Understanding the aviation industry and its global impact: why are airlines destroying shareholder value and how do they contribute to the world economy?

João Moura Soares Bandeira (33747)
Nuno Francisco Macedo Eusébio Rodrigues (33795)
Tiago Ayala Botto Pires Eusébio (33212)

3rd of January, 2020
Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: commercial passenger airlines, destruction of shareholder value, spillovers & scalability

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), PORLisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and PORNorte (Social Sciences DataLab, Project 22209).
Why are airlines destroying shareholder value and how do they contribute to the world economy?

Executive summary

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?
   - The commercial passenger airlines segment – full-service carriers (FSCs) and low-cost carriers (LCCs) – is the main driver of the industry due to its highest value and volume.
   - From the segment analysis conducted it is apparent that FSCs focus on providing the best services to attract customers looking for a reliable and comfortable airline which is achieved through differentiation. On the other hand, LCCs make every effort to provide the cheapest service to attract price-sensitive customers through cost leadership.
   - Furthermore, a Porter’s Five Forces analysis concluded that airline’s bottom line is squeezed due to powerful suppliers.
   - The main driver of the aviation industry has been identified, it is now crucial to analyse why the industry is destroying shareholder value.

2. Why is the aviation industry destroying shareholder value?
   - This chapter reveals that four factors lead to aviation’s low profitability – Threatening Forces, Volatile Cost Structure, Strategic Decisions and Legislation.
   - By analysing the problem through three different perspectives – 1) Value Chain, 2) Operations and Strategy and 3) Profitability – key success factors (KSFs) are uncovered.
   - Aviation presents one of the worst returns on invested capital (ROIC) amongst industries and a big dispersion between best and worst performers occurs due to six factors.
   - If this industry destroys $18.2 billion per year, why is money still being invested?

3. What are the spillovers of the aviation industry?
   - Aviation plays a decisive role in driving global economic growth and contributed with just under $1 trillion to global GDP in 2016, generating approximately 29 million jobs. Together with tourism, these industries provided 65 million jobs and its economic contribution represented 3.5% of global GDP in 2016.
   - As a driver of sustainable development, global aviation contributes to businesses as well as the health and general well-being of people.
   - The negative environmental impacts of aviation and climate change are the main sources of concern and a growing risk threatening the operations and economic profitability of the aviation industry.
   - It is now important to understand the challenges the aviation industry will face in the future and how they can be solved.

The commercial passenger airlines segment is the main driver of the aviation industry, with the industry as a whole experiencing shareholder value destruction of $18.2 billion per year due to four factors. Nonetheless, it has a crucial role as a driver of economic growth valued at $2.7 trillion, which ultimately results in an overwhelming net positive contribution to the world economy.
Executive summary

4. Scalability: a new challenge for the future

- From the previous three chapters it is possible to conclude that the profitability issue within the aviation industry is intrinsic and of difficult resolve, however, the demand for air transport is expected to increase, further strengthening the aviation industry’s impact on global GDP growth, generating jobs and driving private consumption.
- This sheds light on a new issue: scalability. For which fleet, infrastructure and labour will need to be reinforced to allow the industry to capture the increasing demand in air travel.
- Ultimately, a customer journey approach can solve profitability and scalability issues as well as enhance the customer experience.

Air transport demand is expected to increase 78% by 2035 and to absorb this growth the aviation industry needs to develop three drivers (fleet, infrastructure and labour). A customer journey approach can be conducted to solve profitability and scalability issues while simultaneously enhancing the customer experience.
Which segment is the main driver of the aviation industry and what are the characteristics of the full-service and low-cost carriers?

Tiago Ayala Botto Pires Eusébio (33212)

3rd of January, 2020
Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: commercial passenger airlines, full-service carriers & low-cost carriers

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), PORLisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and PORNorte (Social Sciences DataLab, Project 22209).
1. Which segment is the main driver of the aviation industry and how?

Executive summary

1A. Segmenting the industry
- The aviation industry had global revenues of $704 billion and employed 65 million people in 2016.
- The aviation industry can be broken down into two main areas: freight and passenger transportation.
- Freighters dominate the air freight transportation industry accounting for 90% of the revenues.
- General aviation (private and recreational flying) is the private transport component of aviation.
- Commercial aviation – full-service carriers (FSCs) and low-cost carriers (LCCs) – is the public transport component of aviation.
- The commercial aviation segment has a value of $728 billion and volume of 2.2 trillion revenue passenger kilometres (RPK) in 2018.

1B. Commercial passenger airlines analysis
- The commercial passenger airlines industry analysis conducted will focus on three key components.
- FSCs offer several services to enhance the customer experience which results in a higher price, while LCCs focus exclusively on offering low prices which comes at the cost of very limited services offered.
- Commercial passengers can be divided into four segments: efficiency, comfort, price and performance.
- FSC customers look for efficiency and comfort with travel agencies organising their travel plans, while LCC customers are price conscious since they organise and book the flights themselves.
- FSCs follow differentiated marketing through the high quality and number of services offered, while LCCs follow cost leadership which is achieved by constantly pursuing operating cost reductions.

1C. Key success factors
- FSC average price is $112 more expensive but LCCs are slightly more punctual.
- Porter’s Five Forces analysis main conclusion is that airline bottom line is squeezed due to powerful suppliers.

The commercial passenger airlines segment is the main driver of the aviation industry with global revenues of $728 billion and 2.2 trillion revenue passenger kilometres in 2018. Within this segment, full-service carriers (FSCs) focus on providing the best services to attract customers looking for a reliable and comfortable airline which is achieved through differentiation, while low-cost carriers (LCCs) focus on providing the cheapest service to attract price-sensitive customers through cost-leadership.
1A. The aviation industry had global revenues of $704 billion and employed 65 million people in 2016
Technological innovation and regulatory changes have increased the size and profitability of the industry

Key facts and figures in 2016*:

- $704 billion – Aviation global revenue
- 3.5% – Global GDP supported by aviation
- 65 million – Jobs supported by aviation and tourism worldwide
- 45 091 – Routes served globally in 2017
- 85 million – Hours flown by airlines in 2018
- 54 billion – Kilometres flown by airlines in 2018

*Unless otherwise stated

Sources: 1 ATAG; 2 Wittmer et al.; 3 Airbus

The aviation industry

- Civil aviation industry is defined as the global network of aircraft operators, airports, air navigation service providers and manufacturers of aircraft and their components
- It is responsible for connecting the global economy, providing millions of jobs and making the modern, internationally connected way of life possible
- It has grown over the years and is today an important driver of economic growth

