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Selection of Development Mode of Police Unmanned Aerial Vehicle from the Perspective of Intelligent Policing

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Abstract: Choosing the right development mode of police unmanned aerial vehicle can better promote the development of intelligent policing. Based on SWOT-AHP model, this study concludes the internal advantages > external opportunities > external threats > internal disadvantages of the development of police unmanned aerial vehicles. Through the analysis of the four-quadrant coordinate method, it is determined that the police unmanned aerial vehicles in China are in the development stage of seizing opportunities, and the local public security organs should actively seize the opportunities of national policy assistance to achieve good and rapid development.

1. Introduction

Police unmanned aerial vehicle refer to equipment used by public security organs to realize police supervision, law enforcement patrols, intelligence collection, emergency rescue and other police work [1]. Police unmanned aerial vehicle is a new driver for the development of intelligent policing [2], which can realize "full-time" monitoring without dead ends, achieve efficient data collection, and improve the accuracy of policing work [3]. Therefore, police unmanned aerial vehicle is an important part of the intelligent policing system and have an irreplaceable role. However, at present, the research on intelligent policing and police unmanned aerial vehicle development in our country is still relatively weak, and the research methods are relatively single, and there is a lack of systematic research on what kind of development strategy should be adopted. At the same time, whether the development concept and strategic choice held by the state are correct is directly related to the living space of the development of police unmanned aerial vehicle and the development process of intelligent policing. If there is a mistake in strategic development, it will inevitably bring serious consequences. To this end, this project takes the perspective of police unmanned aerial vehicle as an important part of the smart policing system and an important driving force for the development of smart policing as the starting point, and conducts research on the question of "What kind of development strategy should our country adopt and why should it adopt this strategy", and plans to establish a SWOT-AHP analysis model that combines qualitative analysis and quantitative analysis to clarify the strategic positioning and development direction of the development of police unmanned aerial vehicle in China.

2. Analysis of SWOT Factors

2.1 Internal Advantage Analysis

2.1.1 Innovative Law Enforcement (S1)

Police unmanned aerial vehicle can effectively improve the law enforcement efficiency of public security organs and reduce law enforcement costs, and can ensure the safety of law enforcement personnel in high-risk and unreachable situations. Such as: monitoring illegal acts such as speeding on highways and running red lights, and realizing off-site traffic enforcement; Quickly capture panoramic images, videos, and data at the scene of disasters, accidents, and more. Covertly track specific targets from a high altitude, and more [4].

2.1.2 Improving Law Enforcement Efficiency (S2)

The timely, accurate and three-dimensional characteristics of police unmanned aerial vehicle can effectively improve the efficiency of law enforcement. Maneuverable flexibility and fast arrival, compared with traditional police and patrol, saving time and human resources; High-resolution camera and video transmission technology, which can be monitored in real time; Intelligent identification technology to accurately and quickly identify and analyze information to achieve intelligent auxiliary analysis.

2.1.3 Optimizing the Law Enforcement Process (S3)

By connecting with the police information platform, the police unmanned aerial vehicle can realize the real-time collection and intelligent analysis of massive information, produce detailed image and video data, promote the integration of information elements such as intelligence collection, research and judgment, and corresponding command and disposal, so as to make law enforcement more intelligent, on-site emergency handling more timely and effective, and emergency handling safer, so as to further optimize the law enforcement process of "integration of emotion, instruction and practice"[5].

2.2 Internal Disadvantages Analysis

2.2.1 Unstable Data Transmission (W1)

The image and video data taken by police unmanned aerial vehicle need to be transmitted to the command center or the mobile terminal of law enforcement personnel in real time, but the data transmission is not stable enough due to factors such as distance between unmanned aerial vehicle and equipment, environmental interference, and network signals. Especially in some areas, due to the old version of the unmanned aerial vehicle internal image transmission and flight control system and other reasons that are not updated in time, there are often problems such as signal occlusion [6], which seriously affects the disposal efficiency.

2.2.2 Limited Battery Life (W2)

Most policing tasks require round-the-clock work, and unmanned aerial vehicle have limited battery capacity and charging time, usually only supporting short flights [7]. Even with large-capacity batteries, a long charging time is required, which affects the length of time that the unmanned aerial vehicle works continuously. At the same time, the environmental factors of flight will also have an impact on its endurance, especially in bad weather or strong wind environment, due to the increase

in drag during flight, acceleration power consumption, so that its endurance is greatly reduced.

2.2.3 Lack of High-Quality Training (W3)

The current training lacks uniform standards, and the training content is highly different [8], resulting in trainees being unable to master consistent standards of skills and knowledge; Moreover, the flight process of unmanned aerial vehicle involves GPS navigation, flight meteorology, airspace management and other technologies and mechanisms, troubleshooting and maintenance are also important skills, but this content training is not sufficient.

