

The Assessment Report on the Concorde Jet Airliner

Fange Chen¹

¹ University of Sydney, Australia

Correspondence: Fange Chen, University of Sydney, Australia.

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Abstract

This report presents a comprehensive analysis of the Concorde Jet airliner project, one of the most iconic and controversial international collaborations in the history of aviation. By applying frameworks such as PESTLE and stakeholder analysis, the study explores the technological breakthroughs, strategic motivations, and sociopolitical contexts surrounding the project. Although the Concorde represented a pinnacle of aeronautical innovation, it was plagued by significant challenges including high operational costs, environmental concerns, and limited market viability. Cultural and ethical issues—such as cross-national cooperation complexities, sonic boom disturbances, and fuel inefficiency—further compounded the project's difficulties. Drawing lessons from Concorde's eventual decline, the report offers strategic recommendations for future international project management, emphasizing the importance of stakeholder alignment, environmental sustainability, cultural coordination, and long-term planning in large-scale technological ventures.

Keywords: Concorde jet, international project management, PESTLE analysis, stakeholder analysis, supersonic aviation, environmental ethics, cross-cultural cooperation, strategic planning, technological innovation, project failure

1. Background of the Project

The purpose of this report is to analyze the Concorde jet airliner project, a classic example of an international project in the aviation industry. The Concorde project was run by British Aircraft and Aerospace and operated from 1976 to 2003. Although the Concorde jetliner project was one of the greatest leaps in the history of world air travel, the project faced many challenges and controversies ranging from environmental impacts to financial viability. This analysis will utilize a variety of frameworks and tools to examine these challenges and provide recommendations for project managers involved in similar projects.

This report will provide a comprehensive analysis of the Concorde project through these frameworks and tools. This report aims to decipher why Concorde was controversial and the many challenges encountered, and ultimately provide project managers of future international projects with an all-encompassing analysis of international project antecedents.

2. The PESTLE External Factor

The external factors of the Concorde airliner project can be identified by the PESTLE framework, Policy Factor, Economy Factor, Society Factor, Technology Factor, Eco-friendly Factor, Law Factor, and Ethical Factor.

The Policy Factor of the Concorde airliner project was related to the present global environment, the Cold War. In the Cold War environment, the competition with the Soviet Union led the Western world to alliance to resistance, in this case, the UK and France had alliances on economy (Rafferty, 2003). The Concorde project became a symbol of this alliance to seek support from society that the citizens would solidarity by the issue of "building a supersonic airliner" to reduce the internal opposite voice (May 1979). Thus, this policy background has ensured the investment in the Concorde airliner project will not terminate due to the change of general

election or other public fluctuation.

The economic factor of the Concorde airliner project was the confidence of the macroeconomy. The statistical result of GDP growth in Western Europe has illustrated that there will be enough potential customers to pay the fee for supersonic travel. Between 1950 and 1970, the average annual economic growth rate of Germany, France and the UK had achieved over 6.5% (Statista, n.d.). This growth of the macro economy reflects on the micro level, the value-added of property and income increase of individuals will lead individuals to be more willing to pay extra fees for higher speed and enjoyment in travel. Thus, the growth of the macroeconomy will bring the reward confidence for investors to invest in the Concorde airliner project.

The societal factor of the Concorde airliner project was the special cultural factors in the Cold War environment period. The social consensus of a society in a period can be reflected by the art and literature in this period, including fiction, movies, artwork, and toys. Focus on fiction, in 1950, the most famous type of fiction was science fiction due to social consensus and belief that technologies will change society deeply ("Science fiction | Definition, characteristics, books, movies, authors, examples, & facts", 1998). This social consensus will bring the support of the Concorde airliner project by social public opinion that individuals will expect supersonic travel to change the world. Therefore, the society environment in that period had positive expectations of the change from supersonic airliner which would bring the support of public opinion to the Concorde airliner project.

