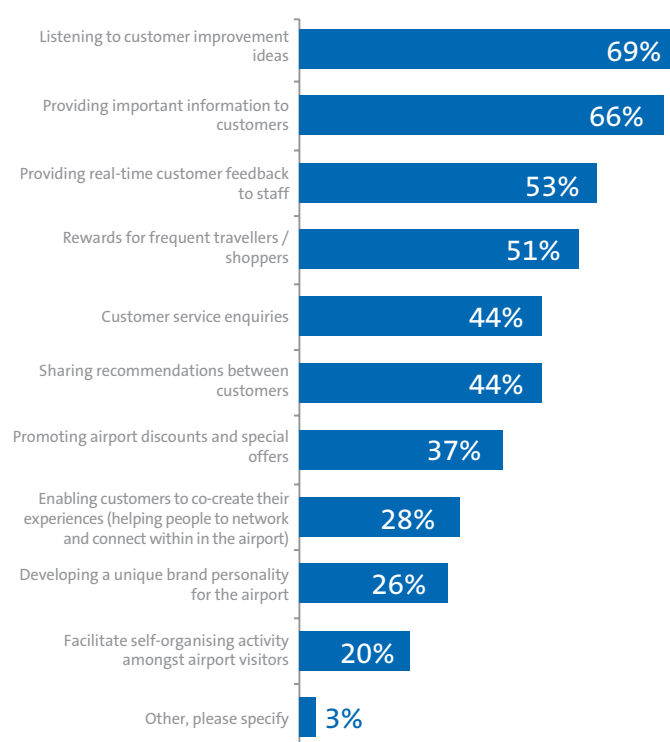
The potential for airlines and airports to commercialise or 'monetise' the mobile channel would come from the purchase of additional goods and services such as pre-boarding flight upgrades, favoured by a large number of passengers (41%). However, few would choose to extend true customisation to personalised adverts and offers (15%), perhaps stemming from security fears.

Use of social media

The value of social media was clearly acknowledged as a vital mechanism for the real-time exchange of ideas, information and feedback between passengers and those that serve them in the airport environment.

There is also commercial potential such as delivering rewards to frequent travellers and promoting discounts and special offers as seen in Figure 4. An interesting emerging theme is the notion of using social media to create passenger communities to facilitate self-organising activities and co-create customer airport experiences.

Figure 4. What are the key ways in which you would like airports to use social media? - Source: Amadeus survey



Social media has been embraced by airlines and airports alike with 69% of airlines selling or planning to sell tickets via social media networks by 2014²⁰. Indeed social media is providing a means of re-introducing the human touch into otherwise fully automated processes, with rapid responses to individual customer queries and quick resolution of operational problems seen as major benefits. A number of airlines made use of social media channels to keep customers up-to-date and handle individual questions during the European ash cloud disruptions in April 2010. Interesting examples of how social media is being deployed today are illustrated in Figure 5.

²⁰ http://www.cisco.com/web/about/ac79/docs/pov/Airline_of_the_Future_PoV_FINAL0712.pdf

Political Economic Social Technological Environmental Legislative

Figure 5. Social media timeline - Amadeus

Social media timeline		
Available now	Pioneers adopting by 2015	In Routine use by 2025
• Key information channel - flight status, retail offers. • Rapid responses to customer enquiries (KLM, BAA). • Selection of seatmates based on social media profiles (KLM). • Proactive interaction (Schiphol²¹). • Offers tailored to social media networks. • Collection of customer testimonials. • Users share peer ratings of the ecosystem - airlines, airports retailers, and restaurants.	• Interaction between flight crew and passengers – e.g. offering destination recommendations. • Customised offers - e.g. free meal voucher when flight is delayed. • Facilitate business connections and ad hoc meetings – especially for transit passengers.	• Impromptu networking at airports becomes a key value-added activity. • Passengers connect and create their own social media experiences, narratives and games in the airport environment. • Intelligent virtual assistants use social media and work schedules to organise complete tailored journeys on request for individuals or groups.

Connecting communities – location-based social media provides a platform to enhance the passenger experience and extend the relationship

An effective social media strategy is now seen as an essential component of the customer engagement strategy. In particular, location-based social media offers major opportunities for passenger engagement, service delivery and revenue generation in the airport environment. Global internet access is projected to reach almost 5 billion users by 2020²², with social networks becoming a key driver of internet usage as they infiltrate every aspect of our lives.

Figure 6. How do you see your approach to using technology evolving till 2025? Source: Amadeus survey



²¹ <http://www.airport-business.com/2011/12/schiphol-focused-on-continued-sustainable-growth/>

²² <http://www.iod.com/MainWebSite/Resources/Document/Q3-The-future-of-the-Internet-you-aint-seen-nothin-yet.pdf>

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Passenger attitudes to technology

The theme of 'being in control' features heavily in many of the survey responses, particularly in relation to how passengers see their use of technology evolving over the next decade or more. Concerns over information security, privacy and information overload are driving passengers' demand for tighter control over who has access to our personal data and whose information we will accept. The majority also expect to be using fully intelligent web interfaces which will enable us to book complete trips in a single transaction, rather than purchasing flights, transfers and hotel elements individually. (See Figure 6).

How airports will adapt and accommodate the future

In the context of an environment which is likely to be more mobile, social and intelligent, what are the critical advances in science and technology that could help us serve future travellers, and how well positioned are airline operators to adapt to and take advantage of expected future developments in travel technology?

For example, the evolution of aviation technology could result in super-fast jet planes which could travel across half the planet in a few hours²³ whilst developments in transport technology could give rise to a widespread high-speed Mag-Lev (magnetic levitating) train network, which could rival aviation in terms of speed and comfort²⁴. What's more commercial space flights to lower-earth orbit are set to take place within the next five years, making holidays in outer space the ultimate luxury experience of the future. This could in turn lead to the building of more spaceports or adapted airports to service a niche space market.

In Figure 7, we have identified a range of critical science and technology developments out to 2025 and highlighted when they are likely to be adopted in the airline ecosystem. A selection of those most likely to play a central role in enhancing the overall passenger experience is outlined in more detail below.

> Biometrics

Biometrics use advanced sensors to recognise and identify an individual through physiological characteristics such as their voice, facial recognition, DNA or hand print, and behavioural traits such as gait. Technologies are also under development to identify individuals via the unique pattern of their heartbeat - your biometric or biodynamic signature. Biometric technology is now in increasingly widespread use in the airport environment. For example, London Heathrow, Gatwick²⁵ and City²⁶ airports already use iris or full face recognition technology.

> Genetic profiling

Genetic profiling is the mapping of an individual's unique personal genome, showing their DNA make-up. The test provides insights into factors such as disease risk, which diseases you might be a carrier of, your potential response to a range of medications and your likely status on a variety of traits ranging from lactose intolerance to longevity. This profile can then be utilised for tailored medicine and healthcare, as well as for identification. Whilst no airports are known to be using genetic profiles at the time of writing, many of our interviewees expect it will be in widespread use by 2025 if not earlier.

> Bio-mimicry

Bio-mimicry is the imitation of nature's designs, systems and processes in human engineering, such as the design of a solar cell modelled upon leaf structures. Airbus use bio-mimicry principles in the design of their aircraft, such as the water-resistant lotus leaf inspiring coatings for cabin-fittings, and the wings of the Steppe Eagle influencing the design of the A380's wings²⁷. Our understanding is that a number of architects are promoting the use of bio-mimicry principles in future airport terminal design and re-modelling.

²³ <http://www.techcast.org/forecasts.aspx>

²⁴ <http://memebox.com/futureblogger/show/586-cars-drive-themselves-trains-go-4-000-mph-in-future>
http://www.reactionengines.co.uk/lapcat_veh.html

²⁵ <http://www.hrsid.com/press-releases/mflow/70-World-first-as-Gatwick-invests-in-pioneering-biometric-technology>

²⁶ <http://www.futuretravalexperience.com/2012/03/london-city-improves-passenger-queue-measurement-with-facial-recognition-technology/>

²⁷ <http://www.thefuturebyairbus.com/future-solutions/the-airbus-concept-plane/biomimicry.aspx>

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> Natural user interfaces - language, touch, gesture

Natural user interfaces recognise and act on commands from a person's gestures, touch or voice. Existing examples include devices such as the Nintendo Wii, Microsoft Kinect and Apple's voice recognition virtual assistant 'Siri'. There is a clear expectation that an increasing number of devices will be controlled by gesture, sound and even thought control. Airports such as Singapore Changi and Dubai are already using touch-screens for airport navigation and passenger entertainment with games and media²⁸.

> 'Big data' and predictive analysis

There is growing interest in how airlines and airports can improve service, performance and enhance revenues by exploiting 'big data' – the massively expanding databases of customer and transactional information being generated through daily activities. The challenge is to create new toolsets that enable us to manage and manipulate these large datasets and generate powerful predictive insights into future customer behaviour.

Predictive analytics combine data mining with statistical techniques, artificial intelligence, machine learning and even game theory to analyse historic and current data in order to draw inferences and make predictions about future events. For example, Cleveland Hopkins International Airport and Cleveland Burke Lakefront Airport have adopted an application which utilises data mining and predictive analytics to help forecast landing fees and optimise their collection²⁹.

In the longer term, some suggest that a fully integrated data warehouse could be established across all of the players in a transport ecosystem from home to airport. This would enable the creation of personalised and destination-relevant offers and greater customisation of the travel experience.

> Ambient / Embedded intelligence – enabling the 'internet' of things

Tomorrow's airport will become a data-rich environment, populated by a range of devices that enable us to interact with literally every object present.

Embedded with sensors, actuators, and communication capabilities, web-connected objects will be able to transmit and receive information on a massive scale, and potentially adapt and react automatically to changes in the environment. Cisco³⁰ (2011) suggests that this 'represents the next evolution of the Internet, taking a huge leap in its ability to gather, analyse, and distribute data that we can turn into information, knowledge, and ultimately wisdom.'

From passenger and asset tracking, through to environment monitoring and stock control, the scale of the opportunity and the resulting data management challenge is immense. This will require the rethinking of a wide range of business processes and ICT (information and communications technology) infrastructure choices.

> Inductive charging

A key challenge in the airport environment is the demand for charging points to enable passengers to recharge an increasingly wide array of electronic devices. One of the most promising options that will not require major changes to the physical airport infrastructure is inductive charging - the wireless transfer of an electric charge to a device. Airports around the world such as Helsinki and Chicago are trialling inductive charging stations in their terminals to recharge passengers' devices³¹, whilst Lufthansa at Frankfurt Airport are experimenting with the inductive charging of electric vehicles³². Inductive charging could also be used for electric cars and all airport located vehicles on roads around airports³³.

²⁸ <http://www.multitouch.nl/?p=295>
<http://www.microsoftnow.com/2010/02/microsoft-surface-at-emirates-lounge-dubai.html>

²⁹ <http://www.prnewswire.com/news-releases/cleveland-hopkins-international-airport-and-cleveland-burke-lakefront-airport-contract-for-passur-revenue-management-solutions-139278383.html>

³⁰ http://www.cisco.com/web/about/ac79/docs/innov/loT_IBSG_0411FINAL.pdf

³¹ <http://powermat.com/2011/07/charging-at-the-airport-just-got-easier/>
<http://www.airlinetrends.com/2011/02/21/wireless-charging-airports/>

³² <http://www.wirelesspowerplanet.com/news/project-for-inductive-charging-of-electric-vehicles-started-at-frankfurt-airport/>

³³ <http://www.wired.com/autopia/tag/inductive-charging/>

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Technology Infrastructure

The advances described above, combined with more short-term trends in ICT, changing passenger expectations and the cost of ownership, are all driving how the technology infrastructure for airlines, airports and other ecosystem players is evolving. This is illustrated with expected timelines in Figure 7.

Figure 7 . Key science and technology developments and their adoption by pioneers

Used by pioneers now	Pioneered by 2015	Pioneered by 2025
Personal Technology		
• Mobile phones • 3G / 4G smart phones • Augmented reality • Gesture recognition	• Intelligent software assistants • Mind control headsets • 3D displays (free Glasses) • Intelligent interfaces • Flexible screens • Digital currency	• 5G phones • Biologically - embedded electronics • Eyewear - embedded screens • Intelligent brain-computer interfaces
Streamlining the Passenger Journey		
• Biometrics – voice/ facial/ handprint recognition • Quick-response (QR) codes • RFID • Interactive displays • Near field communications (NFC) • Temporary airports	• Biometric signature – heartbeat pattern • Body language recognition • Robotics and automated services • Virtual airports	• NFC integrated into all travel documents and passports • Use of human genomic profiles
Enhancing the Passenger Experience		
• Social media • Passenger-polling systems • Hybrid platforms (e.g. Google Wave) • Interactive surfaces • Virtual worlds • Vertical farming (basic) • Next generation cinematic experiences: 6D and beyond	• Real-time language translation • Reality mining • Wearable displays • Immersive web • 3D printing	• Haptics technology • Touchable holograms • Vertical farming (advanced)
Information and Communications Technology (ICT) Infrastructure		
• Wireless broadband • Cloud computing • Telepresence	• Machine learning • Ambient / Embedded intelligence – the ‘Internet of Things’ • Grid computing • MANETS (Mobile Ad-hoc NETWORKS) • Swarm intelligence • Intelligent web	• Semantic web • Machine vision • Optical computers • Collective intelligence

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1.5 Environmental factors

Environmental factors are likely to feature even more heavily on the airport ecosystem strategic agenda over the next two decades. Key factors will include continuing oil price volatility, environmental sustainability of activities across the aviation value chain, and the drive for innovation to decouple resources from consumption.

