A Review of Malaysia’s Aerospace Manufacturing Post-COVID19 Pandemic Using Michael Porter’s Five Competitive Forces Model

Abstract: Developing a team of business risk assessors in pursuit of establishing an aerospace manufacturing company is necessary in producing desired outcomes. Quantitative assessment had proven to be reliable and accurate, however this comes with a cost. Therefore, this paper attempts to discuss the elements of risks and threats involved in establishing an aerospace manufacturing business post COVID-19 pandemic, in a qualitative manner. It acts as a preliminary report, and a qualitative review of existing literatures related to the airlines and aerospace industry. The risks and threats data and justifications are then categorized and compiled according to Michael Porter’s Five Competitive Forces Model (FCFM) in an attempt to visually map the threats and risks involved with the business, either directly or indirectly. Based on the discussion, the overall impact is structured into a comprehensive table which will give interested parties an overall view of the assessment.

1 Introduction

The Aerospace Manufacturing is one of the most dynamic, highly regulated, competitive and complex subsectors as compared to other transportation subsectors. The scope utilized in the Malaysian Aerospace Industry Blueprint 2030 defines aerospace industry as covering the industrial activities that relate to design, development, manufacturing, construction, maintenance & disposal of aircraft, spacecraft, missiles, and rockets. The document further defines aerospace manufacturing (Aerospace manufacturing) as activities that cover the scope of; Engineering and Design, Aerostructure (Composites and Metallic), Avionics Equipment, Engines, and Airframe Equipment [1].

The annual revenue for general aerospace industry is lucrative. It is estimated to bring an annual revenue of USD 3.93 billion, in which 48 percent of this portion belong to the aerospace manufacturing subsector [2]. This huge chunk of the pie open windows of opportunities to new interested parties. Just with any high revenue business ventures, the initial capital required for this industry will also be high. New entrants must analyse the viability of its business model prior listing itself as a participant, or rather, industry rivals. Thorough analyses must be in place using appropriate analytical tools to measure the viability.
2 Review on Michael Porter’s Five Competitive Forces Model

According to Section C (Divisions 10 to 33), Class 3030 of the United Nations’ International Standard Industrial Classification (ISIC) Revision 4, the aerospace industry is classified as an ‘Aerospace Manufacturing (Aero-manufacturing) Sector’. Subsequently, readers an overview of Malaysia’s position on the industry’s manufacturing map. Moreover, Malaysia’s Aerospace Manufacturing Sector using Michael Porter’s Five Competitive Forces Model. This part is focused on the Threat of Substitute Products and Services, and Rivalry Among Industry Members.

2.1 How Big is the Global Aerospace Manufacturing (Aero-manufacturing) Sector?

According to Section C (Divisions 10 to 33), Class 3030 of the United Nations’ ISIC Revision 4, the aerospace industry is defined as manufacturing area related to the design, production, and operation of space vehicles such as aircrafts (passenger and military), satellites, space shuttles. These sub-sectors are closely related to each other and highly interdependent. In this section, we attempt to examine the size of the global aerospace manufacturing sector, particularly in the context of Malaysia’s position in the industry.

The global aerospace manufacturing sector is expected to reach a significant size in the coming years, driven by the growing demand for air travel and the increasing use of advanced materials and technologies in the field. According to Deloitte in 2023, the aerospace manufacturing sector is estimated to contribute USD 115 billion worth of market share in Malaysia alone.

Manufacturers in the aerospace industry are required to adapt to changing market conditions and customer demands. As a result, they are forced to adopt new technologies and developments to maintain their competitiveness. Innovation in the research and development (R&D) areas of the aerospace industry is critical for manufacturers to maintain their competitive advantage.