2.3 External Opportunity Analysis

2.3.1 Decision-Making and Commanding Opportunity of “Integration of Intelligence and Command” (01)

"Integration of Intelligence and Command" has a positive role in promoting the development of police unmanned aerial vehicle. Specifically, "intelligence of emotion and indication" has expanded the application scenarios of police unmanned aerial vehicle from a single air patrol and surveillance to a wider and more complex field, such as: rapid response to police situations, emergency response, anti-terrorism operations, etc., so that the application scope and application benefits of police unmanned aerial vehicle have been improved.

2.3.2 “Full Time” Police Mobility Needs (02)

The demand for "full-time" police mobility capability [2] is increasing with the increasing complexity of China's security situation and the increasing number of security threats, and the use of police unmanned aerial vehicle to improve mobility has become a widely used means at present. The unmanned aerial vehicle is fast to respond and can immediately patrol and monitor in the event of an emergency. For example, in the event of a siege or traffic accident, unmanned aerial vehicle can be quickly mobilized for rapid monitoring and early warning, providing favorable conditions for the public security organs to take countermeasures.

2.3.3 “Multi-Scene” Social Resilience Needs (03)

In the context of economic globalization, population flow and accelerated urbanization, "multi-scene" social resilience has gradually become an important part of China's urban security governance system [3], police unmanned aerial vehicle, as one of the tools for rapid response, can be used to improve social resilience, so that we can better respond to emergencies and security threats. Especially in post-disaster recovery and response to terrorist attacks, public security organs can use unmanned aerial vehicle to conduct high-altitude monitoring and intelligence collection, quickly grasp the full picture of the incident, ensure the safety of people's lives and property, and provide unprecedented guarantees for the rapid recovery of society.

2.3.4 "Automated" Policing Remote Handling Needs (04)

In emergency and emergency situations, unmanned aerial vehicle can realize remote patrol and dispatch through network connection and remote control, improve the response speed and efficiency of police officers to crisis incidents, and reduce the safety risks of police officers. At the same time, through the loading and delivery of unmanned aerial vehicle loads, long-distance transportation of materials, daily necessities and first-aid drugs can be realized, and disaster relief materials can be quickly distributed, so as to meet the short-distance material transportation needs in the process of

major incidents and disaster relief, and alleviate the dilemma of police forces.

2.4 External Threat Analysis

2.4.1 Inadequate Supply of Management System (T1)

At present, police unmanned aerial vehicle technology has become increasingly mature, but in practical application, the supply of management system is insufficient [9]. Although the latest draft has been passed, real-name management and registration will be carried out one after another, but there is still a lack of specific relevant management regulations and laws and regulations that cannot be effectively regulated and supervised [10]; The construction and use standards of infrastructure have not been fully standardized, and it is difficult to solve problems in time when problems occur during operation and maintenance, affecting the overall operational efficiency.

2.4.2 Risk of Violating Personal Privacy (T2)

In the application process of police unmanned aerial vehicle, if the privacy protection issue is not handled well, it may infringe on citizens' personal privacy [2], thus facing legal risks, which will affect the development of police unmanned aerial vehicle [11]. This is because unmanned aerial vehicle can carry out high-altitude surveillance anytime, anywhere, and if they record, collect or disseminate citizen private information at will, they may violate personal privacy, leading to legal disputes and even social panic. At the same time, the technological development of police unmanned aerial vehicle need to be compatible with laws and regulations. If the monitoring and data collection procedures of unmanned aerial vehicle is illegal and irregular, it is likely to lead to illegal acts, resulting in legal disputes and risks.

2.4.3 The Crisis of Dehumanizing Ethics (T3)

The crisis of dehumanization ethics mainly refers to the weakening of emotional communication between police and public [9]. Although the use of police unmanned aerial vehicles can improve the efficiency and accuracy of law enforcement, excessive reliance on police unmanned aerial vehicles for law enforcement will lead to a crisis of dehumanizing the ethics of law enforcement. This is because the task processing of unmanned aerial vehicle program is based on preset procedures and rules, which cannot be handled flexibly according to the situation like humans, cannot adapt to the complex and changeable law enforcement environment, and cannot deeply understand the human feelings behind it, which affects the effect of law enforcement.