The technology factor of the Concorde airliner project was the most important external factor that the jet engine is the mechanical base to achieve supersonic velocity. The technology of jet started during the Second World War, the Jumo 004 jet engine which can support 900 kg thrust has 50 overhaul cycle and drive Me262 to 234 m/s at sea level which is faster than any propeller fighter (Meher-Homji, 1996). However, the primitive jet engine can not boost aircraft to overcome the sonic barrier and the unstable airflow will lead to the surge of the engine that fires in combustion against to air compressor and destruction of the blade and hole engine (Wallner, Lubick, & Saari, 1957). The two-spool axial-flow turbojet Olympus 593 and three baffle air intake with the fly-by-wire system have solved the surge and achieved 46% heat efficiency in the cruise stage. The two-spool axial-flow turbojet has a larger tolerance for unstable airflow. The low-pressure compressor becomes a buffer to adjust airflow and the baffle air intake which is controlled by fly by wire system can maintain shock wave phase-covered air inlet to use shock waves to reduce the velocity of airflow and repair air pressure to maintain airflow stable before jet engine (Wallner, Lubick, & Saari, 1957). Therefore, the technological development made the Concorde project feasible on a mechanical level.

The eco-friendly problem of the Concorde project is the jet engine is high pollution and carbon emission. Compared with the common turbine fan engine, the turbine jet engine will have large fuel consumption to general same thrust due to the turbine jet burning more fuel to heat gas to transfer reaction impulse rather than drive the fan to general reaction impulse without waste energy heating gas ("Turbofan engine," 2021). It means the Concorde will burn more fuel in the same range, and emit more pollution to the air. Therefore, the Concorde project is not an eco-friendly project.

The law factor of the Concorde airliner was in November 1962, the UK and France governments signed a contract to develop a supersonic airliner as a sample of the European alliance to balance the dominant status of the USA in the Western alliance and this contract has dramatic liquidated damage that contract can not be cancelled (Johnman & Lynch, 2002). As a result, this contract was instrumental in ensuring legal protections that safeguarded the Concorde project from premature termination.

The obvious ethical problem of the Concorde project was noise pollution. Between 1977 and 1978, there were frequent mystical noises and vibrations occurred on the east coast of the USA. This strange phenomenon led to the chaos in the east coast area that local residents believed was a precursor of disaster, however, the survey proved it led by the shock wave from supersonic cursing of Concorde (Rogers & Maglieri, 2015). Therefore, the noise pollution from the shock wave of the supersonic cursing is the major ethical problem of the Concorde project.

In conclusion, the PESTLE framework analysis of the Concorde airliner project has illustrated the influence of external factors that although the Concorde project has eco-friendly and ethical problems of this project. However, the negative influence of these two factors has been neutralized by other positive factors, even the ethical problem of the Concorde project appeared when the aircraft was being operated.

3. Stakeholder

Concorde, the world's first supersonic passenger jet, is undoubtedly a milestone in the aviation industry. The following is an assessment of the different stakeholders:

British and French Governments: Project Concorde is a joint effort between the British and French governments to demonstrate the technological prowess of both countries in the global aviation market. Although the project

achieved great technical results, from an economic perspective, it did not bring the expected returns to the two governments (Johnman & Lynch, 2002). The huge capital investment and lengthy R&D process, as well as the associated political controversies, make it difficult for this investment to achieve economic benefits in the short term.

Rolls-Royce: As a major engine supplier, Rolls-Royce provided key technical support for the Concorde project. Despite its technical success, Concorde's sales were not ideal, which impacted Rolls-Royce's long-term financial interests (Glancey, 2015).

Anglo-French Industries: As the main producer of Concorde, Anglo-French Industries was crucial to the project's success. They provided a large amount of technical and production resources to the project and took huge risks. Although Concorde achieved many technological breakthroughs, its commercial success was not as expected, which harmed the profitability of these companies (Johnman & Lynch, 2002).

British and French society: Concorde brought national pride to Britain and France. It proved the two countries' leading position in aviation technology. However, due to environmental problems (such as noise pollution) and safety issues (such as the air crash in 2000), the public's attitude towards Concorde gradually changed and they lost confidence in it. The 9/11 incident dealt a heavy blow to the civil aviation industry (Johnman & Lynch, 2002). Not as many people flew on Concorde as before.

Passengers: For passengers, Concorde offers a unique flying experience. Its supersonic flight significantly shortened transatlantic flight time. However, due to the high ticket price, only a few people can enjoy this service (Glass et al., 2008).

4. Strategy Aim

As the first and only supersonic commercial airliner in history, Concorde's strategic goals carry multiple expectations and sustenance.

