ISSN 2616-5902 Vol. 5, Issue 11: 164-169, DOI: 10.25236/AJBM.2023.051125

Research on the Sales Model of Scenic Area Drone Logistics and Distribution—Taking Jueshan Scenic Area in Shanxi Province as an Example

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Abstract: *Currently, logistics and distribution have spread almost all over the country, but the development of logistics business in mountainous spots is extremely slow. The delivery of drones in scenic spots has many advantages such as fast speed, high efficiency and low cost. If drones can be used to solve the problem of difficult delivery and expensive goods in scenic spots, they will certainly be able to stimulate tourists' consumption, which will in turn attract more tourists to the scenic spots and create higher revenue. Therefore, this paper synthesizes the current situation of logistics distribution in mountainous spots and the direction of development of modern logistics equipment, considers the influencing factors of all aspects, and conducts research on the sales mode of scenic spot drone logistics distribution.*

Keywords: *drones, logistics and distribution, mountainous areas*

1. Introduction

At present, logistics distribution has almost spread throughout the country, but the development of logistics business in mountain attractions is extremely slow. The reason for this is that the bottleneck that restricts the logistics distribution of mountain attractions is the traffic. But it is undeniable that the annual demand for transport of goods in mountain attractions is considerable, and during the annual May Day and November Golden Week, the vast majority of goods in mountain attractions can be said to be in short supply[1]. However, the high cost of distribution raises the price of goods, too long a transport process compromises the quality of goods, and narrow supply channels limit the variety of goods. All these phenomena reflect that it is crucial to find a new type of scenic goods distribution method to solve the above problems, and it also has a broad market prospect. At a time when labor costs and time costs are increasing, a new round of change is coming quietly - drone logistics. UAV distribution in scenic spots has many advantages such as fast speed, high efficiency and low cost. If drones can be used to solve the problem of difficult delivery and expensive goods in scenic spots, they will certainly be able to stimulate tourists' consumption [2], which will in turn attract more tourists to scenic spots and create higher revenue.

2. Feasibility Analysis

2.1 Value Proposition

For customers, each logistics and distribution enterprise is competing for: 1) safety, 2) speed, and 3) information.

(1) Safety: In order to ensure the safety of the logistics network, we have made rigorous and meticulous calculations and selections of the drone model, aircraft weight, cargo weight, lift-to-resistance ratio, GPS equipment, etc. by stipulating the operation routes of the drones to ensure the 100% completion of the cargo replenishment tasks. Among them, the UAV models are multi-rotor UAVs equipped with 5G communication network, global positioning system (GPS), artificial intelligence algorithms, etc. [3], together with millimeter wave radar scanning and positioning. At the same time, we set up stationary base stations at appropriate locations through several experiments and calculations on the subject of UAV delivery to ensure high UAV utilization, fault detection and emergency recovery, and reduce economic losses and environmental damage caused by UAV damage. Two UAVs are kept

ISSN 2616-5902 Vol. 5, Issue 11: 164-169, DOI: 10.25236/AJBM.2023.051125

on standby during working hours as emergency aircraft for unexpected accidents, and other UAVs are used for replenishment operations. When encountering unexpected conditions such as drone failure and other problems, the faulty machine sends out its own positioning signal to provide maintenance personnel with the exact place where the accident occurred, while starting the standby drone to continue to complete the delivery operation of the faulty machine.

(2) Speed: For high-altitude scenic areas, drone delivery will be far faster than other delivery solutions.

(3) Informatization: After understanding and researching the relevant technologies, our team finally decided that the positioning of the aircraft would take satellite, radar and photography triple positioning to improve accuracy while adapting to various complex situations in the scenic area, and we used big data in the design of the route to ensure that the delivery route would not be disturbed by tourists and scenic animals.

2.2 Technical Feasibility

To meet the requirements of our value proposition, UAS components are rigorously selected so that UAS delivery cargo can be adapted to conditions such as the natural environment of mountainous regions.

(1) Payload selection

1) Motor: Q6L KV350 model motor was selected to support the power for transportation.

2) Electronic governor: A brushless ESC with a continuous current of 80A and a battery section of 6S was selected.

3) Propellers: The propellers of model Carbon 22×5.5 were selected, with four propellers front and rear.

(2) Selection of flight components

The flight system is set up with GPS, artificial intelligence algorithm, millimeter wave radar, and 5G communication network for positioning; camera for real-time positioning and detecting flight conditions; attitude sensor for adjusting the attitude of the UAV during flight; flight protection system can make self-protection in time when the UAV faces dangerous situations.

