

Prospective analysis of the Air Transport Industry: Global traffic and individual market-shares - Application to Air France-KLM strategy

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Abstract

Many experts agree to forecast a continuation of the growth of air transport with a doubling (even a tripling) of the traffic within the next 20 years. Without necessarily seeking to contradict this forecast in this paper, we will present a prospective vision of the industry. Vision which try to light the 2 following and linked questions:

- *What explains the air traffic growth: its drivers (maturity, supply, fares, economic growth...) but also its brakes (safety, environment, costs...)?*
- *Which comparative advantages can lead an airline or a group of airlines to increase its market share?*

In this analysis (mainly for the second question) we will take into example the Air France-KLM strategy.

Introduction

The title of this paper is probably more ambitious than its contents and even its objectives. In fact, the main issue it tries to lighten is the recurrent problem of any forecast: all models are calibrated with historic data and events. Nevertheless, if we want imagine a long term future – at least two decades – we have to wonder about the possible ruptures (technologic, economic, organization....).

A retrospective glance, 20 years ago, in 1985 illustrates this remark. At this time, the first PC arrived in the offices but were totally absent at home, Internet or the Mobile Phones did not exist and even are not imaginable, in the air transport, the low-cost model was limited to some folk and marginal initiatives (People Express or Lakker airways), we did not speak about hubs (except in the USA) and even, 6th freedom traffic remained an almost “hijack” practice because opposite to Chicago convention spirit... Excepting some visionary, could we imagine 2005?

The prospective analysis could not solve the problem and propose an accurate description of the future, but it can help to discuss about two issues:

1. Which parameters can influence the worldwide air traffic at a long term horizon (20 years or more) and what sort of breakings in the 5% average growth rate could they generated?
2. In these ruptures, and even without any rupture, there will be winners and losers. So, which comparative advantages - disadvantages could be decisive and then, what kind of strategy has to be used by the different kind of actors. Of course, we will focus in this chapter on Air-France KLM double hub organization since this is the main topic of this first Airneth workshop. On a more generally point of view, two remarks has to be done.
 - ✓ This question is link to the first one by a two-ways relation: traffic induces airline strategies but airline strategies create traffic...
 - ✓ To build a strategy, airlines (or other actors) don't necessarily try to optimize their level of traffic, but more often their level of benefit...

1. Worldwide air traffic

2.1. Which variables could influence the air traffic?

A lot of variables, often directly or indirectly linked both together, influence the level of traffic. On a traditional way, we can divide them in two categories: exogenous variables related to the general background and, at the opposite, the purely endogenous variables we could be used by airlines as tools to implement and develop their strategies.

On this basis, we can establish a probably incomplete inventory

Factors related to the general environment - Exogenous

Geopolitics: Worldwide and regional political and economic policy and stability with a growing influence of potential terrorism action.

World economy (GDP, International exchanges...) tightly correlated with the traffic.

Oil Price

Concerns related to the *environment*

Concerns related to the *safety* or more precisely, the *perception of safety*

Policies of national or regional **planning and organization** (concentration, deconcentration...)

The supply of the *other means of transport* (High Speed Trains, Ferries...)

The supply of *substitute products of travel*: new techniques of communication (Teleconference, Internet)

Mobility of the people with wide gaps depending the purpose of travel (business or personal), the country of residence, the revenue... and, probably, even a fashion effect (Tourism operators action).

Factors related to transport - endogenous

Technology which can improve aircraft characteristics but also ground equipments

Organization and strategies of the players and especially airlines but also, airport or ATC suppliers... this organization is characterized by the **capacity** (supply) of transport

Congestion of the airspace and/or the airports which can damage air services

Airlines Marketing – Prices

And we must add a long term essential constraint: **potential profitability** of each entreprise.

Two general remarks has to be made

1. The different variables are not independent and these links could even exist between variables which don't belong to the same category.
For example, the level of safety is a consequence of, at least, three endogenous parameters (technology, organization and... congestion). The perception of safety, which is a more complex factor since different from one user to another, is probably linked to this level of safety but also some personal (or societal) parameters as revenue and mobility.... The two variables (safety and perception of safety) could generate additive costs and then modify airlines organization and marketing and, at a longer term, technology!
2. Some of these variables, mainly the societal parameters (safety, environment, mobility) are completely different, or have different impacts, from one region to another.

