

Value Innovation

Boeing versus Airbus

Caselet written for INSEAD by Henrik Nielsen

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Boeing versus Airbus – who has chosen the wrong Value Curve ?



In 1970 Boeing launched the world's largest passenger aircraft, the famous B747. Since then, Boeing has had a monopoly in the market for large passenger aircrafts and today the B747 is Boeing's most prestigious cash cow. Early 2001, EADS Airbus, set out to attack this monopoly by officially launching the A380, which now will become the largest passenger aircraft with more than 550 seats.

The launch of the A380 programme pushed Boeing, which had previously led the pack in commercial aviation, into the position of challenger. The roles were now reversed and Boeing had to come up with an answer. The first answer was the B747X, an extended and face-lifted version of the B747. But despite a heavy marketing effort in the beginning of 2001, Boeing did not have the same success with its 747X as Airbus did with the A380. Given the segment's slim size, Boeing had no other choice than to withdraw from the race and create another niche in which to compete. In April 2001, Boeing launched the Sonic Cruiser, which does not only have a surprisingly new design with canards and delta wings, but also a very different strategic approach to the market. Where Airbus' arm was a more comfortable super-jumbo intended to fly between the world's major hubs at a very "low cost per seat", Boeing's new arm was a faster, smaller and more flexible long haul aircraft designed to meet the customers' desire for point-to-point flights between medium-sized airports.

Although both companies forecast a 5% annual growth in the market for the next twenty years, it is hard to see how they both can be successful... Airbus estimates that the price-per-seat will continue to be the driving competitive factor and Boeing foresees that the increasing congestion of the world's large hubs, which together with the increasing number of passengers will create a demand for faster, direct flights between smaller distant airports.

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The total market for large aircrafts (>400 passengers) is estimated by Airbus to 10% of the total volume or 25% in value; that is nearly \$ 320 billion over the next 20 years.¹

In the following, we will take a closer look at each of the elements in the two companies Value Curves (see p.6-8).

Airbus' strategy is driven by the ticket price

Airbus' aim is first of all to reduce the operating cost per seat on long haul flights. The A380 costs 15-20% less to operate per seat than the B747. The reason for this reduction is twofold: First, owing to technical accomplishments since the B747 was created, it has become possible to improve the aerodynamic performance of the airfoils and to increase the lift/drag ratio. This, together with improvements of engine performance and weight reduction with composite materials has a direct influence on the fuel consumption. Second, thanks to the aircraft's bigger size, the cost of the pilots, the cabin crew, its maintenance and the airport fees can be shared by a higher number of seats.

Airbus reminds that the constant growth in air travel in the last century and in the next twenty years will be driven by an increase of the passengers' income and by a reduction of the operating cost.

Passenger demand for fast nonstop flights will drive airplane selection - says Boeing

The major hubs in the world are getting saturated. Airports are congested because of the lack of space and slots. The FAA (Federal Aviation Administration) listed thirteen major US airports as saturated in 1997 and 30% of intra-European flights were delayed for more than 15 minutes in 1999. Furthermore, the airspace on major routes is saturated with airline traffic. Where Airbus' answer to this is bigger aircrafts, Boeing's answer is direct point-to-point flights with an aircraft that gives a higher operating flexibility. Direct routes between smaller airports can help to reduce the load on the big hubs. Furthermore, any market study will show that passengers' desire is to travel point-to-point and to avoid changing flights in the hubs. Boeing also claims that avoiding the transit will help reducing the total price of the ticket.

Higher speed will not only reduce the traveling time, but the airlines will need fewer aircrafts to transport the same amount of passengers. Thus, the saturation of the air corridors will also be reduced.

¹ Airbus : « Global Market Forecast 2000-2019 », July 2000 and Boeing : « Current Market Outlook 2001 »

Big is more...

The bigger size and higher capacity of the A380 makes it possible to integrate more features and flexibility in layout and customization; things that are highly appreciated by the airlines. The spacious decks in the aircraft give plenty of possibilities for designers to create more comfortable seats and rest areas. Compared to the B747, the A380 has 45% more floor area but only 35% more seats. Consequently the pitch, width and flexibility of the seats can be increased as to give more working space or better sleeping conditions. Unless the airlines (such as Qantas, one of the launch customers of the A380) use the extra space to squeeze in more seats...

