

The Impact of the Commercial Aircraft Corporation of China (COMAC) in the Aircraft Manufacturer Industry.

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Abstract

The aircraft manufacturer industry is a global duopoly with two key players. This trend has been consolidated over many years. Recently, there has been an emergence of manufacturers from emerging countries that have either entered a specific niche or are developing a strategy to be a player on a global scale. The Chinese state-owned COMAC is one of those new entrants. This paper evaluates the environment of this industry, the economic opportunities of a new entrant and the strategy being pursued by this company. The analysis shows that this is a highly specialised market, which the most likely will continue to be dominated by certain parties although if one considers that the new entrant can specialise as well as receive the benefits of substantial government subsidies could cost some disruption in the normal operation of the aerospace industry.

Keywords: aircraft manufacturer industry, new entrants, COMAC, specialise, government subsidies.

1. Introduction

The current strong growth in commercial aircraft demand portends well for the aviation industry. In fact, it appears the aerospace sector is experiencing a second golden age (PwC, 2013). Although Airbus and Boeing have welcomed this global increase of orders, they are cautious and wonder if the duopoly where they have operated for decades is now at risk. Emergent aeroplane manufacturing industries want to get involved in this profitable market and they intend to add new entrants to the regional jet and narrow-body or single-aisle segments. The Brazilian Embraer, the Canadian Bombardier and the Japanese Mitsubishi Aircraft Corporation (MAC) along with the government-funded United Aircraft Corporation of Russia (UAC) and the Commercial Aircraft Corporation of China (COMAC) are using their domestic markets to develop the required capabilities and technical skills to become global players. Whether these emerging competitors will succeed is a question that still has to be answered.

This thesis focuses on whether the newly established COMAC will be successful in the large commercial aeroplane segment and, as a result, will end with the global duopoly of Airbus and Boeing. Despite the height of barriers to entry in the aircraft manufacturer industry, current dynamics in the market predict the emergence of new entrants that will face the incumbents. Therefore, the research motivation is to examine if the arrival of the state-owned COMAC supposes a potential serious competitor to Airbus and Boeing and a threat that could break the dominance of the two leader firms in such industry.

Forecasts indicate that the current world mapping of commercial aircraft industry will radically change over the next twenty years in terms of level of air traffic, location of the new hubs and last but not least important the number of manufacturers to satisfy the growing demand.

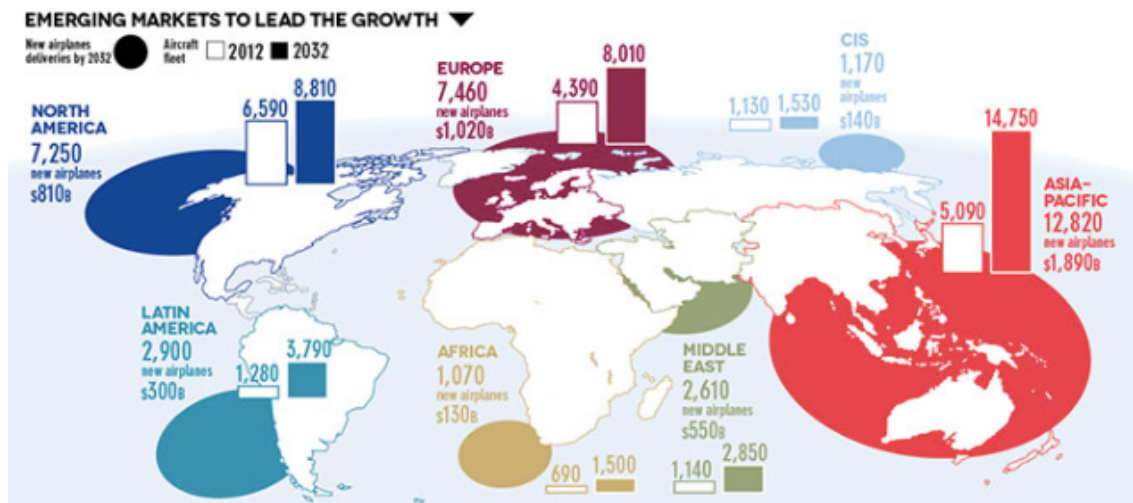


Figure 1. Regional aircraft demand by 2032.

Certainly, the commercial aviation industry is booming with predictions foreseeing a continuous growth rate for the next two decades. This is clearly a great opportunity for aeroplane maker companies but also a challenge.

2. Conceptual background and related literature

2.1 The micro-economics of duopoly

Identifying the number of producers in concentrated markets is one of the keys to measure the effects of entry. However, this number is a dynamic variable that changes with fluctuations in demand and variation in market competition.

Bresnahan and Reiss (1991) suggest that competitive conduct changes quickly when the number of companies increases. In fact, markets with no more than five firms show that practically all variation in competitive conduct happens with the entry of the second or third player whereas the following entrants have slight effect on competitive conduct.

A duopoly is a situation in which two companies own all or nearly all of the market for a given product or service. Essentially, it is the most basic form of oligopoly, that is a market dominated by a small number of companies.

Regarding its impact on the market, it is significant that a duopoly can have a similar effect to a monopoly if the two players involved collude on prices or output. Consequently, consumers pay higher prices than they would in a truly competitive

market. This practice is considered illegal under the U.S. antitrust law and the EU competition law. Both regulations prohibit agreements between two or more independent market operators which restrict competition and forbid firms that hold a dominant position in a particular sector or industry to abuse that position, for example by charging unfair prices, by limiting production, or by refusing to innovate to the prejudice of consumers.

2.2 History of duopoly

The study of oligopoly started in the nineteenth century when Cournot (1838) published his research about this field and Bertrand (1883) subsequently reviewed it. Both authors particularly focused on duopoly and based their studies on Nash equilibrium. While companies compete in output under Cournot model since it focuses on markets whose companies produce homogeneous commodities, firms compete in price under Bertrand model.

More recently, Kreps and Scheinkman (1983) claim that the decision of competing in output or price is eventually an empirical issue within firms. Other authors have commenced to consider a new scenario in which firms do not have to compete following the same model, that is, one firm could choose competing in output whereas the other could conversely select to compete in price. This particular case is known as the mixed Cournot-Bertrand model. In the theoretical literature, Vives (1984) examines a duopoly model where firms own private information about the uncertain demand and shows that if companies decide to share their own knowledge about the market with others, there will be consequences in their wealth, which depends not only on the type of competition described by Cournot and Bertrand but also on the nature of the products (substitutes or complements) and the degree of differentiation. Finally, he concludes that “if the goods are substitutes (not) to share information is a dominant strategy for each firm in Bertrand (Cournot) competition. If the goods are complements the result is reversed”. In addition, the paper of Singh and Vives (1984) explores the three different types of duopoly taking into account the theory of entry barriers suggested by Dixit (1979). They also demonstrate that if companies are only allowed to sign two types of contract with clients: quantity contracts and price contracts, choosing the price option is the prevailing strategy when firms sell

complement goods. In contrast, the dominant strategy would be a quantitative contract if firms sold substitutes goods. Nevertheless, Häckner (2000), Zanchettin (2006) and Arya et al. (2008) argue that asymmetry in technology, institutions and demand may make Bertrand or mixed Cournot–Bertrand models be the optimal choice. Nowadays, these three behaviour models can be observed since the best choice depends on the market conditions.

2.3 Economic literature

There is a large economic literature focusing on the relationship between market structure, conduct, and performance. Unfortunately, it is generally inconclusive and lacks of any guidance for policymakers, who determine in which situations governments should restrict factors of market conduct.

2.3.1 Theoretical research

Several experts underline that their models are not planned to become public policy instruments. For example, the American economist and Professor of Economics at the JFK School of Government at Harvard University Frederic Michael Scherer (1970) wrote in his textbook Industrial organization:

“Economists have developed literally dozens of oligopoly pricing theories—some simple, some marvels of mathematical complexity. This proliferation of theories is mirrored by an equally rich array of behavioural patterns actually observed under oligopoly. Casual observation suggests that virtually anything can happen.”

Likewise, the Professor of Business Strategy at the Haas School of Business at the University of California, Berkeley, Carl Shapiro (1989) states:

“Before embarking on the analysis, it is best to provide the reader with a word of warning... there is no single theory of oligopoly... I do not expect oligopoly theory... to give tight inter-industry predictions regarding the extent of competition or collusion.”

George Stigler (1964), another economist from the U.S., who won the Nobel Memorial Prize in Economic Sciences in 1982, concluded:

“No one has the right, few the ability, to lure economists into reading another article on oligopoly theory without some advance indication of its alleged contribution.”

2.3.2 Empirical research

Attempts to connect market structure with market conduct and performance regarding issues associated with prices and the price-setting process have remained considerably unsuccessful. In words of the economist and Professor of Economics at the University of Oxford Donald Hay and the academic and Oriel College provost Derek Morris (1991):

"The relationship between industrial structure and price setting over time remains very unclear... It is difficult to avoid concluding that, if any such links do exist, they are far from obvious and unlikely to be powerful... Industrial structure may have an important influence on price procedures... but it does not seem to play a central role in the pattern of price changes that develops through time."

Similarly, efforts to determine the relationship between market structure and profits have also been unsuccessful. Initial studies of structure and performance relationships detected connections between concentration and profitability. Succeeding analyses have aimed to prove the real value of those studies. They argue that concentration is not the only variable involved but many other factors such as entry conditions, capital intensity, degree of regulation or growth rates also have an effect on profits and, therefore, need to be taken into account. In addition, they hold the absence of a consistent one-to-one link between concentration and profit. Furthermore, there is no theoretical or observational evidence to support the causal effects between market structure and profits. Hence, causation between these two variables cannot be accepted.

Apparently, there is a generally accepted agreement on the potential characteristics of competitive oligopolies. According to Howard Shelanski (2007), economist and Professor of Law at Georgetown University:

"The comparative performance benefits of oligopoly over monopoly for technological innovation also have empirical support. It is well established in the economic and competition policy literature that the link between market structure and innovation is much less predictable... But there is reasonably good evidence that neither monopoly nor perfect competition is particularly beneficial for investment in research and development or deployment of new technology."

2.3.3 Experimental research

Christoph Engel (2006), a Max Planck Institute for Research on Collective Goods scholar and Chair of the Advisory Board, Amsterdam Centre, for Law and Economics finds more than 150 articles approaching diverse experiments thought to check the performance of market behaviour in terms of quantity under a voluminous and wide range of conditions. The results obtained from this exhaustive literature review indicate that duopoly behaviour depends on the circumstances and the level of performance varies in unpredictable ways. It is also shown that indeterminate outcomes were observed in a large number of experiments whereas the results of many others were not statistically significant.

2.4 Entry Barriers in Duopoly

There is a detailed literature about entry barriers but authors have different interpretations of the costs involved.

2.4.1 Concept

The economic literature provides several definitions of entry barriers, which have evolved over time. Some authors and their different points of view about this concept are presented below.

Joe S. Bain was the first economist who exhaustively studied entry barriers. His book *Barriers to new competition* contains a definition of this concept, which states that “*A barrier to entry is an advantage of established sellers in an industry over potential entrant sellers, which is reflected in the extent to which established sellers can persistently raise their prices above competitive levels without attracting new firms to enter the industry*” (Bain, 1956). The main weakness of this definition is that it is merely based on its consequences.