2.1.Present Air Traffic forecast Models

The air transport forecasters choose the explanatory variables of their models in the former inventory. However, they never use the whole of these variables for at least 3 reasons.

1. It is very difficult, even impossible, to determine an objective indicator able to quantify some of them (it is in particular the case of the societal variables).
2. The historical effects of some variables seem without common measurement with their future potential impacts and then prevent any econometric calibration.
3. Lastly, these variables are not independent

Thus, the models try generally to explain the traffic growth by 4 engines supposed able to aggregate all the effects:

1. Two of them are exogenous: the “**income – wealth**”, generally represented by the economic growth of the GNP, and the “**Progress**”, often represented by a function of the time (S-curve or logistic) which aggregate so different parameters as safety, mobility, technological aspects....
2. At the opposite, the two others are endogenous: “**price of the service**” and the capacity of transport (“**supply**”) generally represented by a function of the number of flights (frequencies).

2.1.What kinds of ruptures of the trend are possible?

By using these models, the air transport experts, with a very wide unanimity, forecast an around 5% average growth for the two next decades, trend which is in line with the observed historical traffic variations.

However, to validate this extrapolation of the past, it appears necessary to also wonder about the potential ruptures and thus to seek what sort of events could generate its. A priori, there are three types of ruptures:

1. First of all, and it is the most difficult scenario to anticipate, the complete rupture which implies that the present models will completely lose their validity.
2. The need to take into account new effects (brakes or accelerators of growth) constitutes the second type of ruptures. In this case, the present models stay usable but must be complete.

3. The last type of rupture of trend can be caused by the modification (stop and even traction inversion) of one or more the identified engines.

Although several causes, all exogenous, can lead to the first type of revolution (serious geopolitical crisis, strong constraining measurements to protect environment, oil shortage...) we will not study its catastrophic situations here and will discuss only the 2 other types of ruptures.

2.1.Impacts of new variables

Classically, we have to look first, the impact of the competing and/or substitution products of air transport.

Currently, this impact (except locally on a specific market) appears quite limited (thus the HST is only a competitor for short haul and high traffic routes), and the substitute products (teleconference for example) are rather complementary than competing.

This situation is the consequence of the current characteristics of the product "air transport" (price, travel duration, comfort, safety...) and of its competitors/palliative and then, it could be called into question by all high modification of these relative characteristics. However, such a scenario can only be, excepting a technological discover improving considerably the attractiveness of one of the air competitors, the consequence of an exogenous cause. Thus, it is not the variation of its competitiveness ratios which is likely to generate a rupture in the air traffic growth but another factor for which the variation of this ratio would be only indirect and thus minor in front of the direct and major effect which is the modification of air product. Then, we can pull away the impact of the competitors/substitution product from the potential causes of direct rupture.

On the other hand, 3 parameters seem able to impact directly and very strongly air transport growth:

1. **Oil prices.** In reference to 2003 average oil price, we could estimate the additional cost for Air Transport to US\$ 37 Billions, then almost 10% of the total turnover for a oil barrel equal to US\$60 and, for a barrel equal to US\$85 this additional cost could reach US\$ 90 billions ...
2. **Environment** can also generate a strong rupture of trend due to 2 separates effects:
 - ✓ Noise in terminal area. Today, especially in Europe, it appears more and more difficult to build a new airport, or to develop an existing platform, because of the increasingly decisive actions of the committees of residents. In the long term, this situation could result in an increase of congestion then a degradation of air transport, or an increase of the average size of the aircraft used and then a reduction of the frequency effect.
 - ✓ Generalization and/or increase of the taxation of all polluting products in order to fight against the gas emissions (CO2 and Nox). Such a decision, in line with Kyoto resolutions and the struggle against the global warming, could lead to a significant increase in the air transport charges and/or a reorganization of the industry.
3. Finally, **safety and perception of safety** is also a factor which can play an essential part in the development of air transport. In fact, the constant improvement of the level of safety is represented, amongst other things, in the forecasting models by the "technological progress" engine. But, today this representation appears very inaccurate for 2 reasons:
 - ✓ September 11, 2001 modified completely the regards on airport security.