First, technological leadership and innovation are the core driving forces of the Concorde project. In the 1960s, aviation technology was experiencing rapid progress. Supersonic flight is regarded as the "ultimate challenge" in aviation. Europe hopes to achieve a major technological breakthrough through the Concorde project, thereby winning its place in global aviation (Glancey, 2015). This is not only the pursuit of aircraft speed, but also the exploration and practice of the future development direction of aviation technology.

Secondly, the Concorde project is also the product of cooperation between the British and French governments. It represents the results of cooperation among European countries. In the international context at that time, Europe needed to demonstrate its joint strength in the high-tech field and its independent status in the face of the bipolar structure of the United States and the Soviet Union (Rafferty, 2003). The Concorde project is not just an aviation project; it is a political and economic strategic cooperation.

Furthermore, from a commercial perspective, Concorde also aims to create new market space. Supersonic flight greatly shortens the time of long-distance flights, which provides unprecedented convenience to businesspeople and gives Concorde an unparalleled competitive advantage in certain specific market segments (Glancey, 2015).

However, these strategic goals are also accompanied by huge challenges and risks, including technical difficulties, high R&D costs, environmental issues, etc. But it is undeniable that the Concorde project, as an iconic aviation project, undoubtedly demonstrates Europe's ambition and strength in the aviation industry.

5. Ethical Considerations

Concorde was undoubtedly a milestone in the aviation industry. But with that comes a host of ethical issues, particularly concerns related to the environment and public safety.

First, noise pollution was one of Concorde's most controversial issues. The sonic boom produced by its supersonic flight caused huge noise problems for residents on the ground. Despite technical improvements, Concorde flights were still restricted in some areas because of the severe disruption it caused residents' lives (Rogers & Maglieri, 2015).

Secondly, health risks are also an important consideration. Because Concorde operates at higher altitudes, passengers may be exposed to higher levels of cosmic radiation (Stokinger, 1957). Prolonged exposure may increase health risks, especially for frequent passengers.

Furthermore, security risks are also a critical issue. Concorde's landing gear wheels were more susceptible to damage due to their unique design and operating environment. Such injuries can lead to serious safety incidents, such as the 2000 air crash in which a Concorde crashed after a tire burst after takeoff.

Finally, air pollution is also a key ethical consideration. Concorde's engines emit high levels of greenhouse gases and other pollutants, which harms the environment, especially given the current context of global climate change (Fahey et al., 1995).

Overall, while Concorde was a huge technical success, the ethical issues it raised cannot be ignored. These issues involve the environment, public safety, and health, and are all issues that must be carefully considered as we pursue technological progress.

6. Cultural Background

There were four main cultural contexts for the Concorde program. After World War II, many countries, especially in the West, experienced an economic boom. The 1950s and 1960s were marked by rapid technological advances and general optimism about the future. There was a widespread belief that technology could solve many of the world's problems and improve the lives of everyone. Thus, for both Britain and France, the Concorde was a source of national pride. In an era when the United States and the Soviet Union seemed to dominate global affairs, the Concorde was a demonstration of their technological prowess and a symbol of European cooperation. Secondly, in the context of the Cold War between the United States and the Soviet Union, both superpowers were vying for technological superiority, and the development of advanced airliners became an area of competition. During the 1960s and 1970s, international air travel increased significantly. The advent of the jet age made travel faster and more acceptable to the general public. It was only when Concorde entered service in the 1970s that concerns grew about its environmental impact, particularly its sonic booms and fuel inefficiencies. Concorde's ability to cross the Atlantic in a matter of hours was seen at the time as the next logical step in the development of air travel. The oil crisis of 1973 caused fuel prices to skyrocket, which made the fuel-intensive Concorde even more expensive to operate. According to the theory of cultural dimensions proposed by Dutch sociologist Geert Hofstede, the Concorde project can also be analyzed in terms of five cultural dimensions: power distance, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance, and long-term versus short-term orientation (Weber, 1991). Firstly, in the French culture, power distance is relatively large and more centralized and hierarchical in the decision-making process.