(3) Command, control and communication (C3) options

1) Command and control: Since there are several flight routes of the UAV and there will be several delivery sites in each route, we can import the routes into the vehicle by means of programming. After assembling the cargo at the bottom of the mountain the staff will determine the site for unloading. When the UAV reaches the set station, the cargo is unloaded and automatically enters the base station to complete the power replenishment. After the power is replenished, it automatically flies down the mountain to the starting point and completes a cargo transport. If the power is insufficient in the middle, the drone will automatically detect the nearest base station to land itself. If the remaining power of the UAV is not enough to land to the nearest base station, or if it encounters a dangerous situation, the flight protection system will recognize the dangerous situation and thus automatically start. When the flight protection system is activated, the UAV will automatically send a distress signal to the staff and send positioning information.

2) Communication: the most advanced 5G communication network is used to make the positioning system of the UAV more accurate, which also improves the safety of UAV flight and the convenience of human manipulation [4]. The entire network includes two entities, the operation and dispatch center (i.e., at the foot of the mountain) and the drone delivery station [5], which sends commands through the wireless network to control the flight routes of the drones. This circumvents congestion, liberates manpower, and gets rid of terrain limitations to cope with extreme conditions.

(4) Support equipment selection

Since new energy sources have been widely used in recent years, there is no doubt that our team has chosen the electric power system as the power source for the power system. Electricity as a clean energy, no pollution, high efficiency, and more convenient energy replenishment.

2.3 Market Potential Feasibility

We use the combination of drones and vending machines to substantially increase profits while

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reducing costs.

(1) Compared to traditional scenic spot delivery, drone delivery has the following advantages.

1) It makes it very convenient to replenish goods in hard-to-reach scenic spots, avoiding price increases due to site restrictions and taking market advantage based on great convenience to consumers.

2) After networking the vending machine with the base station, the automatic replenishment can be accomplished by conducting network analysis according to the data returned and excluding the drone for replenishment.

3) By replenishing the goods through drones, the number of employees is greatly reduced, reducing the economic base required to consume human and material resources and increasing the profitability.

(2) Compared to traditional scenic delivery, vending machines have the following advantages.

1) Diversified options can be provided according to consumer needs, such as using the machine's own electrical system to heat or cool the supplies, providing consumers with hot or cold drinks to meet consumer demand.

2) Reduce labor costs, unmanned vending, no need to keep watch throughout, and can operate 24 hours a day to meet the night tour of consumers.

3) Save time, eliminating the need to queue for checkout.

4) Solar panels installed on the vending machine can be used to generate electricity from the sun for beverage heating and normal work, excess electricity can be stored to charge the parked drones to ensure that they can normally fly to the next drop point and fly back.

3. Brand Positioning

The end result of brand positioning is to build the brand into consumers' minds[4], so that consumers have an overall brand perception in their minds (including brand association, brand image, perceived quality, etc.). When consumers think of our brand, they can associate it with a series of related contents. Compared with human delivery, drones are more convenient, faster and safer for mountainous scenic spots, and more types of goods are available. The main target market of this product is the scenic spots containing mountainous areas all over the country. The main feature of this target market is that as the altitude rises, the demand of tourists for water and simple food increases, and at the same time the price of these goods also shows a precipitous increase, which is difficult to meet the needs of consumers. Based on this point of departure, the use of drones to deliver goods to the mountainside and mountain tops, through vending machines and other forms, to sell to tourists at prices lower than the current scenic commodities to meet their needs. In the long run, once consumers see the drones of this company delivering goods to the mountain, they will unconsciously think that there are low-priced vending machines in that scenic spot, thus mobilizing tourists to consume, and thus indirectly increasing the sales of goods.

3.1 Brand Portfolio and Framing

The brand portfolio is single brand (drones) for our company and multi-brand (goods for sale) for other companies; the brand structure is a single brand structure.

3.2 Promotional Tools

In order to better promote the advantages of our products over traditional delivery and leave a deeper impact on the viewers, we set up a promotional website to introduce in detail the mode, characteristics and advantages of drone delivery, etc.

In addition, in order to facilitate the operation and management of drone delivery in the background, we designed a cell phone APP for the administrator's background.