Fuel price volatility – will remain in the absence of viable immediate alternatives

Fuel price volatility seems set to remain one of the biggest single influences on airline profitability in the next two decades, and will be a fundamental factor in shaping future airline strategies.

Despite growing interest and investment in alternatives, Bloomberg New Energy Finance (February 2012) reports that the potential cost of some aviation bio-fuels from non-food vegetable oils could reach parity with conventional fuels by 2018³⁴. However, the US Federal Aviation Administration (FAA) estimates that it will be between 5-10 years before most producers of bio-fuel are ready for commercial-scale production³⁵.

Environmental sustainability - rising concerns will place the spotlight on performance across all sectors

Airlines have been under scrutiny for their overall sustainability and environmental performance for some time. Now the spotlight is on airports. Some analysts suggest we have already breached 3 out of 9 critical environmental boundaries for the planet, and that the other 6 are under threat. The World Business Council for Sustainable Development reports that 60% of the Earth's ecosystems have been degraded in the past 50 years and natural resource consumption is expected to reach 170% of the Earth's bio-capacity by 2040³⁶.

When formulating your strategy, you might want to consider:

- > What would the effect be of a fuel price rise of 10%, 20% or 50% in the next 5-10 years?
- > What strategies are in place to drive a co-ordinated reduction of the total environmental footprint across all of the players in the airport ecosystem?



³⁴ <http://www.eco-business.com/news/cost-of-green-jet-fuel-could-match-kerosene-by-2018/>

³⁵ <http://www.centreforaviation.com/analysis/norways-avinor-obtaining-tenders-for-how-to-establish-local-aviation-biofuel-production-62044>

³⁶ <http://www.wbcsd.org/home.aspx>

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1.6 Legislative factors

Global regulation – consistency and coherence must compensate for complexity

Airlines in particular are concerned about the complexity and cost implications from an apparent lack of long-term strategy driving industry regulation. The push is for a far more coherent and co-ordinated approach to regulation at national, regional and global levels, particularly around airline and airport ownership, safety, security and segmentation of airspace.

For emerging markets in particular, there are concerns about unclear regulatory and operational roles where governments both own and operate airlines, airports and other parts of the ecosystem. IATA claims that ‘the nature of government intervention is a key reason for poor airline profitability. Restrictions on cross-border investments, the nature of bankruptcy procedures and subsidies for failing airlines are some of the key barriers that keep the industry from adopting a more effective structure³⁷.’

Airline alliances – an inevitable consolidation of power?

There is a growing sense that since their inception in the 1990’s, the three global airline clubs—Star Alliance, oneworld and SkyTeam have grown to the point where they are more powerful than the individual airlines. Some argue that over time such alliances may subsume their member airlines, and passengers will book with one of them rather than with individual airlines. In response, there is concern that regulators might intervene to limit their monopoly power and introduce competition as they did to break up the British Airports Authority (BAA).

As the Centre for Asia Pacific Aviation³⁸ (CAPA, 2011) explains, the regulators’ goal ‘is to create a “neutral” situation where no airline in the joint venture gains anything by keeping passengers on its own flight, as opposed to losing them to its alliance partners’. This has been a flaw in many of the earlier agreements in which consumers became captive to one airline – usually the one which ticketed them.

When formulating your strategy, you might want to consider:

- If the number of airlines was reduced significantly, what might the implications be for airports, ground handlers and the remaining airlines?

³⁷ Source: IATA Vision 2050

³⁸ <http://www.centreforaviation.com/analysis/global-airline-alliances-transformed-by-antitrust-immunity-but-confronted-by-uncertainty--part-1-54369>

2 Passenger perspective on the future

The macro-environment driven by the PESTEL factors we have identified will determine how and where airlines and airports make both intellectual and financial investment over the coming years to secure growth, profitability and long-term sustainability. The successful outcome of the decisions they take are entirely reliant on passengers choosing to fly a given airline or pass through a particular airport. Ultimately, passengers will have the final say - a position of undisputed power.

This chapter examines the key stages in the passenger journey, and uses feedback from traveller survey responses to gauge the passenger perspective on air travel today and in the future. We also look at how airlines and airports can identify passengers in the airport environment, communicate with them and provide future value-added commercial services that will encourage additional airport spend and improve the overall journey experience.

2.1 What causes passengers stress in their journey?

One key area the survey explored was what causes passengers stress and unhappiness in their journey. A clear majority (72%) cited inefficient streamlining of the core passenger journey from check-in to boarding, despite this being an area in which airlines and airports are investing significant resources.

Some airports however, have met this challenge with success. Singapore's Changi Airport is an award-winning example of an airport taking practical steps to reduce traveller stress by attending to the basics³⁹ and providing extensive leisure and entertainment options⁴⁰ as seen in Case Study 2.

2.2 What factors would contribute most to passengers' wellbeing?

Speed, simplicity, convenience and reliability of completing core airline and airport processes are seen as the biggest contributors to emotional wellbeing. There is also a growing awareness of the importance of terminal ambience – visual, sound and smell – with 39% of respondents selecting this as an important contributor to wellbeing. However, despite substantial investment into the provision of self-service facilities, only 28% selected it as a principal contributor. Some airlines like Lufthansa have taken measures to relieve passenger stress, such as the Guide and Family Service⁴¹ described in Case Study 3.

Case Study 2

Passenger Focused Innovation – Singapore Changi Airport

Singapore's Changi Airport is often highlighted as an exemplary airport, focused on continuous customer-focused innovation. This has won the airport 360 awards since opening in 1981, and 27 "Best" awards in 2009 alone. The airport features a "SWIFT" smart phone-enabled service for agencies and tenants at Changi to receive real-time feedback from customers at key points, such as check-in and information counters. This dynamic communication exchange means that issues raised (such as dirty washrooms) can be resolved immediately.

Changi has also invested in providing a range of leisure and entertainment options. These include themed gardens and nature trails, including the first airport Butterfly Garden. Also on offer are free Singapore city tours, movie theatres, gaming consoles, massages, interactive art zones, a 3D Electronics Zone, free local calls, over 500 internet stations and airport-wide Wi-Fi.

Case Study 3

Reducing Arrivals Stress - Lufthansa's Guide & Family Service

Passengers arriving at Frankfurt and Munich can purchase a personal guide service for EUR 50–400 depending on passenger numbers. A Lufthansa guide meets passengers at their gate and accompanies them through the airport, answering questions in over 50 languages.

³⁹ <http://www.travelmole.com/stories/1149642.php?mpnlog=1>

⁴⁰ <http://www.lashworldtour.com/2011/04/10-free-things-to-do-at-singapores.html>

⁴¹ <http://blog.apex.aero/inflight-services-2/airlines-airports-find-creative-ways-reduce-passenger-anxiety-generating-fresh-ancillary-revenue-streams/>

2.3 Rethinking the passenger journey over the next 5 years

When asked what key developments passengers would like to see over the next 5 years, technological advances which would give them more control over their journey featured heavily. These included: remote check-in and bag collection, use of mobile phones to navigate through all key touch points, self check-in kiosks, frequent flyer cards as permanent boarding passes, permanent electronic bag tags, automated self-bag drop, 'self-service' immigration/passport control/boarding and notification of baggage loading. (See Figure 8).

We take a closer look at each part of the 5-stage passenger journey to see how technology could respond to passengers' future needs and desires:

> Airport interconnectivity

For most passengers, the travel experience typically starts with some form of transportation to the airport. Minimised journey times and a reduction in the environmental footprint were highlighted as the key drivers in determining choice, whilst the ultimate goal is for greater integration in terms of interconnectivity;

- between different physical transport services.
- of processes, so that passenger baggage can be handled more seamlessly.
- of data, so that service providers can adopt a holistic view of the travellers' experience and tailor information provision appropriately. (Refer to Figure 9).

Figure 8: What developments would you most like to see in your journey through the airport over the next five years? (Select all that apply) – Source: Amadeus survey

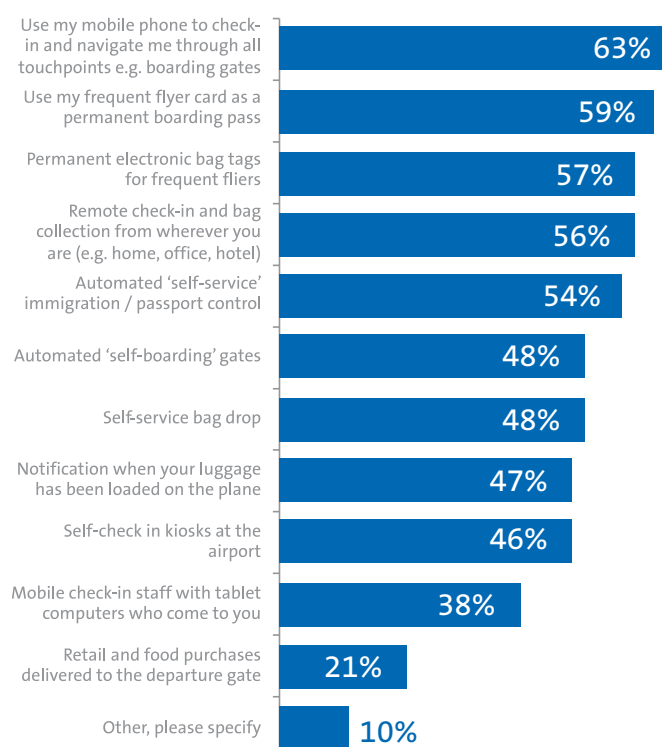


Figure 9: Passenger transport timeline

Passenger transport timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
• Intermodal transport integrating airports to national infrastructure. • Personal chauffeurs for premium passengers. • Integrated taxi fleets. • Automated transit pods. • Single ticket intermodal (rail / air) travel.	• Smart parking to direct drivers to their bay. • Airports only accepting green transport • Fully synchronised passenger journeys across transport modes. • Door-to-door transport services for economy class passengers. • Multi-modal end-to-end travel.	• Recognise passenger is delayed in traffic – automatically rebook flight. • Driverless vehicles in the airport. • Inductive charging for cars and all airport located vehicles⁴².

⁴² <http://www.wired.com/autopia/tag/inductive-charging/>

> Check-in

The check-in process is probably one of the most stressful parts of the passenger journey. Therefore, any improvements in automation and innovation will have a positive impact on the passenger experience. The advances we can expect to see are illustrated in Figure 10.

Figure 10. Check-in timeline

Check in timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
• Bar coded boarding passes. • Frequent flyer card, NFC or smart phone used to check in and navigate all airport touch points. • Proliferation of self-service kiosks. • Check in at train station (Zurich⁴³). • Check-in at city metro (Delhi⁴⁴). • Check-in whilst you eat (McDonalds, Munich⁴⁵). • Check-in via social media⁴⁶ (KLM). • Skype video chat check-in (Estonian Air⁴⁷). • 'Five-star hotel' style check-in area: luxury leather couches, concierge services and porters (Abu Dhabi⁴⁸).	• Seamless, fully automated check-in to boarding - airline staff add value as personal assistants. • Seat allocation based on the amount of hand luggage you have. • Passive 'in pocket' scanning of e-tickets. • NFC used systematically for check-in, baggage check, security, boarding, lounge access and as a wallet in and around the airport. • Self-service and online pre-arrival check-in overtakes physical check-in. • no designated check-in area. • RFID-enabled travel documents -automatic check-in upon airport entry.	• Bypass terminal entirely - premium travellers check-in offsite, pass through security en-route. • Biometric (e.g. face recognition and iris scanning) and / or genetic information used to check-in passengers automatically upon airport entry.