In addition, aircraft manufacturers are shifting their focus on narrow body aircraft to meet the increasing demand for more fuel-efficient and cost-effective aircraft. This trend is driven by the growing focus on sustainable flying and decarbonization of the air transport industry. According to Deloitte, the production of narrow body aircraft will increase to reach pre-COVID levels in 2022, with a forecast of USD 21.6 billion in China, USD 18.8 billion in France, USD 12.6 billion in Germany, USD 10.8 billion in Japan, USD 10.6 billion in the Netherlands, USD 10.4 billion in the United Kingdom, USD 10.2 billion in Canada, USD 9.8 billion in the United States, USD 4.9 billion in Brazil, and USD 2.1 billion in Brazil.

There are dozens of generic business analytical tools and models developed by experts in business. For investors and entrepreneurs, these tools assist business ventures and investors to understand the viability of their proposed business models. These tools also help to identify growth opportunities and market trends that can drive business success.

More importantly, these tools serve to assess two of the most important fundamentals of any investment which are the strategic planning and the existing resources. These tools enable businesses to make informed decisions about their future strategies, investments, and growth goals.

For businesses, the competitive forces model provides insights into the competitive landscape of the industry. The model allows businesses to identify and assess the key forces that shape their competitive environment. This understanding is critical for businesses to develop strategies that can help them to remain competitive and successful.
emerging trends of sustainable aviation, one may summarize that the industry’s growth will

2.2 Malaysia’s Position in Aero-manufacturing Attractiveness Ranking

that affect the industry’s supply chain. This could be due to

2.3 Michael Porter’s Five Competitive Forces Model

Porter’s
Porter’s Five Competitive Forces Model gives investors a bird’s eye view of potential threats and challenges, either to existing business or new entrants. It qualitatively streamlines potential competition and allows for the strategizing of appropriate risk management measures. In other words, new investors will be able to position themselves in the existing market with proper risk assessment. From a different perspective, this model may also be utilized to identify a business venture’s competitive edges that may add value to the industry.

According to Flouris and Oswald in [10], Porter argued that the model is applicable to all industries though they differ greatly in composition. There are five forces identified in the model which are categorized as:

1) Threat of New Entrants,
2) The Power of the Supplier Market,
3) The Power of the Buyer Market,
4) Threat of Substitute Products and Services, and
5) Rivalry Among Industry Members.

The details explanation are as follows:

2.4 Threat of New Entrants.

Porter argues that the level of difficulty for a new actor entering an industry influences its landscape. An industry that has low entry barriers will become very competitive as new entrants will flock drastically to have a portion of their share. In these circumstances, market share for each actor will be relatively small. Subsequently, this will create a playing field that can easily be disrupted. Though not the only influencing factor, this will make it a dynamic playing field.

3 Economies of scale.

For the aero-manufacturing industry, the barriers exist in several forms, in which the most common being the economies of scale. Globally, there are several notable producers that are supplying the aviation sector with parts and components. Aerospace giants such as Boeing and Airbus have been the main actors for quite some time. Their global customer database includes Malaysia’s two major airlines – Malaysia Airlines and Air Asia. They are classic examples for companies that have achieved scale economies that provide technological solutions to airlines and military in large quantity. Following the duo are United Technology, Lockheed Martin, Northrop Grumman and GE Aviation, just to name a few. By gaining scale, the actors can gain control over cost per unit of an item. At a lower cost, these corporations can control the market share, making it difficult for new entrants to position themselves on a level playing field as huge capitals are needed [10].

3.1 Brand Loyalty.

Typically, being huge in the market also means that brand loyalty aspect of the barrier does...
not go unaddressed. Airlines generally would stick to the brands that have been serving their respective organizations. As loyal customers, Malaysia Airlines and Air Asia would stick to Boeing and Airbus as their primary service providers because this would also mean undisputed level of service which may also be interpreted as sustained operational efficiency.

3.2 Government Policies and Regulation.

Malaysia has strict regulators such as the Civil Aviation Authority Malaysia (CAAM) and its subsidiary, Malaysia Aviation Commission (MAVCOM), that monitors all aspect of the industry. MAVCOM in particular, keeps an eye on the economic matters relating to the aviation industry, while CAAM covers all other aspects including aero-manufacturing in Malaysia. The local industry’s regulations and policies are designed to adhere international guidelines such as those lined by ICAO, EASA, FAA, JAA and the Quality Management System (QMS) certifications. This is to ensure that the industry puts safety and quality as its priority. Once again, huge capital investment for new entrants is needed to ensure the policies are observed. In addition, newcomers are also expected to bear the pressures of learning knowledge related to the field that is constantly evolving.