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4. Communication Strategy

4.1 STP Strategy

The first is market segmentation. The company divides the entire market into several sub-markets or sub-sub-markets with different needs according to the type of attractions [5-6]. According to the type of attractions, it can be divided into eight categories, such as lake attractions and forest attractions. Through market segmentation, we selected the most suitable target market at present - mountain attractions, while providing inspiration for discovering new markets.

Next is the target market. Selecting the target market and specifying which type of users the company should serve and which of their needs it should meet is an important strategy for the company in its marketing activities. Drone distribution mainly solves the problem of difficult, high cost and difficult management of distribution in scenic areas. Using the centralized market strategy, we select mountainous spots as the target market and implement specialized sales. The use of centralized market strategy can focus on the strengths, which is conducive to the marketability of products, reduce costs and improve the visibility of the company and products.

Finally, market positioning. The essence of market positioning is to make our company strictly distinguishable from other companies, so that customers obviously feel and recognize this difference and thus occupy a special position in their minds. Currently drone delivery is a relatively new field, and the implementation of drone delivery in scenic areas is unheard of by most people. Therefore, the difference between drone delivery and traditional human delivery is obvious, and drone delivery will leave a deep impression on visitors.

4.2 Porter's Five Forces Analysis Model

(1) Bargaining power of suppliers: Through the drone delivery is conducive to solving the scenic area for many years of scenic hawkers unmanaged, expensive goods and other problems, while enabling the scenic area to obtain a certain amount of profit in this. At present, the market of drone delivery is relatively shallow, and no one is involved in scenic spot delivery, so there is less competition in the industry and the market position is more stable[7]. In summary, drone delivery has a certain bargaining power for scenic spots.

(2) Bargaining power of purchasers: At present, drone delivery is only in the pilot stage, so there are fewer purchasers, and the scale of suppliers is small, so scenic spots have certain bargaining power in this regard.

(3) The ability of potential competitors to enter: At present, there are no competitors or few competitors in the scenic area drone delivery, so there is no need to worry about the threat of new entrants in the early stage. However, when the market scale is expanded and drone delivery is promoted to a certain extent, potential competitors may arise.

Our response strategy is to occupy part of the market in time by piloting in the early stage, and then use the successful pilot market as the basis for an extensive publicity strategy to build brand, reputation and word of mouth. After gaining certain profits, we will improve and develop the technology so that the distribution system can be more adapted to the scenic environment and show the difference with other distribution companies (differentiation strategy). Use cost leadership strategy to force other drone delivery companies to also upgrade their equipment, so that these companies launch competition due to high costs. Through these means, the business endpoint is placed in scenic goods distribution, and the competitive advantage and market position of scenic distribution is established, i.e. agglomeration strategy.

(4) Substitute ability of substitutes: At present, the substitutes of drone delivery are mainly the vendors who go to the scenic spot to harvest on their own. Since the merchandise of the vendors are transported by human power to the halfway point of the mountain or the top of the mountain, the price of the merchandise is extremely expensive. And due to the lack of management of vendors at scenic spots, the personal safety of vendors, food safety of consumers, and environmental hygiene of scenic spots cannot be guaranteed. In short, vendors have low substitution ability as alternatives.

Our response strategy is to promote the advantages of drone delivery to scenic spots in rectifying chaos and facilitating management, and to promote to tourists that the goods delivered by drones have the advantages of good quality and low price and quality assurance, so as to gradually reduce the market

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share of small traders (mountain people). In order to prevent hawkers from destroying drone equipment, etc. due to the loss of economic resources, they can be employed as administrators of drone delivery, eliminating the burden of using manpower to transport goods to the mountains and providing better treatment; they can also reach cooperation with them to have their goods delivered by drones on their behalf and have profits distributed by both sides, which can promote the growth of hawker sales.

(5) Competitors in the industry now have the ability to compete: At present, even the existence of drone delivery in other industries has never been involved in scenic goods delivery, so the competitor's ability to compete in scenic delivery is weak. If scenic drone delivery is promoted for a period of time, other drone delivery companies also join the ranks of scenic delivery, there may be some competitive ability.

5. Sales Model

5.1 Pre-Feasibility and Feasibility Studies

Through a pre-feasibility study and feasibility study, we decided to introduce the sales model of drone delivery as a logistics product, using the scenic area of Jue Shan Mountain in Shanxi Province as an example.