Brief history of the aviation industry

- In the late 18th century the first flight attempts were held with lighter-than-air flight using hot-air balloons designed by the Montgolfier brothers
- Followed by un-powered heavier-than-air flight with gliding by Otto Lilienthal in the late 19th century
- Powered flight only started in the beginning of the 20th century with the construction of the first powered aircraft by the Wright brothers
- Since then, the aviation industry has been technologically revolutionized with the introduction of the jet, becoming a viable and important form of transportation around the world

Only after the deregulation and the development of efficient jets did profitability start to rise:
1A. The aviation industry can be broken down into two main areas: freight and passenger transportation

Civil aviation industry has a more significant impact on the global economy compared to military aviation

The aviation industry structure

- The aviation industry has two main pillars: civil aviation and military aviation
- Due to the very different nature of these two industries and the higher global industry value for civil aviation (as shown below) only civil aviation is within the scope of this study
- The structure of the civil aviation industry is presented on the right and the first breakdown is between the transport of freight and passengers

Civil aviation is far more valuable than military aviation:

**Freight**
- Operating of aircraft to transport goods
- Can be further divided into: dedicated freighters and passenger belly capacity
- The former includes the use of aircrafts which are solely used for the purpose of transporting goods
- The latter includes the use of spare volume in the luggage compartment of passenger aircrafts to transport goods

**Passenger**
- Operating of aircraft to transport people
- Can be further divided into: general aviation and commercial aviation
- The former is the private transport component of passenger aviation (private transport and recreational flying)
- The latter includes the public transport component of passenger aviation (full-service carriers and low-cost-carriers)

Sources: ¹ ATAG; ⁴ MarketLine
1A. Freighters dominate the air freight transportation industry accounting for 90% of the revenues
61.9 million tonnes of cargo were transported by air resulting in industry revenues of almost $120 billion in 2017

Freight

- Air freight is the transport of goods via aircraft
- It is the fastest mode for long-distance freight transport, however, it is also the most expensive
- It is especially valuable for individuals or companies which have urgency in receiving a particular good to satisfy customer needs or to help with inventory management
- Freight can be transported in two ways: through dedicated freighters or passenger belly capacity

Steady growth in value and volume of air freight transport:

Key facts and figures in 2017:

- $6 trillion – Value of cargo handled by air
- 61.9 million – Tonnes of freight handled by air
- 255 billion – Scheduled freight tonne kilometres

Air freight volume is low but of high value:

By volume

- Air (1%)
- Road, rail and water (99%)

By value

- Air (35%)
- Road, rail and water (65%)

Dedicated freighters

- Involves the transport of goods by air in specialized freight aircraft
- Particularly well-suited for transporting high-value goods since they provide direct routing, unique capacity considerations, reliability and highly controlled transport
- Cargo aircrafts offer a higher value of service generating more than 90% of the total air cargo industry revenue

Passenger belly capacity

- Involves the transport of goods by air in the belly capacity of passenger aircraft
- Extra space in this compartment is used for cargo to capitalize on additional revenue opportunities
- Volume of cargo transported is limited to the space available and include passenger networks which are much broader and often include destinations where cargo demand is minimal

Sources: 1 ATAG; 4 MarketLine; 5 Boeing
1A. General aviation (private and recreational flying) is the private transport component of aviation

Total revenues of almost $330 billion and employed 1.65 million people in 2018

**General aviation**

- **General aviation** is defined as all aviation other than military and commercial airlines
- It is the private transportation component of aviation and as such is usually expensive
- The type of aircraft can vary a lot depending on the activity and the number of people transported
- General aviation can be segmented into two areas: private transport and recreational flying

The increase in value from 2016 onwards is a result of the recovery from the financial crisis:

**Key facts and figures in 2018:**

- **$328.5 billion** – Total revenues
- **446 thousand** – General aviation aircraft flying
- **1.65 million** – Jobs supported by general aviation

**Two thirds of passenger traffic comes from the U.S.:**

- **330 billion** – Total revenues
- **446 thousand** – General aviation aircraft flying
- **1.65 million** – Jobs supported by general aviation

**Private transport**

- This segment involves the transport of a small group of passengers in a business or private jet
- Aircraft activities include: corporate aviation, private charters, fractional ownership, and personal travel
- The type of aircraft used can be from a very light jet (max. 9 passengers) to a VIP airliner (max. 220 passengers)

**Recreational flying**

- This segment usually involves the transport of a single passenger for leisure or sports purposes
- Activities include: recreational flying (powered/powerless leisure flying activities) and air sports (aerobatics and air races)
1A. Commercial aviation (full-service carriers and low-cost carriers) is the public transport component of aviation

Almost 9.5 billion passengers were transported resulting in revenues of $730 billion in 2018

Key facts and figures in 2017:

- 7.75 trillion – Passenger kilometres
- 4.1 billion – Passengers carried by airlines
- 41.9 million – Commercial flights worldwide

Passenger traffic distribution is similarly split by region:

By global passenger split

- International passengers (41%)
- Domestic passengers (59%)

By regional passenger split

- Americas (31%)
- Asia (32%)
- EMEA (37%)

Rapid growth in value and volume in the industry:

Full-service carrier (FSC)

- Involves the transport of passengers by air via full-service airlines
- Connect large sets of destinations through multiple hubs and typically have a core geographic market in which they are located
- These airlines offer transportation in all travel classes
- FSCs normally have the highest unit revenue as well as the highest cost structure

Low-cost carrier (LCC)

- This segment involves the transport of passengers by air via low-cost airlines
- LCCs typically provide only one travel class
- Are mainly focused on short and medium-haul markets
- Compete on cost leadership since they tend to have the lowest cost structure

Sources: 1 ATAG; 4 MarketLine
1A. The passenger commercial airlines segment has a value of $728 billion and volume of 2.2 trillion RPK in 2018

The focus of this chapter will be on the commercial passenger airlines since it represents the most significant share of the global revenues.

Focus of the chapter

It is important to limit the focus of the chapter to the segment which is the most relevant within the overall aviation industry. When analysing the significance of a given segment within an industry it is critical to observe the respective value and volume – revenue passenger kilometres (RPK) or freight tonne kilometres (FTK).

In 2018, passenger aviation had the highest value and volume...

