**Without leadership, Campania’s historically competitive business will dissipate.”**

di **John Halpin**

We receive, and gladly publish, John Halpin's point of view on the new short to medium term prospects of the air transport following the COVID effects.

John is one of the main analysts in the air transport sector and a careful observer of the Italian aviation industry and Campania region, in particular.

In recent times, he has focused attention on technological innovation and the evolution of the aircraft, especially on new solutions in the propulsion and aircraft systems sector. His speeches are frequent in various Aerospace magazines and in conferences on the topic.

In October 2018 he participated in the III 2018 Aeronautical Culture Seminar, organized by Aeropolis, AIDAA, Euroavia and the Polytechnic School of the University of Naples, providing an interesting and complete overview of the impact of new technologies on the prospects of regional air transport, with particular reference to the future of the ATR family and region’s aerospace industry.

In a 5 May 2020 AvWeek Opinion: “Why Air Transport’s Return to Normal Will be Anything But” Antoine Gelain [1] pointed out that the biggest correction is on the demand side citing several variables that are restructuring the future air traffic growth trajectory:

* Increased environmental pressure: Will governments impose sustainability covenants on airlines as a condition for their aid?
* Consumer behavior: Will consumers travel as much, as far and with the same level of tolerance for “poor” service as before?
* Airline business models: Will low-cost carrier, LCC, airlines continue to push the sector toward commoditization, or will there be a revival of a highly differentiated market?

It is useful to examine how the variables could alter the air traffic growth curve, by 2035. Revenue passenger kilometres could be one-third lower than the 15 trillion expected before the crisis. This would imply a long-term 1995-2035 annual growth rate of about 3.8%, providing a reduced but potentially sustainable business base (see graph)

****

Fig. 1 – TOTAL PASSENGER TRAFFIC History and Forecast Scenarios [1]

**(**Sources: ICAO 2019 Aviation Benefits Report and Paragon European Partners)

Oliver Wyman has developed the Pandemic Navigator and combined its output with forecasts on gross domestic product growth and historical and near-term air travel booking data from the International Air Transport Association, IATA. The Pandemic Navigator has three possible scenarios for passenger demand recovery.

Fig. 2 Projected In-service Aircraft Recovery

Their baseline scenario [2] was used to project the impact of COVID-19 pandemic on commercial aviation fleet types (Regional TP&RJs, Wide-bodies and Narrow-bodies) [3]. Figure 2 is a reconstruction of the Oliver Wyman projections as a percentage change for the three airvehicle classes based on the 2019 fleet sizes before the pandemic.

These projections show a very weak recovery for the combined TP & RJs. This projection does not recognize the potential for new airframe deliveries for replacement of aging vehicles.

A separate projection of U.S. domestic traffic recovery by carrier type has been developed by Delta Airport Consultants assuming a similar baseline pandemic model [4].

Fig. 3 Projected U.S Travel Recovery by Carrier.

The dashed boxes in Figure [3] are based on the global 2022 Regional Fleet size in Fig [2] utilizing a CAGR of 3.8% cited in Fig [1]. The DAC projections for the U.S. domestic LCC supports the narrowbody recovery projections of Fig [2] and suggest an examination of the emergence of the LCC business models and implications for emerging e-airvehicle options.

**In summary**, the aerospace industries expect that domestic travel routes primarily served by LCC and narrowbody aircraft will recover before international travel routes, which are primarily served by widebody aircraft. Smaller regional communities are continuing to lose service limiting TP and RJ demand for new vehicles. Some airlines have a debt load so big that downsizing operations will likely result, potential restructuring major airlines – demand erosion will reduce production capability. Consequently, the sector’s growth trajectory before the crisis is unsustainable.

Too address these 3 questions it is useful to understand how consumption patterns are changing and the implication for the changing role of the Low-cost Carriers, LCC’s, business base and the structural changes for electrically powered airvehicles.

In 2003 to 2009 the available LCC’s seat miles as a fraction of total capacity doubled from about 11% to 22%. By 2018-19 timeframe the global share was about 33%. That implies an LCC CAGR (cumulative average growth rate) of 7.5% CAGR. The LCC 7.5% CAGR highlights the pervasive impact of the LCC’s business model and operating concepts. Clearly the LCC 7.5% is unstainable. Will other business sectors emerge enhancing the Post-COVID market?

The LCCs are an example of disruptive innovation. Low-cost airlines redefined the economics of air travel, by focusing on basic functionality, minimizing creature and convivence functions, drastically reduced cost of air travel, allowing a whole new category of consumers to fly. It was enabled by an “infrastructure” innovation, a combination of airline deregulation and an aircraft product (twinjet narrowbody) optimized for short-haul trips. It created its own ecosystem opening the door to new entrants. It disturbed the way traditional players had been making money by offering a typically less sophisticated technology, but one targeted to the economic needs of less demanding customers. Structural changes resulted and some consequences;

It was the LCC economic objectives of their business model that contributed to the unfortunate 737MAX fiasco. *For decades it has been assumed that pilots could effectively intervene to prevent a runaway stabilizer from causing loss of control. Unfortunately, this assumption was proven wrong in two tragic instances. The Maneuvering Characteristics Augmentation System failure should not have led to loss of life.*  *But the question becomes why are systems whose known failure modes require immediate pilot action to prevent loss of life are still allowed to be certificated? It was a disregard for Fail-safety.*

Will we see regulatory changes to assure the pilots’ fail safety role as we evolve toward autonomous flight (specifically the Changed Product Rule for modifications as was unfortunately applied for the 737MAX modifications), see [8]?