⁴³ <http://www.zurich-airport.com/desktopdefault.aspx/tabid-116/>

⁴⁴ http://articles.economictimes.indiatimes.com/2012-02-21/news/31082994_1_check-in-facility-shivaji-stadium-stations-airport-metro

⁴⁵ <http://www.atkearney.com/index.php/Publications/airport-shopping-takes-off.html>

⁴⁶ <http://www.rnw.nl/english/bulletin/klm-introduce-%E2%80%98social-seating%E2%80%99>

⁴⁷ <http://www.dw.de/dw/article/0,,15584112,00.html?maca=en-rss-en-all-1573-rdf>

⁴⁸ http://www.worldairportawards.com/Awards_2011/premium.htm

> Baggage Handling

Many interviewees predict that the amount of baggage being carried by passengers will decline by 2025. However, the requirement for rapid, secure and seamless baggage handling is unlikely to be eliminated for the next two decades at least. The most widely expected developments are:

- collection of luggage from passenger's location – possibly by a secure third party such as a courier firm.
- baggage delivery on arrival to the passenger's final destination – allowing them to go straight to work or meetings.

- self-service bag drop, bag tag printing and excess baggage payment.
- permanent portable bag tags or luggage-embedded permanent baggage tags.
- tracking of checked in luggage status and location throughout the journey (such as the mobile app from Delta Airlines⁴⁹).

There are already an increasing number of self-bag drop facilities appearing, such as Qantas Next Generation Check-in⁵⁰ at all six of its major airports, and Aéroports de Paris (ADP) in Terminal Ouest in Paris-Orly Airport⁵¹. (Refer to Figure 11).

Figure 11. Passenger baggage timeline

Passenger baggage timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
• Self-service bag drop. • Permanent bag tag. • Mobile app to track bag status and location.	• Automated collection of baggage fees at self-bag drop. • Airline baggage allowances eliminated – passengers pay for luggage according to weight carried. • Self-service lost baggage registration. • Bag collection from home, hotel or transport terminal. • Baggage tag integrated into luggage • Drive-through car park bag drops.	• Passenger self-loading of luggage to container or direct to airplane. • Self-scanning baggage introduced. • Baggage sent straight from airport to destination on arrival via vetted secure intermediary similar to FedEx. • Entirely robotic / automated end-to-end baggage handling systems.

⁴⁹ <http://www.futuretravelexperience.com/2011/11/delta-app-offers-real-time-baggage-tracking/>

⁵⁰ <http://www.qantas.com.au/travel/airlines/q-bag-tag/global/en>

⁵¹ <http://www.futuretravelexperience.com/2011/11/adp-trialling-two-step-bag-drop-system/>

> Security, immigration and border (passport) control

Whilst security was identified as a significant source of stress, passengers generally see the need for it but want the impact to be reduced and for the process to become more unobtrusive.

Advances in science and technology are offering an ever wider array of unique identification and surveillance technologies ranging from biometrics, to genetic profiling, embedded identifier chips and nano-cells (refer to Figure 13). As in many fields, the rate of advancement far outstrips society's understanding of the implications. Hence, whilst many experts expect to see rapid advancement – particularly in non-intrusive surveillance and identification – human rights and privacy concerns will play a major role in determining the scale and speed of adoption. Many suggest that the more intrusive methods may be offered on an opt-in basis – much as airports currently offer their biometric border control service.

Figure 12: Which of the following security and border (passport) control / immigration solutions would you most like to see? (Select all that apply) – Source: Amadeus survey

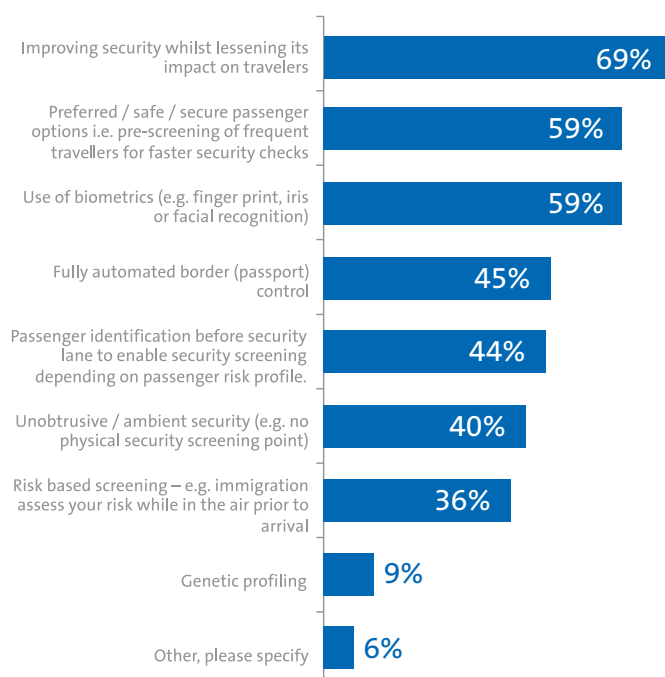


Figure 13. Security/ Immigration/Border control timeline

Security / Immigration / Border Control timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
- Frequent / secure traveller lanes. - Gatwick⁵²: - Notification of wait times for security lines. - Iris at a distance recognition to monitor entry and exit from departure lounge. - Separate security lanes for frequent flyers, families and general travellers⁵³. - On-board pre-arrival immigration (Garuda Indonesia⁵⁴). - Walk-through archways for security and border crossing (Seoul Incheon Airport).	- Interoperability between some countries on trusted traveller programmes. - Opt-in automated pre-arrival security vetting of passengers on-board or on journey to the airport. - Smarter scanning technology ends some security restrictions e.g. liquids.⁵⁵ - Automated intelligent analysis to determine risk profile based on passenger data - passport, bank account details, frequent flyer profile, trip duration, how tickets purchased, changes and meal requests. - Integration of Passenger (e.g. CCTV) and IT security systems.⁵⁶	- Global trusted traveller programme in place. - First adoptions of IATA's seamless 'checkpoint of the future'. - Ambient technology scans on arrival in terminal. - Optional genetic profile- based security. - Optional body-embedded identification Smart identity cards carrying personal biometric and genetic data. - Bomb sniffing x-ray.

⁵² <http://www.airlinetrends.com/2011/11/17/london-gatwick-rethinks-airport-security/>

⁵³ <http://www.aoptix.com/iris-recognition-blog/?p=570>

⁵⁴ <http://www.garuda-indonesia.com/news/2010/01/22/garuda-indonesia-introduces-immigration-on-board-service>

⁵⁵ <http://www.bbc.co.uk/news/uk-england-oxfordshire-16645733>

⁵⁶ <http://www.airport-technology.com/features/featurebelieving-in-biometrics/>

Taking a glance into the future, it is possible that by 2025 a passenger could opt-in to a service where an intelligent software agent in their mobile phone notifies the authorities that they have left for the airport. On arrival, screening has already taken place and passengers are guided to the appropriate security and immigration lanes via their mobile (refer to Case Study 4).

> Boarding

As the final stage of the outbound journey, the gate area and boarding process are effectively the last impression we have of a destination, and hence the passenger experience is vital. Figure 14 indicates what future tools have been proposed to aid passenger boarding.

But how will airlines identify passengers in the airport environment and, what tools will they use to communicate with them?

Case Study 4
Streamlining security – London Gatwick Airport

As part of London Gatwick’s £1.2 billion spending program to improve the overall airport experience, the airport has invested £45 million in its South Terminal security area. Adoption of smarter scanning technology and automated processes now enable passengers to pass through security in five minutes or less. Passengers first swipe their boarding cards to access security and screens notify queue times for different colour-coded lanes. There are 15 standard lanes, two for premium travellers and two dedicated to families with young children and passengers with reduced mobility.

Figure 14: Boarding timeline

Boarding timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
• Mobile phone / NFC boarding • Self boarding • Redesign of gate areas to provide more retail, services and leisure activities	• Passengers boarded according to the amount of hand luggage they have • Biometric scans used for passenger boarding • In-wallet scanning of travel documents at departure gate	• Facial recognition used for operator-less boarding gates

2.4 Identifying passengers in the airport environment

Passengers want to retain control over access to personal data, but accept that the desire for speed and convenience in the airport environment will require the use of a range of individual identification technologies. The majority are most comfortable with non-invasive solutions such as: electronic passports, smart ID cards, electronic tags, location-based tracking services using their mobile device and biometrics. There was significantly less comfort with the use of behavioural, biological and implant solutions such as gesture recognition (9%), personal genetic profiles (8%) and body-embedded electronic devices (8%).

2.5 Communicating with passengers

The passenger journey is a data-rich set of processes, and travellers have emphasised the desire for the timely delivery of key information, such as gate allocations, boarding calls, cancellations and delays. With mobile phones becoming the first truly ubiquitous global technology and the growing popularity of tablet devices, it comes as no surprise that 90% want key information delivered to their mobile device. Interactive computer displays and surfaces were the second most popular communication option (59%).

Despite a general sense that we still prefer a human face for service provision, a significant proportion of respondents are happy to interact with artificially intelligent interfaces. For example, 43% selected 'automatic language translation' at all electronic contact points. Similarly there was support for natural language communication with airport systems (30%) and interactive virtual check-in staff and airport assistants (27%).

This can be seen with American Airlines' use of mobile check-in and service staff⁵⁷, and the deployment of 2D holographic service agents to guide passengers through key processes at airports such as Dubai and London Luton⁵⁸. (see Figure 15)

Berlin's Tegel Airport is a good example of a smaller airport where every process is designed for passenger convenience⁶² as seen in Case Study 5.

This is an opportunity to promote the local area, to show off dining and local attractions, to promote the destination and the airport as a destination on its own.

Steven Bongers,
IT Business Analyst, Brisbane Airport

Case Study 5

Passenger Centric optimisation of airport design – Berlin Tegel Airport

Tegel Airport in Berlin has several features that are designed to ease the passenger journey. As passengers approach the airport in a taxi, a large real-time departure board tells them the gate for their flight, which they then drive to. Check-in is located immediately behind the entry doors, and a few more steps take you through passport control and security. The UK's Centre for Policy Studies (CPS) notes that 'seven minutes after stepping out of the taxi a passenger can be in the departure lounge, boarding pass in hand, along with toilets, a good coffee bar and one modest shop with the usual drinks and perfumes for those who cannot kick the airport shopping habit.' Instead of passengers going through airline and airport processes they effectively come to you. To make it work, a strict timetable governs the rotation of check-in assistants, passport control officers and security agents between gates.

⁵⁷ http://travel.usatoday.com/flights/2010-06-28-airportcheckin28_ST_N.htm

⁵⁸ <http://www.telegraph.co.uk/news/newsttopics/howaboutthat/8296304/British-airports-get-first-holographic-helpers.html>

Figure 15. Passenger communications and tracking

Passenger communications and tracking		
Available now	Pioneers adopting by 2015	In routine use by 2025
- Augmented Reality App guides and tracks passengers through terminal using wi-fi data (Copenhagen)⁵⁹ - Digital cameras and Bluetooth monitor passenger queues at check-in, security checkpoints and parking areas (Houston)⁶⁰	- Passenger decides on level of and nature of incoming communication/offers. - Increasingly intelligent airport management systems track, manage and share real-time information⁶¹. - Location-aware software tailors airport services, flight information, way-finding and retail offers via mobile / interactive screens. - Proactive communication of flight changes and electronic delivery of new boarding pass. - Personalised airport navigation information for transfer passengers. - Free human guide on request. - Real-time translation.	- Passengers receive unified communication from whole airport ecosystem through one channel and device. - Widespread interactive surfaces enable real-time information and feedback throughout terminal. - Natural language interfaces. - Biometrics and genetic profiles identify and track passengers through all airport processes. - RFID enabled aviation ecosystem – providing real-time location information of all objects and individuals.

2.6 Additional developments to enhance the airport experience

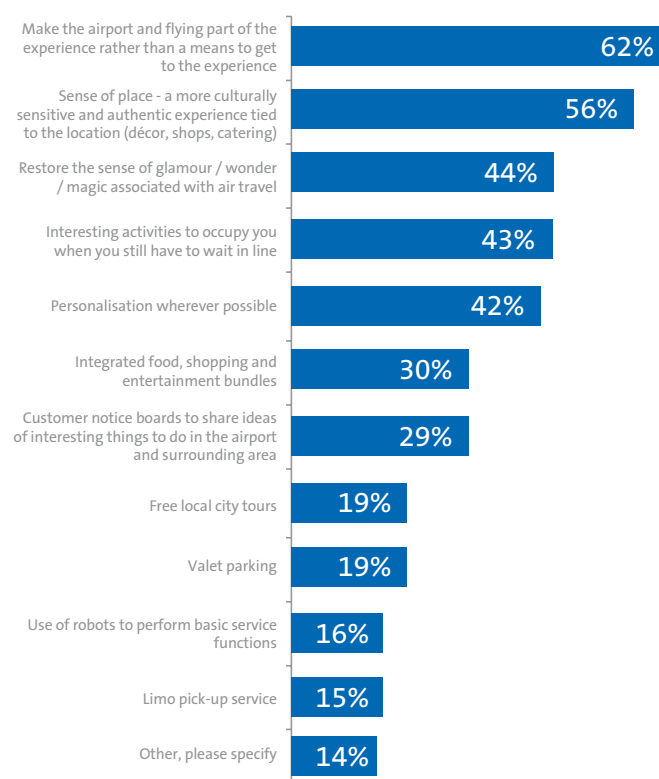
> Create 'a sense of place'

Emotional and sensory factors topped the list of priorities when respondents were asked what additional developments they would like to see in the airport experience by 2025. For leisure and business travellers alike, there is a clear desire for the earliest possible removal of stress. Achieving this implies making the airport and flying part of the overall experience rather than a 'process step' on route to the experience, and transforming the airport into a culturally sensitive and authentic destination in its own right. (See Figure 16).