<table>
<thead>
<tr>
<th></th>
<th>Freight</th>
<th>Passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>$127 billion</td>
<td>$1 trillion</td>
</tr>
<tr>
<td>Volume</td>
<td>208 billion FTK</td>
<td>2.2 trillion RPK</td>
</tr>
</tbody>
</table>

...where the commercial airlines segment was the driving force

<table>
<thead>
<tr>
<th></th>
<th>General aviation</th>
<th>Commercial airlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>$329 billion</td>
<td>$728 billion</td>
</tr>
<tr>
<td>Volume</td>
<td>NA*</td>
<td>2.2 trillion RPK</td>
</tr>
</tbody>
</table>

From the value and volume analysis conducted it is clear that the main driver of the aviation industry is the passenger aviation segment, more specifically, commercial passenger airlines and as such this segment will be the main focus of this chapter.

Sources: 4 MarketLine; 6 GAMA

* No available public data for general aviation volume
1B. The commercial passenger airlines industry analysis conducted will focus on three key components

The business model, customers & demand and marketing strategies will be identified for FSCs and LCCs.

The commercial passenger airlines (FSCs and LCCs) will be analysed using the following framework:

<table>
<thead>
<tr>
<th>Business model</th>
<th>• Network</th>
<th>• Fare structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Operations &amp; services</td>
<td>• Key players</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customers &amp; demand</th>
<th>• Customer segments</th>
<th>• Demand volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Customer journey</td>
<td>• Demand, ASK and PLF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marketing strategies</th>
<th>• Marketing strategies</th>
<th>• Perceptual mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Value proposition</td>
<td>• Positioning strategies</td>
</tr>
</tbody>
</table>
1B. FSCs offer several services to enhance the customer experience which results in a higher price...

FSCs made up 70% of the commercial passenger airlines industry resulting in a $477 billion market in 2017

The availability of connecting flights and the several services offered by the FSCs...

<table>
<thead>
<tr>
<th>Network structure:</th>
<th>Operations &amp; services</th>
<th>Fare structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hub-and-spoke (HS):</td>
<td>Aircraft operated:</td>
<td>Travel class:</td>
</tr>
<tr>
<td>+ Several origins and destinations relatively well interconnected with a low number of routes</td>
<td>• Different aircraft types from small regional feeder to a long range widebody aircraft</td>
<td>Economy class:</td>
</tr>
<tr>
<td>- Congestion in hubs result in delays and increased turnover times of aircraft, raising airline unit costs</td>
<td>Services offered:</td>
<td>• The lowest travel class of seating in air travel</td>
</tr>
<tr>
<td>Multi-hub-and-spoke (MHS):</td>
<td>• Several services offered included in the base fair (e.g. in-flight meals, checked luggage, loyalty programs)</td>
<td>Business class:</td>
</tr>
<tr>
<td>+ More flexible consolidation of traffic in hubs through connecting flights, obtaining an adequate load factor for large aircrafts and efficient flight frequencies</td>
<td></td>
<td>• The highest level of service distinguished by the quality of seating, food, drinks, ground service and other amenities</td>
</tr>
<tr>
<td>- Need to schedule a high rate of flights between multiple hubs</td>
<td></td>
<td>• Business class prices are more expensive and can be up to double the price of the economy class</td>
</tr>
</tbody>
</table>

Geographical network range:
• Mix of short, medium and long-haul domestic and international flights

...translate into multiple travel classes and a higher price

American FSCs generate the highest revenues while European FSCs are the most expensive:

Sources: 7 Annual Reports; 8 Carmona-Benitez et al.; 9 Lordan; 10 DLR

1A. Segmenting the Industry 1B. Commercial Passenger Airlines Analysis 1C. Key Success Factors
The focus on short-haul flights and the limited services offered by LCCs...

**Network**

**Network structure:**
- Point-to-point (PP)
- + Lower temporal density due to the non-existence of connecting flights
- + Lower probability of delays, lower peaks of needs of personnel and a lower turnover of aircrafts due to the low temporal density of operations
- - Need to implement a much larger number of routes than the HS network to link a similar number of destinations
- - Only operate on routes where demand is high enough to have a high load factor
- - Limited to short and medium-haul flights since long-haul routes are usually out of reach

**Geographical network range:**
- Short and medium-haul domestic and international flights

**Aircraft operated:**
- Homogenous fleet of medium-sized aircraft with high density seating and high capacity utilization

**Services:**
- Very limited services offered by LCCs (e.g. food and drinks are only available for purchase at prices significantly exceeding typical market value – source of ancillary revenue)

---

...translate into a single travel class and a lower price

**Travel class:**
- LCC’s usually have only a single service class so there is no price discrimination

**Pricing:**
- Low fares are charged due to strong focus on price competition
- Very dynamic pricing with discounts and tickets in promotion

**Southwest Airlines is the main driver of LCC revenue while Asian and European LCCs are the cheapest***:

![Bar chart showing LCC key players with the highest revenues by geography (2017)]

Source: Annual Reports

---

* LCC’s夜间 airline
** Source: Annual Reports
1B. Commercial passengers can be divided into four segments: efficiency, comfort, price and performance

The increase in passengers over the years is a result of the decrease in prices due to deregulation and increased competition

**Efficiency**
- Relatively low-price sensitivity
- Punctuality, flexibility and schedule are the most important features for choices in this segment
- Decision and booking of flights is outsourced for business reasons
- Travel frequency: several times per week
- Demographics: customers with university degrees and working in leadership roles

**Comfort**
- Very low price sensitivity
- Decision and booking of flights for business and leisure trips are usually made by travel agencies
- Do not use the internet as a booking medium
- Travel frequency: several times per month
- Demographics: elderly customers who work in high-ranking positions

**Price**
- Very price sensitive
- Planning of trips is done in advance to obtain the cheapest prices
- Not interested in in-flight services
- Travel frequency: 2-4 times a year
- Demographics: at least a high-school educational background and are lower-to-middle management employees

**Performance**
- Price is important as well as efficiency
- Customers base their choice on a mixture of price and quality
- Extensive research on travel portals
- Book flights by themselves
- Travel frequency: 5-7 times a years
- Demographics: entrepreneurs and lower-to-middle management employees

Historical evolution of demand
- Deregulation in the aviation industry around the 1980s in the U.S. and 15 years later in the European Union, meant that regulations concerning market access, capacities and prices were abandoned
- Customers benefited from lower prices and a rise in number of flights and connections resulting in more options for customers due to increased competition
- The emergence of the first LCCs at the end of the 20th century started a price competition
- Air transportation became more affordable resulting in the demand growth shown below

