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A LOOK AT AIRLINE MANAGEMENT AS EVENT MANAGEMENT

About the challenging task of trying to run a profitable Airline

**Christoph Brützel
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Abstract:

Warren Buffett once famously stated that airlines were infamous for destroying shareholder value. His hindsight proposition to better have taken the Wright brothers out of the sky violently surely was a pointed one, if not entirely serious. This paper seeks to shed some light on the challenges underlying the industry that Buffett blames as a value destroyer, and explain the difficulties most airlines have to tackle on a daily basis. The idea of aviation management as event management is the basis of this exploration of the airline industry, emphasizing the daunting task of offering an intangible product, created long before demand is certain, at a price that is lowest when the product itself is most difficult and costly and complex to produce. This underlying conundrum is one of the central challenges airlines need to confront when trying – hard at most times – not to actively destroy shareholder value.

Keywords:

Aviation, Airlines, Performance Management, Product Management, Event Management

JEL classification:

M10, M11, M31, N70



What is so hard about running an Airline?

Airline management is event management - every day, every single flight. Behind this statement lies not only the challenging and puzzling complexity of airline management, but also its fascination to numerous aviation enthusiasts.

Each individual flight is an event for which numerous participants, equipment and infrastructures, much as the wheels of a precision watch, must work together "just in time" to ensure that it takes place safely and punctually. The complexity and the demands on the synchronization of this machinery are unique. That's probably why team spirit is one of the most important prerequisites for everything to function smoothly. And it is also why the information systems and their internal and cross-company interdependencies are so diverse, puzzlingly complex and crucial to success.

This paper will address some, if surely not all¹, core areas of management complexity to the interested reader. The first part will focus on the special features of the product airlines are selling to their customers. The second part will focus on its sales and distribution and the final third on its actual production challenges.

Part 1 – The Product Challenge

From the customer's point of view, a product is simply what she buys and what she values just a bit higher than the dollar value she has to pay for it. From the seller's point of view, a product unit is what is actually produced. The following figure depicts the general commercial aviation value chain and introduces the core products at the top in orange:

¹ Admittedly, we had to omit other critical topics like fuel price and currency risk management, which would make a separate discussion paper, but are not particular to the Airline industry alone. We also focused on the passenger airline business as air cargo management has its very specific challenges as well.

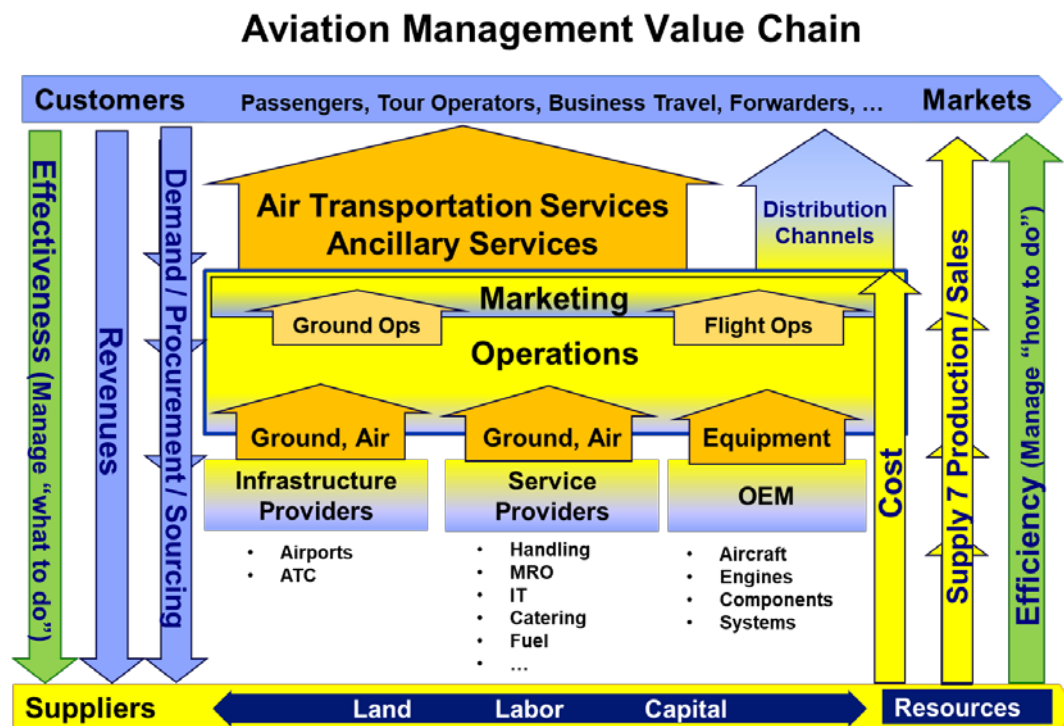


Figure 1: Commercial Aviation Value Chain (own figure)

Here already, the special features of air transport emerge as an "event business". While in manufacturing and many service industries, the product is identical from both perspectives, in air transport the customer buys an (entrance) ticket, or in freight terms an airway bill (AWB in short). The supplier, on the other hand, produces a concert: an airline produces a flight event in which a large number of customers ultimately and hopefully participate, with passengers coming along in person, but also with freight customers represented only impersonally by their simultaneously transported tonnage.

While products are manufactured piece by piece in manufacturing industries, in the event business, bulk capacities are provided. Only as a very small part of the overall market, Wet-Lease Carriers (ACMI) and Charter airlines sell flights as a single product unit in a strict B2B fashion.

Events - alas - can't be stored

While in manufacturing industries products can by definition only be delivered to the customer after the time they have been manufactured, events are delivered simultaneously with their one-time consumption. Thus, tangible products can be stored and are typically sold after manufacture. Events are not "storable", so they have to be sold before or at the latest at the very beginning of the actual production. However, there is one major difference of a flight to the actual concert event we just used to describe its characteristics: You can make a recording of a concert event and later sell sound or video copies. This is not possible for transport services, as this event's original value lies in the displacement of physical matter (passengers, freight) within a specified time-frame from the origin coordinates to the destination coordinates.

While other services and possibly also events can be carried out "to order" and the resources of the providers can be used elsewhere in the event of a lack of demand, scheduled flights must regularly be planned with binding effect on all resources involved (aircraft, crew, ground staff etc.) before they can be offered on the market. Scheduled airlines publish a flight plan between six up to eighteen months before the individual flight events take place. Once the flight schedule has been published, the production costs are to the largest extent committed. Only a tiny part of the costs of a flight event depends on whether seats and/or freight capacities find a buyer, and thus would be variable per passenger or shipment.

Utilization is a central control factor

Due to the low passenger- and freight-dependent costs, capacity utilization is one, if not the most critical key performance indicator in the airline business. It is important to maximize not the price of a ticket sold but the revenue actually received on average per seat offered, referred to in the industry as yield management.

At the time the flight plan is published, the development of demand is only partially predictable and it is also not certain which competitors will offer how many competing products of what quality and pricing. In established markets with historical data available, this is still a comparably well manageable uncertainty when we think non-stop connections, but it is an entirely different picture with transfer connections.

While customer benefits increase with production output for manufacturing products and other services and events, this is different for buying an air transport ticket. From the customer's point of view, a non-stop connection from an origin to a destination (O&D) offers greater benefits than a transfer connection, as it consumes less travel time and obviously is more convenient. For the airline, connecting services means producing more seat kilometers between the point of departure and the point of arrival than operating non-stop services. Consequently, the production of the non-stop service is significantly cheaper than that of a transfer connection, not only because its distance flown there is regularly greater, but also because the costs of the take-off and landing and using airport infrastructures and services at the hub add on. From the customer's point of view, a transfer connection is an inferior product compared to a non-stop service, thus creating lower value and, in consequence, willingness to pay as much for it. So here's a conundrum: airlines have to sell transfer flights cheaper despite higher production costs! This leads to despair anyone who believes that the price of a product can be calculated on the basis of its costs.

