



## Use of drones by the Judiciary Police in Brazil: a study on their contributions to Public Safety

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**ABSTRACT:** This article aims to analyze the contributions of using RPAs by the Judicial Police in Brazil to legal security, taking into account examples from comparative law. Through a qualitative approach and an exploratory methodology based on bibliographic research, the study seeks to understand the potential benefits and challenges related to the use of RPAs in this context. The analysis carried out allows us to conclude that the use of RPAs by the Judicial Police brings undeniable benefits to strengthening the investigative process and the criminal justice system. However, it also highlights the urgent need to update the legal framework to guarantee respect for human rights, in addition to the essential continuous training of security agents to operate RPAs in a technical and responsible manner. **KEYWORDS:** RPAs. Judicial Police. Legal security. Normative instructions. Comparative law.

### I. INTRODUCTION

The use of remotely piloted aircraft (RPAs) by the Judicial Police in Brazil is an emerging topic that has garnered the interest of researchers and professionals in the field, raising questions about the benefits and risks to legal security. The application of this technology brings both potential advantages to the work of public security agents and challenges that must be identified and addressed.

On one hand, the use of RPAs—commonly known as drones—by the Judicial Police can streamline investigations and contribute to obtaining evidence more efficiently. On the other hand, in the absence of regulatory instructions, the actions stemming from the use of RPAs by the Judicial Police present challenges related to legality, privacy, proportionality, and cost-effectiveness. The absence of specific regulatory instructions complicates the definition of limits and criteria for the use of RPAs, contaminates the evidence produced, and may result in fundamental rights violations.

This work is justified by the need for a more in-depth analysis of the possibilities and limitations of RPA usage in investigations conducted by the

Judicial Police, contributing to the improvement of police investigation techniques and practices.

The lack of specific regulations within the context of Judicial Police activities in Brazil generates legal uncertainty regarding the use of RPAs. Hence, the central question of this study is: how does the absence of specific regulations for the use of RPAs by the Judicial Police affect the legal security of criminal investigations?

The gaps in the legal, ethical, and regulatory spheres regarding the use of RPAs by the Judicial Police in Brazil, as well as the absence of specific norms, create uncertainties for the criminal justice system, both for its operators and for society. Considering that legal security is a fundamental principle for the fair and equitable functioning of the justice system, which must be based on predictability and consistency in the interpretation and application of norms, it is essential to analyze the contributions and impacts of specific regulations for the use of RPAs in police activities.

This exploratory research, based on a bibliographic approach with a qualitative and deductive methodology, sought articles, theses, and dissertations related to the topic from electronic databases such as Scopus, Web of Science, and Google Scholar. The keywords used for the search included: RPAs, police investigation, innovation, and Judicial Police.

The analysis included works published in English and Portuguese that addressed the use of RPAs in Judicial Police investigations over the last ten years. Studies that did not meet the inclusion criteria or lacked relevant content for the proposed topic were excluded.

The research corpus obtained was analyzed through a systematic review, aiming to identify the main topics addressed, trends, gaps, and challenges in the use of RPAs as an innovative tool in Judicial Police investigations.



## II. INCORPORATING TECHNOLOGY FOR POLICE INVESTIGATION EFFICIENCY

Criminal investigation activities play a crucial role in protecting society by seeking justice through the restoration of social peace disrupted by unprevented crimes. Given its importance and complexity, it must be conducted technically, impartially, and in accordance with constitutional and legal principles. Article 144 of the Brazilian Federal Constitution of 1988 (CF/88) stipulates that public safety is a duty of the state and a right and responsibility of all, with police investigation being one of the essential instruments for its guarantee and promotion. Therefore, it is necessary to ensure the Judicial Police's autonomy, independence, and guarantees in performing its functions, aiming to enhance the effectiveness of the public safety system and strengthen public trust.

The CF/88 and procedural criminal frameworks underscore the indispensability of criminal investigations for maintaining public order and protecting citizens. According to the CF/88, it is the Judicial Police's responsibility to conduct criminal investigations, aiming to determine the circumstances of crimes, identify perpetrators, and collect evidence for criminal procedural instruction.

The Brazilian Code of Criminal Procedure (CPP), established by Decree-Law No. 3,689 of October 3, 1941, defines the police inquiry as an investigative means presided over by a police chief. Subsequently, Law No. 12,830 of June 20, 2013, introduced significant changes, granting autonomy to police chiefs in conducting investigations to achieve this objective.

Scholars like Capez (2018), Carnelutti (2015), Figueiredo (2014), Gomes (2019), Gonçalves (2020), and Silva (2017) discuss the importance of police investigations being impartial, respecting the fundamental rights of suspects, and adhering to efficiency and effectiveness principles, alongside constitutional guidance and adequate regulation.

In today's context, technology has proven to be a valuable ally in police investigations, with advancements such as DNA analysis, fingerprint analysis, voice analysis, facial recognition, and artificial intelligence. However, as mentioned earlier, it is necessary to consider potential disadvantages and ethical, legal, and regulatory dilemmas, such as privacy violations, data analysis errors, misuse of technologies, and the creation of social control mechanisms.