Demand has increased at a steady rate with the last few years experiencing higher growth rates:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of passengers (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>1000000</td>
</tr>
<tr>
<td>1973</td>
<td>1500000</td>
</tr>
<tr>
<td>1976</td>
<td>2000000</td>
</tr>
<tr>
<td>1979</td>
<td>2500000</td>
</tr>
<tr>
<td>1982</td>
<td>3000000</td>
</tr>
<tr>
<td>1985</td>
<td>3500000</td>
</tr>
<tr>
<td>1988</td>
<td>4000000</td>
</tr>
<tr>
<td>1991</td>
<td>4500000</td>
</tr>
<tr>
<td>1994</td>
<td>5000000</td>
</tr>
<tr>
<td>1997</td>
<td>5500000</td>
</tr>
<tr>
<td>2000</td>
<td>6000000</td>
</tr>
<tr>
<td>2003</td>
<td>6500000</td>
</tr>
<tr>
<td>2006</td>
<td>7000000</td>
</tr>
<tr>
<td>2009</td>
<td>7500000</td>
</tr>
<tr>
<td>2012</td>
<td>8000000</td>
</tr>
<tr>
<td>2015</td>
<td>8500000</td>
</tr>
<tr>
<td>2018</td>
<td>9000000</td>
</tr>
</tbody>
</table>

Sources: 2 Wittmer et al.; 4 MarketLine; 11 Teichert et al.; 12 World Bank

**Customer segments and preferences according to Teichert et al.’s study**

**Historical number of passengers carried by airlines**

Source: World Bank

**Demand**

Demand has increased at a steady rate with the last few years experiencing higher growth rates:

- Sources: 2 Wittmer et al.; 4 MarketLine; 11 Teichert et al.; 12 World Bank
1B. FSC customers look for reliability and comfort with travel agencies organising their travel plans...

Demand for FSCs is increasing at a higher rate than the rise in supply measured by the number of available seats

FSC customers according to Teichert et al.:

**Efficiency:**
- Business travellers who cannot afford travel delays and seek the fastest route to their destination. May travel in business class
- Leisure travellers who can afford the services provided by FCCs

**Comfort:**
- Leisure travellers who seek a comfortable trip with the best service

Customer journey

- Planning, booking, purchase and pre-trip check-in are usually outsourced to travel agencies
- Purchase is done directly through the travel agency with the payment of a commission
- Travel agencies can also send pre-trip reminders of the day, time and gate of the flight

- Customer ultimately only needs to go through the boarding process and enjoy the services offered by the airline
- Post-trip the customer may review his/her experience based on reliability and comfort

Passenger load factor (PLF) is increasing over the last 5 years, since the increase in demand (passengers) is greater than the increase in supply (ASK):

Sources: MarketLine; Annual Reports; Teichert et al.; ICAO

FSCs historical average available seat kilometres (average of key players)

FSCs historical average available seat kilometres (average of key players)

FSCs historical average passenger load factor (average of key players)
LCC customers according to Teichert et al.:

**Price:**
- Leisure travellers who pay for the travel expenses themselves and look for the cheapest option to their destination

**Performance:**
- Leisure travellers who also seek a cheap solution, however, are also willing to pay extra for on-time flights and the necessary connections without having to change airline to reach their destination
- Business travellers with a limited budget

Customer journey:

- Planning
- Booking
- Purchase
- Pre-trip
- Departure
- In-flight
- Post-trip

**Compared to FSCs, LCC demand, supply and PLF is increasing at a higher rate representing the growth in the LCC segment over the last 5 years:**

Sources: MarketLine; Annual Reports; Teichert et al.; ICAO
1B. FSCs follow differentiated marketing through the high quality and number of services offered...

Strategies for FSCs include improving customer service, offering several services, implementing a strong brand and forming alliances.

<table>
<thead>
<tr>
<th>Marketing strategy</th>
<th>Strategies to implement differentiated positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Differentiated marketing:</strong></td>
<td><strong>Innovation</strong></td>
</tr>
<tr>
<td>• A market-coverage strategy in which an airline decides to target several market segments and designs separate offers for each</td>
<td>• Airlines are constantly looking for ways to improve not only their operations in efforts to become more cost efficient but also their services through innovative features</td>
</tr>
<tr>
<td>• Two travel classes: economy and business class</td>
<td>• Example: China Eastern Airlines is developing a service that will allow customers to give better instructions and feedback on their in-flight meals. Through AI, the airline can better ensure that the tastes and preferences of its customers are kept safe, analysed and applied in the future</td>
</tr>
<tr>
<td>• FSCs advocate that they offer superior value</td>
<td><strong>Branding</strong></td>
</tr>
<tr>
<td><strong>Value proposition:</strong></td>
<td>• Customers may perceive a difference between two competing offers based on company or brand image</td>
</tr>
<tr>
<td>• “More for more” value proposition is implemented by FSCs providing upscale services and charging a higher price to cover the higher costs</td>
<td>• Example: In 2019, Delta Air Lines was the most valuable airline brand in the world with a brand value of $10 105 million. This leading brand value is achieved through Delta’s strong culture, enthusiastic employee base and strong business outlook</td>
</tr>
</tbody>
</table>

### American and European FSCs charge higher prices for their increased reliability:

![FSC key players perceptual map in terms of price and on-time performance (OTP)](image)

Sources: 7 Annual Reports; 14 OAG; 15 Cheramakara; 16 Qu; 17 W20

**Service**

• FSCs carry out service differentiation when claiming that they offer several in-flight services as well as punctual and flexible travel

• Example: Lufthansa operates over 60 airport lounges around the world. These lounges are typically only accessible to business class passengers or premium members of the airline. This is a luxury service which Lufthansa provides to passengers so that they can wait for their flights in a more comfortable fashion

**Alliances**

• FSCs are usually part of an alliance composed of several airlines which can greatly benefit its members through economies of scope

• Alliances are formed through: code sharing and mergers

• Example: Lufthansa founded the Star Alliance to strengthen its network and benefit from economies of scale, scope and density to compete with LCCs
Most punctual

Least punctual

Cheap

Very cheap

LCC key players perceptual map in terms of price and on-time performance (OTP)

### Marketing strategy

#### Cost leadership:
- A market-coverage strategy in which an airline goes after a particular market segment
- This is achieved by offering low prices which attract the price and performance customer segments

#### Value proposition:
- “Less for much less” value proposition is implemented by LCCs meeting customers’ low quality requirements at a much lower price