So why don't airlines just fly directly point to point? Well, Low-Cost Carriers do exactly that, but they serve only a small portion of the market demand. The largest part of the demand requires high connectivity, which calls for the operation of hubs. These provide the opportunity of connecting n airports to one another by operating one roundtrip (two flights) to the hub, in total: $(n-1) * 2$ flights where n is the total number of origin and destination airports including the hub itself. In order to create the same connectivity it would need $n!$ number of non-stop connections. Thus, the industry has a high reliance on hubs, transfer connections and even interlining with other airlines (a.k.a. competitors). Only this way, airlines can provide a globally tight network of frequent connections the market demands, while allowing for sufficient capacity utilization, expressed as Yield or Revenue per offered Seat Kilometer (RSKO).

Business travel products versus private travel products

The service standard is often regarded as a key differentiator between business travel products and private travel products. For business travelers it should be Business Class, for private travelers Economy. This traditionally combines different cabin compartments, seating comfort and service products.

In addition, a distinction is made between "normal fares" and "special fares", particularly in the economy section. The product difference mostly lies in the flexibility for rebooking or cancellation without surcharge or reimbursement of the ticket price.

While separate seat compartments are regularly connected to the different fare classes on long-haul routes, the fare zones on short- and medium-haul routes are becoming increasingly large and flexible. In the past, there were three classes on long-haul routes, but today First Class is often dropped, and where it is still offered, upgraders often fill most seats to exchange their bonus miles for a special flight experience. Even with the First Class becoming a rare animal, today often 4 or even more classes are offered on long haul flights.

One-way or return?

In order to optimize the yield, airlines try to charge different kinds of customers by their different willingness to pay. The demand for business travel is supposed to be less elastic than the one for private travel. Business travel is supposed to happen Monday through Friday, private travel rather during the weekend. By so called "fencing" practices, Network Carriers set round-trip-fares depending on whether the travel includes a weekend. These practices aim at charging business travelers more than private travelers. They require most complex distribution systems, which will be subject of the second part of this discussion paper. Other than Network Carriers, Low Cost Carriers focus on private travelers.

All-inclusive or à la carte?

The airline ticket of the Network Carriers traditionally bundles numerous additional services with the transport service for the passenger, such as luggage, in-flight service, seat reservation and rebooking. Only in-flight sales of duty-free items and, if applicable, the carriage of excess baggage are not included in the ticket price, and recorded as ancillary service revenue, i.e. independent products. The hub-bound Network Carriers are therefore still often referred to today as Full Service Network Carriers (FSNC). In order to be able to jointly offer transfer connections between remote departure and arrival points as "seamless travel" with one ticket, tariff-specific service standards (menus) must be agreed between these carriers, particularly within the framework of interlining, so that the service bundle sold with ticket sales by one airline can also be delivered by the partnering airline (interlining, code-sharing) accordingly.

The essential background of full or bundled service was and is the necessary standardization of the product package across the individual flight segments (called Legs). The standard menus are also what can be displayed, booked and further processed as an "order" in the classic Global Distribution Systems (GDS, e.g. Amadeus or Sabre).

The core product of the Low Cost Carriers (LCCs) is a point-to-point connection, one way, for which no cooperation with other airlines is required. Therefore, low-cost carriers can also rely on their own individual reservation systems for direct sales. As a rule, they do not reach business travelers who, for understandable reasons of booking efficiency, prefer indirect distribution channels. However, if promised an attractive price, the private traveler is willing to book directly on the airline's website.

There, however, he meets an à la carte offer, i.e. he has to buy himself more or less every single service as his own product. These services are by no means "no frills", and certainly not "cheap". Often they are also of better quality than the bundled comparable, e.g. if you compare the menu in the in-flight sales menu of the "Low Cost Carrier" with the standard catering of the "Full Service Network Carrier".

À la carte generally costs more than a standard product or menu. This is the same in the restaurant when ordering your own hand-picked menu, and also when buying a car. Only with airlines, the assumption remains unchanged that it is systematically cheaper, as it is the product offering choice associated with LCCs!²

Flight is only part of the service package

Today, Full Service Network Carriers also prefer to sell their menus unbundled. With the next generation of distribution systems, called New Distribution Capabilities (NDC) discussed in Part 2, they want to open up the possibility of individualized order packages (One Order). This means to individualize the service package associated with a ticket, but also to enrich the service package so that they, like the low-cost carriers, can also benefit from commissions for the purchase of additional services such as insurance, luggage, rental cars and airport transfers. The future belongs to the customer-specific event, in which flight performance will only be part of the airline product.

² Note: Important to stress at this point the "low-cost" part of LCC refers to the lower production costs of the carriers, NOT to the lower costs of flying to the passengers. Anyone who had to rebook a flight or missed his plane with one of them will not violently at this point.

Part 2 – The Sales and Distribution Challenge

As the first part of this paper was about the product, this part will highlight the special challenges in airline sales and distribution. It has already been pointed out that one can only sell events before they take place, unless one can also sell them (like music events) as "canned goods".³ But this is not possible with transport events – these need to be finally marketed before the event. From the customer's point of view, the transport service is not the primary purpose of the demand but only a consequential need arising from a business or a private concern at the destination of the travel. This is, however, important in order to understand the special challenges facing an airline's sales department.

No flight without aim and purpose

Even if in media and e-mail newsletters, airlines try again and again to arouse travel needs with special offers and flamboyant destination descriptions – it is a difficult task. Surely, no business travel is likely to take place because someone feels motivated to a journey by such advertising measures. And also for private travelers, buying an airline ticket is not the purpose of traveling but a subordinated demand for the purpose of getting to a destination. On shorter distances, air travel may well be replaced by car, bus or train. When it comes to medium range distances or even long haul there is, however, hardly any alternative to using air travel.

Because of this, the short-term price elasticity of overall demand for airline tickets or airway bills is relatively inelastic. Economists describe demand as inelastic to price when a change in price of one percent induces a change in demand of less than one percent. In other words: If tickets become one percent cheaper on the market, the purchased quantity and thus sales increase by less than one percent. This is bad news for the airline industry as a whole.

The supposedly good news for the individual airline is that despite flight miles and other loyalty programs, customer loyalty, especially in the private customer business, is extremely price-elastic. Private travelers often accept long journeys to remote airports and time-consuming transfer connections due to small price differences. So demand is not easily created, but easily diverted in the private flight segment. In conjunction with the long-term fixation of the offer through timetable publication described in the first part of this paper, this leads to a fatal thing we want to call "moral hazard of common suicide" as soon as an imbalance between overall supply and demand occurs.

Pig cycles in air transport

After the Second World War, air transport was organized as a public service offer in a global network and on the basis of detailed bilateral state air services agreements. The entire offer was agreed upon bilaterally in such a way that the costs were covered by setting the binding air fares at a level that was reported by the IATA⁴ airlines of the countries of origin and of destination concerned. These IATA Airlines were publicly owned "National Airlines" all over the world but in the United States, where the airline industry has been a private business from the beginning. In this way, supply capacity was systematically developed in line with expected demand. The efficient airlines, which at the same time provided good service, made good profits. Airlines with less stringent operational discipline, which had to charge the same fare, had correspondingly poorer returns and even made losses – but on average for the industry, the costs were covered.

Following liberalization, this became a thing of the past. Since, flight schedules and thus also the capacity on the market have resulted as the sum of individual airlines' planning. After liberalization proved to be a blessing for the US economy, the EU also adopted a gradual liberalization program for the 1990s onwards. The strategists of the national network airlines, most of which were still publicly owned, saw this as an opportunity to gain market share and outgrow the competition.

This, of course, required additional aircraft, which were ordered so vigorously that the delivery times for new orders from aircraft manufacturers rose in some cases to up to ten years. At the beginning of the 1990s, capacity in the market as a whole jumped upwards, and since the aircraft and the crews trained to use them as well as the maintenance and repair capacities implied high fixed costs, the additional capacities were of course also diligently marketed.

However, as with the famous pig cycle described in economics, one had to recognize that overall demand did not intend to keep pace with growth rates of supply. As overall demand is relatively inelastic, but customer loyalty is low (see above), overcapacities led to mutual price undercutting.

³ We are well aware that this is not „the real thing“ and essentially a different product than the original event.

⁴ International Air Transportation Association, the industry's main coordinating body next to the ICAO, the International Civil Aviation Organization.