- ✓ The improvement of safety can be associated with a degradation of the perception of safety, which is the only decisional variable. The tragic series of accident during the summer 2005 and their reports by the media, crossing with an increasing societal need of safety, give an illustration of this situation.

In each case, two types of mechanisms can be used:

1. Economic mechanisms (it's difficult to consider other reactions for oil) could result in increasing the services cost. This could be by the taxation of gas emission, additive requirements constraining chartering or code-sharing but also direct degradation of the service (security procedures for example).
2. Administrative regulation lawful prohibiting certain activities (examples: withdrawal of noisy aircraft, black lists of airlines...)

We can obviously think that, as in the past, the regulating authorities will continue to privilege the economic treatment (even if they will mix it with administrative measures).

Thus, the **potential impact of the new variables is likely to result in a significant rise of the structural cost of air transport.**

2.1. Modifications of the engines of growth

Let us quickly analyze the 4 engines of air traffic growth, beginning this review by the endogenous ones.

Prices of the services

The engine "Prices" is particularly important and for two decades, the regular fall of the price, created or amplified by the strong competition between airlines, has undoubtedly generated a wide part of the traffic growth.

Moreover, the economists consider that in a completely mature market, perhaps this is the case of the US domestic market, the decrease of prices is the only cause of growth.

In this logic, to keep on traffic growth the airlines will have to continue to lower their fares, movement which appears rather contradictory with:

- ✓ Their present situation since their margins are very weak and even strongly negative for the American airlines
- ✓ Risks of significant rise of their structural costs to face the 3 problems stated in the preceding paragraph (Oil, Environment, Safety - Security).

Then, except finding important productivity gains, we should rather observe tariff increases (already began in Europe and Asia in reaction to the rise of oil price), and then a thrust reversal of this engine and a potential traffic decrease.

In fact, the historical action of the motor "Prices" seems more complex than its single representation in a model by an elasticity index, since it does not operate on the same way on all the market segments.

To simplify, the historical model of air transport consists clearly in a cross-subsidy from "business" (high contribution and weak price elasticity) passengers to "personal" (low contribution and high elasticity) ones. The cross-subsidy ratio has increased for several decades since the fall of prices profited especially to low fares but very weakly to business ones. Obviously, this logic which increased the gap between the different prices, amplified traffic growth since this action was concentrated to the most price sensitive passengers.

Moreover, could it be differently in a market where supply (costs and capacity) runs systematically after the demand (prices and traffic)? But will it be the same in the future?

The first answers of European and Asian airlines to the structural increase of cost seem to be a wide change of strategy since they preferred create new over-payments completely independent of the tariff class. In this spirit, the major European airlines introduced a oil lump sum surcharge (approximately 50 euros for a long haul flight) which they regularly revalue, airports and administrations, created security taxes independent of tariff class and even of final destination.

Thus, some people start to worry about the total level of over payments which represent sometimes more than 25% of the "air ticket" price (53,89Euros for a return travel Paris-Marseille while the lower ticket price is 94,89 Euros...)

Undoubtly, this new approach amplifies the negative effects on the traffic of each increase of cost and could have, at long term, a drastic impact on low contribution passengers.

However, the two digits figures of growth observed in 2004 and 2005 seem in contradiction with these pessimistic forecasts. In fact, they rather illustrate the delay between the variation of a parameter (rise of oil price) and its impact in term of traffic. Two reasons create this phase difference:

- ✓ The hedging policy attenuate (or delay) the rise of jet fuel price
- ✓ An aggressive marketing policy separates "fares" (often only know during reservation register) from "duties, fees, taxes and surcharges"....

Obviously, these two tactics, efficient at short term, will have few effect at long-term...

Capacity - Supply of transport

This driver, generally represented by the number of flights (frequency effect) is very difficult to show statistically (the problem supply - traffic is an alternative of the eternal dilemma hen and egg). Nevertheless, some experiments show undeniable results. Thus, all things being equal, if we watch an air market, an improvment in the services (new routes, new airlines and/or a growth of the number of frequencies) is almost always followed by a clear traffic increase.