Shanxi is one of the top five provinces in the country in terms of holiday traffic, and Jue Shan is one of the famous scenic spots in Shanxi, which can receive an average of 400,000 passengers per day during the peak season. However, because Jue Mountain is located 13 km southeast of downtown Jincheng on the south bank of the Dan River, with high altitude and treacherous terrain [8], it is difficult to transport living materials to the mountain, and the human and material resources consumed in distribution are large, leading to a significant increase in prices in the scenic area. If drone delivery can be applied to this scenic area, it can replace human labor in a large number, and the demand in this scenic area is large, the market value of our proposal will be very considerable.

In terms of drone delivery itself, the climate of Juezhan is very suitable for drone delivery. Jueshan belongs to the warm temperate semi-humid continental monsoon climate. The climate is warm and rainy in summer, but it needs to be protected from rain, and there is enough light for vending machines to use solar energy to supply their own power. And the height difference between the top of the mountain and the foot of the mountain is 973 meters [7], and the temperature drops about 6 degrees, which has less impact on the flight. Basically, the flight can be realized all year round.

The distribution is mainly for tourists who visit scenic spots and do not bring enough food supplies. Since about 80% of the tourists in Shanxi come from outside the province, these people are more inclined to buy goods, and about 60% of them belong to the age group between 19-45, which is our main source of customers because of the large number of tourists in this age group and their strong purchasing power.

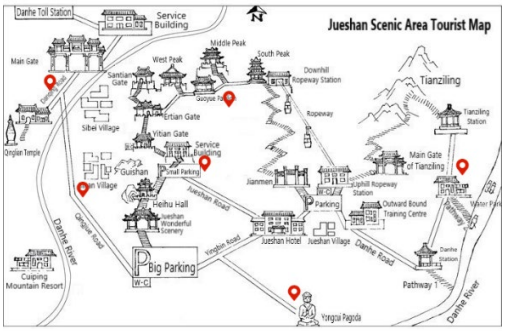

Figure 1: Schematic diagram of the placement site

According to human physical strength calculation, 3.5 hours of exercise can consume all the stored sugars, so choose to set up a drop site every 2 km to ensure the normal resupply of the human body. Also taking into account the special situation needs of tourists, the drop-off distance is appropriately shortened [9-10]. And according to the topographic survey, the drop-off location should be gently sloping and not easy to accumulate water, suitable for the installation of vending machines. So a comprehensive research on the instantaneous passenger flow in different locations of the scenic spot selected the drop-off location as shown in Figure 1, which has a high flow of people and can maximize the sales and meet the needs of tourists.

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5.2 Expected Results

Vending items include water, functional beverages, coffee, and higher energy and easily stored food items such as bread, Snickers, compressed cookies, and ham hocks.

Depending on the location set, at least three drones are needed for spot flight replenishment and six vending machines. Add vending machine goods and stocking, as well as site rental of $400,000 per month in high season and $50,000 per month in low season. The principal invested in the first month should be 1 million yuan. In order to comply with the scenic spot selling price requirements, the selling price of each commodity will be increased by about 150%, excluding the compensation for unforeseen circumstances of 30,000 yuan, the annual accident insurance of 50,000 yuan paid in high season (which can be reduced in low season) and the energy consumption cost of drones, etc. The profit is expected to be 300,000 yuan/month in high season and 100,000 yuan/month in low season, with a payback period of 3.3 months in high season or 10 months in low season, which is within the acceptable range. Profit will start after that.

6. Conclusions

In general, the field of logistics and distribution in the mountain attractions has a fairly huge potential interest. And this huge benefit needs to be discovered and enjoyed by scenic spots and logistics companies together.

As the owner of the land, the annual income of the scenic spot is mainly the rent of the site. Compared with the previous decentralized business model of small traders, our team's drone delivery model appears to be more centralized and integrated, and the increase in site area correspondingly raises the annual rental income of the scenic spot in the future. This is the direct benefit of the scenic spot. In addition, the operation of small vendors in the scenic spot is relatively chaotic and difficult to manage, which to a certain extent reduces the visitors' play experience; the centralized management of drone delivery can make the operation more standardized, and the improvement of the order of the business environment inside the scenic spot will greatly enhance the satisfaction of visitors and increase the annual passenger flow. This is the indirect benefit of the scenic spot.

In the future, on the basis of certain cooperation with scenic spots, we intend to sign a revenue sharing contract with the scenic spots, so that the scenic spots can reduce the annual rent; at the same time, we will set the revenue sharing ratio, and the scenic spots will enjoy a certain percentage of our company's sales every year. In order to achieve a greater degree of win-win situation.

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