3.3 Switching Costs.

Another factor that may pose as entry barrier to new entrants is high switching cost within industry. Clients that have established a sturdy relationship with incumbent suppliers and providers will be hesitant to switch to new ones. Bhasin and Abanteriba elaborates switching costs as search cost, transaction costs, shopping costs, compatibility costs, learning costs, contractual costs, uncertainty costs, psychological costs, and political costs as shown in Table 1, that may have to be considered by a client prior switching providers or Original Equipment Manufacturer (OEM)

Table 1: Analysis of Cost Endured by a Customer When Purchase is made from A New Entrant or Incumbent OEM.

<table>
<thead>
<tr>
<th>Cost Type</th>
<th>New Entrant</th>
<th>Incumbent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search</td>
<td>Significant</td>
<td>Nominal</td>
</tr>
<tr>
<td>Transaction</td>
<td>Nominal</td>
<td>Nominal</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Significant</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Learning</td>
<td>Significant</td>
<td>Nominal</td>
</tr>
<tr>
<td>Contractual</td>
<td>Significant</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>Significant</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Psychological</td>
<td>Significant</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Shopping</td>
<td>Significant</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Political</td>
<td>Significant</td>
<td>Nominal</td>
</tr>
</tbody>
</table>

3.4 The Power of the Supplier Market

Flouris and Oswald in [10] describes the power of supplier market as closely related to the significance of the component part to the final product. In Malaysia, the biggest portion of the OEM market belongs to Airbus and Boeing as the two major aviation actors operates on fleets designed by these manufacturers, followed by several other actors supplying the local military market. The Malaysia Aerospace Blueprint 2030 highlights that there are fourteen NADCAP certified companies in Malaysia. It also highlights that the cost of doing business in China and other parts of the world has somewhat leveled in the recent years. Prior the COVID19 pandemic, this could mean less bargaining power from the supplier market. However, due to buyer’s
manufacturing subsector, and suppliers’ market.

Likewise, the aero manufacturing has substitutes to conventional OEM parts and services give another example to this would be the replacement of glass bottles in the beverage industry. From the perspective of the suppliers, these changes in the market can be seen as threats to their business. For example, in the European market, the use of plastic bottles has increased due to the ban on glass bottles. This has led to a decrease in demand for glass bottles, which in turn has decreased the bargaining power of suppliers to manufacturers. As a consequence, aero manufacturers may have to either reduce the price of their parts and components, or consider a temporary reduction in their cost. This may also shrink the value of the bargaining power of suppliers in the aviation market, especially in local suppliers. According to Hanson in the aerospace industry continues to embrace non traditional manufacturing processes via the usage of advanced manufacturing technology.

3.5 The Power of the Buyer Market

Perhaps, a critical area that may be explored in this section of Porter’s FCFM would be the buyer’s purchasing power. In this case, airlines, and military customers. Delloite reported to improve in the second half of 2022 [5]. Considering this, the buyer’s power of the aero manufacturing subsector buyer’s market will be

3.6 Threat of Substitute Products and Services

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3.7 Rivalry Among Industry Members

The discussions in section 2.1 until 2.3 are summarized in the following section below, which describes the industry's rivalry among members. Considering that the additive manufacturing technology is relatively new to the aerospace manufacturing subsector, it is important to note that there are many actors playing in the same market. To translate this into more quantifiable measures, the rivalry among industry members is described using the framework of Porter's Five Competitive Forces Model (FCFM). This model is used to analyze the competitive intensity of an industry and to understand the factors that affect the profitability of a company within the industry. Among these factors, industry rivalry is considered to be one of the most significant. 