#### LCCs globally are similar when it comes to customer efficiency with Asian airlines offering the cheapest price:

<table>
<thead>
<tr>
<th>Cost leadership:</th>
<th>Strategies to implement cost leadership positioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>• A market-coverage strategy in which an airline goes after a particular market segment</td>
<td><strong>Low fleet cost</strong></td>
</tr>
<tr>
<td>• This is achieved by offering low prices which attract the price and performance customer segments</td>
<td>• LCCs typically operate a single aircraft type</td>
</tr>
<tr>
<td></td>
<td>• This significantly decreases maintenance and training costs</td>
</tr>
<tr>
<td></td>
<td>• Example: Ryanair only uses the Boeing 737-800 in its aircraft fleet and as such the crew only needs to be trained to operate this type of aircraft and the maintenance is the same for the entire fleet</td>
</tr>
<tr>
<td></td>
<td><strong>Low landing fees</strong></td>
</tr>
<tr>
<td></td>
<td>• LCCs typically use secondary airports which charge lower fees</td>
</tr>
<tr>
<td></td>
<td>• There is less traffic congestion and as a result fuel consumption is minimized</td>
</tr>
<tr>
<td></td>
<td>• Example: EasyJet uses the Luton Airport as its London airport. Even though this is a secondary airport and is further away from the city centre than Heathrow Airport it charges lower fees making it cheaper to operate for the airline</td>
</tr>
<tr>
<td></td>
<td><strong>Aircraft utilisation</strong></td>
</tr>
<tr>
<td></td>
<td>• Heavy emphasis on cost reduction</td>
</tr>
<tr>
<td></td>
<td>• Since money is only made when the plane is being operated, turnaround times are reduced to limit the time of the aircraft on the ground</td>
</tr>
<tr>
<td></td>
<td>• Example: JetBlue Airways employees usually have multiple jobs. Air stewardesses can also work at the boarding check and as a result the airline saves on employee costs since a role typically done by two employees is done by only one</td>
</tr>
<tr>
<td></td>
<td><strong>Limited onboard services</strong></td>
</tr>
<tr>
<td></td>
<td>• Checked bags or carry-ons are costly to process at the airport so they are paid in advance (when purchasing flight tickets)</td>
</tr>
<tr>
<td></td>
<td>• There is no assigned seating</td>
</tr>
<tr>
<td></td>
<td>• No onboard meals since it is costly to stock them and increases aircraft weight</td>
</tr>
<tr>
<td></td>
<td>• Example: Southwest Airlines uses its no assigned seating policy to promote that customers can choose where to sit</td>
</tr>
</tbody>
</table>

Sources: 7 Annual Reports; 14 OAG; 15 Cheramakara; 16 Kotler et al.

1A. Segmenting the Industry 1B. Commercial Passenger Airlines Analysis 1C. Key Success Factors
FSCs are on average more expensive than LCCs, however, they are not more reliable, which contradicts Teichert et al.’s study. As such, if no connections are needed and both FSCs and LCCs have exactly the same flights, the LCC will better satisfy the needs of a customer from the Efficiency segment. Hence, if LCCs can make these customers aware that their flights offer a better deal, then LCCs will continue to gain market share from FSCs.
1C. Porter’s Five Forces analysis main conclusion is that airline bottom line is squeezed due to powerful suppliers

The establishment of LCCs in the market and the low switching costs for customers are other disruptive forces within the aviation industry.

### Threat of new entrants
- Limited incumbency advantages
- Demand-side benefits of scale
- Easy access to distribution channels

### Bargaining power of suppliers
- Aircraft and engine producers are both concentrated oligopolies
- Airports have significant power since they are local monopolies
- Operations at network hubs are controlled by powerful labour unions
- A small concentrated number of firms provide airport services (handling, catering and cleaning), but switching costs are low

### Competitive rivalry
- **Multiple direct and indirect rivals**
- Growth has been rapid but volatile
- Limited product differentiation; similar company structures

### Threat of substitutes
- The number of customers who can afford air travel is increasing, especially in emerging markets
- Web-conference technology is improving
- Time consuming security measures make trains a short-haul competitive alternative
- Travel can be delayed or done without airlines
- Environmental issues challenge air travel

### Bargaining power of customers
- Low switching costs for most customers
- Buyers are fragmented
- Air travel is viewed as a standardized product
- Travel is a meaningful share of discretionary spending and as such customers tend to be price sensitive
- Websites increase price transparency

→ To understand why suppliers have so much power over commercial airlines it is necessary to analyse the industry value chain and respective operations

Sources: 17 IATA
## Appendix
### Aviation glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASK</td>
<td>Available Seat Kilometer: the measure of a flight’s passenger carrying capacity. Calculated by multiplying the number of seats on an aircraft by the distance travelled in kilometres. Used to measure an airline’s capacity to transport passengers</td>
</tr>
<tr>
<td>FSC</td>
<td>Full-service carrier: an airline that focuses on providing a wide range of pre-flight services, including different service classes and connecting flights</td>
</tr>
<tr>
<td>FTK</td>
<td>Freight tone Kilometers: the equivalent of RPK for freight. One FTK is one metric ton of revenue load, carried one kilometer. The sum of FTKs for every segment flown by every aircraft over a specific period is the FTK of an airline over that period</td>
</tr>
<tr>
<td>HS</td>
<td>Hub-and-spoke network configuration: destinations are linked to a main airport called a hub</td>
</tr>
<tr>
<td>LCC</td>
<td>Low-cost carrier: an airline that is operated with an especially high emphasis on minimizing costs and without some traditional services and amenities provided in the fare, resulting in lower fares and fewer comforts</td>
</tr>
<tr>
<td>Long-haul</td>
<td>Flights lasting more than 6 hours</td>
</tr>
<tr>
<td>Medium-haul</td>
<td>Flights lasting between 3-6 hours</td>
</tr>
<tr>
<td>OTP</td>
<td>On-time performance: flights that arrive or depart within 15 minutes of their scheduled arrival/departure times</td>
</tr>
<tr>
<td>PLF</td>
<td>Passenger Load Factor: is a measure of how much of an airline’s passenger carrying capacity has been utilized. It is calculated by dividing the RPK by the ASK. A higher passenger load factor therefore means that there are less empty seats on each aircraft</td>
</tr>
<tr>
<td>PP</td>
<td>Point-to-point network configuration: airports are connected by direct routes rather than through a general hub</td>
</tr>
<tr>
<td>RPK</td>
<td>Revenue Passenger Kilometers: shows the number of kilometers traveled by paying passengers. It is calculated as the number of revenue passengers multiplied by the total distance traveled</td>
</tr>
<tr>
<td>Short-haul</td>
<td>Flight lasting between 30 minutes to 3 hours</td>
</tr>
</tbody>
</table>