> Personalisation

The most popular of the personalisation options (48%) was 'Premium terminal facilities for first and business class travellers – distinct from frequent flyers'. There was also support for other forms of customisation such as seated check-in and pre-bookable premium services. (See Figure 17).

Figure 16: What additional developments would you like to see in the airport experience by 2025? (Select all that apply) – Source: Amadeus survey



⁵⁹ <http://www.switched.com/2011/03/22/copenhagen-airport-to-track-passengers-using-wi-fi-data/>

⁶⁰ <http://www.customerservicemanager.com/airports-track-passengers-to-improve-customer-service.htm>

⁶¹ <http://www.freerepublic.com/focus/f-chat/2727775/posts>

⁶² <http://www.cps.org.uk/blog/q/date/2011/10/11/i-have-seen-the-future-of-airports-and-it-is-berlin-not-london/>

Figure 17: Personalisation services timeline

Personalisation services timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
- Instant personalised banner kiosks for friends and family to welcome travellers (Schiphol⁶³) - Seasonal gift wrapping services (Virgin Atlantic at LHR⁶⁴)	Complimentary replacement items for lost baggage	Use of intelligent data mining to pre-empt your mood and schedule before you enter - tailoring the experience

> Sustainability

Passengers expect that sustainability issues, coupled with the drive for service personalisation, will be the two most significant factors shaping the airport environment by 2025. Whilst only 22% saw green transport solutions as a current priority, by 2025, the majority (63%) expect airports to operate with a zero or low environmental or energy footprint. The focus on environmental sustainability even extends to airport construction with 35% expecting the 'use of biological systems, materials and designs that are multi-functional, sensory, responsive, adaptive, self-healing and fully recyclable'. Social sustainability was also emphasised with 39% expecting the airport of tomorrow to be tightly integrated with the local economy.

> Non-aeronautical revenue generation

Increasing revenue per passenger requires more engagement with the retail, dining and leisure experiences on offer. This in turn implies that people would probably need to spend more time in the airport environment. 81% agree to some extent that 'to encourage people to increase time spent at the airport, airports will need to become an immersive space that enables interaction with multiple cultures and evokes the local culture, architecture, ecology, biology, commerce and worldviews.'

Munich⁶⁵ is a good example of an airport that recognises its commercial potential. By combining a range of leisure activities⁶⁶, attractive architectural design, clever use of space and people flows⁶⁷, it creates a 'mini-city' feel that attracts local residents⁶⁸, as well as passengers (see Case Study 6).

Driving non-aeronautical revenues will come from enhancing and creating new retail experiences that will encourage people to spend more time and therefore money at the airport on shopping, leisure, entertainment, dining and personal/business services.

Airports will shift their focus from making money from airlines to making money from the passengers in terms of commercial revenue.

Ryan Ghee
Editor, Future Travel Experience

⁶³ <http://inworldmanyautos.blogspot.com/2012/02/top-10-airport-in-world-2011.html>

⁶⁴ <http://www.sleepinginairports.net/bestof.htm>

⁶⁵ <http://inworldmanyautos.blogspot.com/2012/02/top-10-airport-in-world-2011.html>

⁶⁶ <http://www.sleepinginairports.net/bestof.htm>

⁶⁷ <http://www.sleepinginairports.net/bestof.htm>

⁶⁸ <http://www.munich-airport.de/en/consumer/erlebnis/index.jsp>

a) Enhancing the airport shopping experience

Airport shopping is seen as the low-hanging fruit in terms of growing non-aeronautical revenues both for airports and the airlines that fly the passengers. For much of the last two decades, conventional wisdom has been that upscale and luxury were the model to pursue. However, in toughened economic circumstances, customers are more cautious, leading to a rethink on how to increase passenger to shopper conversions.

The challenge is how to persuade shoppers to do more of their discretionary spending in the airport environment – even if their total spend is staying flat or declining. The survey highlighted a clear difference between what passengers want from major hubs and international airports versus smaller, commuter, leisure and feeder airports. For the latter, speed and convenience factor far more highly than diverse retail options.

Price is also a clear driver with 54% saying that discount outlet stores would encourage them to shop more in the airport, against just 13% who would like an expansion of the luxury offering. Greater use of sales, discounts, best price guarantees and early-shopper incentives were also popular (46%). Over a third of respondents were attracted to the notion of buying in the air and picking up on the ground – a solution which has proved beyond most airline-airport partnerships to date. Support (42%) was also expressed for locally-themed airport retail offerings.

There is growing investment in the use of technology to enhance the retail experience outside the airport environment. However, there is a clear sense that passengers are not embracing these new options unreservedly. Most of the options proposed, from personalised and interactive advertisements to mobile shopping apps, received support from between 33% and 41% of respondents, with limited enthusiasm for 3D printing services.

The expansion and evolution of leisure facilities airside holds much promise for revenue creation. Singapore Changi, a premier global airport, generated retail spending of \$1.18 billion in 2011, a 17-percent growth over 2010. The Changi Airport Group said⁶⁹ the expansion of its retail offerings coupled with shopper promotions had helped to boost consumer spending.

The type of leisure experience offered is also deepening, often reflecting local culture, but the potential remains for a much improved experience thanks to technological progress. (See Figure 18).

Case Study 6

Giving customers a sense of place – Munich Airport

Voted fourth best at the 2011 World Airport Awards in Copenhagen, Munich promotes itself as 'more than an airport'. It offers attractions ranging from beach volleyball tournaments and mini golf, to Customs Office tours and a visitors' terrace. The Munich Airport Centre (MAC) located between its 2 terminals is also open to non-travellers and offers shopping, business and recreational facilities and hosts the airport's Christmas market.

Architect Santiago Calatrava commenting on Munich explains that 'when you emerge from that airport it feels as though you are in an actual place. There are plazas, gardens, regular events, an upmarket hotel, a feeling of life and an ambience one doesn't get in many airports. Again, you see people without luggage; locals who have travelled there specifically to take advantage of the amenities.'

Airlines could sell airport products onboard; it might make airports more co-operative. You could order onboard and pick up at the airport, though this would result in smaller shops but with a higher turnover of goods.

Cees de Vos

Director Innovation Outstations & Partnerships, AirFrance/KLM

⁶⁹ <http://archives.californiaaviation.org/airport/msg49277.html>

Figure 18: Retail timeline

Retail timeline
Available now • Pop-up retail experiences. • Online/in-town purchase of duty-free goods collected at the airport (Incheon⁷⁰). • Buy on board - collect on arrival . • Personal grooming services. • In flight auctions. • Shopping experiences with entertainment (bands, sporting events) for non-travellers (Düsseldorf). • Leisure experiences offered as rewards to encourage shopping - The Slide@T3 (Changi). • Single smart card for purchases in outlets across the city and in the airport (Amsterdam). • Discounts on duty free shopping or hotel service purchases based on spending (Bangkok Duty Free / Pullman Hotel). • Use of QR codes and Microsoft Tags to boost retail sales. Passengers scan coloured barcodes (Tags) around the airport with their smart devices to receive retail and dining coupons⁷¹ (Dallas Fort Worth). • Airport loyalty programs.
Pioneers adopting by 2015 • Rethinking the mix – dedicated areas for discount outlets. • Attraction of high street chains and department stores. • Shops become virtual storefronts (Tesco virtual supermarket Seoul Metro)⁷². • Pop-up only retail environments. • Airport supermarkets: shop / collect on arrival. • 3D printing of goods within airport shops. • Robotic store assistants. • Multiple business models- aggregated buying, auctions, flash sales. • Deals targeted to passengers based on their profile, purpose of trip and destination. • Packaged offers combining retail, dining and leisure. • Use of NFC with mobiles as a unified method of payment. • Acceptance of virtual or local currencies e.g. QQ, Bristol Pound⁷³, Bitcoin. • Augmented reality mirror that acts as an entertaining, social and novel way to shop⁷⁴ (virtual store).
In routine use by 2025 • Intelligent systems used to dynamically change store layout and displays to reflect the different sets of passengers flying through at different times and their historical sales trends. • Intelligent forecasting of short-term retail trends and behaviours based on predictive analysis of social media dialogues. • Personalised offers tied to destination. • Discounts / offers for those arriving at the airport before the standard 2 hour window.

⁷⁰ http://www.koreatimes.co.kr/www/news/bizfocus/2011/11/335_96343.html

⁷¹ <http://www.psfk.com/2011/12/microsoft-tags-encourage-airport-spending.html#ixzz1hME4kF5B>

⁷² <http://www.designboom.com/weblog/cat/16/view/15557/tesco-virtual-supermarket-in-a-subway-station.html>

⁷³ <http://bristolpound.org/>

⁷⁴ <http://www.psfk.com/2011/08/mirror-lets-kids-try-on-virtual-outfits.html#ixzz1bACwlrBm>

b) Increasing leisure experiences

Passengers have indicated that they want the airport and flight to be part of their total travel experience and there is a growing interest in the provision of leisure facilities that reflect this, particularly for passengers with time between connecting flights.

The relatively limited support for virtual reality, multimedia and multi-sensory experiences may reflect the fact that many of us are bringing our entertainment with us, and would prefer to engage in physical or cultural pursuits. For example, The Slide at Singapore Changi, or the locally-themed setting of Christchurch Airport have more appeal than concepts such as the new Almost@home Lounge at Helsinki Vantaa Airport's Terminal 2, which is designed to feel more like home with a kitchen, dining room, children's playroom, media lounge, and office⁷⁵.

As is natural, the diversity of individual interests and motivations is reflected in the spread of options that received support. Families with children will want different physical activities than those connecting on a long-haul flight. However, the emphasis on stress reduction and the potential for travel to be a tiring experience motivate the two most popular leisure service choices: short-stay hotels and spa treatments— both of which are appearing in an increasing number of terminals. (See Figure 19)

Figure 19: Which of the following physical leisure experiences would you find most compelling and attractive in the airport environment? – Source: Amadeus survey

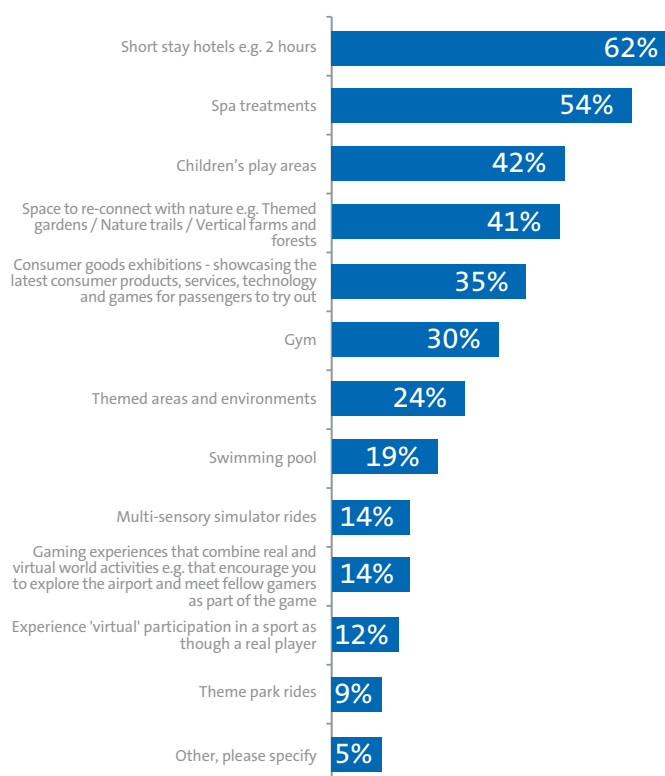


Figure 20: Leisure timeline

Leisure timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
- Authentic local leisure activities e.g. genuine Finnish sauna (Helsinki airport⁷⁶). - Traditional culture workshops (Incheon⁷⁷). - Rijksmuseum (Schiphol⁷⁸). - Fish spa (Changi⁷⁹). - Art zone (Changi). - Free city tours (Changi). - Cooking classes (Paris) Orly, Charles de Gaulle airports⁸⁰. - Christmas market (Munich).	- Language classes. - Immersive experiences . - Vacation packages allowing you to live as a local (on arrival). - Entertainers at gate waiting area / for longer queues. - Interactive museum areas.	- Immersive technology enabling personalisation of the local experience, tailoring to specific interests such as heritage or shopping. - Airport becomes a resort-style destination with minimal space for holding passengers pre-flight. - Day / overnight surgery centre e.g. plastic surgery, dentistry, laser vision correction.