There are several ways in which industry rivalry can be measured. One way is to look at the number of competitors in the market, which can be influenced by the size of the industry and the number of companies that are entering the market. Another way is to look at the degree of concentration in the market, which can be measured by the number of dominant players and the extent to which they control the market. A third way is to look at the degree of differentiation among competitors, which can be measured by the extent to which each company offers unique products or services. 

While the exact number of competitors in the industry is difficult to determine, it is clear that there are many companies competing in the aerospace manufacturing subsector. Some of these companies are large and established, while others are smaller and emerging. In addition, there are many different types of companies in the industry, ranging from traditional manufacturers to startups that are using new technologies. Despite this diversity, there is still a lot of overlap between the companies, and they are often competing against each other for the same customers.

In terms of concentration, the industry is relatively concentrated, with a few dominant players holding a significant share of the market. The largest players are Boeing, Airbus, and Bombardier, which together control a significant portion of the market for commercial aircraft. However, there are also many smaller players, such as Bombardier, Airbus, and Embraer, which are competing for market share in different segments of the industry.

Another important factor to consider is the degree of differentiation among competitors. While there are many companies in the industry, the extent to which they offer unique products or services varies. Some companies are focused on developing new technologies, while others are more focused on improving existing ones. In addition, some companies are focused on developing new markets, while others are focused on maintaining their current ones.

Overall, the rivalry among industry members is high, and it is expected to remain so in the coming years. The industry is highly competitive, and companies are constantly looking for ways to differentiate themselves from their competitors. This is especially true in the face of new technologies and innovations, which are changing the landscape of the industry. As a result, companies are constantly looking for new ways to increase their profitability and stay ahead of the curve.

4 Conclusion

As a result of the discussions in section 2.1 until 2.3, it can be concluded that the aerospace manufacturing subsector is a highly competitive market. It is also highly regulated, and there are many factors that affect the profitability of companies within the industry. However, despite these challenges, there are also many opportunities for companies to grow and increase their market share. By implementing the latest technologies into their business, companies can improve their efficiency and reduce costs. In addition, they can increase the durability of their products, which will help them to compete with other companies in the market. 

In conclusion, it is important to note that the aerospace manufacturing subsector is a highly competitive market. Companies must be able to adapt to the market and constantly look for ways to improve their products and services in order to stay ahead of the curve. By doing so, they can increase their profitability and achieve long-term success in the industry.
The commercial passenger market has been impacted badly, thus reducing demand in the aero-manufacturing subsector because of grounded airplanes. Global conditions such as war in Ukraine, rising fuel cost, rising cost of living and global inflation may dampen further industry's growth, though current market outlook by prominent experts is promising. It is unknown as to when exactly the market is going to recover due to the volatility of circumstances.

### Table 2: Summary of Porter's FCFM for the Aerospace Manufacturing Subsector

<table>
<thead>
<tr>
<th>Porter’s Force</th>
<th>Overall Impact</th>
<th>Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat of New Entrants</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>The Power of Supplier Market</td>
<td>High</td>
<td>Limited supply and increased price of natural resources due to current global condition.</td>
</tr>
<tr>
<td>The Power of Buyer Market</td>
<td>Moderate</td>
<td>Buyer market still in recovery phase post pandemic. Slow recovery in business and leisure travelling due to anticipation given to ripple economic effect and global inflation.</td>
</tr>
<tr>
<td>Threat of Substitute</td>
<td>Moderate to High</td>
<td>Emerging of new manufacturing technologies. Innovations in greener aircrafts, cheaper and lighter but durable parts.</td>
</tr>
<tr>
<td>Rivalry among Industry Actors</td>
<td>High</td>
<td>Overall combination of Porter's competitive forces.</td>
</tr>
</tbody>
</table>

Michael Porter’s FCFM is a qualitative instrument that identifies competitive forces for business leaders to develop sound strategies. Given the facts presented, it may summarize the potential forces as low, moderate or high. This analysis will give strategists alike, a generic picture of an industry’s threats and potential competition as shown in Table 2.

### References

8. M. E. Porter, Competitive Strategy: Techniques for Analyzing Industries and