Sources: 20 CAPA
Appendix

Chapter 1 references

1 ATAG. 2018. “Aviation Benefits Beyond Borders.”
6 Annual Reports:
Scalability: a new challenge for the future

João Moura Soares Bandeira (33747)
Nuno Francisco Macedo Eusébio Rodrigues (33795)
Tiago Ayala Botto Pires Eusébio (33212)

3rd of January, 2020
Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: scalability, growth drivers & customer journey

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), PORLisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and PORNorte (Social Sciences DataLab, Project 22209).
### Executive summary

#### 4A. Drivers of growth
- Global population is expected to reach 8.7 trillion people in 2035, followed by an increase in global GDP and global trade
- The aviation industry will need to quickly adapt to the constant changes in the market and face new and exciting challenges
- The number of international passengers is expected to reach 7.3 billion by 2035 and the industry is expected to generate up to 30 million jobs
- Commercial passenger airlines have several profitability and scalability problems that can be solved by enhancing the customer journey

#### 4B. Capacity concerns within the industry
- Infrastructure barrier can be surpassed with three measures
- Labour barrier can be solved by forming 617,000 pilots, 679,000 technicians and 814,000 cabin crew workers
- Fleet barrier can be surpassed by increasing load factor and overall capacity

#### 4C. Customer journey analysis
- A customer journey overhaul can solve profitability and scalability issues and enhance the customer experience
- Customers want more transparency when it comes to booking and destination selection
- Customers want a smooth and quick transition from arriving at the airport to boarding the aircraft
- Customers want to continue connected to the outside world during their flight

To keep up with an increasing demand of air transportation services, the aviation industry needs to expand its fleet, infrastructures and labour requirements. A focus on the customer journey is expected to simultaneously help solve the profitability and scalability issues of the industry and enhance the customer experience.
4A. Global population, income, GDP and trade are macrotrends impacted by the aviation industry in the future

Global population is expected to reach 8.7 trillion people in 2035, followed by an increase in global GDP and global trade.

Global population and income class
- Over the next 16 years, world population is expected to grow at a CAGR of 1%, reaching almost 8.7 trillion people in 2035.
- The number of people in the middle and upper income classes is expected to increase, therefore, increasing the number of flights demanded since they have a higher average number of trips per year compared to people in the lower income class.

Global GDP
- Real private consumption (consumers’ spending on goods and services) is expected to reach just under $75 trillion in 2035, accounting for more than 50% of global GDP.
- Aviation will be one of the main drivers of this growth, generating jobs and driving consumption. Together with other components, global GDP is expected to grow at a CAGR of 3% from 2019-2035.

Global trade
- The value of exported goods and non-factor services is expected to almost double until 2035. Developing and emerging markets are the main drivers of this expansion, growing almost 85% and 92%, respectively, from its 2019 value.
- The aviation industry will be an important stakeholder, facilitating the transportation of freight and goods worldwide.

---


### Sources
4A. Society, economy, technology and environment are the main drivers of change for the aviation industry

The aviation industry will need to quickly adapt to the constant changes in the market and face new and exciting challenges

### Society and Economy

#### New modes of consumption

- Consumers’ behaviour towards consumption has shifted over the last few years, from a one-size fits all to a more authentic and personalized experience.
- In addition, consumers are more aware of their environmental footprint and look for a sustainable consumption. Aviation is the perfect example of an industry that must adapt in order to offer customers what they want.

#### Price of oil

- The future outlook for crude oil prices is somewhat uncertain. Lower prices may drive initial cost savings for the aviation industry, but the impact on global economy can be tragic.
- Alternative fuels and energy sources are a real threat, as they might completely replace oil in the long term.

#### Global population growth and global economy

- A growing population and economy will likely lead to a growing demand for the services provided by the aviation industry – freight and passenger transportation.

### Technology and Environment

#### New aircraft designs and configurations

- Several investments have been made in R&D in hope that breakthrough designs bring fuel savings (e.g., Flying-V, an aircraft design that promises 20% fuel savings when compared to the Airbus A350).
- Different airplane configurations have been tested to face the changing customer needs and wants.

#### Alternative fuels and energy sources

- Alternative fuels and energy sources completely change how businesses and people consume energy.
- Traditional fuels used by the aviation industry can be replaced by bioenergy or fuel cells and recent technological advances in energy storage will likely favour the growth of renewables worldwide.

#### International regulation of emissions and noise pollution

- Even though CO2 emissions from the aviation industry have been increasing, its contribution is still low when compared to other transportation sectors (such as road transportation).
- The CORSIA deal and monitoring plans along with technological improvements will contribute to the process of lowering industry emissions.

### Sources:

1. IATA; 2. KLM

---

4A. Drivers of Growth

4B. Capacity Concerns within the Industry

4C. Customer Journey Analysis
4A. Demand for air transport is expected to increase, generating new jobs and driving private consumption

The number of international passengers is expected to reach 7.3 billion by 2035 and the industry is expected to generate up to 30 million jobs

The number of international airline passengers is expected to increase 78% by 2035

By 2035, the number of international airline passengers is expected to reach 7.3 billion, representing an increase of almost 80% when compared to the 4.1 billion passengers in 2017.

The Asia-Pacific region will be a key driver in this growth and is expected to more than double its number of international air passengers by 2035.

In the next few years, there will be a lot of demand for commercial planes to keep up with an increasing number of international air passengers in the aviation industry.

Global Commercial Fleet Projections

22 730

Additional aircrafts

The Asia-Pacific region will need two out of every five planes.

Employment generated by the industry

An increasing global commercial fleet will lead to an increase in the workforce (e.g. crew, operators, technicians) to fly and maintain the airplanes.

New jobs directly generated by the industry in 2035

2 110 000

Pilots 617 000
Technicians 679 000
Cabin crew 814 000

Together, aviation and the tourism industry are expected to generate between 20 million to 30 million new jobs by 2035 (direct, indirect and induced jobs).

Sources: 4 National Geographic
4B. Profitability and scalability are the main challenges the industry will need to address
Commercial passenger airlines have several profitability and scalability problems that can be solved by enhancing the customer journey.