This link has generated a strong historical trend. In order to develop their traffic (or their market share), the airlines has increased their frequencies rather than the average capacity of their aircrafts, and much more slightly, this increase has been sometimes achieved with a decrease of their average capacity.

Three remarks could change this strategy of more and more flights rather than more and more capacity per flight and then weaken the frequency effect:

1. First, all the air transport economists know that there are density effects in the air transport and, that the unit cost to produce an ASK is a decreasing function of the capacity of the aircraft used to produce it. So, an increase of the average size of aircraft linked with a decrease of the number of flights, could be a reaction to the increase of structural costs.
2. Secondly, the profitability requirements has to limit the number of routes
3. Finally, the environment pressures could limit the number of flights

Meanwhile, the conclusion of first paragraph (potential reduction of low contribution traffic) could nuance this slowing.

Economic Growth

It's generally represented by the GNP growth rate (country, regional or worldwide). The correlation traffic – GNP has always been high and the logic of such a link is obvious. Meanwhile, this variable synthesizes two different impacts often, but not always, linked both together:

- ✓ A production effect (organization and nature of the production, trade exchanges...) which mainly simulated the business traffic.
- ✓ A wealth effect which have an impact, in association with the level of fares, on the non-business traffic.

On a long term trend, if we watch, on one hand, the successive models calibrated to forecast the traffic growth of a specific market and on the other hand the different models used to forecast, at the same time, the traffic of different markets we can make two linked remarks about the elasticity traffic-GNP

- ✓ More a market is developped, weaker is its value
- ✓ It seems a decreasing function of time.

All those remarks can be easily understood by a clear trend observed on all markets: the decrease of the part of business traffic which induces a weaker impact of the production effect and a grower impact of the wealth effect, itself often better represented by fares/revenues variables.

Meanwhile, the conclusion made in first paragraph (potential decrease of low contribution passengers) could invert this quite long term trend and lead to an increase of the economic growth engine and it's then very interesting to look the GNP forecasts. Two important issues have to be noted:

1. According to experts, the world GDP has to grow by 3.2% over the next 20 years even if this forecast, cross with environnement aspects, calls a question: can we have an infinite growth in a finite world?
2. This average is in fact the synthesis of wide difference at a national level: average of 2% for developped countries, but more than 4% for some developing countries and even, 6,2% for China. Differences which will induce high gaps of air traffic growth by markets.

Progress - Maturity of Air transport

The S function generally used represents in fact two very different factors:

- ✓ the “objective Air Transport product” which is dependant from the actors action
- ✓ Its subjective perception and its impact in term of mobility which is more external and societal.

The first factor, that we can call “objective Air Transport product”, is probably close to the asymptote of the maturity curve and has a quite weak residual effect - and even a negative impact if we take into account Airport and Airspace congestion, security process, and even, for some passengers, Hub and Spoke strategies.

The second is more complicated to analyse. It's different components (perception of safety, public planning and mobility) are directly, or indirectly (public planning is dependent of environment concerns), linked to economic growth. Some figures related to mobility¹ and GNP per capita in different countries illustrate this link. So, it's analyse seems close to the former (economic growth) one.

	RPK/Cap. RPK/Cap. GDP/Cap.			RPK/Cap. RPK/Cap. GDP/Cap.		
	Internat.	Domest.	US\$	Internat.	Domest.	US\$
United States	876	2 559	39 453	Uruguay	303	0 3 865
Japan	552	578	36 285	Romania	74	3 3 285
Netherlands	4 283	5	35 752	Brazil	109	128 3 250
United Kingdom	2 629	151	35 734	Algeria	85	24 2 706
Germany	1 714	101	32 929	Peru	47	39 2 407
France	1 329	524	32 108	China	19	77 1 263
Australia	2 447	1 860	31 368	Indonesia	39	36 1 065
Singapore	14 188	0	23 178	Egypt	97	7 970
Korea	1 162	158	14 219	India	16	13 640
Russian Fed.	143	233	4 061	Kenya	126	5 487

Meanwhile, it seems that the two conclusions made at the end of this first analyse has to very amplified since, the difference of mobility are very high. Finally, the so-called maturity or progress is probably a variable which can generate significant ruptures illustrated by 2 new questions:

1. At present, there is a wide gap between countries for their air mobility but also for a lot of other characteristics as for example the famous comparison “600 cars for thousand American against 6 cars for thousand Chinese”. Can we imagine (and if it is the case, there is an important reserve of air traffic) that the developed country model will become the universal one or, taking into account in particular the limited planetary resources, a future universal model, more balanced, let us supposed 100 or even less cars for thousand inhabitants...
2. At present, in Europe or USA, the so-called “seniors” (young pensioners) have a very high mobility, since they benefit a very interesting combination: free time, low price for travel and quite high revenue. Can we extrapolate this situation or must we quest ourselves about the future income of this category when it will become the most numerous?

2.1. Conclusion

From our various interrogations, we can draw 4 general conclusions:

1. The 5% average long term growth rate is not absolutely certain but has to be consider only as an assumption
2. The strongest danger which weight on this assumption is represented by factors which are not taken into account in the present forecasts models but which separately (and more strongly together) can raise the structural cost of air transport.
3. The low contribution market is the most exposed since it's the most price sensitive but also because its fares could be the most increased.
4. Finally, in all the cases, there will be high differences of growth from one market to another.

¹ The figures are in fact the number of PKT carried by the airlines of the country divided by its population which is not a perfect indicator of mobility.

2. Specific airlines results

2.1. Airlines Objectives

For an airline, like for all other type of company, the main objective is not to maximize its production (traffic) but its profit even if, in the past, these two concepts were completely equivalent.

- ✓ That was true when air transport was regulated (tariffs being imposed, all turnover increase are link to traffic increase)
- ✓ But also since the industry is deregulated because the total capacity is probably too much higher than the potential profitable demand and, in this case, the only way for airlines is to lower the prices to full its planes and then increase its market share, process which start an infernal circle where the costs run after the prices.

In the long term, with a consolidated activity, we can think that it can be quite different. The demonstration can be done by reduction ad absurdum... looking the current situation of the US majors which continue to lower their prices whereas they lose much money... But also, by comparison, at a smaller level, with the objective of yield management systems which is not to fill more but to fill better a flight.

Then, a reduction of a part of their market, especially a non profitable one, could be a non dramatic event for some airlines.

The objective being specified, in reference to first chapter, which comparative advantages can have an airline?

In fact, there are different types. The first one is the Business Model, the others are different forms of efficiency to operate this model.

2.2. Business Model

Prospective analysis has clearly shown a great danger of rupture in the traffic growth, especially for the low prices market segment. According to this remark, we can wonder about the solidity and durability of the different existing airlines business models. At present, to simplify, there are 3 of them:

- ✓ Point to point short and medium haul operators (generally Low-costs)
- ✓ Hub and Spoke medium haul – medium haul (American Majors).
- ✓ Hub and Spoke Medium haul – Long haul (European and Asian Majors)

Obviously, the third one is less “competing” for 2 main reasons:

- ✓ The traffic between each city pair it connects is generally too thin to be served by a point-to-point service, except some tourist specific destinations often served by charters.
- ✓ The service required by high contribution travellers (direct and daily flights) reduced the number of candidates.

In addition, it seems also less exposed to the various risks of ruptures analysed in chapter 1, since:

- ✓ At the opposite of the first model, completely low-prices oriented, its mixed (high to low contribution) passengers, strategy which reduces the consequences of a potential increase of structural cost.
- ✓ Its low contribution passengers have often higher income and thus weaker elasticity price.

This is a first advantage for the Air France – KLM group: operate with an apparent potentially profitable business model. But this is not sufficient since a lot of airlines have the same model, so, the second question is how to be competitive? Three factors (the next competitive advantages) could be listed: be present on all market (network structure), have a higher yield and a lower cost...