Second, George J. Stigler describes a barrier to entry as “*a cost of producing (at some or every rate of output) that must be borne by firms seeking to enter an industry but is not borne by firms already in the industry*” (Stigler, 1968). Stigler focuses on the difference in costs between the companies who are already in an industry and the new entrants. He considers as a barrier to entry those costs which were previously borne by the incumbents and now have to be endured by potential contenders.

Third, according to James M. Ferguson an entry barrier is “*a factor that makes entry unprofitable while permitting established firms to set prices above marginal cost, and to persistently earn monopoly return*” (Ferguson, 1974). This explanation follows Bain’s approach and includes an extra condition: incumbents necessarily make monopoly profits.

Fourth, Franklin M. Fisher summarises this concept as “*anything that prevents entry when entry is socially beneficial*” (Fisher, 1979). This is a combination of Bain and Ferguson’s approaches whose main inconvenience is that it is normative instead of positive.

Fifth, Carl Christian von Weizsäcker defines a barrier to entry as “*a cost of producing that must be borne by a firm seeking to enter an industry but is not borne by firms already in the industry, and that implies a distortion in the allocation of resources from the social point of view*” (von Weizsäcker, 1980). Similarly, this definition is normative but it is based on Stigler’s approach.

Later, Richard Gilbert understood that an entry barrier was “*a rent that is derived from incumbency*” (Gilbert, 1989). The emphasis of this definition is on advantages of the incumbents instead of on the disadvantages of the newcomers.

Finally, Dennis Carlton and Jeffrey Perloff conclude that “*a barrier to entry is anything that prevents an entrepreneur from instantaneously creating a new firm in a market. A long-run barrier to entry is a cost necessarily incurred by a new entrant that incumbents do not (or have not had to) bear*” (Carlton and Perloff, 1994). They successfully suggest a time dimension as an additional cost of entering but then they minimise its impact by taking into account entry barriers in a long temporal horizon.

2.4.2 New classification

More recently, new and more updated definitions have been presented in order to clarify the confusion related to this particular topic.

Economically, an entry barrier is the cost that a new entrant has to bear to access to a given market. This cost may be exclusive for newcomers or may have already been incurred by the incumbents.

In terms of antitrust regulation, a barrier to entry is a cost that causes a permanent or a late access to the market for new entrants. Basically, a barrier to entry protects incumbents from potential rivals through impediments that hinder an increase in competition in order to prevent from a reduction in price. Although competition authorities are interested in making price reach the competitive level by allowing potential rivals to get access to the market, the key point is to determine how long this procedure will take.

While economic barriers can be considered as antitrust barriers, most of the latter cannot be interpreted as economic barriers. In addition, the existence of antitrust entry barriers does not automatically imply an obstacle for mergers. In fact, the real message derived from antitrust barriers is that the benefit to society would be higher if they did not exist.

It is also significant the distinction between direct and reinforcing barriers. The former are implicit costs and represent entry barriers by themselves whereas the latter do not represent any barrier to entry on their own, but support others (McAfee et al., 2004).

2.4.3 Types of entry barriers: structural and strategic

The nature of entry barriers depends on the circumstances under which they are created. While structural entry barriers are intrinsic to a particular industry, strategic entry barriers are associated with tactical behaviours adopted by established companies.

Structural barriers are based on industry conditions and factors such as cost, economies of scale or network possessions may be especially important. When the price of a required component or an efficient factory construction is identified beforehand, it is doable to measure and obtain the exact value of these barriers.

Conversely, strategic barriers are made on purpose by firms who are already working in a market with the aim of delaying the entrance of potential competitors. Trade agreements between the incumbent firms are a typical example of this type of entry barrier. Quantifying the impediments derived from such actions to prevent new entrants from getting access to the market is significantly more difficult in this case. Additionally, it is not an easy task to foresee how

strategic conduct will be understood. Sometimes it is deemed as way to encourage competition whereas in other cases it is assumed as a method to constrain it. Competition authorities suggest that in some cases strategic actions are taken in order to hinder competition and consequently the incumbent companies can keep their market shares by imposing entry barriers. However, in other situations barriers to entry are raised to protect the efficiency of a market. Therefore, the mission of competition agencies is to decide when strategic conduct is designed to foster or block competition.

For instance, exclusivity is a clear example of how a market characteristic can have completely different consequences for the new entrants depending on the distribution. An excess of exclusivity in established firms would be considered an entry barrier for future competitors if they were left with a limited number of retailers to efficiently distribute and be able to compete. Nevertheless, a right dose of exclusivity would increase competition by promoting stores to provide a better service and customers would definitely benefit from it.

Finally, regulatory barriers can be either structural or strategic depending on the level of influence that incumbent firms have under governments in order to convince them to establish certain types of impediments to new entrants.

2.4.4 Most common barriers to entry in duopoly

Economies of scale are a persuasive instrument to prevent from potential competition in many cases. In fact, they may oblige entrants to provide goods or services to a huge portion of an industry in order to be able to compete with established firms. Possible competitors might see the large amount of investment required to be competitive in terms of costs as a non-profitable sector even when the established companies are earning money. Hence, the entry barrier is not only a result of economies of scale but also of capital commitments (von Weizsäcker, 1980).

Another frequent entry barrier is *product differentiation*, which is based on consumers' perception about a specific product. Many factors such as past experiences, expert opinions or celebrity endorsements determine the quality associated to such product. It is especially important in industries whose

consumers struggle to correctly identify the quality of a product when they have not previously used it.

The need of paying *sunk costs* as a compulsory requirement to entry to a market usually provokes a loss of interest in such industries by potential entrants. In addition, if a company decided to entry, it would still incur high fixed costs annually. This circumstance encourages potential entrants to change their mind and consider this kind of markets as non-profitable in many cases.

Fiona M. Scott Morton (2000) analyses the effects of *brand advertising* in new entrants. Historically, advertising has been seen as a way to expand the market for a product. However, it can also be a method of entry deterrence in profitable markets (Spence, 1977). For example, Coca-Cola invest huge amounts of money in marketing campaigns, which persuade potential competitors to not enter the soft drinks industry by reducing their profit expectations.

When entry is inevitable, the incumbent business adopt some measures before the entrance takes place. Threatening newcomers with a voracious output increase has been proven as a very effective action. However, the success of this tactic depends on the credibility of the threat, which it is crucial to make entry look less attractive.

2.5 Industry dynamics in duopoly

There are some patterns in duopoly that allow firms to better know whether entry to a market is a right choice or not (Abbring and Campbell, 2007). In terms of company age, firms can make entry or exit decisions based on the last-in first-out (LIFO) assumption. The rationale of this approach suggests that it is not possible to produce after the exit of a more mature and elder participant. It simply exemplifies that the likelihood in young firms exit is higher than in older competitors.

Another pattern is observed when the entrant's sunk costs are raised, which substantially decrease the degree of entry and exit activity in a given market, and eventually contribute to reach stability in the industry structure.

With respect to the level of competition in a given market, Bresnahan and Reiss (1991) demonstrate that it is possible to make conclusions about the effects of

entry without focusing on prices or costs of a particular firm. In fact, their econometric study shows that the higher the number of incumbent companies, the lower the post-entry competition. Therefore, the greatest increase in competition takes place when a second or third rival entry to the market. This fact came as a surprise to them since they assumed that entry effects would increase more gradually.

Last but not least important is the demand shocks consistency. If the demand lacks of factors such as constancy, reliability or regularity, the sector becomes less appealing and, consequently, the number of companies in the industry decreases considerably. The absence of those characteristics is called the entry-discouraging effect. Regardless, Luis Cabral (2012) states oligopoly dynamics is a field in which a lot of work still has to be done.

2.6 Market failure due to Oligopoly

The market failure in oligopolies can be ascribed to different causes such as inefficiency, instability and indeterminacy, which might be the origin of a market fall. A firm's dominance is reached through a process in which its capacity is consolidated over time since competition is not based on pricing factors but on artificial entry barriers. For instance the carbonated soft drinks industry is characterised by large amounts of money invested on heavy advertising campaigns. Consequently, prices are much higher than cost and price discrimination triumphs. Sometimes, incumbent firms are committed to establish self-regulation to protect the profitability of a market and ultimately their market shares from potential entrants (Grewal and Kumnick, 2006). This favourable position allows companies to freely set the price of their products, which differ to a large extent from what society is willing to pay. In addition, these big firms overwhelm consumers with misleading commercials, which make them buy products that they do not need or want. Certainly, they take advantage of their power in order to influence consumer's mind acting like what Adam Smith called "an invisible hand" (Smith, 1776).

In conclusion, while in a market with perfect competition firms are oriented to maximise consumer welfare and resources are allocated efficiently, in duopoly this allocation is not generally well done with companies trying to adjust prices to their

own benefit. Although oligopoly can provoke a market crash, some economists argue that it has also substantially contributed to the economic growth in wealthy countries by raising the level of incomes on overall over the last twenty years (Baumol and Blinder, 2009).

2.7 Successful Industries with Two Main Provider Firms

Even though frowned upon by economic theory, nowadays, finding a duopoly is easier than someone can expect. In fact, local businesses usually become monopolies or duopolies in very small markets since spatial and geographical aspects condition competition. Mostly, this is observed in markets whose populations are small in terms of size. For instance, the number of suppliers is generally not higher than two in rural areas. Not only in municipal levels duopoly can be found but also in regional and national levels.

2.7.1 The carbonated soft drinks industry

It is widely known the duopoly Coca-Cola/PepsiCo in the soft drink industry, where they share approximately 75 per cent of the market. The level of concentration is so high that both companies have to compete in different ways. The rivalry between Coca Cola and PepsiCo is not based on the price of the product but they fiercely launch advertising campaigns, compete for product location in stores and sign agreement with celebrities to strengthen their brand image. This rivalry is also very intense when the two firms fight to become exclusive suppliers to restaurants, pubs or even universities. Additionally, the introduction of new varieties of soft drinks and promotions either to supermarkets or directly to consumers is another practice commonly used by the two firms.

With respect to price competition, an analysis of the price impacts of a hypothetical merger between Coca-Cola and PepsiCo concludes that the merging firm would raise the price (Tremblay, 2007). Nowadays, Pepsi will not follow increases in price made by Coca Cola and vice versa, allowing consumers to switch brands giving preference to that with lower price. Therefore, this study suggests that duopoly brings advantages for consumers in the carbonated soft drink industry.

2.7.2 The mainframe aircraft manufacturers industry

The American corporation Boeing Co. and its European counterpart Airbus form another duopoly within the mainframe aircraft manufacturing industry. Despite the entry barriers, both companies are highly competitive. Outsiders face many difficulties in order to access to this particular sector where learning-by-doing economics plays an important role.

Due to the fact that the demand of airline orders is large but in non-regular basis, the rivalry between the two firms is vigorous aiming to sign the contracts. In addition, loyalty plays an important role since airlines usually prefer to use the same plane. This strategy lets them be more efficient by saving costs in activities such as maintenance and repair of aircrafts and training of crews.

Innovation is also essential in this duopoly, whose firms are constantly competing to develop new and improved aeroplanes. For example, on the one hand, Airbus was pioneer in the use composite materials and introduced the revolutionary “fly by wire” census, a system that replaced the conventional manual flight controls of an aircraft with an electronic interface. On the other hand, Boeing enhanced its commercial fleet with composite wings and fuselage. Indeed, this is a reference duopoly in terms of engagement in research and development practices by the two companies involved since Boeing and Airbus spend considerable percentages of their revenues in R&D.

3. Aircraft manufacturer industry analysis

Three different methods have been used to examine the aeroplane maker industry: Porter’s Five-Force model, PESTEL analysis and SWOT analysis.