<table>
<thead>
<tr>
<th>Challenges the aviation industry needs to address</th>
<th>Main drivers</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Profitability</td>
<td>Threatening forces</td>
<td>By analysing the industry through another perspective, both problems can be mitigated</td>
</tr>
<tr>
<td></td>
<td>Volatile cost structure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic decision</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Legislation</td>
<td></td>
</tr>
<tr>
<td>2. Scalability</td>
<td>Infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Labour</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fleet</td>
<td></td>
</tr>
</tbody>
</table>
4B. Infrastructure barrier can be surpassed with the help of three measures
Secondary airports are taking advantage of capacity pressure in nearby large airports by absorbing new demand

**Airport infrastructure development**
- Up to 2030, an investment of around $1.2 – 1.5 trillion is expected to be necessary for global infrastructure to keep up with the increasing air travel demand
- Investment will be used to build and improve runways and terminals so that cost-efficient facilities can balance capacity with demand
- LAX is implementing three projects for improving access to the airport, terminals and gates

**Airport process improvement**
- By improving airport processes idle time is reduced
- RFID use on checked baggage, biometric boarding, RFID use on passengers and advanced sensing cameras are some of the technological advances airports are capitalizing on to improve processes

**Air navigation services’ improvement**
- Air navigation services’ improvement is the most difficult barrier to surpass due to the need of bringing all stakeholders to agree on a solution
- ICAO is proposing a new methodology – Aviation System Block Upgrades – that aims at harmonizing circulation, increasing capacity and improving environmental efficiency

**How is new demand being absorbed now?**
- Increasing passenger growth is pressuring infrastructure and causing congestions
- Secondary airports are growing by capturing new demand from nearby airports
- Process optimization is also responsible for absorbing growing demand for air transport services by freeing time that was previously wasted
4B. Labour barrier can be solved by hiring 617,000 pilots, 679,000 technicians and 814,000 cabin crew workers

In the short-term there might be skill supply problems due to the demand in emerging markets

**Labour**

To cope with market growth

- **Technicians**: are highly-skilled workers who need a lot of knowledge to perform their jobs
  - In the medium-term, there might be a shortage of skills supply due to the demand increase
  - To have the required amount of professionals, the industry will need to invest in technology to accelerate the hiring process
  - Aviation will need to hire about 679,000 technicians until 2035

- **Pilots**: increasing competition in pilot labour market due to traffic increase creates a big challenge regarding recruitment and talent retention
  - Emerging markets pulling high percentages of labour
  - Mandatory retirement age of 65 imposed by most regulators
  - Retirements and attrition is estimated at around 3% per year

- **Cabin crew**: workers are the fastest to hire but a larger number of people will be needed
  - Industry needs to position aviation as a desirable career path to attract candidates
  - In the medium to long term, technological advances will enable the automation of many functions and decrease the size of the workforce
  - Aviation will need to hire about 814,000 cabin crew members until 2035

Source: Boeing Commercial Market Outlook, 2019

**Pilot demand forecast - 2035**

- 707k Active pilots
- 417k Pilots to face growth
- 290k Active pilots
- 200k Retirement + attrition
4B. Fleet barrier can be surpassed by increasing load factor and overall capacity

A new fleet of more efficient airplanes will substitute the majority of today’s active fleet delivery capacity to face growth concerns.

### Increase load factor

- Load factor reflects the percentage of available seats that is occupied by passengers. To increase it, airlines need to attract and transport a higher number of passengers.
- Load factors are at all-time high levels of 82.1%, according to IATA. Increasing it will become more difficult in the near future.

### Increase overall capacity

There are three ways to increase overall capacity:

1. Increase the number of planes
2. Increase the number of hours flown by plane per day
3. Increase the total number of seats per plane by upgauging and increasing cabin densification: smaller leg room, smaller seats, smaller corridors, smaller toilets, etc.

---

**Sources:**
1 Airbus; 10 Eurocontrol; 11 Boeing

---

### Fleet forecast - 2035

- **24,400** Active fleet
- **18,800** Replaced
- **22,730** Planes to face growth
- **47,130** New fleet

**RPK growth absorbed by productivity gains and fleet growth (07-17)**

- **40%** Productivity gains
- **60%** Equivalent airplanes
- **5,600** New airplane deliveries

**Source:** Boeing Commercial Market Outlook, 2019

---

*Load factor reflects the percentage of available seats that is occupied by passengers. To increase it, airlines need to attract and transport a higher number of passengers.*
4C. A customer journey overhaul can solve profitability and scalability issues and enhance the customer experience

The airline customer journey is composed of seven phases which have distinct characteristics and contribute to the travel experience:

### Customer journey

<table>
<thead>
<tr>
<th>Planning</th>
<th>Booking</th>
<th>Purchase</th>
<th>Pre-trip</th>
<th>Departure</th>
<th>In-flight</th>
<th>Post-trip</th>
</tr>
</thead>
</table>

#### Planning:
This is the first phase of the airline customer journey where the traveller decides where to go and researches on the possible flights and connections which might be necessary to reach the destination.

#### Booking:
In this phase the customer will compare the prices of the several options identified in the previous phase as well as the different services provided, ultimately, choosing the options that satisfies best the customers' preferences.

#### Purchase:
After identifying the best option for the customer the next step is the purchase of the flight tickets which can be done online or at a designated airline ticket stand where payments can be done in cash or via credit/debit card.

#### Pre-trip:
This phase consists on preparing for the day of the flight which includes activities such as packing and booking a transport to the airport, if necessary.

#### Departure:
Includes the checking-in at the airport, checking baggage if necessary, going through passport and security screening as well as boarding the aircraft.

#### In-flight:
This phase is the actual flight to the destination where the customer can enjoy several included or paid services.

#### Post-trip:
This is the last phase of the airline customer journey where the passenger evaluates and provides positive or negative feedback regarding their flight experience.

---

### How to solve profitability and scalability issues?

- As previously discussed, the commercial passenger airline industry has severe profitability and scalability problems.
- One way to solve both of these issues would be through the overhaul of the customer journey.
- The current customer journey can be enhanced mainly through the implementation of innovative technologies.
- Profitability and scalability problems can be solved by making the customer journey more efficient resulting in cost cutting for airlines.
- Additionally, an overhaul of the customer journey will also simultaneously improve the customer experience.

