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Analysis of the External Environment of the Civil Drone Industry: A Case Study of DJI

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ABSTRACT
Nowadays, when it comes to aerial photography drones, consumers think of DJI at the first time. Among consumers, DJI seems to be equated with drones. But DJI is a young company which established in the 2006. This paper conducts a strategic analysis of the macro environment in the initial development stage of Shenzhen DJI Innovation Co., LTD. The analysis is from the aspects of political, economic, social and technological environments four dimensions, to find it strengths, weaknesses, opportunities and threats, and establishes an analysis matrix. It also introduces the historical background and strength of DJI, and tries to find out the successful experience and inspiration of DJI. Through these analysis, it is found that the company relies on the distinction between domestic and foreign markets, product differentiation and keen marketing strategies for its rapid expansion in the field of drones.

Keywords: *DJI, UAV, Drone, SWOT, PEST*

1. INTRODUCTION

As a leading company in the drone industry today, the rapid development of DJI Company is worth to study. Some companies try to replicate the development experience of DJI on themselves. According to Skylogic Research's Drone Market Sector Report in 2018 which was collected through an online survey of 2,500 respondents, DJI is estimated to have a 74% market share. The same report in 2016 showed that DJI had only a 50% market share [1]. DJI has expanded its market share by 24% in just two years, which is inseparable from its flagship series products, especially the Phantom aerial photography drone released in 2016. Based on this phenomenon, this paper mainly analyzes the rapid growth of DJI in the global civilian drone market and the market environment before the release of Phantom products in combination with the analysis model of SWOT and PEST, study the political, economic, social, and technological environment of DJI, and try to find out some reasons of DJI to expand the market share of civilian drones in a short time.

2. THE DEVELOPMENT OF THE DRONE INDUSTRY

2.1. The Preliminary Overview of the Drone Industry

When it comes to the word drones, people think of high-tech technology products. However, drones are not as novel as expected. As early as World War II, drones were used as targets to train anti-aircraft gunners. The military drone market has always been the mainstream market of the drone industry [2]. The UAV (Unmanned Aerial Vehicle) market can be divided into two markets: military and civil use, between which the civil drone market can be divided into consumer UAVs for ordinary consumers and industrial drone markets for enterprises. With the development of the drone industry, there will be smaller, more functional, and cheaper UAVs, and the civilian drone market will expand rapidly. According to Goldman Sachs' drone industry analysis report in 2016, the global UAV market will reach 100 billion dollars by 2020 [3]. According to research data released by Drone Industry Insights, the actual global drone market size in 2020 is about 22.5 billion dollars, which shows that the space in the drone market is huge, and the market growth rate is faster than people's expectations [4].

2.2. The Development of Civil Drones

Although drones were recorded in the 19th century, it used in military at first. In terms of commercial drones, the first national recognition of the potential of commercial drones was in 2006, when the FAA issued the first license for commercial drones, which allowed the use of drones in U.S. civilian airspace to search for survivors of disasters. At first, almost no commercial drone licenses were applied by companies. However, its price has gradually decreased and its technology has become more and more mature. Many enterprises have seen its commercial prospects and begun to use it in logistics, security patrol, fire warning, gasoline mining and geological exploration. Because the use of drones can reduce enterprises' costs, such as in the field of surveying and mapping, drones are used to replace inefficient manual land surveying and mapping methods. Besides, they can be used to substitute for traditional high-cost and weather-prone aircraft to conduct aerial mapping [5].

For the consumer-grade drones, when big companies announced the use of drones, the public generally began to really notice drones. In 2013, Amazon announced that it would use drone delivery, and in December of the same year, the search volume of the keyword 'drone' in Google also increased sharply. Since then, more drone manufacturers have tried to upgrade the drone and they put the photographic equipment on its, which has formed the mainstream function of consumer-grade drones, the aerial photography [6].

2.3. Characteristics of Consumer-grade Drone Market

The consumer-grade UAV market is one of the growing UAV markets with great development prospects, so a large amount of capital is poured in this industry, which leads to fierce competition in the market. In 2016, consumer-grade drones began to be favoured by ordinary consumers. Their products gradually developed into lightweight, and their prices gradually became affordable to the people. The main consumer groups are aimed at video producers and we-media channels with aerial photography needs. Therefore, products with high-quality image transmission functions are more popular. These groups are mainly individual, so price is also the key issues in consumer consideration. Furthermore, because most of these consumer groups are not professional remote-controlled aircraft enthusiasts, the usability of products is particularly important. As a result, drone products that do not require aviation model experience and are easy to use are more popular [7].