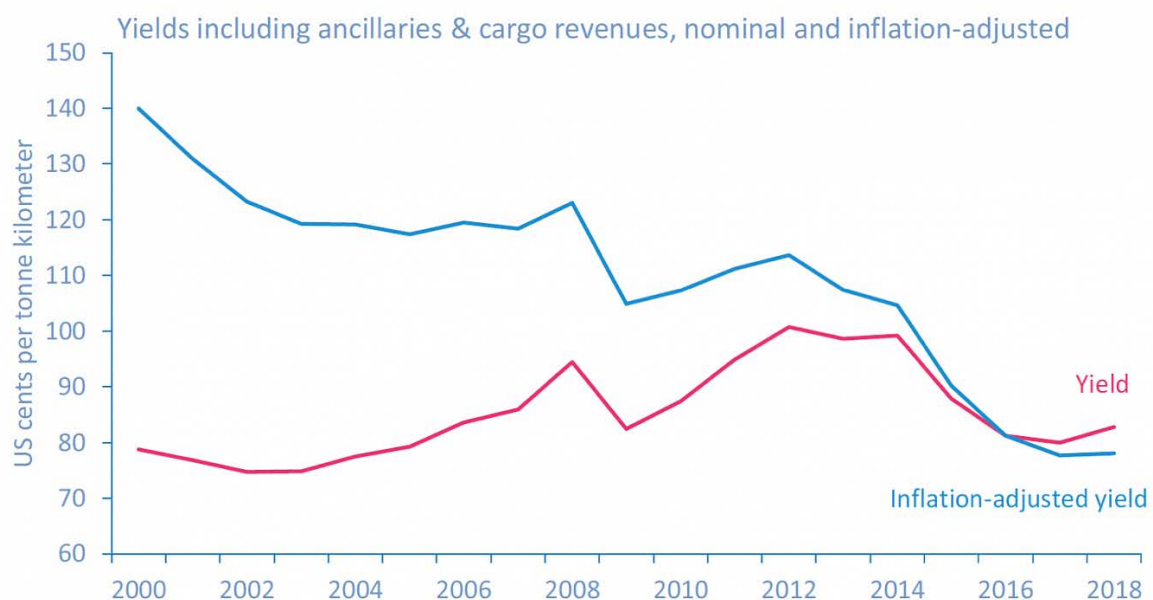
Of course, it was not in the airlines' interest to cut prices in their home market, where their market share could hardly be increased anyway. By contrast, the prices in the competitors' home countries were slashed most vigorously. A ticket with British Airways from, say, Cologne via London to New York was marketed much cheaper than one from London only to New York. Conversely, Lufthansa offered cheaper tickets from Manchester via Frankfurt to Singapore than one from Germany to Singapore. Adversely, these cheaply sold transfer connections were more costly to produce for the airlines, and thus had to be cross-subsidized by the direct connections and higher fare classes. Much like the proverbial lemmings, the airline industry plunged into the abyss together, struggling to gain unprofitable market share and survive long enough to see better days.

Appointment to commit suicide together

Within a very short time, the entire industry suffered higher losses than the accumulated profits since its inception. The process can also be titled to be an unwanted appointment for joint suicide.

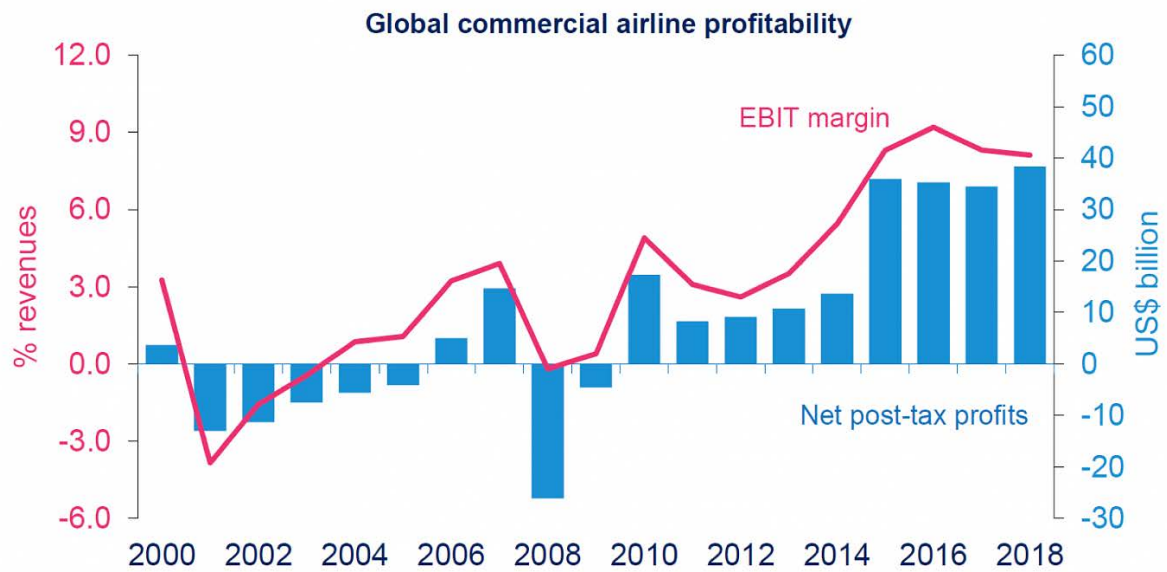
When the industry had just recovered from this, the entry of Ryanair, Easyjet and other low-cost carriers in Europe again resulted in a capacity leap, which triggered another foreseeable down cycle even before September 9th, 2001, which was often mistaken as the cause. Already in spring 2001 the charging factors and yields had started to plunge. The events of September 11 did the rest. The reason is that here, another kind of elasticity comes into play: While the mentioned long-term price elasticity of demand is low, the elasticity to changes in the global economy is by far greater. So in the case of regional or even global economic crises, air transport demand evaporates fastest, with customers scrambling towards cheaper means of transportation or leaving the market altogether. Airlines must then manage sharp yield declines, being stuck with largely fixed capacity offers and costs.

Seven years later, the global economic downturn and the financial crisis of 2008 led to the airlines' next decline in demand and another dramatic slump. The price drop induced by this is easily discernible in the industry reports regularly published by IATA:



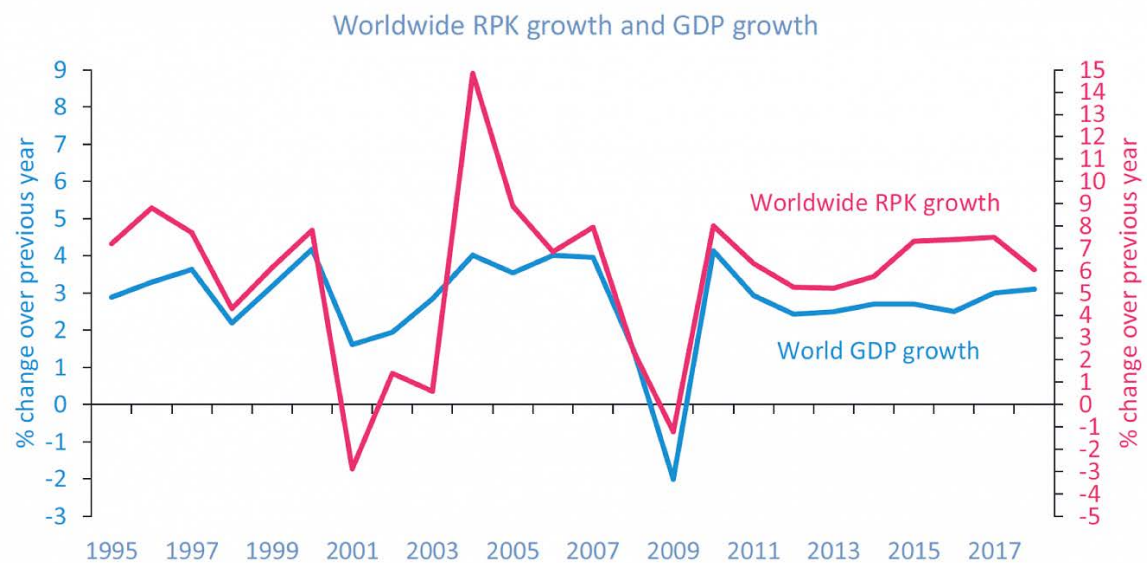
Source: IATA Economics using data from ICAO, PaxIS+, Datastream, IATA forecasts