“Traveling time is not an issue, even for premium class travelers”, claims Airbus’ New Product Communication Director, Robert Lange; if the passengers can find a convenient working space or get a good night’s sleep in the aircraft, they do not feel they are wasting their time.

On the other hand, due to its size, the A380 requires important modifications of the airport terminals. Not only do the runways have to be modified, but the boarding bridges, the luggage handling etc. do also have to be adapted to the large number of passengers. Compared to the B747, when these modifications are done, the embarkation and disembarkation times should be shorter. Mainly because the A380 can be boarded at two decks simultaneously with two bridges.

High productivity means lower operating risk

Although the load factor has increased² over the last ten years, it is difficult for the airlines to get all tickets sold without deceiving some customers. According to Airbus, the A380 gives an added flexibility for the airlines. Thanks to its higher productivity, the break-even load factor is 58% instead of the B747’s 70% (operating risk). Or, for the A380, 323 seats must be sold to break-even and 290 for the B747. But with the A380, the remaining 232 seats represents a profit potential, whereas this number is only 126 for the B747. This means that the airline has a higher chance of breaking even with a A380 than with a B747 on routes with high demand.

At this stage it is too early to assess the break-even point or the operating risk for the Sonic Cruiser. But due to its higher operating costs, there is very little chance that it will become competitive in a direct comparison. Applying the point-to-point concept could give it an advantage, but in this case the Sonic Cruiser should be compared with a A380 flying between two hubs and at least one connection with a smaller aircraft to a non-hub airport.

² Source : ITA

Attractive appearance

The B747 has a clearly identifiable shape with a high design appeal. When it was launched in the early seventies the iconic shape undoubtedly helped making it more prestigious to fly with this airplane than with any other. The same is true for the Concorde which was launched in 1976.

Seen from the outside, the Sonic Cruiser has a much stronger identity than the A380. With its canards and its delta wing it will be easy to recognize both on the ground and in the air. The A380 will be difficult to distinguish from any other aircraft when in the air or at a distance.

Flying farther...

The Sonic Cruiser will have the highest range. It will be able to travel 9000nm (nautical miles) nonstop. This means that it will be able to fly directly from New York to Singapore or Jakarta, which is not possible with today's aircrafts. Nor will it be possible with the A380 in its present configuration. Boeing is also talking about a version with a range of 10000nm, which means that Sydney can be reached directly from London or New York.

Efficient ground handling

The turnaround time is important for both the passengers and the airlines. For the passengers, the time it takes to embark and disembark as well as the time to load and unload the luggage, is an important factor for the overall appreciation of the flight (boarding efficiency). For the purchaser/airline it has a direct impact on the operating cost and thus it is in their interest to reduce it as much as possible. For the user/passenger it is of course also a plus when the boarding efficiency can be increased.

The B747 is known for having long turnaround times. Mainly because in most cases the embarkation is done through one door. For the A380, a door at each level will be used and if the rest of the airport services are designed in consequence, this should give the A380 an advantage over the B747.

The turnaround efficiency includes embarkation and disembarkation, but also other ground handling activities such as refueling, cleaning and catering.

The Sonic Cruiser is expected to have relatively good turnaround efficiency and boarding efficiency, due to its size, but at this stage there is high uncertainty thereabout.

Environmental friendliness

Over the aircraft's total life-cycle, three major ecological factors are important, and will certainly become even more so; fuel consumption, air pollution and noise. The A380 is estimated to burn 5 to 10% less kerosene than the B747 and between 30 to 40% less than the Sonic Cruiser. Boeing claims that the point-to-point concept will reduce the Sonic Cruiser's number of takeoffs and landings. This combined with its improved climb performance should result in a better overall environmental friendliness with reduced noise and NO_x emissions in the airport areas and greater fuel efficiency. Nevertheless, it is hard to estimate how much the point-to-point concept will help to reduce the fuel consumption over the hub-to-hub concept, which most often requires two or more flights to get to the final destination.