3.1 Porter’s Five-Force model

Porter's Five-Force analysis provides a model that explains the reasons why some industries are more able to maintain their levels of profitability than others. It claims that "the nature and degree of competition in an industry hinge on five forces: the threat of new entrants, the bargaining power of consumers, the bargaining power of suppliers, the threat of substitute products or services (where applicable), and the jockeying among current constants" (Porter, 1979).

Figure 2 illustrates Porter's Five-Force framework applied to the aircraft manufacturer industry.

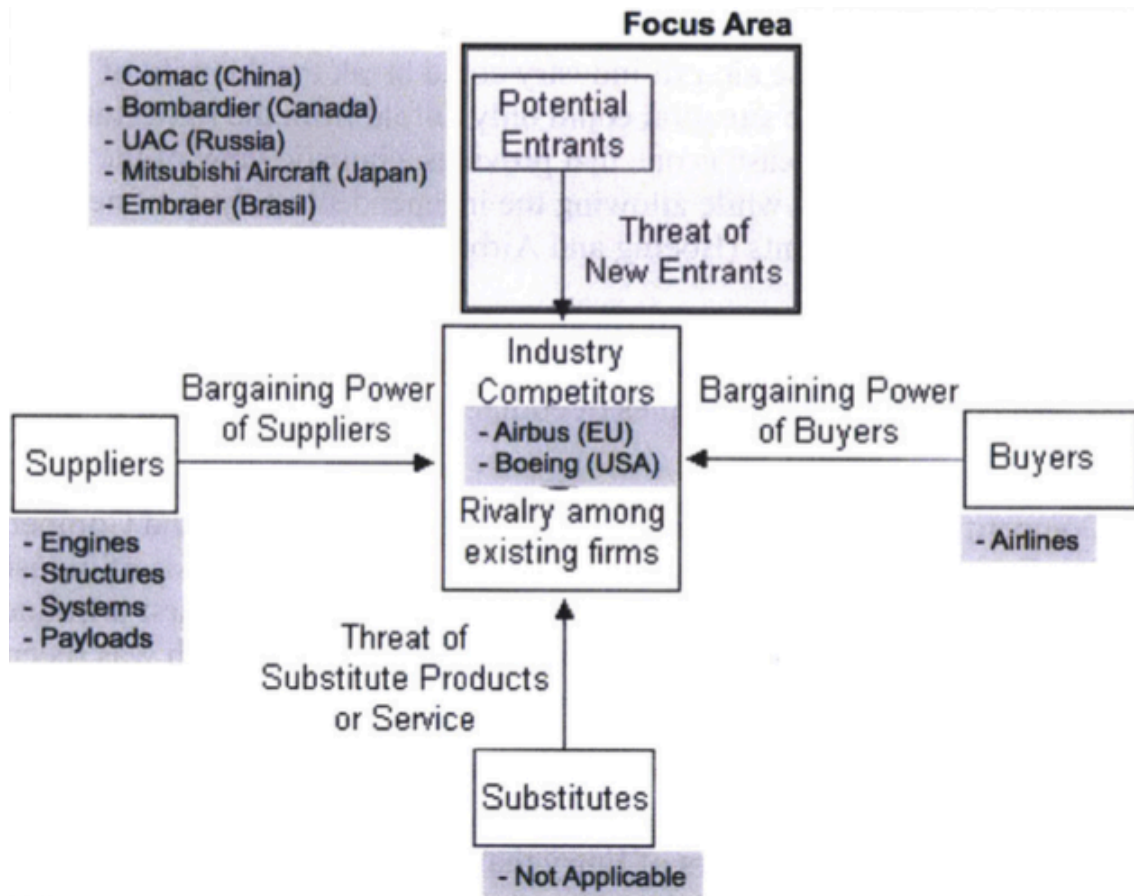


Figure 2. Porter's Five-Force framework in the commercial aircraft industry.

1. Threat of New Entrants

The threat of new entrants in the aircraft manufacturer industry is low due to tremendously high initial costs, particularly at the aeroplane and engine maker level since they require huge investments whose return takes many years. In fact, firms might need government financial support such as subsidies or military contracts in order to get access to this market. For example, Europe provided approximately \$10 billion government funding to Airbus before it became a consolidated player.

While entry barriers are extremely high at the engine and aircraft manufacturer level, they are lower at component manufacturer level. However, they are high compared to other industries though. The fact that engine manufacturers have

considerably reduced their number of suppliers over the past ten years has supposed an increase in the difficulty of entering to the industry.

2. Bargaining Power of Suppliers

It is not too strong in the aviation industry since aircraft manufacturers can usually choose from several suppliers. Consequently, a high level of competition is expected in the market because they are obliged to fight against each other. However, there are some exceptions, especially when a supplier offers an essential technology that cannot be provided by any other competitor.

3. Bargaining Power of Buyers

It is relatively high because airlines stimulate ruthless competition between the two major aeroplane providers, Airbus and Boeing, since their orders represent an important percentage of aircraft manufacturer companies' total sales. Flight operators are aware of it and request discounts in price making use of their position in the market.

4. Threat of Substitute Products/Services

There are two factors that make the threat of substitute product and/or services not applicable to engine and commercial aircraft manufacturers. First, travelling by plane is the fastest mean of transport and, second, it is the only way to travel over water. Aeroplanes will only face some threat in case of short distances over land, where they might occasionally compete against trains and cars.

However, the threat of substitute products/services is fairly high at the component level. New materials and more advanced technologies are continuously developed due to the high investments in R&D present in the aerospace industry.

5. Intensity of Rivalry among Competitors

Airbus and Boeing fiercely fight to ensure airlines' orders, which would allow them to recuperate the high fixed costs incurred and the large amounts invested in R&D. The intensity of competition is also increased by the standardization of the aeroplanes, since aircraft have a very low degree of differentiation.

3.2 PESTEL analysis

The acronym PESTEL stands for Political, Economic, Social, Technological, Environmental and Legal. The analysis of these six external factors in relation to the aircraft manufacturer industry helps to understand how they affect the aeronautical sector in the long-term.

Political factors

Government policies may significantly influence aircraft demand and the way they are used. For example, when Europe and the U.S. signed the transatlantic agreement, traffic air increased with new flight destinations in both continents and, consequently, there was an increase in aircraft demand. In short, political factors are all about how and to what extent a government intervenes in the economy.

Economic factors

Aircraft manufacturing firms rely on subsidies. While Airbus receives fully support from the European government, Boeing is equally supported by the U.S. authorities. Currently, many countries are still suffering the effects of the economic crisis, which had a negative impact in the flight operators. Due to the economic recession, the number of passengers decreased and airlines reduced their flights and demand of new aircraft.

However, the economic situation is completely different in countries such as China or India where the passenger demand is rapidly growing. Certainly, the focus is now in Asia and particularly in the Pacific region, where the new hubs will be located.

Social factors

People travel for different reasons. Whereas business trip demand is quite steady, the demand for holidays and religious trips is more seasonal. Christmas and Easter are the most common periods of the year when passengers fly because they want to celebrate these festivities with their families. As a result, airlines place orders for more aircraft in order to satisfy the increasing demand and manufacturers need to increase their production pace.

Regarding trips based on religious beliefs, Saudi Arabia and more precisely the airports of Jeddah and Makkah experience a huge increase of travellers from the Islamic community once a year since they wish to visit the holy places during the pilgrimage season. In addition, Muslims have in general different priorities in terms of aeroplanes compared to the rest of the world. Therefore, Middle-East airlines also have to increase their fleet due to the increasing demand and place orders of the most luxurious aircraft to fulfil passengers' expectations.

Technological factors

The main driving forces of Airbus and Boeing are now more fuel-efficient aircraft, which enable airlines to save cost in terms of fuel and aeroplanes can also fly longer distances without refuelling. Another technological advancement is the introduction of supersonic aircraft with higher speed in order to satisfy passengers' demand of reaching destinations in a shorter period of time.

Environmental factors

Generally speaking, consumers have an increasing concern about business environmental practices. The International Air Transport Association (IATA) is aware of it and is encouraging manufacturing firms to reduce the emissions of their aeroplanes. As mentioned above, one of the characteristics of the new generation of aircraft is fuel-efficiency.

Regulation in this respect already exists being the Carbon Disclosure Project and the European Emission Trading Scheme in charge of setting the limits for airlines emissions. The use of environmentally friendly materials is another measure to combat climate change.

Legal factors

Government subsidies may alter the real competition between the two big players. In fact, the World Trade Organization had to intervene to resolve an issue of Boeing against Airbus for getting illegal subsidies.

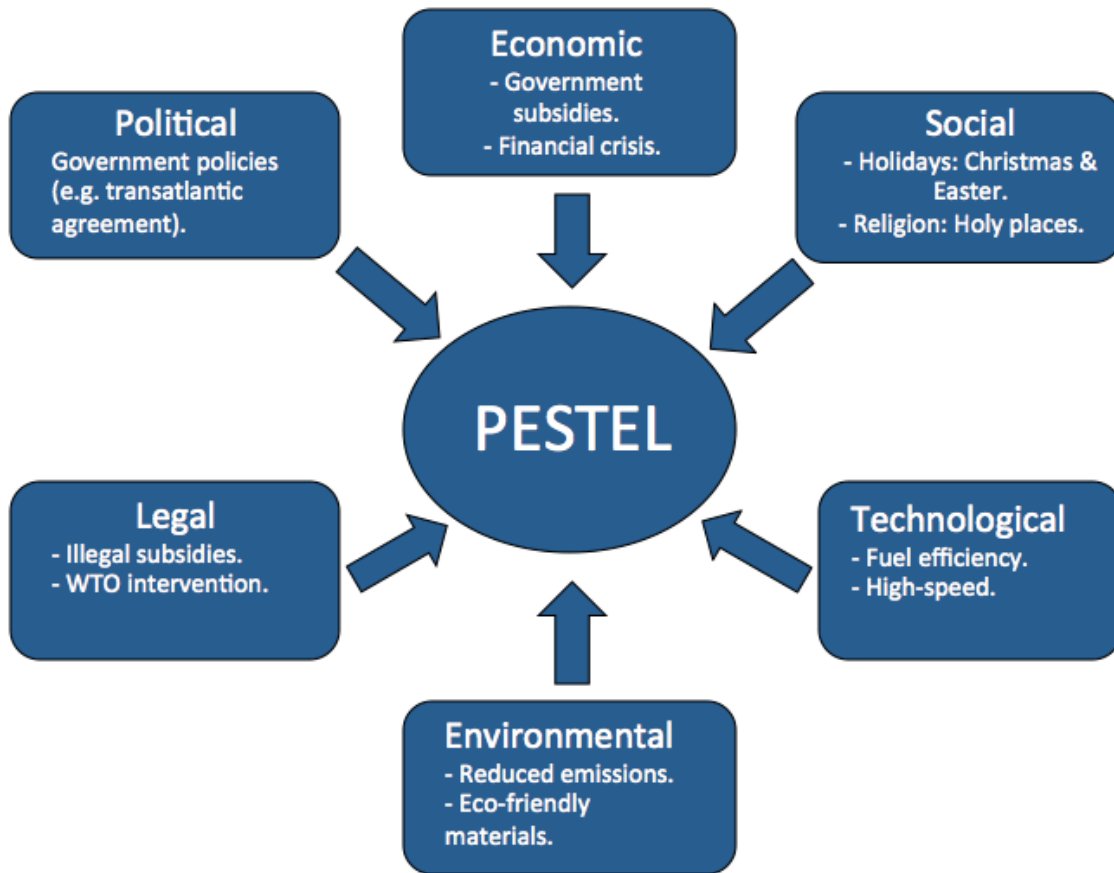


Figure 3. PESTEL analysis for the commercial aircraft industry.