Figure 2: Airline Yield Development (Source: IATA)



Source: IATA Economics using data from ICAO, IATA estimates and forecasts

Figure 3: Airline Profitability Development (Source: IATA)



Source: IATA Economics using data from ICAO, IMF World Economic Outlook, IATA forecasts

Figure 4: Airline Revenue Passengers Kilometers vs. global Gross Domestic Product growth (Source: IATA)

Here, we see another conundrum of the industry in the past years: Continuously declining yields. The industry's answer has been rigorous cost cutting and several waves of consolidation from merger and acquisition activity. While customers usually benefit from efficiency increases, consolidation tends to reduce competition. In the US, the biggest market in the world, only three national players are left and ticket prices have not decreased as in most other markets in the past years. This explains the seemingly contradictory past 4 "fat" years for the industry on average.⁵ From the last figure, it can also be seen that ultimately, as argued, air transport demand is associated with economic health.

⁵ The average here hides huge differences in profitability in different markets and on the individual Airline level. We witness for example the US and Middle East Airlines performing well, with Latin American Airlines at the bottom of the global scale.

Airline tickets are offered globally

"All business is local" is a statement often made by sales & distribution experts. Even most services are purchased "locally", and before the triumphant advance of Amazon and Co. the share of mail order in total retail sales was rather small. In contrast, the inventory of a flight event, for example the seats on a morning flight from Frankfurt to Hamburg, has always been marketed globally.

Potential customers do not only want to book a flight in Frankfurt and Hamburg alone, but also in New Zealand, Gabon or Paraguay, because they need a connecting flight in Frankfurt to Hamburg as part of a transfer connection. What in times of the World Wide Web is not witchcraft - namely to display the availability of seats and the quoted prices in real time and synchronized worldwide - was previously one of the biggest challenges of the aviation industry in a world without globally available network standards and capacity such as the Internet.

Airlines have been operating computer reservation systems since the 1960s, which could initially only be accessed by their global sales organizations and agencies (Global Sales Agents or GSAs). This worked via a dedicated global network that the airline industry had built up as a cooperative project and still operates today (SITA, Société Internationale de Télécommunication Aéronautique). With the advent of Global Distribution Systems in the 1980s, the industry was a pioneer in B2B e-commerce. At that time, however, "Open Source" and "Open Application Programming Interfaces" were not even the subject of utopias.

In addition, storage space was a precious commodity. The authors recall that in 1987 Lufthansa erected a building for over DM 100 million to operate its own reservation systems and the necessary storage capacities (three terabytes), for which a high three-digit million sum also had to be invested. The Amadeus data center, which was built shortly afterwards in Erding near Munich, was at that time the largest and by far the most complex in Europe. The computers had classic mainframe architectures, the programs were, once compiled into machine code, only customizable by few specialists.

The rigid structures and interface standards of airline distribution systems are still in effect today. "Simplifying the Business" is the name of IATA's strategy project, which includes the development of "New Distribution Capabilities" (NDC). With this and "One Order", the Network Carriers want to upgrade themselves to comprehensive travel service providers with the promise of a seamless customer journey. Instead of merely offering flights, they want to organize trips and thus not only play GDS and travel agency in one, generate additional revenues for brokered third-party services in direct sales (insurance, rental cars, hotels etc.), but also reduce their interchangeability, especially through direct customer contact. Or, to put it bluntly: They want more ownership of their customers.

The LCCs, above all Southwest Airlines, are already one step ahead. With SWABIZ, Southwest operates a travel booking platform that acts like an electronic travel agency on the customer side, but also functions as a GDS on the content provider side, i.e. directly accesses the reservation systems. Ryanair CEO Michael O'Leary announced that his airline will one day be the Amazon of travel with an affiliated airline. But so far the Ryanair platform has accessed aggregator platforms such as HRS, for example for hotel bookings, instead of acting itself as a platform for the original content providers. It will be fascinating to watch the industry battle for customer ownership in the years to come.

Private customers: Package travel or flight only?

In the business travel segment, the airline typically acts as a direct and visible provider of transportation on the market, even though the tickets are sold using different intermediary channels. For private customers however, the airlines' marketing experts typically distinguish between "Holiday travelers" and "Visiting Friends and Relatives (VFR)". Holiday travel has historically been the far greatest share of private travel. The main difference between these customer groups is that holidaymakers typically require additional local services at the destination (hotel etc.), while VFR only want to book the flight. Holiday travelers, especially air holiday travelers, are therefore the classic clientele of package tour operators. The flight is an integral part of a package that the customer buys from a tour operator rather than an airline. Holiday airlines such as Condor or Tuifly sell their seat contingents to organizers either completely (example Tuifly: completely to the Tuifly organizers) or predominantly (example Condor: mostly to organizers of the Thomas Cook Group and few others).

As an airline in this segment, the flight schedule is either dictated in full by the tour operators (charter) or specifically tailored to the seat contingent demands of several tour operators. The more tour operator contingents, the lower the systematic utilization risk for the airline - one should think. However, tour operators, whose value-added share of the total trip is less than ten percent and whose sales margin is only a fraction of that, lack the substance to bear the risk of flight capacity utilization. These account for 30 to 40 percent of total value added on a 14-day medium-haul travel package.

Take a recent example: When the political conditions in North African vacation countries or Turkey deterred vacation-willing travelers, tour operators focused on these destinations would have had to announce bankruptcy

immediately, had they sourced their seat allotments on binding agreements when aggregating their travel package portfolio long term ahead. In the final consequence, for this segment the employment and capacity utilization risk factually remain with the airlines.

When the product was still called "Charter", numerous medium-sized tour operators (e.g. Tjaereborg, Jahn Reisen, Kreuzer Reisen etc.) fell onto the charter airlines through active swaps (equity for receivables). As a result, integrated tourism groups developed between the pure tour operator level and the airline. Today, the utilization risk for tour operators often presents itself as an existential challenge to political foresight, clairvoyant abilities and competence in game theory.

As to political foresight and clairvoyant abilities: Prior to the political developments of recent years, it seemed appropriate to strongly expand the supply of seating capacities to North Africa and the Turkish Riviera. When the political spring in Egypt and Tunisia was over, the hopeful capacities planned there were shifted in the direction of booming Turkey - until demand there also collapsed immediately afterwards due to the unrest and political tensions around the president. If one had known that before ...

Ryanair: Where to put the capacities?

Game theory skills: So where to put the capacities? The collapse of Air Berlin was a blessing for the tourist airlines in the classic warm water destinations on the Spanish and Greek islands, taking out significant capacity pressure. Eurowings, Condor, Tuifly, Germania and operators based at the destination countries, but also Ryanair and "New Entrants" such as Sund Air and Small Planet rushed into the left-overs of Air Berlin in parallel. Consequently, scheduled frequencies on the Düsseldorf-Palma de Mallorca (DUS-PMI) route, for example, were growing by more than 50 percent as of May 2018 compared to the comparative week of the previous year despite the bankruptcy of the Air Berlin Group – which had been the market leader on this route up to 2017.

Eurowings, Condor and Tuifly had already divided up the old Air Berlin/Niki slots (landing and take-off rights) in the winter before Laudamotion pushed into the field in April, citing "grandfather rights"⁶ that had long expired formally, and then Ryanair discovered them as a vehicle for positioning its holiday flight product directly in Düsseldorf.

Only after that Ryanair and Laudamotion had to learn that there was no demand to be served for their capacities scheduled 2 months before time of departure, forcing them to cancel 25% of them.