RPA's have become increasingly present across various fields, playing a crucial role by offering greater efficiency, agility, and precision,

which provide numerous benefits and expand possibilities in different contexts. Table 1 below provides an overview of actions in which RPAs have been used, highlighting the type of action, its purpose, and how RPAs contribute to maximizing results.

**Table 1 – Examples of RPA Applications in Public Safety Actions**

Type of Action	Purpose of the Action	Maximization of Action Using RPAs
City Mapping	Obtaining updated geographical information about the city	Expanded coverage of mapping areas difficult or risky for humans to access; Agility in data collection and generation of precise maps; Cost reduction compared to traditional mapping methods.
Suspect Pursuit	Monitoring and tracking individuals in flight	Aerial vantage point for tracking suspects across various terrains and obstacles; Speed and mobility to follow targets in real-time; Collection of audiovisual evidence to aid investigations.
Crime Scene Investigation	Evidence collection and crime scene documentation	High-resolution image capture for accurate documentation; Identification of clues or elements difficult for investigators to access or observe;



Type of Action	Purpose of the Action	Maximization of Action Using RPAs
		Reduced investigation time with more efficient data collection.
<b>Car, Plane, and Boat Accidents</b>	Damage assessment and victim search	Aerial inspection of affected areas, providing a global view and quick victim identification; Swift location of individuals in areas difficult for rescue teams to access; Real-time recording of the accident scene for subsequent analysis.
<b>Search and Rescue</b>	Locating and rescuing individuals in danger	Coverage of large areas in reduced time; Aerial view for identifying lost or at-risk individuals; Delivery of essential supplies to people in isolated or inaccessible areas.
<b>Support for Firefighters</b>	Assisting in firefighting operations	Monitoring and identification of fire hotspots to aid decision-making; Transport of equipment or materials to areas difficult or dangerous for firefighters; Thermal analysis to locate hidden heat sources.
<b>Event Prevention</b>	Risk identification	Monitoring vulnerable areas

Type of Action	Purpose of the Action	Maximization of Action Using RPAs
	and preventive actions	to prevent accidents or incidents; Early alerts for corrective actions or evacuations; Support in implementing security measures.
<b>Event Management</b>	Monitoring and security during events	Aerial surveillance to detect suspicious behaviors or risky situations; Crowd control and logistics tracking for events; Image recording for later analysis and incident identification.
<b>Disaster Response Assistance</b>	Coordination of natural disaster response actions	Damage assessment and mapping of affected areas for decision-making; Victim identification and rescue needs; Efficient communication and coordination between response teams.
<b>Troop Advancement Mapping</b>	Tactical information gathering for military operations	Identification of routes and obstacles in unknown terrains; Monitoring of enemy or suspicious activities at long distances; Collection of strategic information for



Type of Action	Purpose of the Action	Maximization of Action Using RPAs
		operation planning.
<b>Illegal RPA Apprehension</b>	Combating unauthorized RPA use	Location and identification of RPAs operating illegally; Tracking pilots and audiovisual recordings as evidence; Safe neutralization and control of unauthorized RPAs.
<b>Informational Monitoring</b>	Real-time data collection and analysis	Identification and mapping of patterns and trends through data analysis; Monitoring critical or sensitive areas to detect suspicious activities; Generation of reports and insights for informed decision-making.

**Source:** Elaborated by the author.

According to Santos et al. (2019), RPAs are considered disruptive technologies capable of revolutionizing different sectors, such as public safety, urban management, environmental

### III. CLASSIFICATION, UTILIZATION, AND REGULATION OF RPAS

The classification of unmanned aircraft systems is a significant topic in the context of civil and military aviation. These systems encompass a broad field of study and work, developed across various national and international organizations, aiming to integrate airspace considering technological and operational advances in recent decades. This classification is essential to understand the complexity of these systems since there is no human presence onboard (Souza; Santos, 2019).

According to the Brazilian Aeronautics

monitoring, and emergency rescue. Their ability to fly and capture high-resolution aerial images enables the acquisition of detailed and updated information about urban environments, contributing to urban planning, infrastructure monitoring, and project development (Müller et al., 2020).

In the context of public safety, RPAs have been widely employed for various purposes. According to Silva et al. (2021), they can be utilized to pursue suspects, investigate crime scenes, and apprehend RPAs illegally used. Additionally, these devices have proven useful for search and rescue operations, providing broader aerial coverage and facilitating the location of missing or endangered individuals (Chien; Han; Wu, 2017).

Regarding accidents involving cars, airplanes, and boats, RPAs play a fundamental role. As noted by Wang et al. (2018), these devices can provide real-time information about the extent of damage, assisting emergency teams in directing necessary resources and planning rescue actions.

RPAs have also shown significant relevance in supporting firefighters. According to Almeida et al. (2020), these devices can be utilized in firefighting efforts, providing information about fire propagation and helping identify safe routes for rescue teams. Furthermore, RPAs equipped with thermal cameras enable the detection of heat sources in hard-to-reach areas (Yang et al., 2017).