3.3 SWOT analysis

The SWOT analysis scans the internal and external environment and provides information that helps firms match their resources and capabilities to the competitive market where they are or intend to enter. Therefore, this business tool is very beneficial for COMAC when formulating and selecting strategies to enter the aerospace industry.

Environmental factors that are internal to the company can be classified as strengths (S) and weaknesses (W) whereas those that are external can be opportunities (O) or threats (T).

Strengths

All internal factors such as resources and capabilities that contribute to develop or maintain a competitive advantage are included in this section. For example, the aircraft manufacturer industry has been characterised by a continuous increasing demand of aeroplanes due to the passengers' propensity to fly. In fact, when

forecasts started to predict a possible stabilization in the North American and European markets, the Asian market emerged placing many new orders.

The safety record of this mean of transport and the high qualification of all the staff involved in the aeronautical industry from a mechanic to the pilot are also key internal factors.

Weaknesses

The absence of certain strengths compared to other industries may show some weaknesses. In addition, a weakness may be the flip side of strength in this particular case. Whereas a huge amount of manufacturing capacity might be seen as a strength, the massive investment required might become weakness if it is an obstacle to quickly react to changes in the environment.

Another weakness may be the difficulty to manage the complex process of assembling aircraft, whose components are made all over the world.

Opportunities

The arrival of new technologies and a continuous contact with customers to know if they have any unfulfilled need or what they yearn for may reveal some opportunities.

The aircraft manufacturer industry offers continual expansion opportunities for both divisions military and civil, which can also be divided into leisure and business.

The latest trend in the new demand of aircraft is the use of fuel-efficient engines. This technology advance satisfies the desires of the costumers and brings cost savings at the same time. Furthermore, it is directly related to eco-friendly practices that are positively valued by end consumers, adding extra value to the product.

Threats

Any change in the external environment with negative consequences for the industry is included here.

An economic recession is always a threat for any industry but it is especially harmful for the aviation industry because the first thing people stop spending money on is leisure and ultimately travels when the economy is not prosperous. Despite high level of safety, terrorist attacks can also affect negatively air traffic and consequently aircraft demand.

The matrix below illustrates all these factors within the aviation industry.

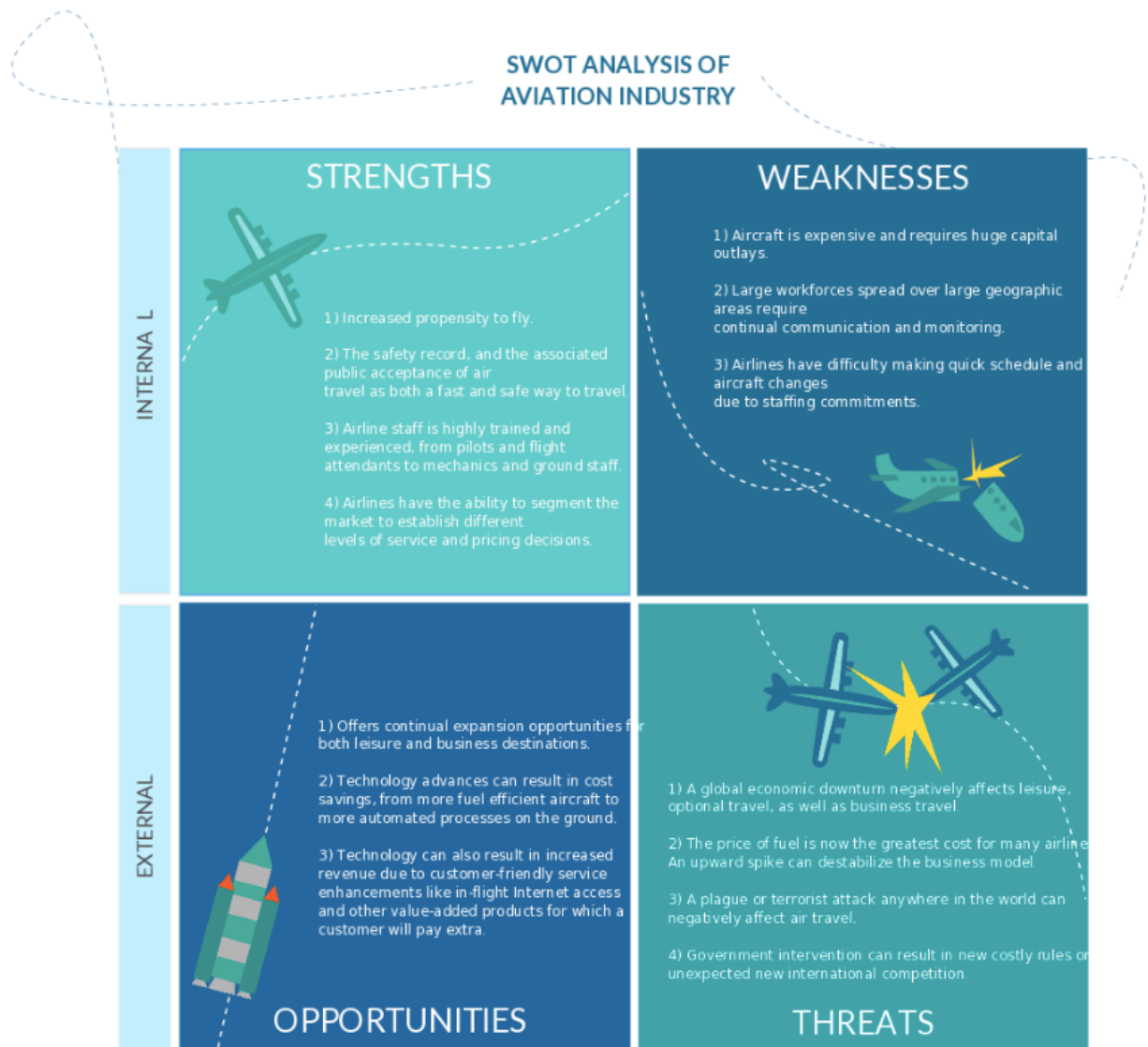


Figure 4. SWOT matrix.

4. Organization strategy

A penetration strategy to the aircraft manufacturer industry is determined by a primary choice through which new entrants decide the segment where they want to compete. The aviation industry is comprised of business jets, regional jets, small

commercial aircraft, large commercial aircraft and helicopters. The demand of the first segment collapsed in 2008 due to the financial crisis and, consequently, more than 800 orders were cancelled. The General Aviation Manufacturers Association (GAMA) reports that business jet demand will improve gradually but there will be a substantial reduction in prices (Bouvet et al., 2011).

Originally, there were only two segments (regarding only fixed-wing aircraft): small and large commercial aircraft, but the Canadian Bombardier and the Brazilian Embraer found a niche of commercial aeroplanes with less than 100 seats and filled the gap with their C Series and ERJ families, respectively. Nowadays, the regional jets segment is still controlled by these two manufacturing firms and Airbus and Boeing seem to be abandoning from this market (Wilson, 2015).

Nevertheless, both the small and large commercial aircraft segments are dominated by the market leaders Airbus and Boeing. While the former sector produces narrow-body or single-aisle aeroplanes with no more than 230 seats, the latter provides three different versions of wide-body aeroplanes (small, medium and large) with a number of seats that goes from 200 to more than 400.

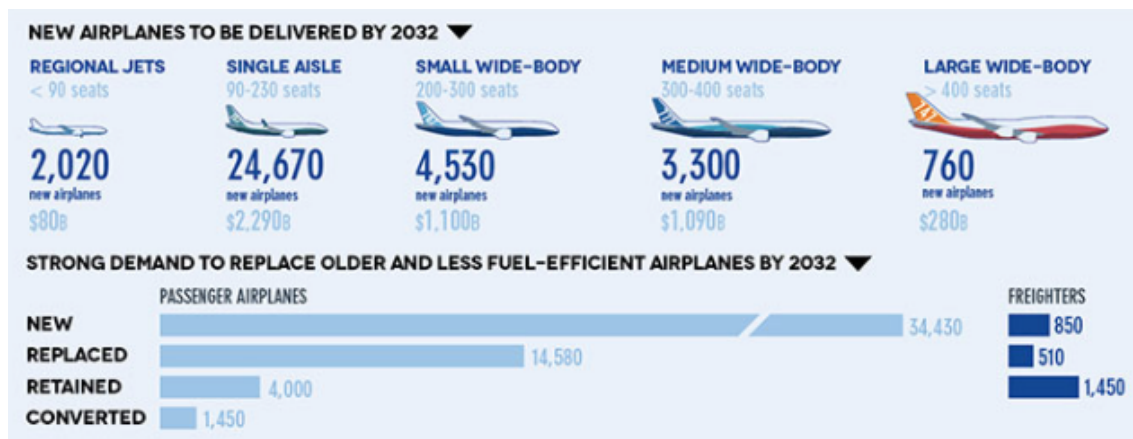


Figure 5. Types of aircraft orders by 2032.

Certainly, big profits are in big aeroplanes since the regional jet segment is the market with the lowest estimated deliveries. This explains the success of Bombardier and Embraer in the regional jets segment. Airbus and Boeing were too busy competing with each other for a bigger market share that they did not notice there was a demand of aircraft with less than 100 seats.

In addition, the problem of the regional jet segment is that it is becoming smaller because Airbus and Boeing press customers to bigger aeroplanes. Currently, this segment is “no man’s land” since it is too large for the U.S. regional airlines but not big enough for the major airlines (Wilson, 2015).

The newcomer COMAC is aware of these circumstances and in contrast to the Canada- and Brazil-based companies, it wants to enter the single-aisle segment, whose expected demand is 70 per cent of the whole aviation industry over the next twenty years. As shown in *Figure 6* and *Figure 7*, delivery forecast encourages them to do so.

Airplanes in service 2014 to 2034			Demand by size 2015 to 2034		
	2014	2034		New Airplanes	Value (\$B)*
Large widebody	740	670	Large widebody	540	230
Medium widebody	1,620	3,800	Medium widebody	3,520	1,220
Small widebody	2,520	5,800	Small widebody	4,770	1,250
Single aisle	14,140	30,630	Single aisle	26,730	2,770
Regional jets	2,580	2,660	Regional jets	2,490	100
Total	21,600	43,560	Total	38,050	5,570

Figure 6. Aeroplanes in service & Demand by size.