Conclusion

A380 versus B747 : At first glance, the value curves for the two aircrafts do not show a major change of paradigm for the industry. Nevertheless, in this industry, small margins make a big difference. The A380's advantage in terms of operating cost and comfort seems to have outperformed Boeing in the market for large (>400) passenger aircrafts. After having been a leader with a monopolistic situation, Boeing now finds itself as a challenger in a market where there does not seem to space for two.

But the A380 requires major changes of the terminals and infrastructures in the airports. New boarding bridges, increased luggage and passenger capacity, modified taxiways and runways etc. And this for all the terminals used by the airlines using this high capacity aircraft. Will these additional costs reduce its success ?

Sonic Cruiser versus A380 : The Sonic Cruiser is a « joker » in the game. It does not fit with the present segmentation of the market ; it is designed for far lower passenger capacity, and from this point of view it should rather be compared with smaller aircrafts. But its typical use will be long distance flights where speed makes a difference, and these flights are normally carried out by large, economic aircrafts. For this reason, it can be considered as a major competitor to the A380.

The Sonic Cruiser has the advantage that it can (probably) use any international airport without any changes of the terminals and infrastructure. Smaller airports are in general cheaper to use, and this should also be to its profit.

It represents a quantum leap in terms of speed and flexibility, especially when the two adds to the overall value of the service provided, which is the case on long haul flights. It does also deliberately let some potential customers go, mainly those for whom time counts less than money – which is the case of many economy class passengers.

So, the market for the Sonic cruiser seems to be premium class passengers and the remaining question is, whether there will be enough of these to fill-up the aircrafts and allow for frequent connections between medium-sized (non hubs) distant airports when it will start flying in 2007 ?

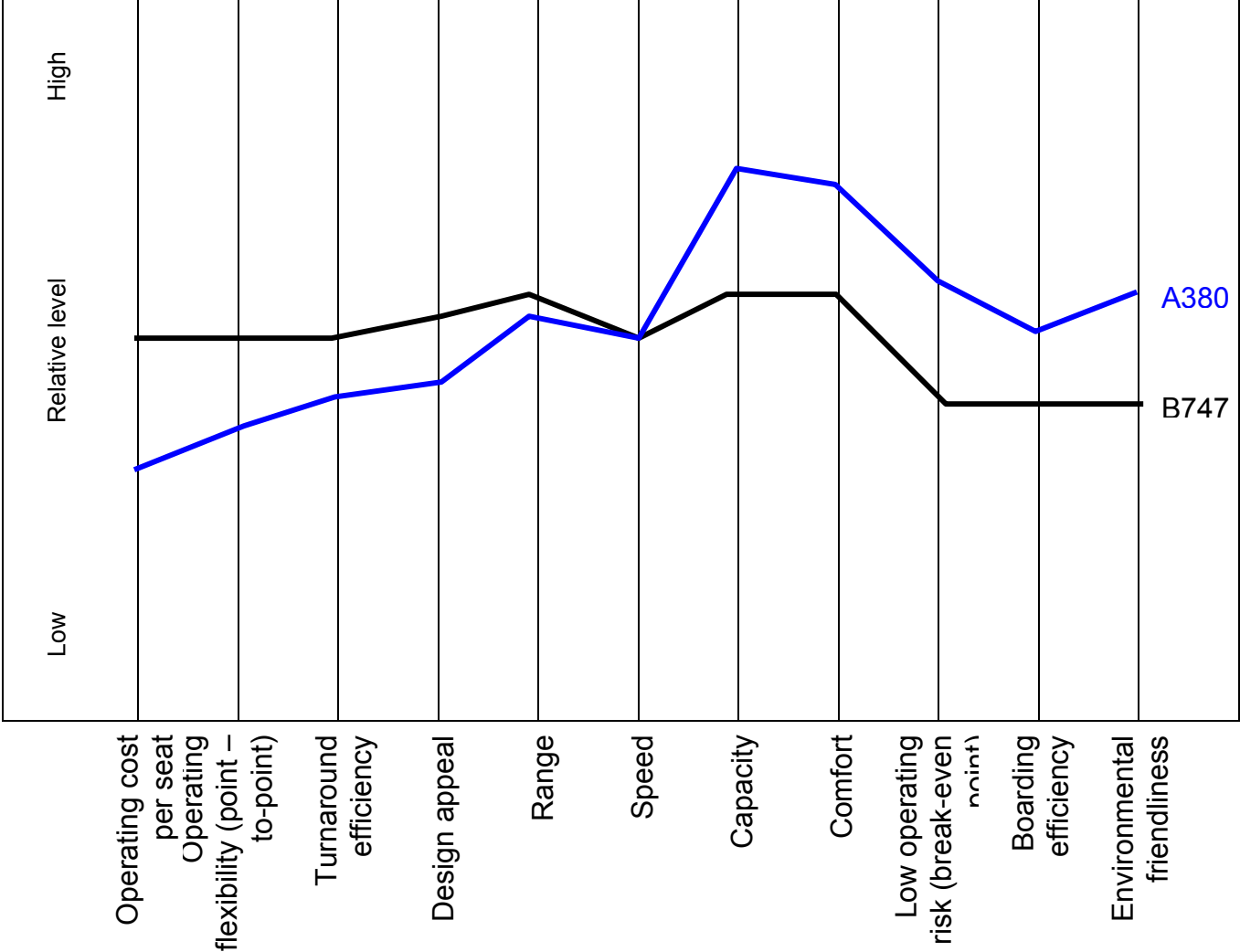
The viability of the point-to-point concept is therefore a big question mark. Imagine for example a flight from Paris to Cincinnati: If, on a full A380 flying hub-to-hub from Paris to New-York, 10% of the passengers transits to Cincinnati, it means that only 55 passengers could potentially be interested in taking the Sonic Cruiser instead.