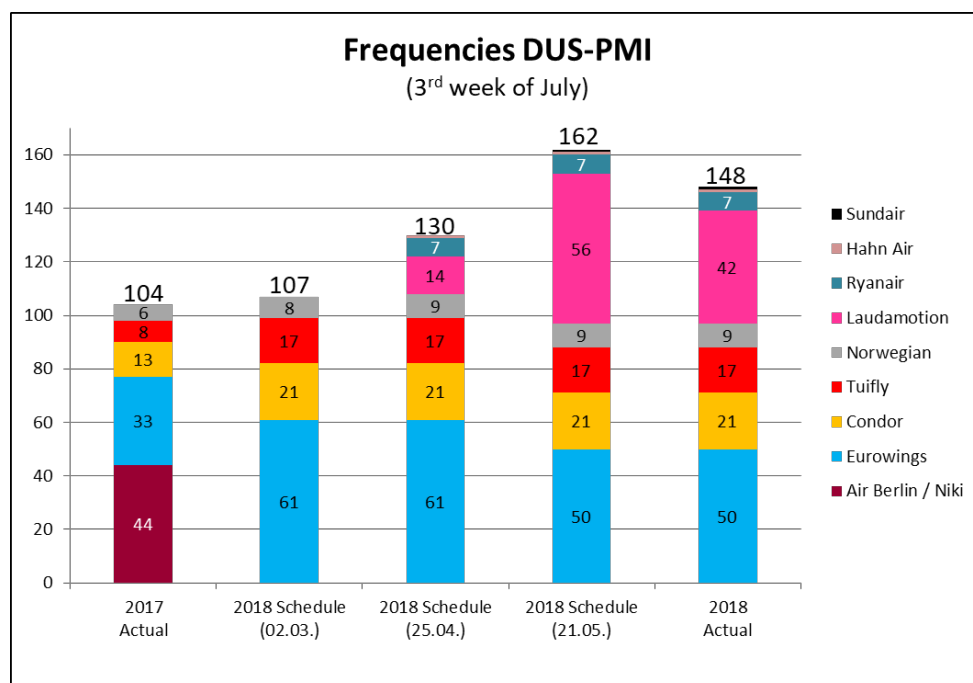


Figure 5: Flight Frequency example (Own figure)

⁶ In short, grandfather rights are the right of an Airline to reclaim all the slots that it has been granted and also actually used in the current period at an airport for the subsequent flight plan period.

However, this was quite an expensive lesson: Offering additional services in a market that is already sufficiently well served in terms of capacity leads to the mechanisms already described for Network Carriers: Demand can hardly keep up with this capacity leap. Ryanair/Laudamotion couldn't sell their capacities, though they offered the seats in the first holiday week of North Rhine-Westphalia for less than 30 Euros each day:

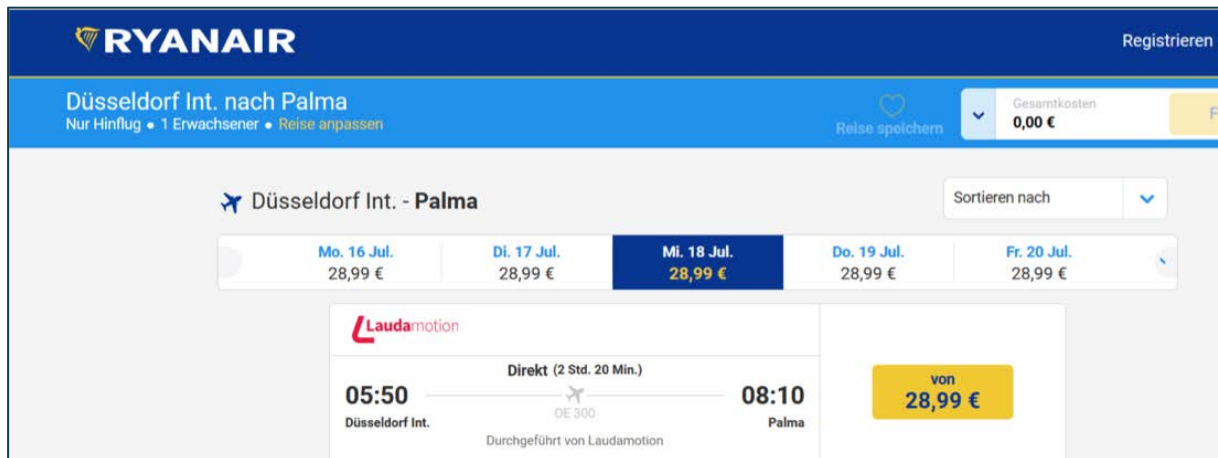


Figure 6: Flight Pricing Example (Source: www.ryanair.com)

For this amount of money, the cheapest low-cost carrier will not benefit from its favorable cost structure even when fully utilized. A sample calculation of operating costs on the route DUS-PMI revealed that only the variable costs depending on passengers and flight – not even including the fixed cost of crews and aircraft capacity – are beyond 60 Euros per each passenger⁷

Part 3 – The Production Challenge

Every flight event is an individual event. Even a flight scheduled every morning from A to B is a single event, for which at the right time at the right place:

- an operational flight plan (4D) coordinated with air traffic control must have been drawn up,
- a suitable, airworthy aircraft must be ready for operation at the origin airport,
- passengers have to pass through check-in, security checks, passport controls and boarding processes at the airport of departure on time,
- the respective passenger handling service providers or the public control bodies and/or their subcontractors must maintain the currently required personnel capacities and operating resources for this purpose,
- a crew with suitable licenses and duty time availability fitting the planned rotation must be ready for operation at the cockpit and cabin services,
- a load sheet must be created and filed,
- Ground service providers on the apron (catering, fuel, baggage loading, cargo loading, pushback, de-icing) must have completed their services,
- taxiways, runways, departure routes, en-route airspace capacities and also runway capacities at the destination airport must be available,

⁷ Brützel, C.: Was kostet eigentlich ein Flug, <http://www.airliners.de/was-kosten-flug-aviation-management/41685>

- air traffic controllers in the towers and along the entire route in the affected area control centers for lower and upper airspace must be on duty.

The weather also has to play along, but that is hardly in the hands of the above participants to organize. Finally, other users (again, a.k.a. competitors) must be monitored not to spontaneously access one of the resources mentioned at the same time, especially for safety reasons. It is clear that this coordination effort much resembles the concert we referred it to in part 1, but it is so big that it requires even a number of highly specialized conductors instead of just one.

Operational planning begins long before the flight

In part 2, the long lead time for the marketing of scheduled flights became clear, as flights must be planned before reservations can be accepted. But long lead times are also required for operational planning:

The arrival and departure times will be distributed at coordinated airports⁸ at the latest at the IATA slot conference. This conference is held twice a year and brings together all national flight plan coordinators, airport and airline representatives to coordinate the arrival and departure slots for scheduled flights. In Europe these are virtually all major commercial airports, which have bottlenecks for runway capacities throughout the day or at peak times. Slots for which no "grandfather rights" are claimed are scarce.