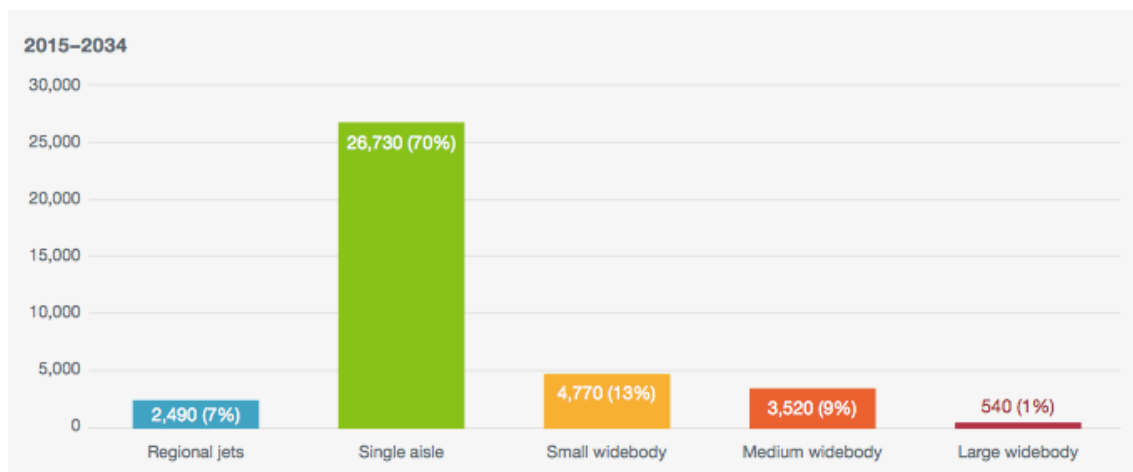


Figure 7. Forecast aircraft demand by segment.

Although forecasts for the next 20 years are very appealing, there is no guarantee that a move to the aircraft manufacturer industry and particularly to the single-aisle segment will be a success. Therefore, the research question is “Is there room

for a new entrant in a global duopoly?” and it is represented in the flowchart below.

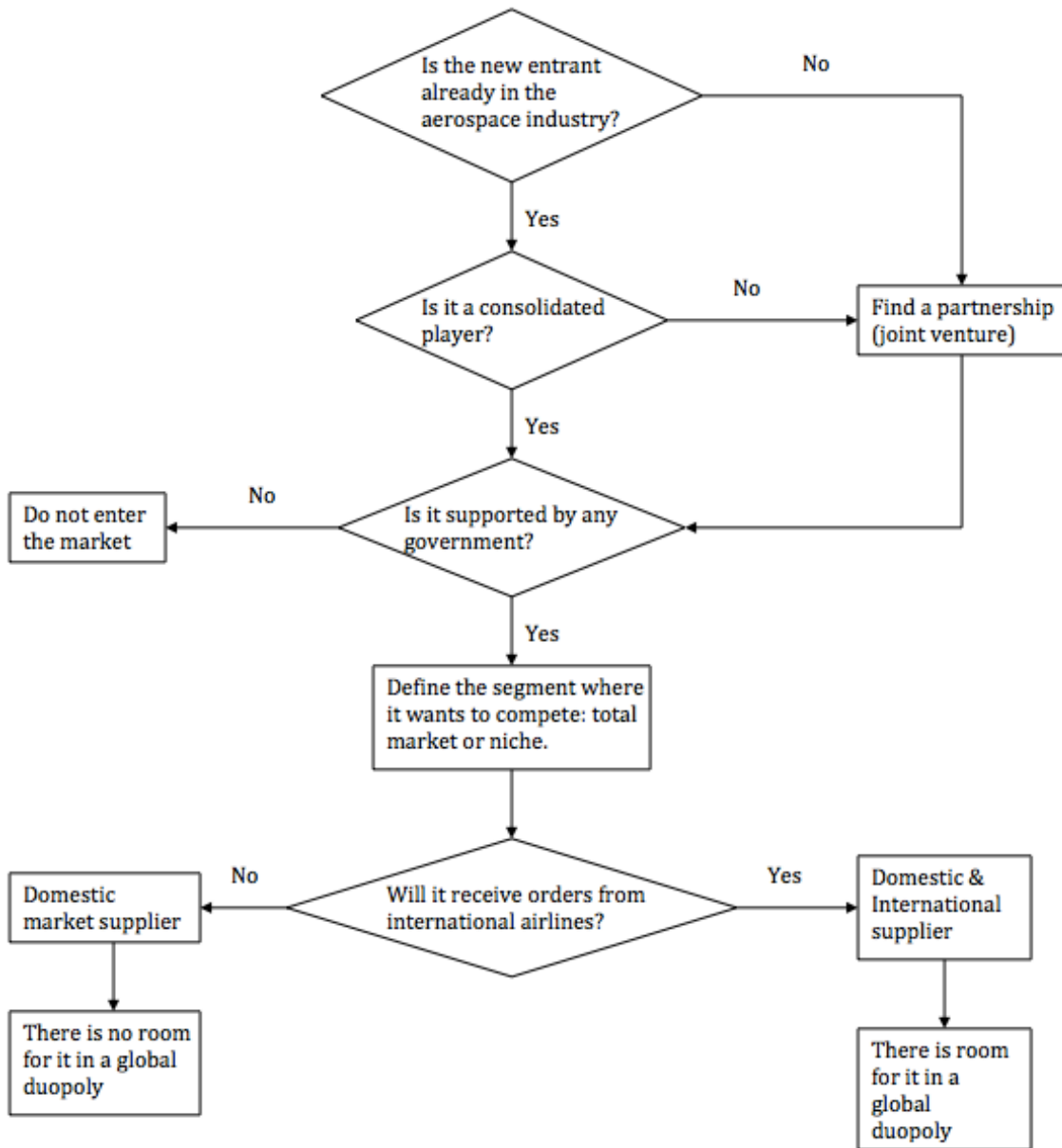


Figure 8. Research question flowchart.

The only way for COMAC to entry the market and survive the fierce competition it will face against Airbus and Boeing is to lower the price. Even so, the EU would still buy Airbus aircraft whilst the U.S. would do the same with Boeing. This situation may move China’s interest to Africa if the West does not let it sell its aeroplanes in Europe and North America.

The Commercial Aircraft Corporation of China COMAC's strategy

China is interested in building a successful commercial aeroplane to demonstrate that it can equal the United States and the European Union, and develop a national economy with high-tech industries.

After an unsuccessful move to the regional jet segment with the ARJ21, COMAC's primary objective now is to build a larger passenger aircraft in order to become an independent innovative country and improve its competitiveness.

While some manufacturers such as Bombardier and Embraer fight against each other in the regional jet segment and are slowly entering the single aisle market by introducing aircraft with less than 150 seats, COMAC intends to compete head-to-head with the Airbus A320neo and Boeing 737-8 Max in the single aisle segment with the launch of the C919 and become a consolidated third player in this particular market.



Figure 9. New competitive scenario 70-180 seats.

It does not seem there is any new niche in the market. Therefore, the strategy of the new entrants is based on product differentiation, offering more fuel-efficient engines, which is now a requirement sine qua non to enter the market. In fact, the emergence of potential contenders with fuel burn improvements has made Airbus

and Boeing re-engine their aircraft. *Figure 10* exhibits the cost per seat and the cost per trip of all aircraft operating in the regional jet and narrow-body segments.

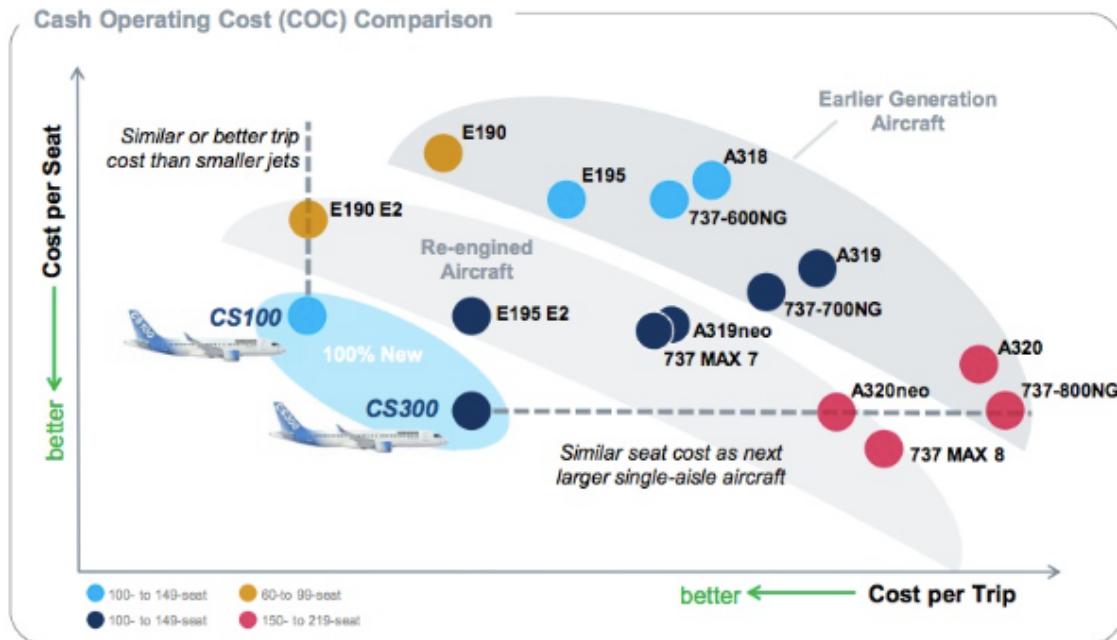


Figure 10. Cash Operating Cost comparison.

Indeed, COMAC's strategy is a very ambitious move since the state-owned firm attempts to transform the aircraft manufacturer industry structure.

Current market situation

1. Airbus.
2. Boeing.
3. Other minor manufacturers.



COMAC's aim scenario

1. Airbus.
2. Boeing.
3. COMAC.
4. Others minor manufacturers.

Figure 11. Hypothetical transformation in the single-aisle segment.

The first C919 is expected to be delivered in 2019, if sceptics are correct. Its arrival will take place a few years later than the A320neo and Boeing 737 Max but its price will be lower. The aeroplane is estimated to be much cheaper than its rivals. There is no official price for the aircraft yet but a report published by China National Radio suggested an estimated cost of \$50 million a year ago. This amount is considerably lower than Boeing 737 and the Airbus A320 families, whose average list prices is \$75 million and \$97 million, respectively.

However, the European and American firms offer lower maintenance costs, fuel-efficient engines and consequently lower operating costs. "The C919 will not be as technologically advanced as the A320 and 737, but that is not China's aim for now. It wants to learn how to build a viable and safe aircraft, and become more competitive in the long-term. It is learning from what Airbus did to Boeing in the 1970s," said a Western supplier who has regular meetings with COMAC directors (Govindasamy and Yan, 2013).

Figure 12 shows that the A320, the 787-800 and the C919 are very similar in terms of dimensions (length and wingspan), capacity and range.