2.4.4 Risk of Loss of Responsible Entity (T4)

Unmanned aerial vehicle behavior and decisions are not attributed to a person or organization, resulting in harmful consequences (bombings, casualties) that cannot be attributed to a specific person or organization, resulting in unclear responsibility [3]. Although, in theory, we can rely on relevant laws and regulations such as the *Regulations on the Use of Police Equipment and Weapons by the People's Police and the Operating Rules for the People's Police to Stop Illegal and Criminal Acts on the Spot of Public Security Organs* to demonstrate the legitimacy of unmanned aerial vehicles and their tasks. However, theory and practice are two different things, and grassroots law enforcement personnel will have many scruples in order to ensure the safety of law enforcement [12], which will cause great restrictions on the development of unmanned aerial vehicles.

3. AHP Model Analysis

Based on the analysis of the internal and external influencing factors of the development of police unmanned aerial vehicles, an evaluation system for its development was constructed (Figure 1). Combining the factors of SWOT analysis, it is concluded that the internal advantages> external opportunities> external threats > internal disadvantages of the development of police unmanned aerial vehicles are obtained, among which innovative law enforcement methods (0.6054) are the biggest internal advantages to promote their development; The opportunity of "Integration of Intelligence and Command" reform of public security decision-making and command (0.5393) is the best external opportunity to promote its development; the insufficient supply of the management system (0.5430) is the biggest external threat hindering its development; the biggest internal disadvantage hindering its development at present is the lack of high-quality training (0.6961); and according to its center of gravity coordinates and the interval where the θ azimuth angle is located, it is an opportunistic development.

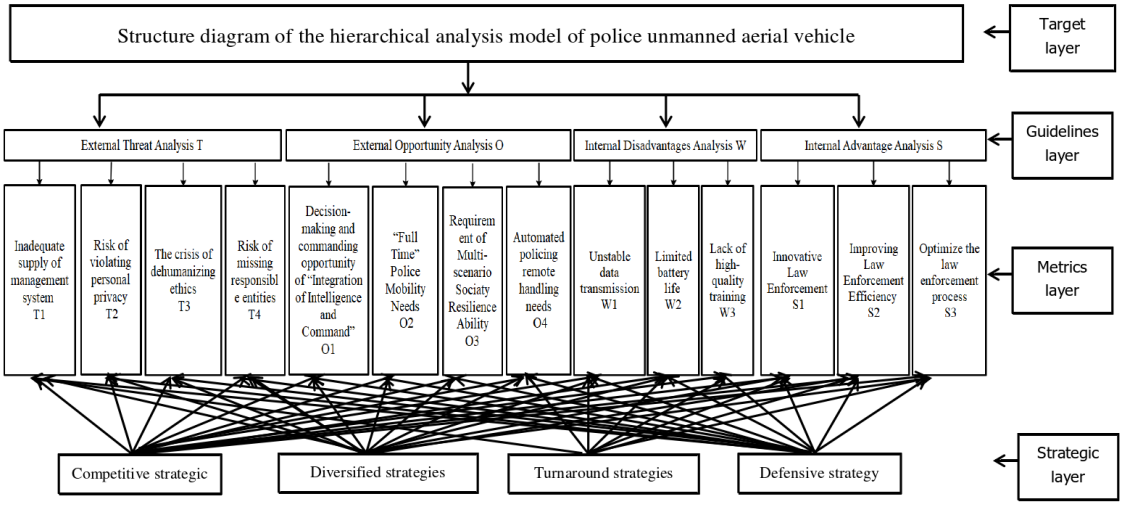

Figure 1: Evaluation Index System for Development Strategy of Police Unmanned Aerial Vehicle

4. Conclusion and Suggestions

4.1 Conclusion

(1) Internal advantages > external opportunities > external threats > internal disadvantages of the development of police unmanned aerial vehicle. Among them, innovative law enforcement way (0.6054) is the largest internal advantage for its development; the biggest internal disadvantage hindering its development is lack of high-quality training (0.6961).

(2) According to the coordinates of the center of gravity and the interval where the θ azimuth angle is located, police unmanned aerial vehicles belong to the opportunistic type and should adopt a competitive strategic development.

4.2 Suggestions

The purpose of developing intelligent policing is to improve the efficiency of policing work and improve the quality of policing work, and police unmanned aerial vehicles, as one of the important carriers in intelligent policing, should seize the opportunity of national policy assistance and accelerate the construction of intelligent combat platforms, namely: which unmanned aerial vehicle in the area takes off and lands, where is the work area, what tasks are performed, images and data

information are directly transmitted to the platform server, and case information is integrated and judged, and the platform port should be connected to the graphic investigation, Big data and technical investigation can realize real-time data sharing. At the same time, from the perspective of intelligent policing, it is necessary to strengthen scientific and technological innovation, promote the innovation and upgrading of police unmanned aerial vehicle technology, achieve more functions, and improve the efficiency of use; It is necessary to improve the unmanned aerial vehicle management system, from the management system, operation mode, training and other aspects, to ensure that the use is safe, reliable, standardized and legal.

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