No new key elements seem to have been created for any of the two new aircrafts. Nevertheless, the Sonic Cruiser stands out from the pack thanks to its high speed and different shape, but not as much as did the Concorde, when it was introduced in 1976.

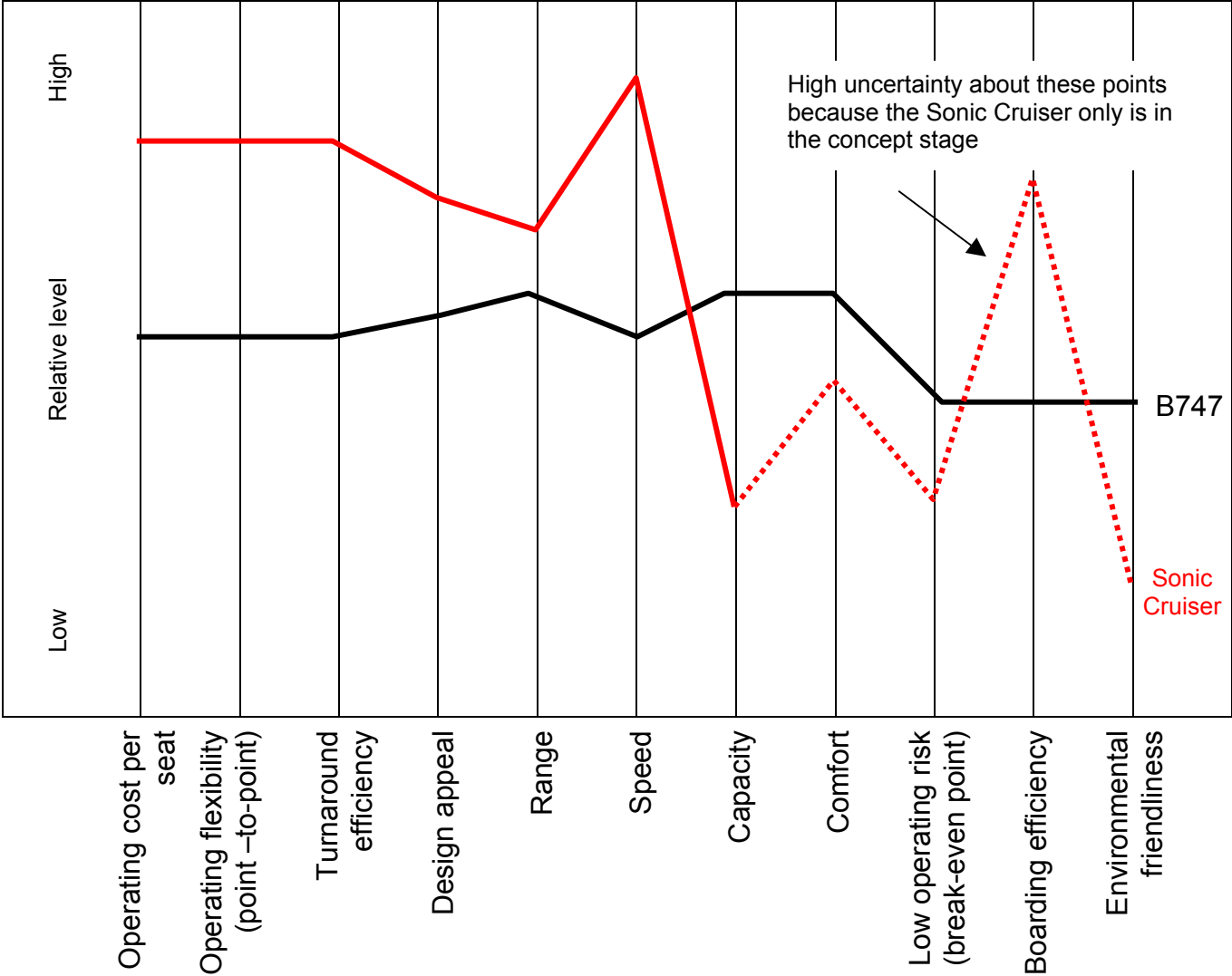
It will be interesting to see who will win the competition. Future changes in public opinion about ecological aspects as well as the evolution of the world economy and the oil price will certainly be decisive for whether low operating costs and high flying comfort will win over high speed and flexibility.