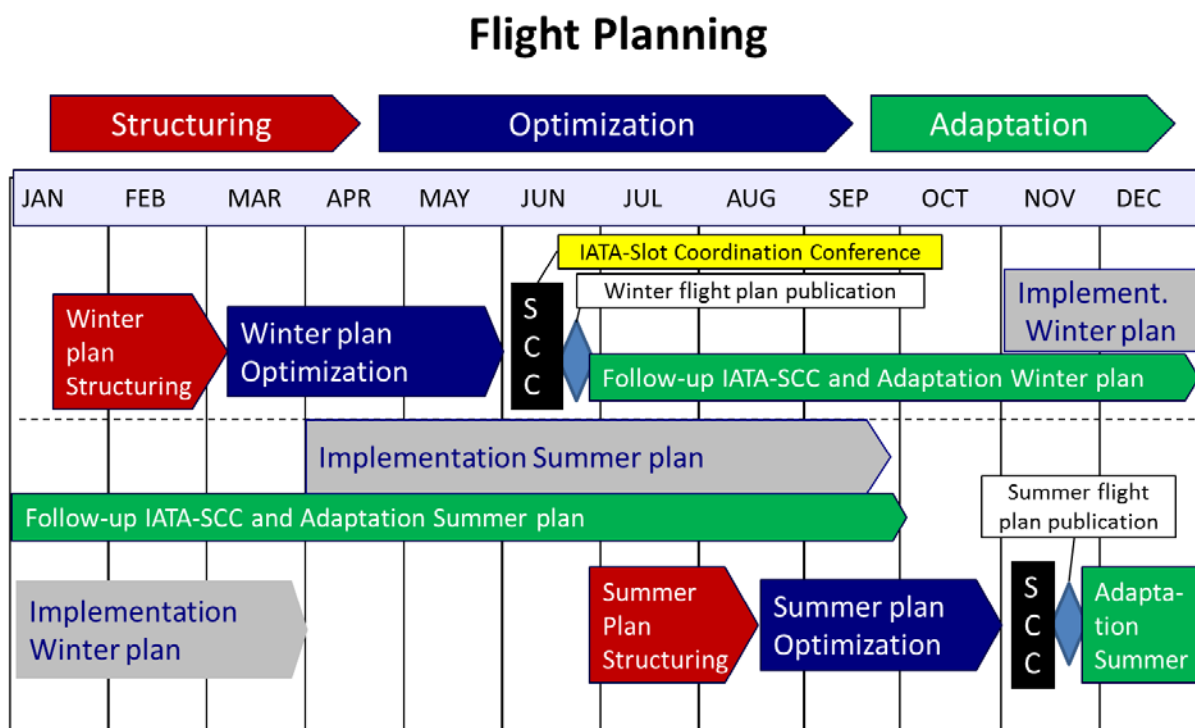


Figure 7: Exemplary flight planning timeline (own figure)

The flight plan is then published and can therefore only be changed to a very limited extent. The aircraft types used can most likely still be optimized. From the moment of the flight plan implementation on, all participants must concentrate on executing every flight event safely and on time.

Punctuality requires perfect synchronization of all process participants and processes. Everyone involved must function like a wheel of clockwork, without which all other wheels cannot rotate. Network management, maintenance, flight operations, ground operations and also the necessary external service providers must work closely together so that a detailed operating plan for the entire network can be provided two to three days before

⁸ Coordinated Airports are one of three airport types as defined by ICAO, the International Civil Aviation Organization. They are those (usually large an international) airports where slot demand by far exceeds air movement capacity. These airports require an independent coordinator system to administer capacity for the two existing flight plan periods and uphold fair competition.

the day of operation to the Operations Control Center, the one department that from then on takes responsibility for ensuring reliable, on-time and, last but not least, efficient management of the flight events.

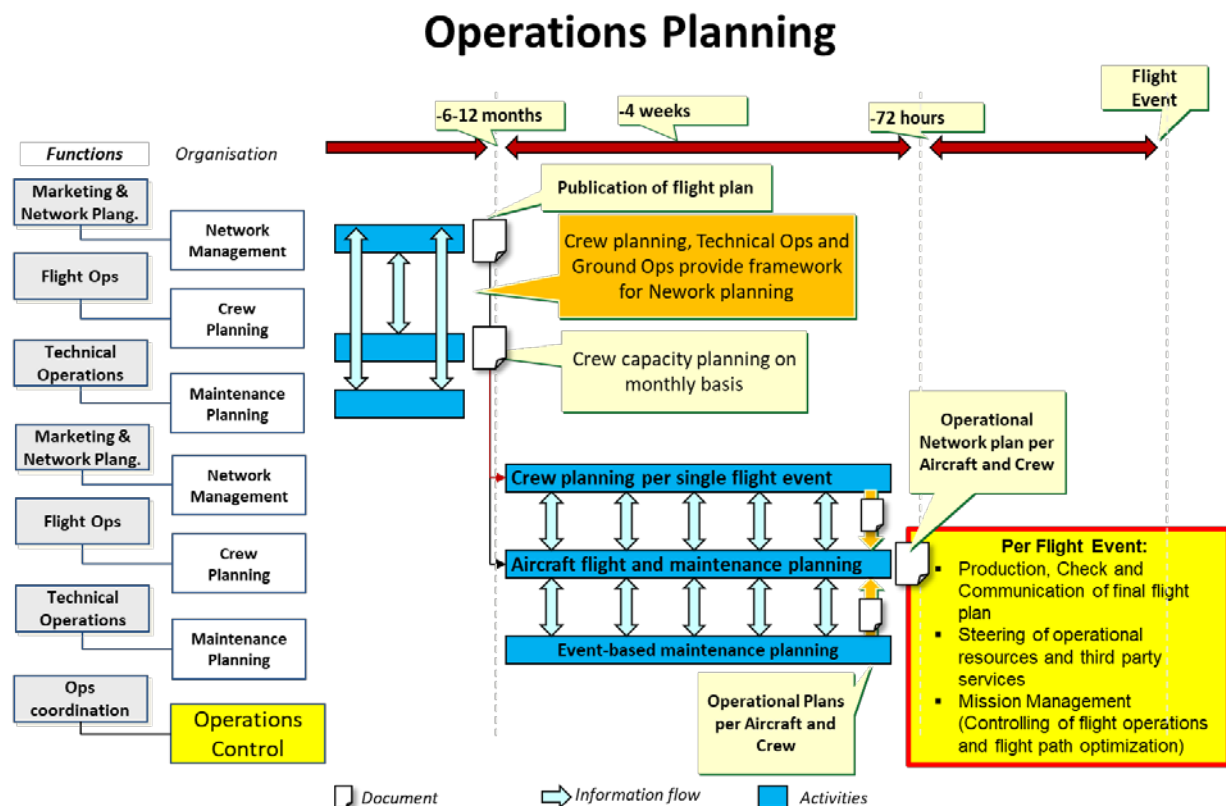


Figure 8: Operations planning steps (own figure)

Slips between individual wheels beyond existing buffer times in the best of cases only lead to delays and additional costs. However, there is no slip between individual wheels without safety risks, for example in the coordination between air traffic control and cockpit. Safety before punctuality is paramount for all resources and processes.

If only one of the wheels is missing or only one is not operational according to the rigid legal regulations, the flight event is cancelled or must be postponed until all the wheels are operational and turn as planned. "Delay" is the consequence. All subsequent wheels of the factory must be readjusted and made available synchronously for the new cycle time.

Rotational linking causes complexity squared

Depending on how long the delay lasts, not only the upcoming flight event is "out of time", but also the following one. At least the aircraft, but most often also the crew, are rotationally linked for use.

At this point, the frequently expressed assumption that airlines would cancel flights and push forward technical causes because capacity utilization was too low and it would be cheaper to organize substitute transport for the (too) few passengers can be dispelled. If the flight from A to B is cancelled, the aircraft and often also the crew for the next event are missing in B.

For low-cost carriers with decentralized home bases for aircraft and crews, the event chain is usually limited to outward and return flights, alleviating this challenge somewhat. For Network Carriers this also applies, but only if they are limited to hub-and-spoke circulations (not if, as most do, they also have decentralized flights in their program). In the past, Network Carriers produced weekly rotation plans in which aircraft and crews went on "business trips" on a regular basis for several days. With such weekly rotations, the event chain was correspondingly long and therefore susceptible to failure. The planning range has shortened significantly today, with the consequence of requiring far greater flexibility in the time planning of the flight crews involved.