In contrast, the UK may value individual contributions and opinions more. In the case of the Concorde, an international project within a project, this may have led to challenges in decision-making and communication between the two countries. Secondly, although the Concorde airliner was a multinational collaborative project with an emphasis on collective effort, and despite the emphasis on cooperation and collective effort on both sides, both the UK and France had their own unique aerospace industry backgrounds and technological accumulations (Shi et al, 2023). During the project, engineers from both countries may come up with different technical solutions and design concepts. Such technical and design differences reflect the individualistic tendencies of each. The aerospace industry has traditionally been a male-dominated field. However, over time, women's participation and contributions have begun to be emphasized, reflecting inclusive and more progressive ideas about gender equality in both countries. In response to the uncertainty surrounding this project, supersonic flight as a first of its kind brings with it many technical and safety uncertainties (Glass et al., 2008). But both Britain and France have shown a high degree of risk-taking and innovation, and have been willing to take these risks, demonstrating a commitment to innovation and exploration. The Concorde program has taken decades and huge investments. This shows that both countries have an orientation towards long-term planning and commitment rather than seeking short-term returns. All in all, the Concorde project is a good example of the intersection of British and French cultures. It not only reveals the similarities and differences between the different cultural influences but also demonstrates the compromises made by both sides to work together. This kind of deep international cooperation is not only the integration of technology but also the exchange and collision of cultures.

7. Conclusion

In short, the Concorde jetliner program is one of the classic international cooperation projects in the long stream of history. However, it still failed to meet the serious challenges of broken financial chains, high operating costs and low passenger numbers. These financial pressures, coupled with the emergence of more cost-effective competitors, hinted at the program's eventual demise. The external environment, previously analyzed using the PESTLE framework, suggests that political, economic, social, technological, legal, and environmental factors significantly influenced the project's development and course. Rising fuel costs, changes in government regulatory standards, and changing societal attitudes toward the environment further exacerbate the difficulty of keeping the project running.

Stakeholder analysis revealed the complexity of managing different interests in the project, and the sometimes conflicting expectations and interests of the UK and France led to difficulties in aligning the direction of the project. As Hofstede's theory of cultural dimensions illustrates, cultural differences, values, and perspectives between the parties can lead to miscommunication and misalignment of goals, making it increasingly difficult to manage the Concorde Jet program. In addition, failures in strategic direction that failed to accurately predict future market conditions and adjust accordingly were some of the key factors in the project's failure. Ethical considerations surrounding the project and the inability of the project team to find solutions to the environmental

issues associated with supersonic flight further contributed to the project's failure. These experiences provide valuable lessons for future international projects, emphasizing the importance of the external environment, stakeholder management, strategy and ethical considerations in international projects.

8. Suggestion

We have also summarized the lessons learned and some recommendations through our study of the project. First, we need to consider technical innovation and economic practicality. Although the Concorde is a technological masterpiece, its high operating costs limit its economic benefits. Second Future projects should pay more attention to environmental protection. The Concorde airliner project did not take into account many of the environmental issues (such as sound pollution and fuel consumption), so there is a need to ensure that technological development is compatible with environmental sustainability. Incorporating environmental protection and sustainability into the core objectives of the project ensures that the project balances all three aspects — economic, technological and environmental. Thirdly, the collaboration between the UK and France in the Concorde airliner project demonstrates the potential for international cooperation, but there are communication and management challenges. Therefore, the development of international projects can be better facilitated by clarifying the roles and expectations of each party in advance, ensuring open communication and providing cross-cultural training for the project team, and establishing effective communication mechanisms to ensure smooth information flow and efficient decision-making. Fourth, the Concorde has technical advantages, but it does not meet the needs of most airlines and travellers because the project did not conduct good market research and understand customer needs. Moreover, the Concorde project took decades from development to retirement. During this process, the technology, market and policy environment changed. That's why it's important to conduct in-depth market research at the beginning of a project to ensure that the product or service meets the actual needs of the customer. International cooperation projects also require long-term planning and investment, as well as flexibility to adapt to changes in the external environment. Finally, when operating such projects you need to consider the long-term operation and maintenance costs of the product during the design and development phase, and at the same time establish a sound risk management system to anticipate, monitor and respond to various potential risks in the project. Ensure that all potential risks are taken into account during the design, development and operation processes. Ensure that it is competitive throughout its life cycle. Overall, this international collaborative project has provided us with a valuable case study demonstrating the importance of technological innovation, market strategy and project management. By learning these lessons, we can better prepare for future projects.

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