2.3. Network Structure – Scope Economy

Taking into account the strong differences between markets (mobility and economic growth), it is important to be present on each city-pair and, to be able to easily adapt (increase) its supply quickly. Those 2 requirements are linked with 2 problems:

1. To have the necessary terminal capacity (airport slots). It is the main problem for all European major airlines since their historic and natural hub (always an important gateway) is saturated and not easily extensible consequences of the environmental constraints. Operate two hubs allow Air France – KLM group to deal more easily with the problem, especially because, consequence of history and geography, the former networks of each airlines were rather complementary (only 32 common long-haul destination among the 111 of the group).
2. To have a sufficient potential traffic to open new routes with a competitive service (direct and daily flight) for the high contribution passenger. Of course, the jointed potential, either Air France and KLM either French and Dutch Market, on a specialized hub is an important advantage to reach this critical size more easily. Thus, in the summer program 2005, the flights towards Manila and Djakarta are ensured by KLM, one a daily basis from Schipol Airport, the supply from Charles de Gaulle Airport to South America will be strongly increase in the winter program 2005-2006...

2.4- Higher Yield – Business travellers oriented services

This factor is obviously linked to the precedent. However, the bi-hub strategy allows to offer, on high density routes operated from the two hubs, a more important choice of schedules and prices. This possibility is increased by the availability to combine the services of the two airlines using, for example, Air France via Paris on the outward journey and KLM via Amsterdam during the return.

In addition, this strategy also allows to propose special flights, completely business oriented and especially to oilfield destination with a special equipment A319 Dedicate. This service is operated from Paris (Malabo, Pointe-Noire...) or Amsterdam (Kuwait city).

2.5- Lower cost

To lower its costs is obviously another means to improve its profitability. Then for several decades, airlines have reduced all expenses items to follow the tariff falls required by the market. Nevertheless, in this movement, the room for manoeuvre is narrow since a great part of the inputs is constrained either by international prices (fuel, aircrafts...), or by national environment (wage costs).

Today, which room remains to continue this requirement: lower the costs? Which comparative advantages are associated? We can list 4 main possibilities

1. Economy of scope

The economy of scope is a consequence of the operation of a hub and spoke network. We will not reconsider this item already discussed (2.3).

2. Economy of density

The Economy of density is, mainly, a consequence of the using of larger aircraft (allowing a weaker average cost per seat). The bi-hub strategy, with specialization of one of the 2 airports, supports this possibility. Thus, in the last summer program, Air France could operate daily and direct flights from Charles de Gaulle to Caracas using a B747-400.

3. Economy of Scale

The quantity of production is also a potential factor to reduce costs. First, because it allows to better distribute the fixed structure costs. Secondly, because it strengthens the business power during bargain with suppliers. Lastly, because it makes easier to optimize the financial policy (financing of aircraft, oil hedging policy...), maintenance and reservation – distribution – sale operations.

Alliance is the principal means to collect the benefits of scale. Thus, it is an important advantage for the group Air France – KLM but seems not dependant on the strategy of bi-hubbing.

4. Salary Cost

It remains the main item of cost (even after the rise of oil price) of an airline and, for example, it is, generally, around the 40% of total costs for a network airline (even more for a low-cost airline). It is also, calculated in unit cost (cost per unit of production), higher for the airlines of the developed countries and, especially, for Air France and KLM.

This remark is not only specific to air transport, but it is a more general problem for the European economy and especially for the two countries involved, countries considered by Eurostat as those with the weakest weekly duration of work.

It is only very slightly an element of strategy and thus, for example, without relationship with the strategy to operate two hubs.

Nevertheless, the salary cost (even if it has to be balanced with some qualitative associated characteristics of the airline as brand, security level....) can attenuate, even destroy the preceding advantages and, in particular, on the long haul – long haul markets

The great question which can have (it will be last since it brings back to the prospective analysis) is relative to the risk of relocation of air transport which is, in fact, a more general debate about the future of the European economy...

3. Conclusion

Opposed to what the majority of the forecasters say, the strong, infinite or at least long-term, growth of air transport does not seem a certainty but rather a simple assumption. Indeed, many factors can put it into question and, the most exposed segment market is certainly the “low-contribution” one, even this last has the strongest growth since some decades.

In this doubtful future, which could be the end of “cheap air transport”, the European majors have a relatively favourable situation: A natural market (countries where they are established and other countries linked by strong historical relations), a good brand (safety, comfort...), a competitive model business... Among those, Air France-KLM group has a first rank place, reinforced by its bi-hub strategy.

However, these strong advantages are also associated with some structurally higher costs (manly personnel but also airports) compared to global competitors and in particular, airlines operated from the Middle East.