*Competing for a portion of the Post-COVID LCC-short-haul market are emerging classes of new vehicles utilizing various options already in development [5]*.

The aviation systems required to assure fail-safety and operate them safely is lagging. There are significant integration challenges to bringing systems together for electric (eVSTOL, eSTOL and hybrid electric fixed wing) and autonomous vehicles [5, 6 & 7]. Different new vehicle classes, such as drones and air taxis and very short haul services between island and urban mega-centers [5], have a range of system challenges to be overcome, including Supply Chain integration, physical infrastructure, airspace integration, business models and public acceptance.

For a new entrant, it is very difficult to disrupt a mature industry without altering or creating a new ecosystem. There are too many vested interests in the existing one. The e-Fan demonstrator required tackling the technical challenges of generating, converting, storing, distributing, controlling and consuming electrical power on an unpresented scale on an aircraft. Airbus brought in partner for the E-Fan X because there was/is no established propulsion (and “*More Electrical” Subsystems*) supply change similar to the legacy Jet engine airframe relationships.

In the legacy system there was a clear delineation of roles and interfaces between the aircraft and the jet engine manufacturer. That is not the case in the emerging electrified aircraft propulsion market. The aircraft developer is forced to be the propulsion developer because of the tight integration between “More-electrical” subsystems and aerodynamics and propulsion in many of the electric aircraft concepts—particularly those with distributed electric propulsion.

Startups like Ampaire, VoltAero and ZeroAvia are developing the aircraft as well as the propulsion system—or modifying an aircraft for electric propulsion. They intend to become electric-propulsion suppliers once they have demonstrated a new market business case by modifying existing aircraft. An evolution has already begun integrating the Aircraft, the Aeroengine and Electrical Systems OEMs, as illustrated in the figure, see [4]. 

Fig. 4 Changing Aerospace Supply Chain

They are not targeting a traditional aviation market, one that is struggling to recover from COVID. By using electric propulsion and the more electrical subsystems to dramatically reduce the operating cost of aircraft, they are instead aiming to compete with legacy mass transportation and automobiles to provide regional mobility [5]. They are emulating the LCC approach.

Innovation projects are needed to foster collaboration between industry and regulators to enable participants to test new aviation solutions in a safe and controlled environment, focusing on operations outside the existing scope of regulations; *explore minimum requirements for detect-and-avoid systems (working together to develop a safety case for beyond-visual-line-of-sight (BVLOS) flight above 400 ft.), then assessing and evaluate available systems against those requirements.*

*It was the failure of the regulatory process to development operational procedures to support BVLOS operations that frustrated the adoption of drone technologies in the 1990’s.* See [9] for medical drone flights demonstrate confidence in BVLOS operations

The supply chain challenge and collaboration between industry and regulators means that a new entrant is more likely to succeed with “a business case” innovation, combined with “component technology” innovations [5]. Both are necessary.

What will be the next disruptive aerospace innovations? Will we see a refocusing of electrical based propulsion (eVTOL, eSTOL and hybrid-electric fixed wing options) from our larger vehicle size focused on cost per available seat mile, CSAM, to an evolutionary approach starting with smaller short haul opportunities [6&7]?

A balanced approach is required that assures fail-safety for piloted and autonomous operations recognizing and facilitating highly differentiated market business models for very short haul urban and regional operations.

A window of about 5+ years has opened up for new entrants that will lead the next wave of air transport technology innovation reshaping our transport markets. Due to COVID, there is a risk that governments will reduce or hesitate supporting electric propulsion component R&D and Innovation projects. Instead, they should see it as an opportunity to reshape/refresh their industrial base to catch up with the technology leaders - preparing them to compete when the time comes. Now is the time for investments in preparation for a return to market growth led by these structural changes.

References

1. [https://aviationweek.com/air-transport/airlines-lessors/opinion-why-air-transports-return-normal-will-be-anything?utm\_](https://aviationweek.com/air-transport/airlines-lessors/opinion-why-air-transports-return-normal-will-be-anything?utm_rid=CPEN1000000229409&utm_campaign=24092&utm_medium=email&elq2=496d94c3c94c4c4183f62cac185e96a6)
2. <https://www.oliverwyman.com/content/dam/oliver-wyman/v2/media/2020/may/COVID-19_Impact_Update.pdf>
3. <https://www.oliverwyman.com/our-expertise/insights/2020/mar/COVID-19-Impact-On-Commercial-Aviation-Maintenance.html>
4. <https://aviationweek.com/air-transport/airlines-lessors/airlines-rebuild-uncertainty-reigns>?
5. <https://jchalpin.blogspot.com/p/version-7.html>, see UAM & ATR Strategic Risks presentations
6. <https://aviationweek.com/aerospace/aircraft-propulsion/end-airbusrolls-e-fan-x-not-end-hybrid-electric-propulsion>
7. <https://aviationweek.com/aerospace/aircraft-propulsion/super-stol-viable-alternative-electric-vtol>
8. <https://jchalpin.blogspot.com/p/737max.html>
9. [https://aviationweek.com/aerospace/urban-unmanned-aviation/medical-drone-flights-demonstrate-confidence-bvlos-operations?utm\_](https://aviationweek.com/aerospace/urban-unmanned-aviation/medical-drone-flights-demonstrate-confidence-bvlos-operations?utm_%20rid=CPEN1000000229409&utm_campaign=24123&utm_medium=email&elq2=fce3377fadc2466dbd84b8b24ce15fce)