Value Curves

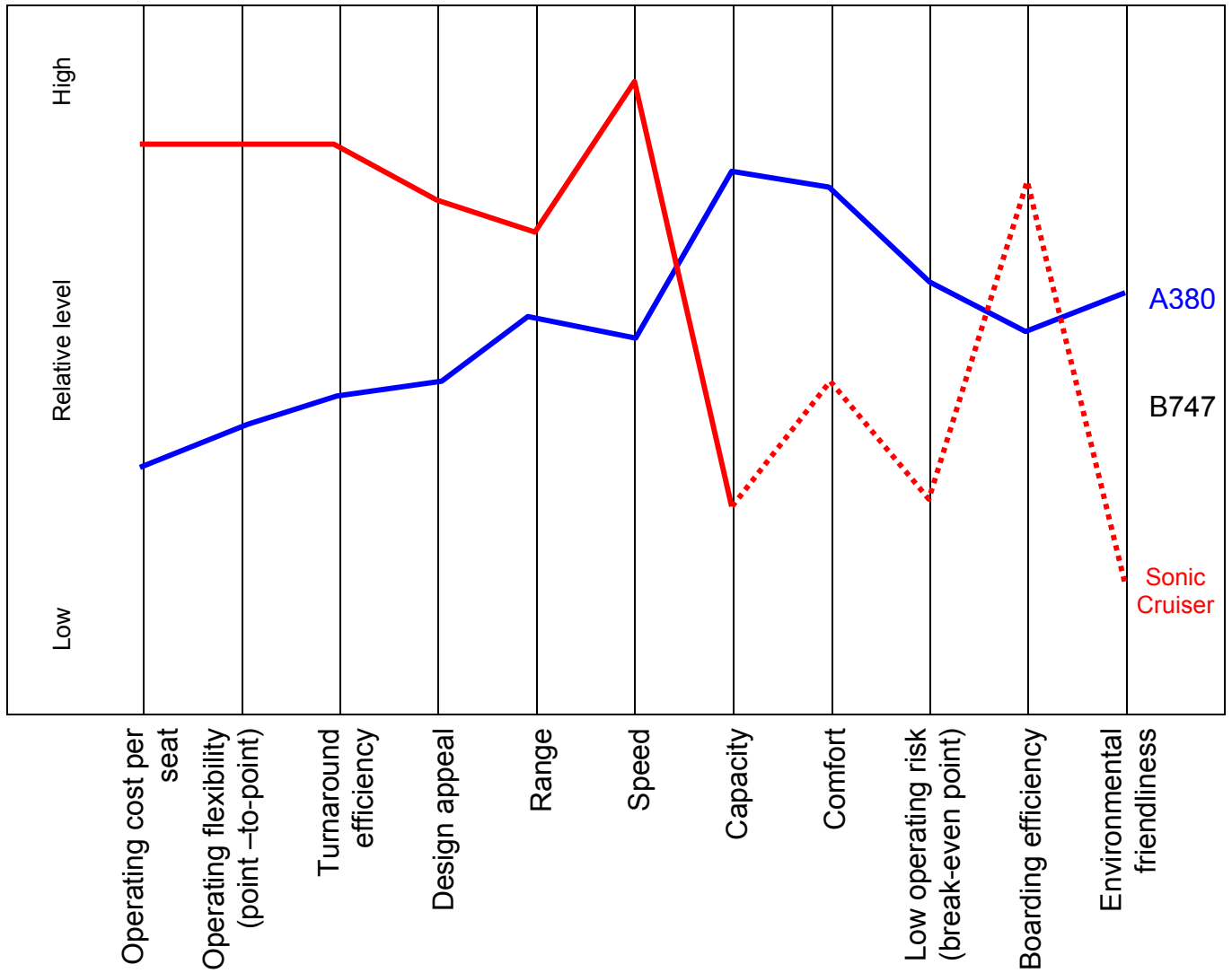
B747-400 vs A380-800






B747-400 vs Sonic Cruiser



Sonic Cruiser vs A380-800



Characteristics of the Aircrafts

	Airbus A380-800	Boeing Sonic Cruiser	Boeing 747-400
			
Passengers (3-class/2-class)	550/x	100-300 ³	416/524
Range (nm/km)	8000/14800	9000/16668	8400/15556
Cruising speed (mph/km/h)	565/910 (Mach 0.85)	703/1131 (Mach 0.95)	565/910 (Mach 0.85)
Fuel Capacity (liters)	326125	?	216840
Operating cost per passenger (relative)	85	115-120	100
Fuel Consumption per passenger (relative)	90	130-140	100
Fuel consumption per passenger (l/km/pax)	0.030	0.046 ⁴	0.035
First commercial flights	2005	2007	1970

Typical flight times

	Airbus A380-800	Boeing Sonic Cruiser	Boeing 747-400
London – New York	7.40	6.15	7.40
London – Hong-Kong	12.00	9.40	12.00
New-York – Los Angeles	6.00	4.50	6.00
New York - Tokyo	12.40	10	12.40

³ The final size and capacity of the Sonic Cruiser is not yet determined.

⁴ Estimate

Time-line

1970	First commercial flight with the Boeing B747
1976	First commercial flight with the Concorde, created in a French-English joint-venture. The Concorde is the world's first supersonic passenger aircraft, flying at Mach 2
1994	Airbus presents the first concepts for the A3XX (later A380), a super jumbo with the capacity of 550 up to 1000 passengers.
1996	Boeing publicly proposed joint development of a next-generation 747 aircraft (B747X) with five Japanese manufacturers. The programme was frozen in January 1997 due to uncertainty about the market size .
2000, June	Airbus gets the first firm orders for the A380.
2000, December	Boeing relaunches the B747 programme, but after an unsuccessful sales campaign, the programme was definitively cancelled in March 2001.
2001, April	Boeing presents the Sonic Cruiser concept.