⁷⁵ http://news.cnet.com/8301-17938_105-57367098-1/go-home-at-helsinki-airport/

⁷⁶ <http://www.ausbt.com.au/helsinki-the-airport-with-a-spa-and-a-sauna>

⁷⁷ http://visitkorea.or.kr/enu/SI/SI_EN_3_1_1_1.jsp?cid=609933

⁷⁸ http://www.krolltravel.com/stories/Holland_Schiphol_Rijksmuseum.html

⁷⁹ <http://www.lashworldtour.com/2011/04/10-free-things-to-do-at-singapore.html>

⁸⁰ <http://www.terminals.com/travel-news/bon-appetit-free-cooking-classes-at-paris-airports/20086/>

c) Creating new entertainment experiences

For airports, the provision of entertainment is challenging because of the diversity of traveller interests, the potentially limited attention span of people in the terminal environment and the time taken to complete an activity. In addition, space requirements, costs of implementation and the rate of change in entertainment trends all have a significant bearing on such decisions.

Given these factors, the entertainment option which received majority support was a TV lounge or movie theatre, followed by more 'timeless' experiences such as museums, art galleries, temporary exhibits, music and live theatre. Of limited popularity were technology-mediated virtual, immersive and interactive activities as was the notion of corporately themed leisure space. And, just over a third of respondents selected integrated multi-platform experiences (gaming/movies) that start in the airport and then continue in-flight. (See Figures 21 and 22).

New forms of entertainment will emerge for the new generation, who has to be constantly entertained, and needs to be engaged by the right brands. There are enormous retail and leisure opportunities for the future, we're only scratching the surface.

”

Greg Fordham,
CEO, AirBiz

Figure 21: Which of the following entertainment experiences would you find most compelling and attractive in the airport environment? (Select all that apply) – Source: Amadeus survey

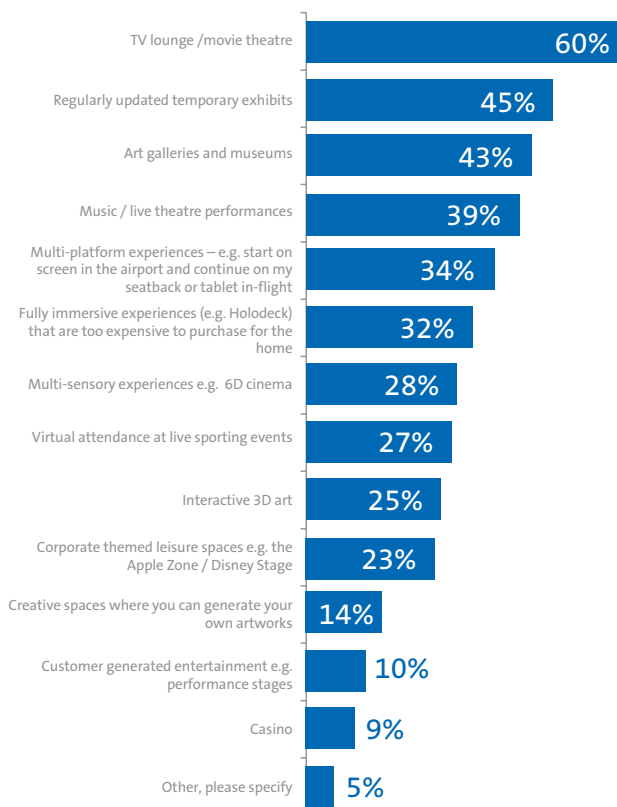


Figure 22: Entertainment timeline

Entertainment timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
6D cinema (Schiphol⁸¹). - Gaming zones – e.g. 14 free PS3 kiosks (Hong Kong International Airport⁸²). - Science Museum / 3D Electronics zone (Changi⁸³). - Interactive surfaces for games and media (Dubai⁸⁴).	- Gaming and other entertainment options that switch seamlessly between airport and airplane. - Massive multi-player games that use the airport environment. - Passengers create individual or group narratives and games through their own personal context and mobile device. - Personalised airport experience – specially targeted information based on your hobbies. - Simulated experiences / theme park rides. - A partnership with a premier leisure/ entertainment player, offering constantly changing airport based activities. - Short courses – acting, singing, improvisational comedy. - Airport music festivals.	Holodeck style immersion (large scale holography).

⁸¹ <http://www.today3d.com/2011/09/amsterdam-schiphol-opens-6d-adventure.html>

⁸² <http://terminalgamer.com/2010/01/25/hong-kong-international-airport-adds-ps3s-for-passengers/>

⁸³ <http://www.lashworldtour.com/2011/04/10-free-things-to-do-at-singapores.html>

⁸⁴ <http://www.microsoftnow.com/2010/02/microsoft-surface-at-emirates-lounge-dubai.html>

d) Changing the airport dining experience

Food is also an increasingly important part of the travel experience and globalisation has exposed the travelling classes to a wide range of international cuisines. Many of us want airport dining to be a part of the overall travel experience and not just a refuelling stop before the journey. Hence the two options which received widespread approval were the provision of an international food selection and locally-sourced food. Whilst low cost options were still popular, only around a quarter of respondents were attracted by each of the options of fast food, fine dining, regularly changing or themed dining options. (See Figure 23).

Despite the emphasis on convenience, few of us are yet taken by the idea of ordering in advance, and the prospect of cooking our own food positively horrifies us! Although locally sourced food is a majority requirement, there was little support for consuming food grown at the airport.

Figure 23: What food and beverage options would encourage you to dine at the airport? (Select all that apply) – Source: Amadeus survey

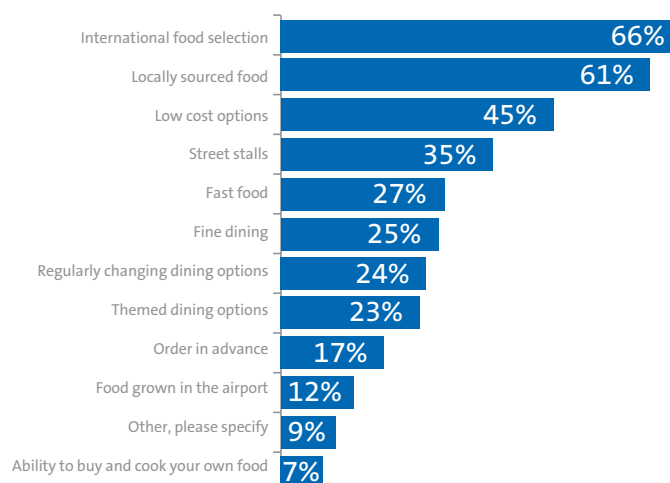


Figure 24: Food and beverage timeline

Food and beverage timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
- On-site vertical farm providing ingredients to airport restaurants (Chicago O'Hare⁸⁵). - Touch-screen enabled table service dining at gate areas, (JetBlue's Terminal 5 at JFK⁸⁶). - Food brought to the gate (JFK).	- Pre-order food at different outlets. - Book your table, design a menu, and select the chef who cooks it. - Chance to cook your own food with the help of a master chef before departure.	- Personalised nutrition choices based on your genetic profile, age, gender and weight. - Airport-only dining experiences – e.g. leading chefs collaborate – book a flight, meal and stay package – never leave the airport. - Experimental food centres e.g. 3D printed food.

⁸⁵ <http://www.urbangardensweb.com/2012/01/23/inside-peek-at-ohare-airports-vertical-farm/>

⁸⁶ http://www.nyc.com/restaurants/jfk_terminal_5_restaurants.612178/editorial_review.aspx

e) Developing new personal and business services

Given the time pressures on people's lives, one idea that has been considered by a number of airports is the provision of a range of business and personal services. It would enable passengers to optimise the waiting time between check-in and departure if they could bank, work or even seek medical assistance 'on-the-move'.

The survey highlighted banking and financial services as the option favoured by the majority, with reasonable support for basic business services such as conference and meeting facilities, language translation, business seminars, technology tutors and short-let office rental. With health welfare at the top of everyone's personal agenda, it is no surprise that over a third of respondents said they would use basic health and wellbeing facilities such as rapid health checks and minor injury/ailment treatment. (See Figure 25).

Airports would generate revenues by charging passengers directly for these services and securing fees from outside service providers from advertising/product profiling. (See Figure 26).

Figure 25: What kinds of personal and business services would you find attractive or valuable? (Select all that apply) – Source: Amadeus survey

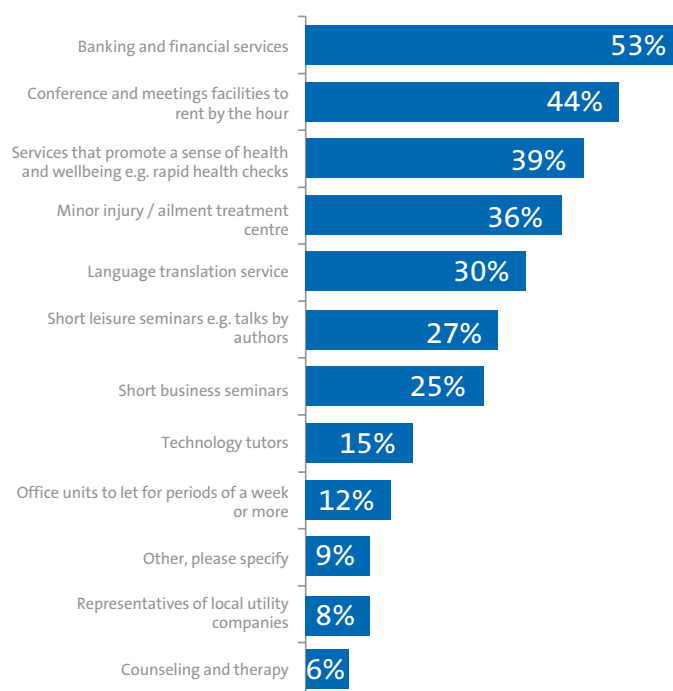


Figure 26: Additional revenue opportunities timeline

Additional revenue opportunities timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
- Airport as a showcase - brands pay for product profiling. - Developing the airport as a destination brand for family days out (Munich, Schiphol).	- Advertising on air traffic control towers / building frontages. - Ultra-short lease office space rented by the hour. - Offer lounge access based on level of airport spending.	- Personalised nutrition choices based on your genetic profile, age, gender and weight. - Discounts/offers for those arriving at the airport before the standard 2 hour window.

3 Industry Drivers Shaping Ecosystem Architecture & Strategies

This section explores critical drivers shaping the strategies of players in the ecosystem. The biggest single commercial issue for the sector is the uncertainty of airline profitability which has a direct impact on almost every aspect of carrier behaviour. This volatility is driving the need to grow non-aeronautical revenues and the search for new business models. Despite this core uncertainty, forecasts for passenger growth remain strong – particularly in Asia. This in turn is driving significant investment in airport infrastructure across the Asia-Pacific region.

For the industry associations, there is a strong focus on enhancing the passenger experience, streamlining security and reducing environmental footprints. At the ecosystem level, operational investment is being shaped by the growing desire for mobile apps, the need for low cost experimentation (see Case Study 7) and the opportunities presented by collaborative decision making.

3.1 The importance of non-aeronautical revenues

Airlines and airports alike are pursuing the growth of non-aeronautical revenues. With airlines applying greater pressure to cut or eliminate landing charges, there is a growing emphasis for airports to develop potentially higher margin, non-aeronautical income streams as the primary revenue source. (See Case Study 7).

> Airports

ACI (Airport Council International) highlights that non-aeronautical revenues have grown from about 30% of total airport revenues in 1990 to 50% or more today⁸⁷. In some cases such as Dubai, the figure is reported to be as high as 60 percent⁸⁸, whilst others have gone as high as 80% (Figure 27). ACI calculates worldwide total airport income in 2010 reached US\$101.8 billion, up by around +7% compared to 2009⁸⁹. These revenues are sourced from enhancing or creating new airport-based experiences in the areas of retail, dining, leisure and entertainment (See Chapter 2).