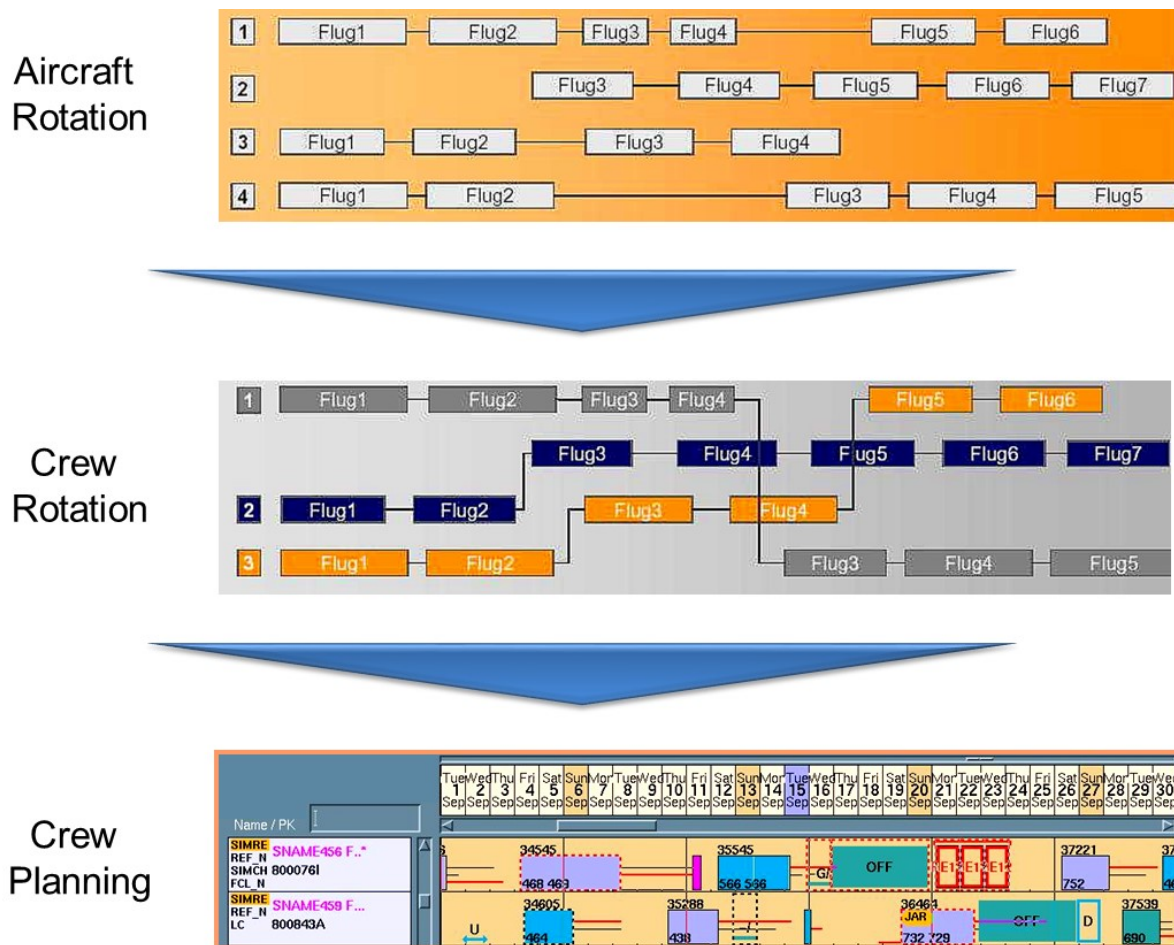


Figure 9: Crew and aircraft in operations planning (own figure)

It is no coincidence that Lufthansa Passage now only operates "Hub Frankfurt" and "Hub München", Air France/KLM only operates Paris and Amsterdam hubs, and IAG only operates hubs in London (British Airways) and Madrid (Iberia). All decentralized flights have been transferred to specially established low-cost carriers, whether they are called Eurowings, Transavia, Hop, Vueling, Iberia Express or whatever. This not only reduces the complexity of the operation, but also systematically reduces crew costs: Without "business trips" for the crews (at least for short- and medium-haul flights), there are no overnight costs and, in particular, no unproductive working hours due to overnight stays and rest periods outside the home base.

Transfer connections link several events

For low-cost carriers, as long as they only sell point-to-point tickets, each flight event is a completed event from the carrier's point of view. For transfer passengers of the Network Carriers however, it is only part of the entire event from the boarding point to the final destination. From the point of view of the Network Carriers, the individual flight events are each in themselves a management challenge. The real and much more complex challenge, however, is that the individual events are closely interlinked throughout the daily flight schedule. If passengers miss the connection, the event is not only a frustrating experience for them. The airline incurs direct (replacement transport; compensation) and indirect follow-up costs (customer loyalty). If a wave goes off-cycle, the entire daily flight plan quickly gets into distress.

Landing and take-off wave structure

Example: LH Frankfurt (historical)

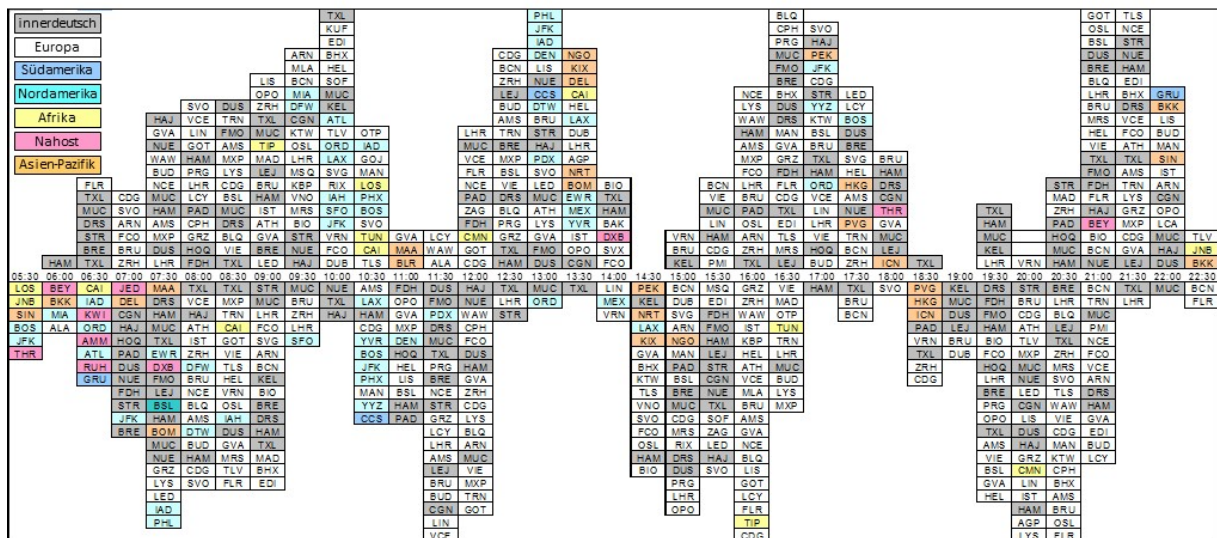


Figure 9: Aircraft movements cycles (own figure)

The stronger the rotary link and the network link, the higher the coordination requirements for the Operations Control department, the central control point for airline operations.

Generally, one would think that all decisions to be made here could be made rationally and deterministically on the basis of the states and potentials of all process participants, a parade case for artificial intelligence based on digital networking for information acquisition and active control.

Operations Control – An Airline's nervous system

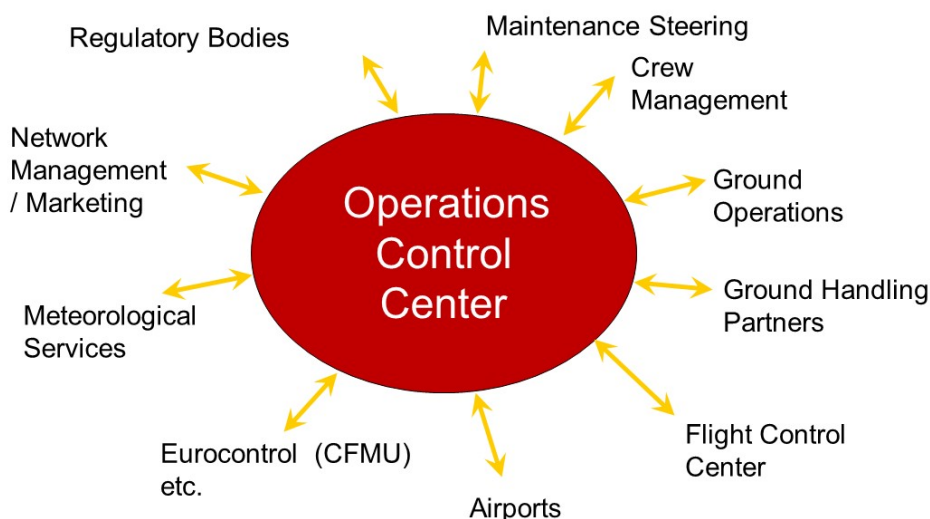


Figure 9: Operations control center interfaces (own figure)

In practice, however, the interface partners and their respective states and potentials are so diverse, heterogeneous and volatile that they cannot be integrated deterministically. So, although there is helpful system support, experience and heuristic competencies are, still today, indispensable in order to keep the entire operation of an airline in sync, and in particular to control it effectively once it has gone out of sync. In the Operations Control Center, good and bad event management are determined to a large extent by the personal competencies of the employees.