3. THE DEVELOPMENT OF DJI

In 2006, Wang Tao, who was also studying for a master's degree at the Hong Kong University of Science and Technology, and his classmates established Dajiang Innovation Company in Shenzhen. The company's main research direction was the helicopter flight control system of aircraft models. However, at that time, the product price of the civil helicopter flight control system was too high (200,000 yuan per unit) and had strong limitations (it is only used on helicopter aircraft models), which made the target market narrower. So he turned his attention to the rising multi-axis aircraft at that time for the principle of flight stability of multi-axis aircraft was not much different from that of helicopters.

In 2011, the flight control system of DJI's multi-axis aircraft came out. In 2013, the iconic Phantom 1 drone was launched in combination with the popular gopro sports camera at that time, which can independently install gopro for aerial photography. Since then, DJI has begun to show its skills in aerial photography drones and constantly bring more new functions. DJI Mavic Pro, launched in 2016, introduced the concept of foldable four-axis aircraft for the first time, which not only improves mobility, but also retains the functions of universal joint stability and long battery life. In the same year, the Phantom 4 product was launched. According to the 2018 market survey report of Skylogic Research, the Phantom Series, which had a 29% market share [1]. According to the survey of Skywatch.ai, the market share in 2018 was 94.1%. Therefore, it is reasonable to believe that the Phantom series is the most popular product line [8].

4. ANALYSIS MODELS

4.1. SWOT Analysis

SWOT analysis is the abbreviation of strengths, weaknesses, opportunities and threats. Its effectiveness and straightforward can condense a large number of identified problems into one by one. It can criticise the internal and external perspectives from the perspective of the enterprise. Between them, the internal perspective is the Strengths and Weaknesses of the products. By clarifying the advantages and disadvantages, enterprises can identify and solve the disadvantages and expand the advantages. The external perspective refers to opportunities and threats, which enhances their competition by maximising opportunities and customer service threats [9].

4.2. PEST Analysis

PEST analysis is the abbreviation of the four words: political, economic, social, and technological. It analyses the macro environment from these aspects. PEST can provide more comprehensive assessment of the environment and market, which is conducive to viewing the company's position in the overall environment [9].

5. ANALYSIS OF THE EXTERNAL ENVIRONMENT OF DJI IN 2011

5.1. Analysis of Political Environment

5.1.1. Political Strengths (PS)

The domestic (Chinese) political environment is stable, and small and medium-sized enterprises are supported by national policies, which is conducive to the long-term development of enterprises. Increasingly open policies have also made international trade more convenient. U.S. President Obama paid more attention to China's trade relations and improved Sino-US relations [10], which established a favourable political environment for drone exports to North America.

5.1.2. Political Weaknesses (PW)

With the development of China, a socialist country, the historical ideological bias of some Western countries has cast doubt on the operational safety of companies from China. Because civil drones are oriented to the mass market and they pursue low-cost control, there is a certain gap in reliability compared with other higher-end drones, and the level of players' operation is uneven. If an accident is not properly manipulated, certain political risks may be generated.

5.1.3. Political Opportunities (PO)

Under the background of the era of military-civilian integration, the trend of drones from military sinking to civilian use is inevitable. Eastern and Western countries have various preferential policies on this new industry, ushering in unprecedented development opportunities, and the civilian UAV market has great development potential.

5.1.4. Political Threats (PT)

The U.S. media and some politicians criticised Obama's China policy for being not though enough. In the future, the policy changes after other political leaders taking office may not be conducive to China's foreign trade in high-tech industries. Other Western countries may also follow suit, which may restrict the export of Chinese companies' products in Western countries and unfriendly product policies, which will affect the production period of enterprises in foreign markets.

5.2. Analysis of Economic Environment

5.2.1. Economic Strengths (ES)

Since the reform and opening up, the domestic economic level has been continuously improved, and the strength of private capital is strong. With the rise of drone popularity in recent years, the huge prospects of the market make it favoured by capital, and it is easier for drone enterprises to raise funds.

5.2.2. Economic Weakness (EW)

The drone industry belongs to the real economy. With the maturity of China's economy, the real GDP growth has slowed down significantly, and the development of the traditional real economy has gradually declined [11]. Besides, Chinese high-tech enterprises may be subject to many restrictions in Western-led international markets, which makes financing difficult.

5.2.3. Economic Opportunities (EO)

Although the country's economic development has slowed down [12], it still maintains high growth. The state's capital investment in supporting emerging industries is increasing, and the company has more policy dividends for innovative research, which brings good opportunities for the company's long-term development.

5.2.4. Economic Threats (ET)

With the development of society, people's living standards have improved, and salary requirements have gradually increased [13]. Enterprise innovation and research and development require more highly educated talents, which will increase the company's operating costs and cause economic burdens.