Case Study 7

Attracting airlines in turbulent times – Malaysia Airports

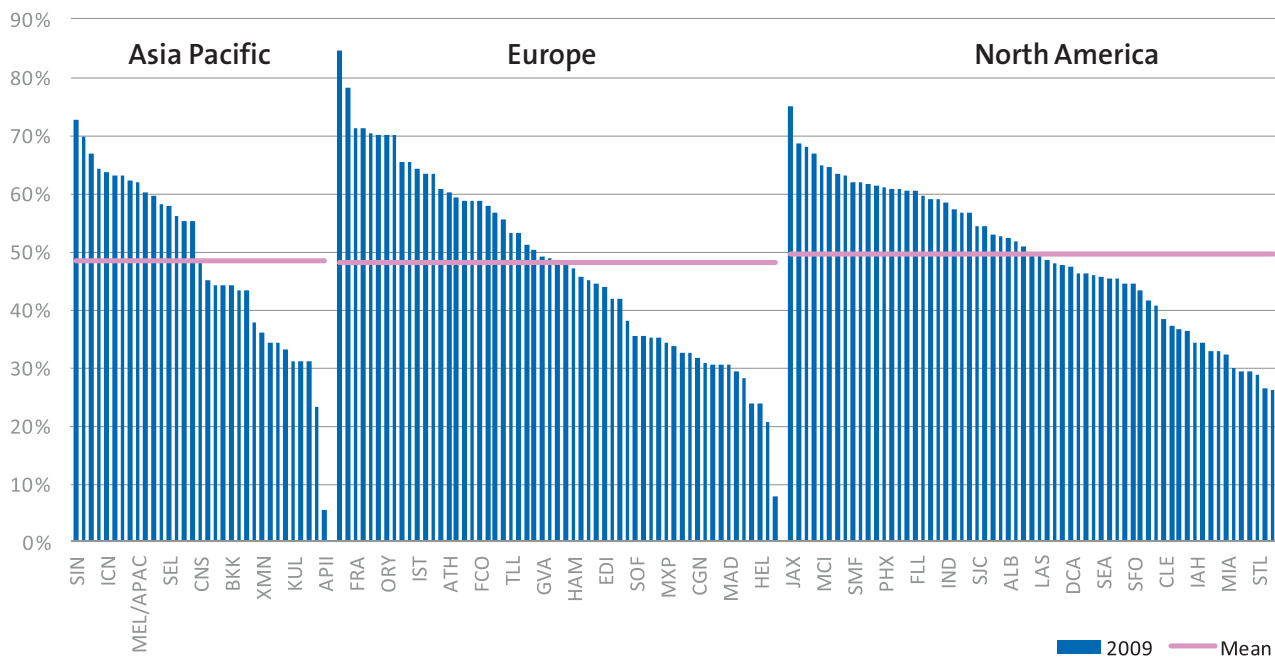
Malaysia Airports Holdings Berhad (MAHB), the owner of Kuala Lumpur International Airport (KLIA), kept landing and parking charges at its airports constant for 19 years until 2012, making them amongst the lowest in the world. Aircraft parking charges are based on 12-hour blocks, with the first three hours free. Landing fees are currently waived for three years for all new and additional frequency routes operated by airlines into Malaysia.

⁸⁷ <http://www.aerotropolis.com>

⁸⁸ <http://www.aerotropolis.com>

⁸⁹ http://www.moodiereport.com/document.php?c_id=6&doc_id=29698

Figure 27: Non-Aeronautical Revenues - 2009 (%)

Source: Air Transport Research Society⁹⁰

> Airlines

Ancillary revenues are an increasingly important part of the mix, with Ideaworks reporting that they reached \$32.5 billion worldwide in 2011- up from \$22 billion in 2010, and almost double that of 2008⁹¹. Forrester Consulting (2011) predicts that third-party airline ancillary revenues (from sources such as hotel, car rental, destination services bookings), will rise 30% over the next five years. This far exceeds projections for overall travel industry growth of 3% per year⁹². In surveying travellers globally, GuestLogix⁹³ (2011) found that more than half would take advantage of destination-related offers onboard a flight, particularly for services that add immediate value to a trip such as entertainment and attraction tickets, ground transportation, and tours.

⁹⁰ <http://www.atrsworld.org/docs/Key%20Findings%20of%20%202011%20ATRS%20Benchmarking%20Project%20-%202027July2011.pdf>

⁹¹ <http://atwonline.com/webinars/ancillary-revenue-100-billion-dollar-question>

⁹² <http://www.ink-global.com/21-february-2011-wall-street-journal-ryanair-to-target-ads-on-boarding-passes/>

⁹³ <http://www.retailinasia.com/article/tech/retail-systems/2011/04/boardroom-inflight-retail-20-catching-asia-says-guestlogix>

> Airlines/airports revenue sharing

As part of the search for ancillary revenues, airlines are looking at ways to capture a share of airport retail revenues, which Datamonitor believes will grow from \$33.6 billion in 2009⁹⁴ to US\$44.1 billion by 2015. There is evidence that this is already starting to happen. For example, Malaysian Airports reported that it shared \$107m of retail revenues with airlines in 2011⁹⁵, whilst Dallas Fort-Worth (DFW) Airport⁹⁶ has implemented its own ten year revenue-sharing agreement (Case Study 8). By 2025, the expectation from many experts is that there will be pressure to extend such arrangements into integrated, inter-modal profit-sharing with other transport players such as metro, rail and taxis.

There are clear concerns from concessionaires and airports over the potential loss of revenue that could result from sharing rewards across ecosystem partners. However, research from AT Kearney⁹⁷ (2010) suggests that the European aviation industry alone is missing out on \$64 billion of untapped revenue from new methods of collaboration. In Dubai, ecosystem collaboration is already in place: 'We have already cracked this (structural) integration,' says Paul Griffiths Chief Executive of Dubai Airports, referring to the integration of Emirates Airline & Group, Dubai Airports and Dubai Civil Aviation Authority, which all share one chairman⁹⁸.

The need to focus on the airport as a highly interconnected, living and adaptive environment reflects a broader trend towards ecosystem thinking in business. Increasingly, collaborative operating models are emerging which help business partners generate revenue as well as reinvest in the aviation infrastructure. The JetBlue Terminal at New York's John F Kennedy Airport is a good example of this⁹⁹. (Refer to Case Study 9).

Case Study 8

Airline revenue sharing at Dallas Fort Worth Airport (DFW)

DFW has implemented a ten year hybrid revenue-sharing agreement with the airlines. The non-airline revenues at DFW are collected in a fund, which is shared with the airlines once it exceeds \$60 million. The split of proceeds is 75 percent to the airlines, 25 percent to DFW. The \$60 million is invested in capital projects within the airport, whilst any revenue spend from the remainder above that \$60 million requires airline approval through an MII (majority-in-interest clause).

Case Study 9

Since October 2008, JetBlue has exclusively owned and operated Terminal 5 at New York JFK International. The Port Authority of New York and New Jersey provided the \$800 million funding for the terminal. JetBlue pays the Port Authority a per-enplanement fee to help recover terminal infrastructure costs over a 30-year term. JetBlue is also the landlord for retail areas, sub-leasing space to concessionaires and sharing a percentage of total revenue with the Port Authority, and captures the in-terminal advertising revenues, which are shared with the Port Authority and the advertising agency.

Source: flightglobal.com

⁹⁴ [http://www.gaca-ppp2011.com/download/D2/8\)%20SH&E%20-%20A%20Mirza_Saudi%20Arabia%205%20April%202011.pdf](http://www.gaca-ppp2011.com/download/D2/8)%20SH&E%20-%20A%20Mirza_Saudi%20Arabia%205%20April%202011.pdf)

⁹⁵ Speech by Tan Sri Bashir Ahmad, Managing Director, Malaysia Airports at Future Travel Experience Asia Conference – February 9th 2012

⁹⁶ <http://www.aviationpros.com/article/10476293/its-all-about-business?page=2>

⁹⁷ <http://www.flightglobal.com/news/articles/airport-special-report-crossing-the-line-350230/>

⁹⁸ <http://www.flightglobal.com/news/articles/airport-special-report-crossing-the-line-350230/>

⁹⁹ <http://www.flightglobal.com/news/articles/airport-special-report-crossing-the-line-350230/>

3.2 New approaches to finance investment

As well as focusing on revenue generation, airlines and airports are looking at new business models from other sectors for ideas on how to control costs, finance new investments and drive growth. The internet in particular has given rise to some potentially disruptive models, experimenting with new approaches to raise finances and alternative ways of charging for goods and services. Examples of such models include:

> Turning owned assets into rented services

Businesses are reducing fixed costs through asset-rental models such as cloud computing. Such rental models reduce capital expenditure requirements by transferring costs to more flexible payment approaches, funded out of operating income.

> Auctions

Made popular by sites such as eBay, the online auction model has become an increasingly popular route for selling travel-related products. Air travel sites such as skyauction.com have emerged, and individual airlines such as Lufthansa, Malaysian Airlines and South African Airlines have all experimented with different forms of the auction model¹⁰⁰.

> Crowd sourced funding

The difficulty and cost of raising funding through traditional debt and equity markets has spawned a number of 'crowd sourcing' platforms which enable firms to go directly to the end consumer. One such example is Kickstarter.com which enables innovators to raise funding for their ideas by pre-selling the outputs to interested customers, prior to even developing the product or service. Over 28,000 ventures and projects have raised funding through this route - in one example, an independent computer game developer raised over \$1 million of funding in one day¹⁰¹.

3.3 Enhancing the passenger experience

A number of key industry initiatives are being introduced to improve the passenger experience, as well as the industry's reputation on security and the environment.

> On the security front

The security screening process is often cited as one of the key pain-points in the passengers' airport experience. To combat these issues, IATA has unveiled its 'Checkpoint of the Future' concept¹⁰². This uses a mixture of advanced screening technology and a risk-based approach, enabling passengers to pass through security without stopping or disrobing. The key concepts are:

- integrating passenger information into the checkpoint process for risk assessment, and
- maximising throughput for the vast majority of travellers who are deemed to be low risk, without compromising security levels.

IATA believes this risk-based approach will reduce security lines, lower airport costs and improve the overall passenger experience¹⁰³.

> On the sustainability front

ACI have been leading the way to promote initiatives which reduce airlines' and airports' impact on the environment, whilst balancing mitigation efforts with the need for green and sustainable growth in the sector. For example, industry-wide standards are coming into force to limit and reduce aviation's noise and air pollution. Already, many environmental initiatives have become common practice, with a majority of airports now undertaking significant recycling of waste water, de-icing fluids and waste from flights¹⁰⁴. Airports such as Manchester aim to have their ground operations carbon neutral by 2015¹⁰⁵.

¹⁰⁰ <http://airinfo.travel/deals.phtml>

¹⁰¹ <http://uk.gamespot.com/features/the-secret-to-double-fines-1-million-success-6350137/>

¹⁰² <http://www.iata.org/pressroom/pr/pages/2011-06-07-01.aspx>

¹⁰³ <http://www.iata.org/pressroom/pr/pages/2011-06-07-01.aspx>
<http://www.engadget.com/2011/06/08/iatas-checkpoint-of-the-future-uses-biometric-ids-to-separate-d/>

¹⁰⁴ http://www.airports.org/cda/aci_common/display/main/aci_content07_banners.jsp?zn=aci&cp=1-4612_725_2__

¹⁰⁵ <http://www.manchesterairport.co.uk/manweb.nsf/Content/CarbonreductionrewardedatManchesterAirport>

3.4 New approaches to operations

> Collaborative decision making: open data-sharing and process collaboration are driving efficiency

A key step in the journey towards a truly integrated ecosystem is the move to adopt collaborative decision making (CDM) at the operational level, engaging all key partners within the airport ecosystem (airlines, airport operators, ground handlers and air traffic control). The primary aim is to reduce runway congestion by cutting delays in take-off and landing, and shortening taxi times. Eurocontrol, ACI and IATA are currently working to promote the implementation of a Europe-wide airport CDM process¹⁰⁶. The benefits include enhanced air traffic management, increased efficiency and lower costs – achieved by reducing delays, improving predictability of flight-related events and optimising resource usage. Operationally, this requires efficient and transparent data sharing and process collaboration between all of the relevant ecosystem parties. Munich was one of the first European airports to implement CDM. Since then, 94% of flights have met their air traffic flow management slots by being ready on the runway five minutes before their scheduled take-off slot¹⁰⁷.

CDM is also being extended to third-party governmental organisations such as the police and weather service. Such collaboration helps establish a common situational awareness and improved airport resilience in the face of unexpected events. For example, at London Heathrow, the UK's national weather service – the Met Office – has forecasters working in the air traffic control tower to provide constant updates on weather conditions, allowing more effective management of weather-based risk decisions¹⁰⁸.

> New terminal design

From an operational perspective, airport architecture is being influenced by a variety of factors: the elimination of check-in areas, a reduction in baggage being carried, changing retail and dining trends, larger aircraft, the growth of pop-up and mobile facilities, and the emergence of temporary and fast-build modular airport designs. At the same time, contemporary design is seeking to merge functionality with the aesthetic. Many architects argue that creating a calm, functional and aesthetically pleasing airport environment can have a huge competitive advantage¹⁰⁹, hence the growing interest in bio mimetic design. (See Figure 28).