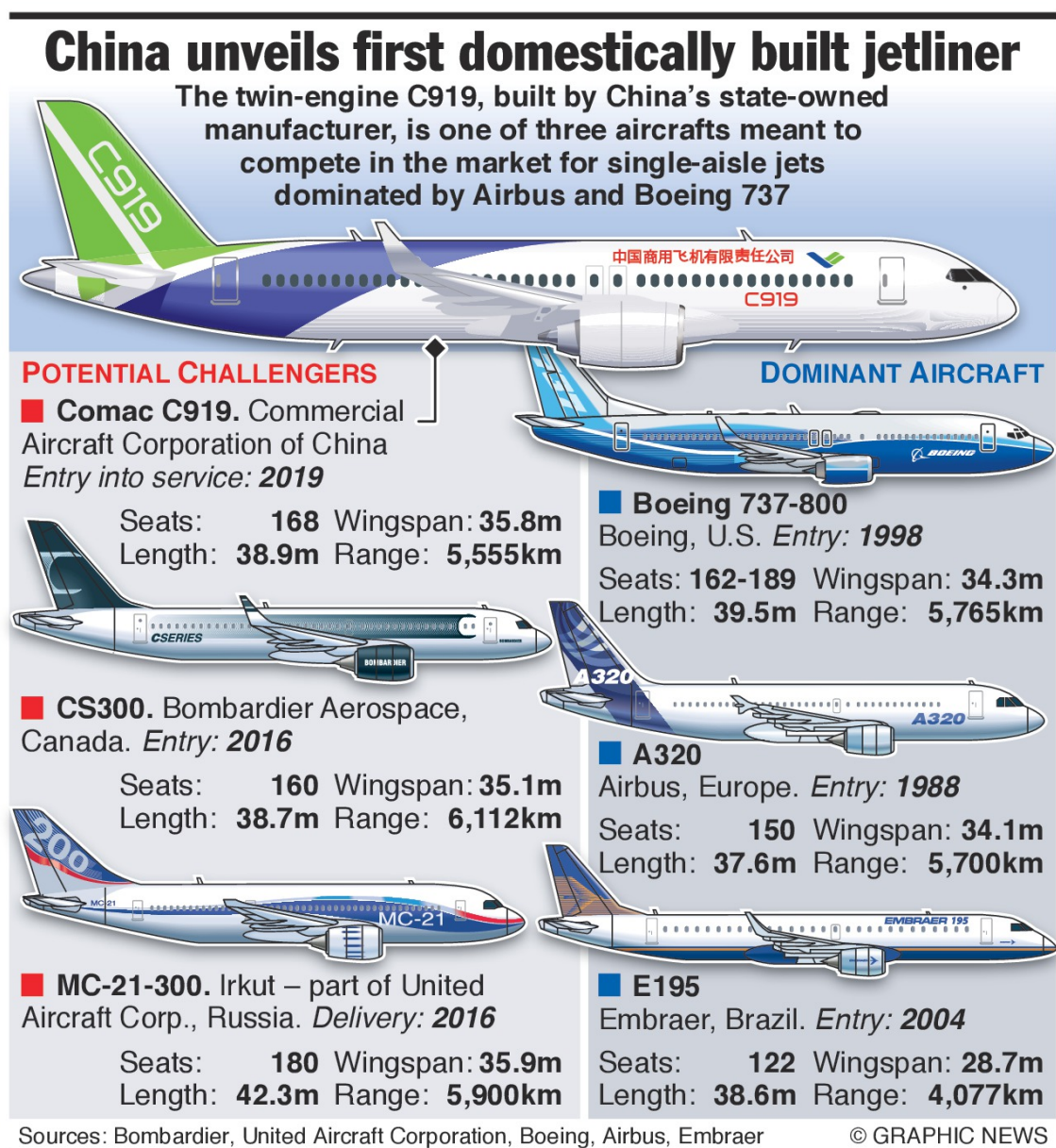


Figure 12. Aircraft single-aisle segment.

5. The global duopoly of Airbus and Boeing

Tom Enders and Dennis Muilenburg, CEOs of Airbus and Boeing respectively, agree that the duopoly over the narrow body segment is close to its end. Although, some studies have assessed this challenge, there is no consensus about the best structure for the aircraft mainframe manufacturer industry.

5.1 Reasons for duopoly

There are several reasons that support duopoly as the optimal structure for the commercial aircraft manufacturer industry. First, the historical evolution of the aeronautical sector shows that this market tends to increase concentration over time. In fact, it started as a large group of small companies and has got more and more consolidated until it has become the current duopoly.

Second, the two remaining firms are considered national treasures. While Boeing has fully support from the United States, the European government backs its main competitor Airbus. Mostly, this is due to the fact that the aerospace sector is one of the world's largest manufacturing industries with respect to the number of employed workers and value of product. The level of commitment between those governments is so high that this matter has become a controversial issue in terms of financing. For example, Fred Hochberg, the President of the U.S. Export-Import Bank, said to the Reuters Aerospace and Defence Summit in Washington "We have no national treasure but every firm is a national treasure" in reference to Airbus. "We are all about U.S. jobs" he emphasised, and announced that his bank, which provides loans for exporting producer companies settled in the United States, will give credit support to the European giant for those aeroplanes that are made in the country (Scott and Hephher, 2014).

Third, although there are many studies about the relationship between competition and innovation, there is no consensus regarding this topic. While some authors conclude that competition stimulates innovation, others claim that duopoly motivates innovation. Schumpeter (1942) was pioneer in this respect and proposed an innovation theory, which states that monopoly encourages innovation. Later, Arrow (1962) affirmed that innovation is a result of competition. The debate about this particular relationship has not finished yet. There are authors who support Schumpeter's opinion such as Demsetz (1969), Gilbert &

Newbery (1982) or Yi (1999), others who share Arrow's perspective, e.g. Holmes, Levine and Schmitz (2012), and Vives (2008) and others such as Aghion et al. (2005) and Sacco and Schmutzer (2011) who have their own view. The lack of a global agreement concerning this issue oblige to examine every industry, sector or market individually in order to make a conclusion.

More recently, Chen and Nie (2012) argue that complementary and substitutability play an important role on the relationship between innovation and competition. They claim that bargaining power and investment in R&D are negatively correlated. Furthermore, they conclude that the higher the market power (substitutability), the lower consumer (social) wealth. Nonetheless, this is not applicable to the commercial aircraft manufacturer industry where both Airbus and Boeing have spent large amounts of money in R&D compared to many other sectors. Consequently, the capacity of a potential rival to reach the required technological advancements in the short-term is very unlikely taking into account the extraordinary R&D investment needed. Even though outsourcing may be an alternative option, the fact that it implies a high level of dependence on others' ability and the difficulty to find a partnership make it non-recommendable.

With respect to barriers to entry, the aerospace manufacturing industry is a capital-intensive business process where newcomers need to invest huge amounts of financial resources to become competitive. Porter claims that, "the need to invest large financial resources in order to compete can deter new entrants. Capital may be necessary not only for fixed facilities but also to extend customer credit, build inventories, and fund start-up losses. The barrier is particularly great if the capital is required for unrecoverable and therefore harder-to-finance expenditures, such as up-front advertising or research and development" (Porter, 2008). Certainly, this is the case of the aviation industry.

The learning curve is another aspect that needs to be taken into consideration. It essentially means that when workers do the same task multiple times, they increase the speed of their performance and as a result they reduce the cost of such task. According to Eriksson and Steenhuis (2016), the learning curve is a continuous decrease for every doubling or repetition in production.

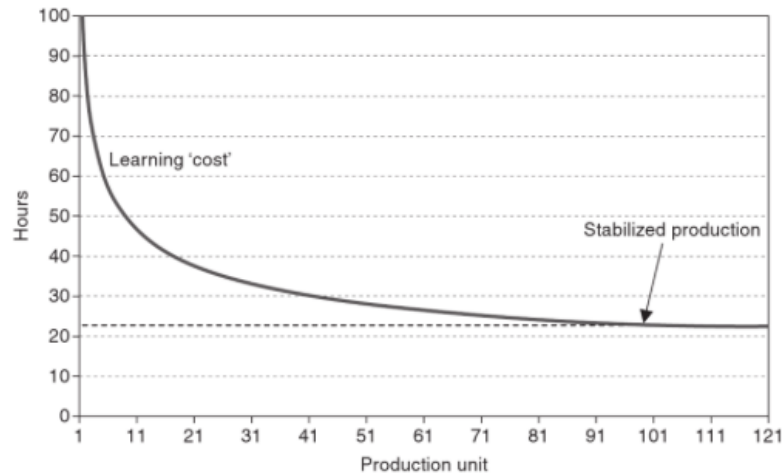


Figure 13. The learning cost curve.

Figure 13 illustrates an 80 per cent learning curve where producing the first unit of any given product takes 20 per cent longer than the second one and so successively. For example, if the fabrication of the first item takes 100 hours, the second item will take 80 hours (100 per cent minus 20 per cent times 100 hours). Doubling again, the item number 4 will take an extra 20 per cent reduction, i.e. 100 per cent minus 20 per cent times 80 hours resulting 64 hours. In short, the higher the production, the lower the cost of the following products and, therefore, the lower the cost per item on overall.

The scope and sophistication of a task along with the level of repetition determine the learning degree of the working staff. *Figure 13* illustrates how the learning cost decreases over time until it achieves the stabilization point from where it remains steady. This point indicates the end of the learning process and, thus, no more substantial cost cut is applicable.

The aircraft mainframe manufacturer industry has historically reached the stabilization point at one hundred or two hundred units. These figures shows that the learning curve has a significant impact in this industry, especially in the early stages when it is not possible to charge clients a price in terms of the present manufacturing cost for their aircraft orders. In other words, this means that if the aeroplane production outlay were originally extremely high, there would not be possible to sell it. That is the reason why manufacturing firms need to take into account the learning curve to effectively identify the estimate cost and be able to

plan their programmes. In fact, Airbus and Boeing have a long experience in this field that allows them to create their learning curves based on past performance.

Therefore, new entrants in the aircraft manufacturer industry will face competition from two very experienced firms whose learning curves are much more progressive than theirs. This fact makes tremendously difficult to become competitive in this particular sector since Airbus and Boeing will reach the stabilization point earlier than any other potential competitor.

Concerning the motives to order new planes, it is observed that they are based on growth or replacement (obsolescence) strategies. In this respect, the action camera industry is a good example of how low levels of replacement may become a problem. GoPro, the world leader provider in this particular market, is struggling to keep their profits since it is not a priority for its customers to replace their cameras for new versions. Similarly, aeroplanes last a lot and replacement orders are placed only occasionally. Additionally, those aircraft that are going to be replaced sometimes are converted to freighters increasing even more their lives. *Figure 14* shows that 5,510 out of 21,600 aeroplanes that were operating as commercial aircraft in 2014 will be still in use as freighters by 2034.

Older, less efficient airplanes replaced with more efficient, newer generation airplanes

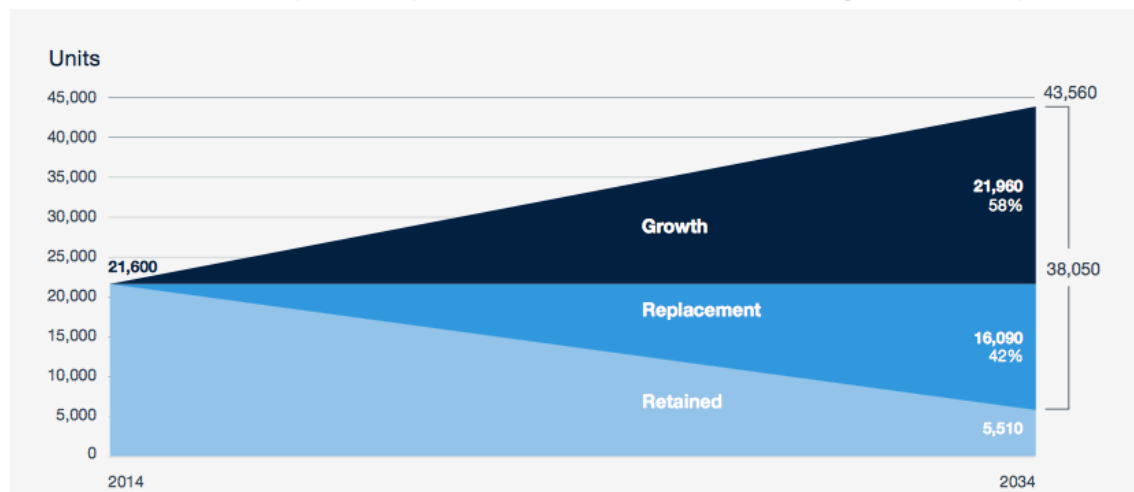


Figure 14. New aeroplanes demand by 2034.