---

Sources: Dent
4C. Customers want more transparency when it comes to booking and destination selection

These frictions can be reduced through the use of AI, NDC, digitization and personalized services to meet specific customer needs

**Frictions**

**Planning, booking, purchase and pre-trip:**

- These four phases can be joined together since they all represent the customer journey before the passenger arrives at the airport.
- In the past few years there have been efforts to increase searching and booking transparency by travel providers and aggregator websites.
- Customers still struggle to find information on attributes other than price and to know when is the best time to buy flight tickets to get the best deal.

**Booking transparency and travel inspiration are the most likely to undergo innovation:**

**Customer journey**

- Planning
- Booking
- Purchase
- Pre-trip
- Departure
- In-flight
- Post-trip

**Artificial intelligence in travel recommendation**

- Customers suffer from information overload and struggle to find information tailored to their needs.
- Travel recommendation engines are using AI to extract useful information from millions of travel products and thousands of global destinations.
- E.g., WayBlazer uses IBM cognitive computing technology to provide a 23% shorter path to booking and 81% quality increase in search results.

**New Distribution Capability (NDC)**

- NDC is a travel industry-supported program launched by IATA which enhances the capability of communications between airlines and travel agents.
- FSCs and LCCs can differentiate their products.
- Aggregators and travel agents have access to full and rich air content of the airlines.
- Corporate buyers and travellers benefit from a transparent shopping experience.

**Digitization**

- Digitization technologies can increase customer satisfaction scores up to 10 percentage points.
- Reduces costs by stream-lining and automating processes for savings of up to 10% in affected areas.
- Increases revenues up to 10% by helping airlines generate deeper insights into customer preferences.
- Decreases lead times needed to release new features for apps by up to 80%.

**Features tailored towards business travellers**

- Few, if any, search and booking tools are tailored for the business traveller resulting in unmet needs.
- Business travellers are the main users of airlines’ mobile app, however, most airlines don’t adapt them to their specific preferences.
- Beneficial features include helping them to get out of airports quickly and making flight changing easier.
- Instead, airlines focus on social media integration.
4C. Customers want a smooth and quick transition from arriving at the airport to boarding the aircraft

These frictions can be reduced through RFID and biometric technology as well as advanced sensing cameras

<table>
<thead>
<tr>
<th>Frictions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Departure:</strong></td>
</tr>
<tr>
<td>• Departure is defined as the moment the customer arrives at the airport until he/she is boarded on the aircraft</td>
</tr>
<tr>
<td>• As a result of the September 11 attacks in 2001, security at airports worldwide was escalated to prevent future terrorist plots</td>
</tr>
<tr>
<td>• Changes in airport security included: improved security on aircraft, improved security screening and identification checks</td>
</tr>
<tr>
<td>• Increased security meant that it took longer for customers to go through the departure phase</td>
</tr>
</tbody>
</table>

| Security screening is where more passengers experience negative emotions in departure: |

<table>
<thead>
<tr>
<th>Percentage of passengers feeling positive/negative emotions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional extremes during the airline customer journey (2016)</td>
</tr>
<tr>
<td>Source: SITA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer journey</th>
<th>RFID use on checked baggage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In 2018, approximately 6 bags were mishandled per thousand passengers and 46% of the times it is due to a transfer mishandling, costing the global airline industry $2.4 million</strong></td>
<td></td>
</tr>
<tr>
<td><strong>RFID technology has led to a reduction of more than 70% of baggage mishandling in a 3 years Baggage Improvement Program</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Biometric boarding</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Self-service boarding gates which use facial-recognition technology</td>
</tr>
<tr>
<td>• Customers simply look into a camera prior to boarding, have their biometric data verified and then walk on to the plane</td>
</tr>
<tr>
<td>• Improved punctuality on domestic flights by 10% according to British Airways trial</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advanced sensing cameras</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Scientists from the Australian National University have invented a device with advanced sensing functions</td>
</tr>
<tr>
<td>• Cameras which can identify hazardous devices or dangerous chemicals in passengers’ carry-on baggage when they walk through an airport</td>
</tr>
<tr>
<td>• Expedites passenger processing at airports and helps reduce waiting times</td>
</tr>
</tbody>
</table>

Sources: 14 Becker et al.; 16 SITA; 17 Swedberg; 18 Lloyd et al.; 19 Cooper; 20 Airport Technology
4C. Customers want to continue connected to the outside world during their flight

This friction can be reduced through IFC, on-board Wi-Fi access, a BYOD environment and offering an end-to-end customer experience

**In-flight:**
- In-flight is defined as the moment the customer enters the aircraft in the airport of origin until he/she leaves the aircraft at the airport of destination
- Services related to passenger experience includes those services needed to maximise their flight experience
- Includes: cabin upgrades, cabin crew training, in-flight entertainment (IFE), connectivity and booking
- Over the next 20 years this market is expected to represent a cumulative $1.1 trillion

**In-flight connectivity revenues are expected to increase by $1.5 billion from 2017 to 2027:**

**In-flight connectivity (IFC)**
- Emergence of smartplane concept
- Connected aircraft is a solution to answer passenger needs and give airlines’ flight crews better significant benefits in the ways these can be met
- E.g. possibility of ordering food from your seat
- Cabin upgrade market is forecasted to represent $270 billion in 2038

**Bring your own device (BYOD)**
- A BYOD onboard environment allows airlines to offer passengers a benefit they have become accustomed to paying for
- This would be further enhanced with the availability of in-flight Wi-Fi
- Reduces in-flight entertainment costs as well as aircraft weight

**In-flight Wi-Fi**
- In-flight Wi-Fi is one of the customers’ most requested services with 81% of passengers worldwide saying that they would use in-flight Wi-Fi if it were available in their next flight
- Global in-flight Wi-Fi market is expected to represent $5 600 million in 2021

**End-to-end customer experience**
- Customers expect the travel experience to be just as seamless as online shopping
- Airlines are connecting with passengers to integrate all touchpoint of their travel experience
- E.g. during the flight customers would be able to book a transport to their hotel which would arrive as soon as the flight lands at the airport

**Sources:**
- Airbus; Boeing; Vanleyseele; Inmarsat Aviation; Statista

---

**Frictions**

**Customer journey**

**Planning**  |  **Booking**  |  **Purchase**  |  **Pre-trip**  |  **Departure**  |  **In-flight**  |  **Post-trip**
2 IATA. 2018. “Future of the Airline industry to 2035.”
4 KLM. 2019. “KLM and TU Delf join forces to make aviation more sustainable.”
7 IATA Economics. 2019
8 ICAO. 2016. “[Global Air Navigation Plan].”
9 CAE. 2016. “Airline Pilot Demand Outlook.”