Figure 28: Terminal design timeline

Terminal design timeline		
Available now	Pioneers adopting by 2015	In routine use by 2025
• Arrival area design reflects local area (Christchurch). • Demand-based flexible and temporary terminal (Heathrow Olympic Terminal). • Facility redesign to accommodate A380. • On-site green power generation solar panels (Phoenix Sky Harbour). • Installation of Wind Turbines (East Midlands Airport¹¹⁰). • Green areas for relaxation and leisure (Schiphol). • Bus-stop style fast throughput terminals (Berlin Tegel). • Mega-mall terminals (Dubai). • Larger gate areas to accommodate permanent and pop-up retail. • Consolidation of terminals and passenger facilities around alliances.	• Modular / pre-fabricated fast erection airport infrastructures. • Re-alignment of space allocation between face-to-face and self-service. • Facility re-modelling due to change of dwell-time. • Check-in halls repurposed for bag drop, retail and leisure. • Bio mimetic architecture – copying designs from nature to save energy and money, as well as provide an optimised 'natural' experience. • Space freed up as take-up of cloud computing reduces cabling and IT infrastructure requirements. • Theme-park areas at major hubs. • Bigger rings of steel and larger airport perimeters for high-risk airports.	• Intuitive, fluid airports – more mobile assets, less fixed locations (retail, security checkpoints). • Implementation of new sources of power such as piezoelectricity generated from passenger footfall. • Smaller security areas. • Use of bio-organic building materials and processes to 'grow' airports. • Infrastructure and time-pressures shrink to create the 'bus-stop airport'. • Virtual service airports located separate to the actual point of take-off and landing.

¹⁰⁶ <http://www.euro-cdm.org/>

¹⁰⁷ <http://www.atc-network.com/cdm/>

¹⁰⁸ <http://www.metoffice.gov.uk/news/releases/archive/2012/Airport-Collaborative-Decision-Making>

¹⁰⁹ <http://www.designbuild-network.com/features/feature87775/>

¹¹⁰ <http://www.azcentral.com/business/articles/2012/02/22/20120222sky-harbor-solar-panels-meet-51-percent-needs.html>
<http://www.eastmidlandsairport.com/emaweb.nsf/Content/Greenappleawardpressrelease>

4 Mapping strategic direction for the next 20 years

In this final section, we highlight some of the critical choices and options that face the ecosystem players individually and collectively as they seek to map their strategic direction for the next two decades.

4.1 Adopting a long term perspective?

In the face of a volatile economic environment, radical shifts in customer behaviour and transformational change in the industry landscape, leaders could be forgiven for adopting a very short term focus. However, such short term thinking cannot hope to address the fundamental challenges or capture the opportunities presented by the scale of change taking place. Ensuring financial viability demands that the ecosystem partners develop a clear sense of the long term role, funding, revenue streams and operating models for their airport. From there, they will need to 'back cast' to the present in order to define a roadmap to drive a coherent but flexible change process.

The long term challenge is to evolve sustainable ecosystem models where airlines, airports, ground handlers, concessionaires and other key stakeholders work together, bearing an equitable share of the costs and receiving fair returns. This multi-level collaboration of ecosystem partners may stretch to shared ownership of the airport itself, so that goals are aligned, a more holistic approach can be taken to the sharing of revenues and profits, and an integrated seamless service can be delivered to the customer.

At the heart of this model is a whole new level of integrated systems that facilitate collaboration from the strategic planning level, right through to operational decision making. New roles will emerge to design and manage these multi-level collaboration processes and systems.

4.2 Defining the ecosystem architecture

The strategic question is how deep should engagement between the players be and what scope should it cover? At one end of the spectrum is a very light touch approach where partners collaborate the bare minimum to get by. At the other is something akin to a multi-partner marriage, where the players have shared ownership of the asset, work as a single entity on planning and service delivery, and share the total costs, revenues and profits for everything that happens within the airport environment. Between these extremes lie a range of options.

There is no single engagement option that will work for all airport ecosystems. In each case there will be different distributions of relative power and interest amongst the various airlines, operators, investors, ground handlers, government agencies, retail, dining and leisure providers and other key stakeholders in the airport environment. In order to establish the kind of engagement required, a systematic assessment is needed of each of the critical elements of what we call the Ecosystem Architecture. In most cases this assessment will need to be led by the airport operator, but engage all of the other players.

The Ecosystem Architecture is the framework of management models that together make up any airport. These encompass the following:

- > the **conceptual model** of what the airport is trying to be
- > the **infrastructure model** of the facilities required and how they will be delivered and managed
- > the **revenue generating model** that outlines how revenues will be generated
- > the **customer engagement model** that sets out the philosophy on developing and managing passenger relationships
- > the **service delivery model** that articulates how resources will be configured to ensure operational excellence
- > the **financing model** that sets out how the necessary investment will be sourced

Each of these models is explored overleaf.

> Conceptual model

So what will tomorrow's airport look and feel like and what will be the underlying conceptual models that drive airport design? To date, airports have categorised themselves based on the passenger groups and airlines they serve – e.g. low-cost holiday, business commuter, feeder, hub or full-service. Such categorisations are based on what the airport does, however increasingly, there is a need for airports to also think what they are trying to be and the role they want to play.

Ten years from now, the airport landscape will have evolved significantly and many new models and partnerships will have emerged. Twenty years from now the whole concept of an airport could be reinvented and a spectrum of models will emerge - from the ultra-low cost 'bus-stop', through to the complex 'multi-shareholder, mini-city co-operative' providing leading-edge leisure, retail and dining experiences.

A number of possible concepts are emerging:

a) Mini-city concept

In this scenario the airport is separate from its local surroundings. A self-sufficient entity offering unique retail, entertainment, dining, work spaces and accommodation. It may even grow its own food and generate all its energy needs onsite. More than a logistics hub, the airport becomes a key multi-purpose destination for the local population, with its economy and transport infrastructures highly interwoven.

b) City extension concept

Here the airport is tightly integrated into the local city, reflecting the best of local culture, history and cuisine. It will be an important arm of local economic development and treated as a community resource with local politicians, businesses and citizens demanding a strong say in the airport's future – whether they are involved in its financing or not. Dubai is a classic example of such a model, where an estimated 25% of the city's GDP flows from the aviation sector¹¹¹.

c) Mall concept

In this scenario, the airport develops its shopping, leisure and entertainment facilities on par and even beyond those found in destinations such as Dubai and Singapore. The vast majority of shoppers will be in transit or non-flying customers, attracted by the wide range of airport facilities on offer. 15% of our respondents thought this model would be predominant by 2025.

d) Walkway concept

In this scenario, many of the current airport processes are performed remotely by the passenger, at home or in a separate virtual terminal – possibly in the city centre. Those that are performed onsite are highly automated with the aim of minimising processing steps and the emphasis on speed.

e) Bus station concept

At the low-cost end of the spectrum lies the 'bus station' model, a no-frills atmosphere where speed and efficiency are key. Airport processes are typically fast and simple, technology is kept to a minimum and cost control is paramount. Berlin's Tegel airport displays many of these characteristics. Such low cost terminals are well suited as temporary locations to cope with periods of unusually high demand (Olympics village), or in destinations where passengers are less concerned about additional airport amenities. Only 4% of our survey respondents thought this would be a predominant model by 2025.

In the survey, passengers were asked to select which of these concepts the airport of 2025 would most resemble. Given the range of different requirements that we have of our airports, it is no surprise that there was not a majority choice. However, by far the most popular preference was for an independent, full service destination airport – with 41% selecting the 'mini-city' model.

¹¹¹ <http://business.blogs.cnn.com/2012/02/23/middle-east-aviation-spreads-its-wings/>

> Infrastructure model

A number of alternative approaches are now under consideration for the construction and management of airport infrastructure.

a) Asset rental

Under this model the operator doesn't actually own the asset but simply rents it as a service from an infrastructure owner – possibly the developer. Payment can be on the basis of a fixed rental agreement or some degree of revenue sharing. Hence infrastructure costs move from capital to revenue budgets and provide far greater flexibility to the operator – although this risk is likely to be reflected in asset rental charges.

b) Temporary Facilities

Increasingly, complete terminal facilities are rented for major sporting events where a temporary peak in demand doesn't warrant a high fixed cost investment (2010 World Cup in South Africa). Whilst the rental costs may be relatively high, they are offset by the low capital investment required and the flexibility afforded to the host destination.

c) Modular Architecture

The high costs of terminal development and the uncertainty of long-term passenger volumes is driving airlines to adopt a modular approach to terminal development, using pre-fabricated modules that can be extended at relatively low extra cost. The airport design is driven by functionality rather than aesthetics, but benefits from speed of construction, ease of maintenance and relatively low costs of erection and ownership.

> Revenue generating model

A number of different revenue re-distribution models could be applied. These include sharing revenues based on total number of passengers each airline brings to the airport, or on actual passenger spend, meaning those airlines with higher spending customers would receive a bigger distribution.

a) Income stream generation

The challenge here is to extend the range of sources through which non-aeronautical revenues can be generated. Options such as real estate development and renting land out for temporary events such as fairs and festivals are often cited as opportunities. However, for most airports, the primary focus is revenues derived from passengers. Smart advertising solutions are also being pursued – such as carrying advertisements in security trays and securing sponsorship for different airport facilities such as power sockets.

b) Pricing innovation

Whilst airports have used sales, discounts and multi-buy incentives, they are not seen to be as innovative as their high street or online counterparts. Models such as forward and reverse auctions, aggregated buying and best price guarantees could soon be introduced into the airport environment.

c) Profit redistribution

Airlines have been applying increasing pressure to receive a share of the profits from airport retail. Airports have largely resisted this move as they argue they need to offset the losses from real term declines in aeronautical revenues. The key here is that airlines hold the prime relationship with passengers and could help drive a major uplift in spending – however they will want something in return. Examples from Malaysia and Dallas Fort Worth Airports show how such schemes could operate, as seen in Case Studies 7 and 8.

> Customer engagement model

One of the most common issues that arose during our expert interviews was that of ‘customer ownership’ – with airlines and airports having strongly divergent views on whether in the modern era it is even possible to talk about really ‘owning’ the customer. What the survey makes clear is that the passenger wants to control the extent, nature and boundaries of any relationships across the passenger journey. As such, 67% said they would define the level of engagement each entity can have with them.

Worryingly for those involved, the passenger is also suggesting that the value of a relationship has yet to be proven. Only 27% would accept the airport as the primary channel for communications, 16% would allow the airlines to perform that role and 22% would look to approved ‘infomediaries’ such as a social network.

There are different scenarios within this model:

a) Multiple parallel paths

In this environment, each ecosystem player realises the importance of engaging the passenger, yet little strategic thought is given to how. A multiplicity of platforms and messages compete for passenger attention, offering discounts, attempting to up-sell and seeking to tap into new revenue streams. Ultimately the passenger is bombarded with information, resulting in a dilution of the intended message and a growing reluctance on the part of the passenger to engage with the players on their terms.

b) Cooperative

In this scenario, airports and airlines remain independent in their communication strategy and platforms, yet agree on a framework that gives the customer increased control over the messages they receive. Airport apps could be utilised to manage the timing and content of offers from the airport and airlines.

c) Single co-ordinated interface

Airlines, airports, leisure providers and other ecosystem partners develop a unified platform and strategy to engage the passenger, providing seamless and passenger-driven two-way communications. The passenger’s mobile device is the ultimate method of delivery, although interactive surfaces are developed for those without access to such technology. Many would argue that the airline is the obvious partner to deliver this as they have the basis for a relationship with the passenger.

‘Who owns the passenger is a ridiculous debate, we should work together against other airports and airlines.’



Annegret Reinhardt-Lehmann

Director, Frankfurt-Rhein-Main: Der Wirtschaftsinitiative

d) Third party solutions

Over time, the customer may choose to take control and authorise key intermediaries through whom they wish to receive all communications. These trusted ‘infomediaries’ might be new players, existing service providers or even social media platforms.

> Service delivery model

The findings of the research and survey suggest that to achieve commercially viable business models, a fundamental mindset shift is required from managing a travel ‘process’, to delivering an integrated travel and leisure ‘experience’. The issue however is who is best positioned to deliver such an experience given the multi-player roles and contributions. Many envisage the industry moving to the kind of deep, multiple-channel customer engagement model that is currently associated with the likes of Amazon, Google and Apple. Similarly, the delivery and constant renewal of high quality leisure experiences is considered the core competence of brands such as Disney, Merlin Entertainments, leading museums and attractions.

Equally, the type of integrated technology infrastructure envisaged may be beyond the means of any of the ecosystem players. Hence we could see the emergence of new technology infrastructure partners capable of building, managing and enhancing an ever growing range of applications that cut across the traditional demarcation boundaries of airline, airport and ground handler systems.