5.3. Analysis of Social Environment

5.3.1. Social Strengths (SS)

The country's social environment is stable; higher education is developing rapidly [14]; the number of people admitted to higher education institutions is increasing; the number of high-level talents is increasing year by year; and there are more potential practitioners in the industry. All factors mentioned above are conducive to enterprises to choose excellent talents. The overall social environment encourages innovation. The huge development potential of civil drones is conducive to attracting excellent innovative talents and the long-term development of enterprises.

5.3.2. Social Weaknesses (SW)

The UAV industry still belongs to the manufacturing industry. In the production and testing process, there will be a certain external cost. For example, safety hazards and noise pollution caused to the surrounding environment during the test flight, etc. Incomplete laws and regulations and mixed quality of flight operators will have an impact on the social evaluation of drones.

5.3.3. Social Opportunities (SO)

People always feel that the drone industry is like an emerging industry with a sense of seniority and science fiction, and industry practitioners are also quite proud and satisfied with this feel. Therefore, the drone industry would attract the arrival of high-tech innovative talents, promote the development of DJI and the whole industry.

5.3.4. Social Threats (ST)

Due to different political ideologies, the development of domestic high-tech enterprises abroad is limited and more harsh, and public opinion is also vulnerable to biased media reports, such as companies helping the Chinese government infringe on citizens' personal privacy, or using the words like 'disrupt the market' to describe the drone industry [15], which will have an impact on the company's reputation in the international market.

5.4. Analysis of Technological Environment

5.4.1. Technological Strengths (TS)

The company started with helicopter flight control system, and the accumulation of technology in this field has become representative and is in a leading position in the industry. Besides, its aerial photography technologies such as Yuntai also have a certain technical capital. While promoting the development of civil UAV technology, DJI also has cost control advantages, making the enterprise's civil UAV products more competitive in the same industry.

5.4.2. Technological Weaknesses (TW)

UAV technology relies heavily on sensors and other electronic equipment. Civil drone companies focus on function development, hardware upgrade, chip sensors, etc., rely on foreign companies, which is not conducive to the long-term development of the company.

5.4.3. Technological Opportunities (TO)

With the coordinated development of aerial photography, cloud platform, camera, navigation system and other technologies, it has greatly improved the acceptance of the market and the functionality of drones, which can better meet the market demand and further expand the user base.

5.4.4. Technological Threats (TT)

The maturity of other related tube technologies of drones requires financial support, but these will increase production costs. Cost issues and technical issues are also important, so how to develop technology at a lower cost is a key technology to occupy the civilian UAV market. Foreign companies have already started research in this field, so DJI needs to be considered as soon as possible.

5.5. Operational Strategies of DJI

Under the different market environments, policies, laws and regulations at home and abroad, DJI North American Company was established in 2011 to specialise in the international market and cover domestic and foreign customer groups more specifically. And it adopts the marketing strategy of market segmentation which is a subgroup within the market that more precisely defines a group of customers [16]. It launched the DJI Phantom series and the Inspire series respectively.

The Phantom series is suitable for the general public and has the characteristics of high cost performance and easy to control. Even if the cost is controlled, DJI still maintains a high level of design, allowing potential groups interested in the drone market to join the market [17]. It not only opens up the market quickly through Phantom, but also expands its popularity in the market.

The Inspire series is positioned as a more high-end and professional drone enthusiast, so it can fully demonstrate the design and technical heritage of DJI [17]. In terms of marketing strategy, it is divided into professional marketing and Internet marketing. The company actively and independently organises various drone-related events, such as aerial photography competitions, aerial model competitions, etc., which has improved its status and reputation among drone enthusiasts. In terms of Internet marketing, DJI actively cooperates with major YouTube anchors to share the most real consumption experience, collects feedback on product use, and attracts more potential customers such as young people to join in [18].

5.6. Experience Learned from DJI

Companies with the intention to enter the international market have increased their attention to foreign markets and increased their political sensitivity at an early stage. They need to seriously study the durability, reliability, safety and ease of use of civil drones. They also need to strengthen self-recognition of market positioning, and keenly grasp the key points of market trends and target potential customers. They could seize the opportunity of national innovation policy support, actively innovate and research and development, attract investment with good commodities, and accelerate their own development.

6. CONCLUSION

This paper roughly summarises the development status of DJI in recent years and analyses the macro environment of the company's development in 2011 through SWOT and PEST analysis. However, because

DJI does not disclose sales and other business data, some of the conclusions are speculation, and they are not complete and clear internal data. DJI has developed fiercely in recent years, but according to the latest data from Drone Analyst, its share in the global commercial drone market fell by 15% to 54% in 2021. Therefore, it can be found that the competition in the industry is still fierce and cannot be taken lightly. DJI should continue to strengthen innovative investment and actively develop functions that consumers are interested in. It can also build strategic alliances and carry out cross-border cooperation, such as previous cooperation with gopro which is a good experience, to develop new market groups and continue to maintain its position in the market.

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