Reputation is another hurdle for potential newcomers in this industry. It especially affects the eagerness of airlines to keep working with those firms with who they have previous successful experiences. After-sales services are equally important for airlines and the consolidation of a reliable relationship between the two parts

involved takes years of solid support. This is reflected with high switching costs between airlines and aircraft manufacturers and it appears to be very improbable that a flight operator will place an order with a different manufacturer to Airbus or Boeing.

5.2 Reasons against duopoly

Generally speaking, the lower the number of incumbents, the higher the bargaining power and, therefore, the higher the ability to set prices. This self-determination to establish the output value may be a threat to consumer wealth. A few reasons of why an industry with a higher number of firms would be more beneficial are presented below.

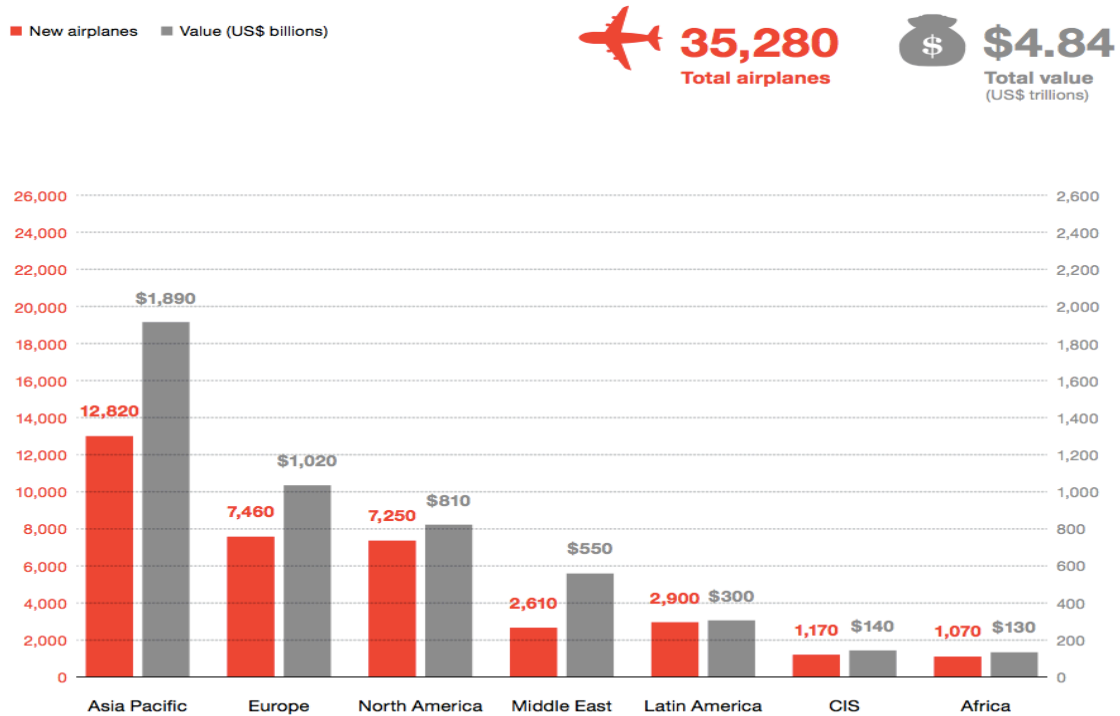
In reference to the level of competition, Bresnahan and Reiss (1991) conclude that a market suffers the highest increase in competition with the arrival of the second or third contender to the market. Thus, a new player in the aerospace industry would make it even more competitive.

Recently, the International Trade Administration (ITA) announced that “more jobs in the United States were supported by exports of U.S. aerospace products than of any other manufacturing or service industry” (ITA, 2011). Countries such as Brazil, Canada or China are aware of the benefits of developing a national aviation industry for their economies. In addition, having an aircraft manufacturing and service industry is very prestigious for a country and very well regarded internationally. It is certainly seen as a sign of economical and political development.

COMAC is run under socialist principles, which ensures its dominance in the Chinese market where domestic flight operators will buy its aircraft even if there are superior alternatives. This scenario is possible thanks to the fact that both the aircraft manufacturing industry and airlines are under the Chinese government control and, hence, it can force national airlines to buy those aeroplanes produced in the country. Such policy is very favourable for COMAC's interests since it provides a consistent demand of its product and protects it from other manufacturers at the same time. All these circumstances may convert China into a

kind of incubator in which COMAC can get the experience of building the C919, its narrow-body aircraft.

Figure 15 indicates that the target destination for aircraft manufacturers in the coming future is Asia, and more precisely the Asia Pacific region.



Source: Current Market Outlook: 2013–2032, Boeing, 2013

Figure 15. Aircraft demand by region, 2013-2032.

Forecasts predict that more than 30 per cent of the new orders will be placed in this area during the next two decades. This percentage is below the total number of orders combining Europe and North America, which is almost 50 per cent. However, this area has a fleet growth rate (5.6%, 6.2% counting China) much higher than Europe and North America, which are 2.3% and 1.6% respectively. Definitely, the emphasis of the aircraft manufacturing industry is now in fast growing markets and COMAC’s location may become an advantage that could increase its possibilities of success.

The weak protection of patents and intellectual properties in China may make well-established firms more vulnerable and reduce the learning process of COMAC by imitation. Nevertheless, the Chinese government is open to negotiate with Airbus and Boeing in this respect. It would guarantee their intellectual property

rights in return to joint ventures with the state-owned company COMAC. This proposition is unlikely to be accepted by the two market leaders since the offer has been interpreted as the dilemma 'now a partner, then a rival'.

5.3 COMAC: A third player in the duopoly?

Some experts have anticipated the beginning of a new era. In fact, they suggest that there is a group of newcomers that are poised to compete with the two leader firms, Airbus and Boeing, for a substantial market share of the smaller commercial jets segment. Even though the jets Boeing 737 and Airbus A320 have control over this segment now, the former Chief Executive Officer of Boeing James McNerney said:

"At Boeing Commercial Aeroplanes, we must prepare now for increasing global competition. Aircraft manufacturers in several countries are ready to challenge us for a share of the market where we have been competing solely against EADS/Airbus. These emerging competitors see the same massive economic opportunity in commercial aeroplanes and related services that we do over the next 20 to 30 years" (Harrison, 2011).

Jim Albaugh, another former CEO of Boeing, in this case of the Commercial Aeroplanes business unit, supported McNerney's view by stating that *"the days of the duopoly with Airbus are over"* (Harrison, 2011). He announced the emergence of new entrants and the probable end of the supremacy that Airbus and Boeing have historically maintained over the commercial jets segment. Russell Solomon, a Moody's senior vice-president, totally agrees with Albaugh. "The beginning of the end of the long-running Boeing/Airbus duopoly is upon us", he claims (Owram, 2016).

Additionally, the current CEO of Airbus Tom Enders, who shares the previous opinions to some extent, believes that *"the duopoly is over in the 100 to 150 seat aircraft segment because that is where the new entrants want to be – so that does not mean the duopoly is over in the entire range of products"* (Harrison, 2011). Although he is not sure about the number of competitors that the market can hold, he expects that "sooner or later there will be some consolidation".

Several questions arise after the increase in competition in the small commercial jet segment. Mostly, there is a concern about if it will occur the same in other segments. Certainly, entry barriers will condition the success or exit of the

newcomers. For example, the degree of sophistication and the know-how required by potential competitors to assemble aircraft may be crucial in order to survive in such competitive industry. Nevertheless, this may not be the case for state-owned firm COMAC since it is financed by the Chinese government, and the commercial perspective might be secondary while it is developing its aeronautical programmes.

Some experts firmly believe that COMAC will challenge the dominance of Airbus and Boeing, will become a worldwide competitor and ultimately will contribute to finish with the current duopoly in the aerospace industry. Their view of why the Chinese government-funded firm will be successful in this particular market is based on five reasons.

First, the C919 (COMAC's narrow-body aircraft) will compete in the single-aisle sector, a segment with a forecasted demand of 24,570 new aeroplanes valued at US\$2,290 billion over the next twenty years.

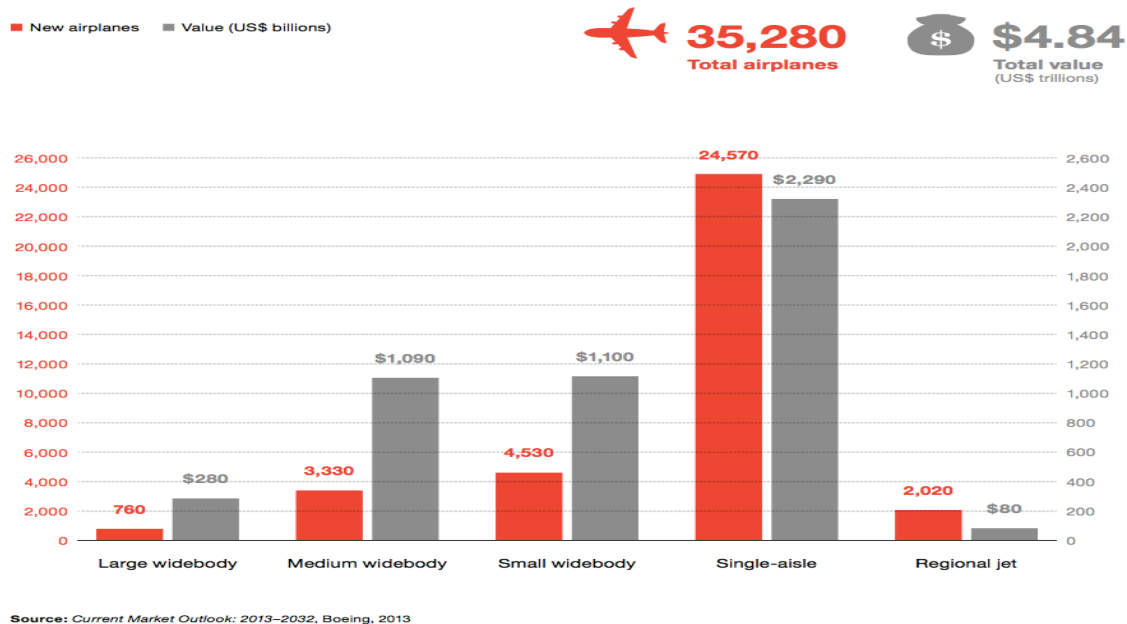


Figure 16. Aircraft demand by size, 2013-2032.

Second, China is the fastest-increasing market in the world in terms of extra passengers per year over the next twenty years with 758 million new passengers for a total of 1.196 billion (IATA, 2015). In addition, *Figure 17* shows that China is the world's second air travel market in terms of growth just behind India with a demand of 6,300 new aeroplanes during the same period, that is, 25 per cent of the

global demand (Yan and Miller, 2015). It is also remarkable how fast the Asia Pacific region is growing, particularly Indonesia, whose estimate growth will be higher than countries such as Japan, Brazil, Germany, Spain or France by 2034.