The range of skill-sets required to deliver tomorrow’s airport ecosystem experience means that there was no clear cut majority view as to who was best positioned to deliver it. The most popular option (41%) believe that it would require new partner groups combining all those involved in the value chain: airlines, airports, leisure, hotel, retail and technology brands. Only 30% believe airports are best positioned to manage the delivery of this total passenger experience and just 8% think the airlines could do it on their own.

> Financing model

The changing economics of aviation and global uncertainty mean that airport financing has become a tougher challenge globally. In its 2050 vision, IATA states that ‘the relatively low return on invested capital for the airport sector is the result of the US and Japanese airports, which are run by governments to deliver a low investment return. In Europe and Asia (excluding Japan), airports do generate excess returns, at least over part of the cycle¹¹²’. Whilst pure public or privately financed models are still in evidence, a number of alternative models are emerging that could become viable:

a) Community funding

With many communities highly dependent on their airport as both an economic stimulus and transport provider, a range of possibilities emerge. One option is a local levy which is accumulated in an airport investment fund. This may come from a bed tax in tourism destinations or a general tax levy. Another option is the sale of equity to local citizens and businesses. In both cases, the aim is to secure a long-term funding partner.

Mankala is a Finnish business model used widely in the country’s electricity sector, whereby a limited liability company is run like a not-for-profit cooperative, for the benefit of its shareholders. The model enables shareholders to merge their resources to acquire a particular asset¹¹³. The Mankala model’s main objective is to bring together a group of shareholders to develop a project that would be too large for any of them individually, under a structure that allocates risks between shareholders in legal terms¹¹⁴. The challenge with any such model is securing sufficient investment funds from local players.

b) Diaspora funding (raising funds from citizens living outside their original homeland)

Ethiopia has pioneered the use of issuing diaspora bonds to finance infrastructure. The Millennium Corporate Bond, which targeted Ethiopians both at home and abroad, aimed at raising capital for the state-owned Ethiopian Electric Power Corporation. Such bonds remain an untapped resource for many countries with large diaspora populations to mobilise resources. The World Bank estimates that Sub Saharan Africa countries alone could raise up to \$5-10 billion per year through diaspora bonds. They are thus a potential source of longer term financial resources for infrastructure¹¹⁵.

c) Ecosystem funding

Under this scenario, some or all of the players in the airport ecosystem are invited to participate in funding upgrades and new developments, in return for an equity share and influence in airport decision making. The joint venture between Lufthansa and Munich airport for the construction of Terminal 2 highlights the positive benefits that can accrue from deep financial and strategic collaboration of ecosystem partners¹¹⁶ (see Case Study 10).

Case Study 10

Airline /Airport collaboration – Lufthansa and Franz Josef Strauss Airport in Munich

When the original terminal at Franz Josef Strauss Airport in Munich had almost reached its 20 million passenger capacity, the airport set about creating Terminal 2 - a new 25 million passenger facility. A key partner was Lufthansa which also found itself approaching capacity at its Frankfurt Rhein-Main Airport hub. Together they decided to build the new 1.2 billion Euro terminal through a joint venture company, 40% owned by Lufthansa and 60% by Munich Airport. The terminal opened in June 2003 and was designed specifically for, and dedicated to Lufthansa and its Star Alliance partners. The terminal’s capacity exceeded the region’s catchment potential and was intended to become a new hub for Lufthansa.

Bjoern Goetsch and Sascha Albers from the University of Cologne reported that in 2004 Lufthansa introduced six new long haul connections, and by 2007, Munich was servicing 2200 weekly flights to 83 continental destinations – more than LH’s primary hub at Frankfurt. The high level of interdependence was seen as a benefit to both sides and the relationship extended to joint planning and decision making, marketing and service procurement. Goetsch and Albers conclude that ‘this organisational set-up resulted in superior information-sharing among the involved parties and led to organisational learning and finally to satisfaction and superior performance of the venture’.

¹¹² IATA Vision 2050

¹¹³ <http://www.ben.ee/public/Tuumakonverentsi%20ettekanded%202009/Peter%20S.%20Treialt%20-%20Mankala%20principles.pdf>

¹¹⁴ <http://www.ben.ee/public/Tuumakonverentsi%20ettekanded%202009/Peter%20S.%20Treialt%20-%20Mankala%20principles.pdf>

¹¹⁵ [http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Africa%20Econo%20brief%202_Africa%20Econo%20brief%202%20\(2\).pdf](http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Africa%20Econo%20brief%202_Africa%20Econo%20brief%202%20(2).pdf)

¹¹⁶ http://www.garsonline.de/Downloads/070616/Goetsch_GARS.pdf

d) Public private partnerships

In the face of an increasingly difficult climate to finance infrastructure, innovative approaches are being explored. One such example is the joint funding and delivery management arrangement established between Southwest Airlines and the City of Dallas to modernise Dallas Love Field Airport¹¹⁷. Commenting on the deal, ACI (Airports Council International) North America says 'this creative approach taken by the City of Dallas and Southwest Airlines will not only generate local, federal and public funds to develop a public facility and infrastructure, it will also enable a private 'partner' to deliver it in an expedited (and therefore, less costly) manner¹¹⁸' (See Case Study 11).

¹¹⁷ www.dallas-lovefield.com/pdf/LFMP_Newsletter_0111.pdf

¹¹⁸ <http://www.aci-na.org/blog/2011/09/12/city-of-dallas-and-southwest-airlines-collaborate-to-deliver-airport-infrastructure-economic-growth-jobs/>

Case Study 11

Collaboration on airport infrastructure development – Southwest Airlines and the City of Dallas

The \$519 million Dallas 'Love Field Modernization Program', will involve a relatively rare form of public and private partnership in the US aviation sector. Under the initiative, the City of Dallas and Southwest Airlines will collaborate in financing and managing the renovation and expansion of the airport. The initiative is being undertaken in preparation for the passenger growth that is forecast to occur when growth restrictions are lifted in 2014. The upgrade will deliver a new centralised concourse with 20 gates, a remodelled lobby, expanded baggage claim area and a new ticketing wing.

The deal combines public funds from the Federal Aviation Administration (FAA) Airport Improvement Program, the Transportation Security Administration (TSA), as well as airport Passenger Facility Charges (PFC). As part of its financial support, Southwest Airlines sold \$310 million in bonds in 2010 at a 5.25 percent interest rate.





Conclusion

A near 'perfect storm' of influencing factors is driving the need for a fundamental rethinking of the airport ecosystem.

- > Globally, airline profitability has been volatile and the industry collectively has only made a profit for 6 of the last 15 years. Expectations of rising fuel prices, continued economic uncertainty and greater passenger price sensitivity will further challenge airline profitability. It will also increase the pressure on airports to drive down airline landing fees, reduce associated charges and share non-aeronautical revenues.
- > Rapid technological change, rising service expectations and the demand for free high-speed wireless connections are pushing up the cost of upgrading and maintaining the airport IT infrastructure.
- > In response to these combined pressures on income and expenditure, airports are looking for an aggressive expansion of non-aeronautical revenues such as retail, dining, car parking, leisure and real estate.
- > The trend towards automation and streamlining the core passenger journey is reducing pre-departure time requirements and therefore potentially cutting passenger spend in the airport.
- > Whilst airports, airlines and airport retailers are all talking about 'owning and engaging' the customer, the survey makes it clear that passengers will be very selective about who can contact them and with what information.
- > Passengers say they will be willing to spend even more time and money at the airport if airports can provide inspiring leisure options and a competitive, enticing retail offering.
- > The majority of passengers surveyed expect airports to give a sense of place which reflects local culture, making the airport destination and flight, part of their total journey experience.



Delivering the Ecosystem Architecture - key strategic challenges

The research identifies that a wide range of ecosystem engagement models will apply across the globe. However, it also highlights some common challenges on the path to a successful ecosystem model:

> It's all about experience

Strategies for growth have to succeed in delivering a streamlined passenger journey and create compelling experiences that encourage the customer to spend more time and money in the airport environment.

> Deep passenger relationships

For players across the ecosystem, the imperative is to grow non-aeronautical revenues. The passenger will remain a primary source of these income streams. Growing the commercial flows demands a deep, engaging relationship where the passenger perceives genuine benefit and value.

> Multiple financing and revenue models

A wide range of models and approaches will need to be explored to secure long-term infrastructure funding and provide a growing stream of non-aeronautical revenues.

> Strategic engagement and data collaboration are essential for an effective ecosystem

To deliver a genuinely customer-centric experience, ecosystem partners will need to go well beyond data sharing and ensure extended collaboration, from strategic planning through to operational decision-making. The same data will be shared and enriched by various players - including the passengers themselves - who will control the level of access to their personal information.

> Tomorrow's airport ecosystem will be a data-intensive, knowledge-rich and intelligent environment

Mobile phones, social media, airport sensors and new applications will generate exponential growth in data. New artificial intelligence knowledge-management tools, such as predictive analytics, will enable the generation of powerful new insights and identify emergent trends and patterns.

> Technology mastery

Effective management of a complex, distributed and potentially outsourced information and communications technology infrastructure will be a core competence required across the ecosystem.

> Powerful new roles and skill sets will emerge

Tomorrow's airport will be a complex environment with the passenger at its heart, collaboration as its lifeblood and innovation as its currency. This means critical roles will emerge around deep customer engagement, complexity management, partnership working and innovation delivery.

> Long range radar

Constant scanning of the long-term horizon will be critical to identify and assess emerging trends, forces, developments, ideas and weak signals that could have a direct bearing on the airport environment.

> Airlines are pivotal in the new order

Developing and deepening the customer relationship is a role probably best suited to the airlines that already have some degree of contact with the traveller. Airlines need to be convinced of the value of extending the level of engagement to the benefit of both the passenger and other ecosystem partners.

Throughout this report we have seen that delivery of an effective competitive response and enhanced total trip experience is only possible with the active total engagement of all players in the airport ecosystem. That goes well beyond the currently popular theme of collaborative decision making (CDM).

More and more event anticipation will be possible thanks to central, instantaneous, atomic data provided by the airport ecosystem. This will enable massive disruption mitigation, and forecasting far before the current airport window. As a result, airport resources will be fine-tuned to ultimate levels of precision and prediction, enabling the overall industry to save vast sums of money. **The airport will be transformed into an intelligent, adaptive and responsive environment.**

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63. **David Vance**, Managing Director – Airport Operations, American Airlines
64. **Nazareno Ventola**, Strategy and CPM Director, Aeroporto de Bologna
65. **Lisa Voldeng**, CEO, SugarLab Corporation
66. **Cees de Vos**, Director - Innovation Outstations & Partnerships, Air France/KLM
67. **James Wallman**, Trends Analyst
68. **Kevin Williams**, Founder, KWP Limited
69. **Thomas Wittmann**, General Manager - IT Development Network Management, Lufthansa
70. **David Wortley**, Former Director of the Serious Games Institute and Freelance Consultant
71. **Eoin Wylie**, Senior Commercial Business Manager, NATS (UK)
72. **Michell Zappa**, Emerging Technology Strategist
73. **Peter Zeitlin**, Project Director - Corporate Development, Finnair

About Amadeus

Amadeus is the chosen technology partner and transaction processor for the global travel and tourism industry. The company provides distribution and technology solutions to help its customers adapt, grow and succeed in the fast changing travel industry. Customer groups include travel providers (airlines, hotels, car rental companies, railway companies, ferry lines, cruise lines, insurance companies and tour operators), travel sellers (travel agencies) and travel buyers (corporations and travellers).

Amadeus' solutions and services are used by our customer groups in different ways. More than 91,350 travel agency points of sale and over 67,180 airline sales offices use the Amadeus system to run their business. Many of the industry's other leading travel service providers use our modular technology to optimise their distribution and internal operational requirements. Amadeus has central sites in Madrid (corporate headquarters & marketing), Nice (development) and Erding (Operations – data processing centre) and regional offices in Miami, Buenos Aires, Bangkok and Dubai.

At market level, Amadeus maintains customer operations through 73 local Amadeus Commercial Organisations covering 195 countries. Amadeus operates under a transaction-based business model that offers IT solutions to virtually all players in the travel industry. The Amadeus system processed 948 million billed travel transactions in 2011.

About Fast Future

Fast Future is a foresight research and consulting firm that works with global corporations, governments and NGOs around the world. Their aim is to help clients understand, anticipate and respond to the trends, forces ideas and resulting scenarios that could shape their environment, the economy and the competitive landscape over the next 5-20 years. Their core activities are futures research, consulting, events, and delivery of workshops and speeches for leadership audiences around the world.

Fast Future works with clients globally across a range of sectors including aviation, technology and tourism in over 60 countries across six continents. Their clients include Amadeus, Aéroports de Paris, Future Travel Experience, GE, GAD, IBM, Intel, Mumbai Airport, SAP, Schiphol Airport, Siemens, Vancouver Airport and Vancouver Airport Services.