Routine and networking are crucial

As always, when it comes to punctual and quality-assured processes, routine, experience and effective information exchange are highly critical. The delays in European airspace in summer 2018 certainly were partly the result of inhospitable weather conditions and air traffic controllers' strikes. However, the particularly poor performance of all German airlines has another driving factor to it.

In the on-time performance statistics of Flightstats⁹ they are ranked 41 (LH Cityline), 52 (Lufthansa), 54 (Germanwings), 57 (Eurowings) and 63 (Condor) out of a total of 65 European network, regional and low cost carriers in the month of May 2018, i.e. almost all in the bottom quarter. Tuifly is not being reported.

A sidenote: On the consequences of the Air Berlin bankruptcy

At this point, we would like to focus again on the AB insolvency and its consequences: Following the demise of Air Berlin, not only Eurowings, Condor, Tuifly and Easyjet felt called upon to step into the gap, but also Ryanair and, most recently, Laudamotion.

On the one hand, this resulted in a massive increase in capacity on certain routes - and consequently also in the strain on airport and airspace infrastructures. Additionally, the strategies of some of those who felt called to the opportunity relied on the same aircraft and crews to expand their operations.

After pre-sorting the business within the Air Berlin Group including Niki, Eurowings believed it could more or less take over the entire tourism business and accordingly went to accept the inheritance at the IATA slot conference. Subsequently, the flight plan for summer 2018 was published and the resource requirements determined (see above).

But then the EU Commission intervened. This meant that Eurowings could only secure the Luftfahrtgesellschaft Walter (LGW), whose crews could only be retrained to the extent that they were not needed to operate the Dash-8-Q400 fleet. Then Eurowings had to even leave the Air Berlin Airbus out of the lease agreement with Laudamotion, which by that time had already been bought or rented from the former lessors.

From then on, Eurowings was practically forced to expand its own operations inorganically, either by recruiting crews from all available and correspondingly heterogeneous sources or by outsourcing (wet leasing). The latter is - in a metered form and for peak coverage - certainly an effective means, but in the given situation it was a further driver of losing control.

The to and fro of the sales and operational integration of Laudamotion posed undreamt-of challenges not only for Condor. Ryanair was plagued by crew shortages and crew dissatisfaction. On top of that, they also lacked the experience to smoothly integrate operations without standing customer-supplier relationships (such as Laudamotion) at all interfaces.

Accordingly, with Düsseldorf, Palma de Mallorca and Cologne, some of the former Air Berlin slots were on the last ranks in the airport statistics of Flightstats for May 2018. Only Berlin Airports did well - likely because Easyjet could fall back on a well-established constellation by taking over the Air Berlin operations in Berlin-Tegel. With Eurowings, the operational troubles became so systemic that the CEO felt the need to apologize in a letter to all customers in early summer. Certainly, the current pains will alleviate with the next flight plan, but customers do have a memory and will remember their experiences of this long 2018 summer.

Delays - annoying not only because of the delay

Delays are measurable and therefore a popular performance benchmark for the event management of an airline. Delays are not only annoying for customers because they miss appointments and have further inconveniences. They are also extremely annoying for the airlines, as they entail considerable costs for customer care, replacement transport and, in the worst case, lump-sum compensation payments.

⁹ <https://www.flightstats.com/company/monthly-performance-reports/airlines/>

Statistics and projections of average delay costs, such as those of the University of Westminster done for Eurocontrol¹⁰, are only part of the truth, as they do not adequately take into account the European Commission's rigid rules on lump-sum compensation payments for delays of more than three hours.

Costs of Operational Delays

Delay (mins)	5	15	30	60	90	120	180	240	300
B733	70	430	1 550	7 020	19 160	36 220	49 040	66 480	89 310
B734	80	480	1 740	7 930	21 690	40 960	55 340	74 780	100 040
B735	70	390	1 400	6 280	17 110	32 350	43 900	59 720	80 590
B738	90	540	1 940	8 860	24 270	45 750	61 740	83 220	110 920
B752	100	620	2 290	10 620	29 250	55 150	74 240	99 700	132 200
B763	170	900	3 200	14 780	39 960	85 300	121 880	152 860	191 990
B744	240	1 370	5 000	23 430	63 710	136 330	194 330	242 440	302 200
A319	70	440	1 600	7 320	20 040	37 850	51 240	69 420	93 180
A320	80	500	1 820	8 350	22 920	43 250	58 420	78 890	105 380
A321	100	580	2 160	10 010	27 580	51 990	70 060	94 250	125 240
AT43	30	180	610	2 610	6 960	13 290	18 550	26 360	37 610
AT72	40	240	820	3 600	9 690	18 430	25 380	35 350	49 210
DH8D	40	250	890	3 900	10 530	19 990	27 480	38 120	52 780
E190	60	320	1 150	5 140	13 970	26 440	36 060	49 420	67 340
A332	180	990	3 550	16 480	44 620	95 330	136 120	170 480	213 660

With reactionary costs.

Figure 10: Average delay costs (Source: Eurocontrol 2015)

For example, if a long-haul aircraft fails due to technical defects and no suitable reserve aircraft of its own is available, the damage very quickly amounts to several times the revenue of that particular flight. This applies in particular if a replacement aircraft with crews has to be hired (sub-charter) and the aircraft still has to be flown in. The additional costs for ferry flights, aircraft and several crews and, on top of that, 600 Euros per passenger as a lump-sum compensation payment in accordance with EU regulations are many times higher than just the additional care costs for the passengers.

A three-hour delay results in a loss-making flight, the compensation for which often requires more than the next 100 flights to run without problems. The loss is likely more than the total planned result for a flight plan period for the affected flight number.

Delay costs can make or break profitability

Delay costs can become a key factor in the profitability of airlines, especially as they are one of the costs that can distinguish good airline management from bad. In any case, customers can be assured that airlines do everything in their competence and within economically justifiable limits solely for their own benefit in order to avoid delays.

¹⁰ Cook, A, Tanner, G: European Airline delay cost reference values, University of Westminster, 24 December 2015, <https://www.eurocontrol.int/sites/default/files/publication/files/european-Airline-delay-cost-reference-values-final-report-4-1.pdf>

From the customer's point of view, the repeatedly demanded provision of additional reserve capacities to avoid delays is understandable. If, for example, an aircraft or crew in the Canary Islands fails, a replacement within the existing three-hour limit requires that aircraft and/or crews are continuously positioned as reserves there or close by. The year-round positioning of reserve crews can make sense if you want to avoid paying 600 Euros each to the passengers concerned – it is a trade-off between the costs of delays (financial and the loss of goodwill) against the high costs of those unused assets. From the airline's point of view, this can only be effective and efficient at the hub. At outstations or, in the case of low-cost carriers, at smaller decentralized home bases, it is unlikely that it pays off.

In the end: No bigger troublemaker than poor service

On final note, it is often not the delays that make customers most deeply annoyed, especially if they are able to benefit from the considerable lump-sum compensation. The real trouble arises from the bad management in dealing with them. Lack of professionalism and care in customer service are not only signs of poor event management, but also of poor overall management. Murphy's Law also applies in aviation, and contingency planning for all thinkable and unthinkable events are at the heart of good airline (event) management.

The "Full Service Network Carriers" show widely varying degrees of good management, just as holiday airlines and low-cost carriers as well. The low-cost carrier Southwest, the airline with the highest sustained customer satisfaction in the world, once again shows how good management leads to good event management with delays and other irregularities. And, finally, to an enviably stable financial performance and shareholder value creation over more than 50 years of operations no other airline has been able to display. But given the specifics of the product, the global competition and the enormous complexity of production, can we really blame them?

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