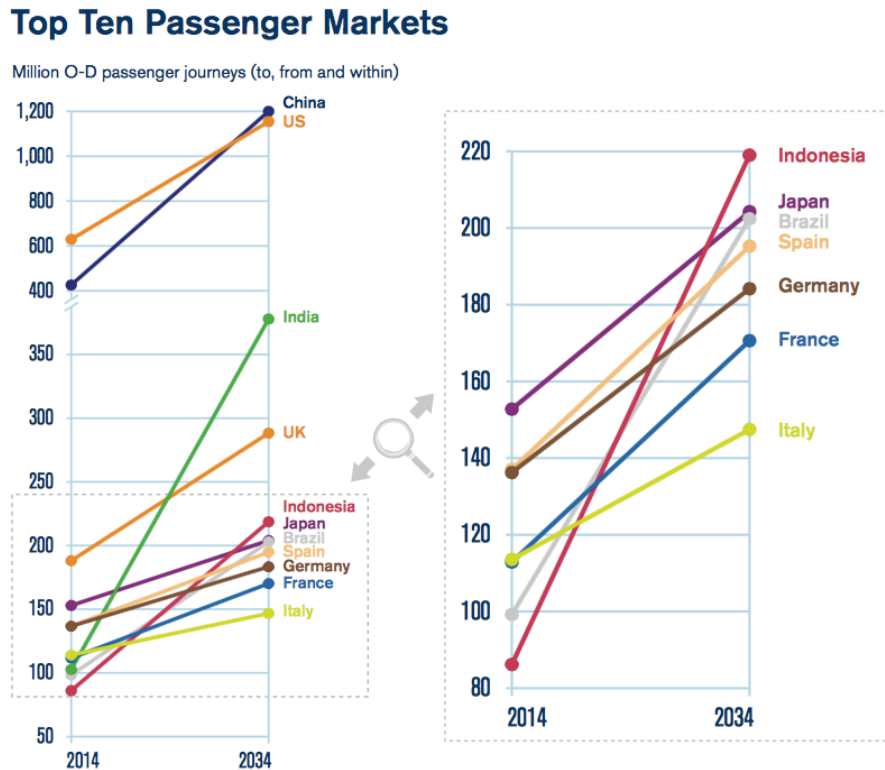


Figure 17. Top ten passenger markets.

Third, in spite of uncertainties, COMAC states it has received 517 orders for the C919. These commitments have been generally signed with Chinese airlines because of the political pressure they face to buy in the domestic market even if there are higher-quality and lower-price products in foreign markets. Specifically, among the twenty-one signed contracts there are seven domestic flight operators, two foreign transportation companies and twelve aircraft leasing companies such as CMB Financial Leasing Co., a business of China Merchants Bank or the finance-leasing arm of China’s Industrial Bank (Chiu, 2014). Among the foreign customers, Thailand’s City Airways has placed an order of ten C919s, GE Capital Aviation Services has ordered twenty and PuRen Airlines, a start-up settles in Germany and financed with Chinese funds, has announced its firm intention to buy seven airplanes (Meszaros, 2015).

The fourth reason is the two partnership agreements that the Chinese manufacturer has signed with Bombardier and Ryanair. The Canadian firm is

helping COMAC to improve its global customer support and its deficient engineering and supply chain capability in order to receive the Federal Aviation Administration (FAA) certification. Furthermore, Ryanair is interested in developing a new aircraft, different to its current Boeing 737 fleet and made by another firm to end with the dominance of Airbus and Boeing. Thus, the Irish airline and COMAC have signed a design agreement of cooperation to become development associate.

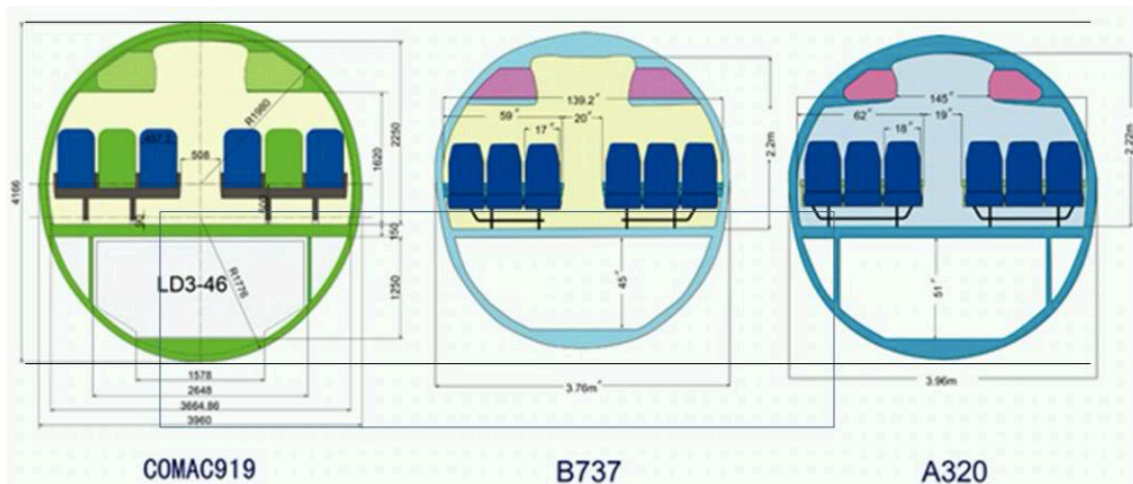


Figure 18. Cabin comparison.

Although Nick Cunningham, a highly regarded expert at the London-based analysis company Agency Partners, reckons that COMAC will benefit from its agreement with Bombardier in terms of technical knowledge, he considers that the “major hurdle” that the Chinese firm has to overcome is the reliability of its aeroplanes to fly safely. “If a Western airline bought Chinese aeroplanes and they proved to be unsafe that would be disastrous for the airline – [possibly] fatal”, he asserts (Parker, 2012).

Finally, the last reason is related to the usage of technology and is thought to convince those sceptics such as Mr Cunningham. The C919 relies on prestigious Western providers to keep the quality standards and increase its international reputation and plausibility. Although the C919 is made in China, many key components come from foreign markets.



Figure 19. C919 aircraft technology providers.

Innovative technologies and smart electronics solutions providers in the aviation industry such as Rockwell Collins, Honeywell, CFM International, Liebherr or Michellin are some of the non-domestic suppliers.

Moreover, there are analysts who also think COMAC is the best-positioned contender to challenge Airbus and Boeing. For instance, Fabrice Brégier, president and chief executive officer of Airbus, recognised the risks derived from the emergence of COMAC and admitted that the state-owned company is a potential threat for his company at Farnborough International Airshow. He told “We know... this market of over 100 seats will open to new competitors, so we need to be prepared to be competitive... We take the C919 as a very serious development, managed by a very serious company”. Another expert present in the event claimed “Of all the newcomers [COMAC] will be the strongest – not because they have the best skill base today, but because they have more financial firepower than anybody else. They can sink billions into [aircraft] projects without any concern for [the] bottom line” (Parker, 2012).

Another factor that may allow COMAC to become a consolidated competitor is the increasing support of Chinese banks to the aerospace industry. John Dowdy, director at McKinsey, argues “China’s emergence as a major player in aircraft financing increases the likelihood that the C919 will become a credible alternative to the Airbus A320 and Boeing 737” (Parker, 2012).

Finally, Jim Albaugh is very clear in this respect claiming that COMAC owns the required resources to be successful and, consequently, he would not put money at stake against the Chinese state-owned corporation in a medium to long time

horizon. He stresses “Whether [the C919 is] a good aeroplane I don’t know, but eventually they will get it right” (Parker, 2012).

6. Conclusion

The European firm Airbus and its American rival Boeing are the dominant manufacturing companies in the aerospace industry, whose new aeroplane demand has an estimate value over the next two decades of \$4.84 trillion (see *Figure 16*). Though this duopoly is undoubtedly facing an increase in competition in the small commercial jets, it is not clear if there is room for a few more players in the civil aircraft segment.

The government-funded manufacturer COMAC believes it can break such supremacy. In fact, it revealed its C919 narrow-body last November and is hoped to launch it into service in 2019. This single-aisle aeroplane is designed to compete with the Airbus A320neo and the Boeing 737-8 Max.

Chinese government policies provide a protectionist environment to its companies, which can be crucial to make COMAC the leader of the domestic market and become a potential worldwide competitor. Nevertheless, these measures along with low labour cost will not be enough to challenge the international market since the key factors that airlines take into account when placing orders are technology and performance. Therefore, China needs to look for a different approach to compensate its lack in these two fields.

The Asian giant is aware of the massive size of its market and its increasing demand, which might be profitable for several more companies, and is willing to open it in return of partnerships with competitors in order to learn from them. It seems China is on the right track in this respect and has already signed an agreement of cooperation with Bombardier “to cross-market their new, separate, single-aisle narrow-body jets in emerging and mature markets” (Van Hasselt and Jelmayer, 2011). A previous partnership between Bombardier and China in the hi-speed train industry encourages the parts to be optimistic. This joint venture started in 1998 and a decade later China was autonomous in the design and development of its trains and became a global competitor.

The agreement between Bombardier and COMAC is remarkable but it must be taken into consideration that technology advancements and innovation rely on suppliers instead of manufacturing firms in the aviation industry. For instance, only one manufacturer, Embraer, has entered the market after the Second World War and its success was based on a global survey to identify the best suppliers to work with whereas just a few tasks were made in Brazil (Aboulafia, 2010).

Time is another factor that has to be considered since delays can have catastrophic consequences for a company. "There is the very serious risk that by the time the C919 enters service, Airbus and Boeing product offerings would make the plane look obsolete. In that case, the government of China will need to decide whether it wants healthy airlines that are free to buy what is on the world market, or a healthy national jetliner champion, prospering because the luckless local carriers are forced to buy an inferior jet", Richard Aboulafia said.

In general, aviation analysts are doubtful about the potential impact of this state-owned company in the aircraft manufacturer industry. Although they have added Western technology to their aeroplanes, experts predict that by the time when their aircraft are ready to fly, they will be a step behind of the latest versions of the A320neo and the 737-8 Max.

Jason Gurksy, an analyst at Citigroup, notes that COMAC is not experienced enough and has a lack of practical knowledge in managing complex assembly systems and supply chains required to achieve the very high standards of trustworthiness and safety demanded by flight operators. This distance with respect to Airbus and Boeing in terms of security does not allow them to become a threat in the short-run.

Even the leader of the regional jet segment Bombardier, whose aircraft safety has already been proven, is having difficulties to get access to this profitable market. Although it has received 250 orders of its C Series approximately, this figure is too far from the number of orders received by the incumbent Boeing, who has already delivered more than 8,700 B737 and airlines have placed orders for 4,200 more aircraft.

Getting a completely new aeroplane design off the ground is not an easy task even for incumbents. In fact, any unexpected issue could substantially increase the estimate cost of an aircraft. For example, the R&D investment for the Boeing 787 Dreamliner reached the amount of \$28 billion because of some problems with its supply chain and electronics. Airbus also found difficulties with its wide-body A380, whose revenues barely cover its production costs regardless the capital spent in R&D. Since the two leader companies face many problems to launch an aeroplane design in the sky, it is not surprising that the majority of the new entrants give up in their attempt.

The success of COMAC will be determined for the know-how it can learn from Bombardier. Whether this partnership is positively seen by global airlines and they will finally place orders of the C919 is a question that has still to be answered. Therefore, the research question about if there is room for a new entrant in the global duopoly Airbus/Boeing is nowadays inconclusive.

Although the relationship between market structure and market conduct has been examined through a diverse array of research, none of them endorse the proposal that duopoly, per se, is synonym of market failure. By contrast, the results of such studies basically suggest that duopoly is not always undesirable. In short, the duopoly Airbus/Boeing is not imperfect but it is the nature of the aerospace industry.

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