This analysis confirms that while RPAs present numerous advantages for Judicial Police activities, their integration into public safety operations demands continuous refinement in regulation, training, and ethical considerations to maximize their potential and mitigate associated risks. Further details on regulatory frameworks, operational challenges, and comparative international applications are discussed in subsequent sections of this paper.

Code, an aircraft is defined as any maneuverable apparatus capable of sustaining and circulating in airspace through aerodynamic reactions, regardless of onboard pilot presence (Brasil, 1986). Therefore, RPAs are considered aircraft, even without a human pilot onboard.

In Brazil, different terminologies refer to these aircraft. The term RPA, originating from the United States, is widely used to describe unmanned flying objects for any purpose, origin, or characteristics, despite lacking technical support or legal definition (Souza; Santos, 2019).

The National Civil Aviation Agency (Anac)



employs the term "unmanned aircraft" to generally encompass civilian-use aircraft capable of circulating in airspace through aerodynamic actions without onboard pilots. This terminology is subdivided into three categories: model aircraft, autonomous aircraft, and remotely piloted aircraft (Brasil, 2021).

For public safety purposes, it is more appropriate to use the acronym RPA, which stands for "remotely piloted aircraft." Although the pilot is not onboard, they remotely control the aircraft through an information exchange device. This acronym is widely used in public safety activities due to the nature and objectives of such operations (Souza; Santos, 2019).

Furthermore, the term RPAS (remotely piloted aircraft system) refers to the set of components involved in an RPA's flight, such as the remote piloting station, command link, and support equipment. This terminology is adopted by the International Civil Aviation Organization (ICAO) and is widely accepted technically (Pecharrmán; Veiga, 2017).

Consequently, classifying unmanned aircraft systems is fundamental for establishing appropriate terminology and understanding the diverse possibilities of these aircraft applications. Defining the RPA and RPAS acronyms allows for distinguishing recreational use of smaller platforms from professional and public safety use.

One of the initial uses of RPAs was reconstructing traffic accidents. RPAs not only capture accident scenes accurately but also accomplish this in one-third of the time required by traditional methods, creating three-dimensional models accessible for later review. More importantly, faster processes reduce secondary accident risks, enhancing safety for all involved (Müller, 2019).

Research indicates that RPAs are also employed in precision agriculture, aiding crop monitoring and information collection to improve agricultural production (Fountas et al., 2018; Yang et al., 2017). Moreover, these aircraft have been deployed in search and rescue scenarios, tracking moving targets, disaster mapping, and crisis management (Chien; Han; Wu, 2017; Zhang et al., 2020).

The pre-tactical deployment of RPAs enables early recognition of hazardous scenes, providing information about a building before a team enters during anti-drug operations, for example. This enhances officers' understanding of the terrain configuration and individuals in the area. Furthermore, RPA surveillance can remain onsite after the team enters, offering incident commanders a panoramic view as operations unfold (Müller, 2019).

RPAs facilitate surveillance by transmitting images in real-time to ground team members. This gives officers the ability to see around buildings, behind fences, and in confined areas instead of advancing blindly. Using visual optics and thermal imaging provides versatile day or night operations (Müller, 2019).

A significant advantage of using RPAs in police investigations lies in their capacity for aerial monitoring and surveillance, providing a broad and comprehensive view of investigated areas (Brown, 2017). This aerial perspective offers a unique vantage point, aiding in identifying evidence, locating suspects, or efficiently mapping crime scenes (Martinez, 2020). Additionally, RPAs have been used for crowd monitoring, crime investigation, search and rescue for missing persons, and reaching inaccessible or hazardous locations (Johnson, 2016).

A practical and successful example of this application occurred in Campina Grande, Paraíba, where the Military Police utilized RPAs to monitor the "World's Largest St. John's Festival" (Paraíba, 2019). This experience illustrates RPAs' potential in obtaining real-time aerial images, significantly contributing to suspect identification and monitoring large events.

#### **IV. LIMITS ON RPA USE IN PUBLIC SAFETY IN BRAZIL**

Incorporating remotely piloted aircraft (RPAs) technology into public safety actions calls for analysis from varied perspectives. This inclusion aims to strengthen the exercise of the constitutional duties of security agencies, emphasizing the principles of cost-effectiveness and efficiency since RPAs offer low operational costs and reduced risks to crews (Silva, 2018; Souza; Santos, 2019).

Although RPA use by public safety agencies remains incipient and requires further regulation, it represents a promising field necessitating efforts to develop these aircraft's use in missions where indispensable, prioritizing crew safety and generating public savings (Silva, 2018; Souza; Santos, 2019).

This inclusion signifies an essential modernization measure and optimization of resources available to security forces. With these devices' assistance, information and evidence can be obtained swiftly and efficiently, expediting investigative processes (Smith, 2015). Additionally, as noted, RPAs enable access to challenging areas and discrete monitoring of locations, minimizing risks faced by security agents (Johnson, 2016).

Consequently, investing in technological resources is crucial for strengthening police work, and using RPAs in police investigation and



monitoring has proven to be a promising tool. According to Müller (2019), employing RPAs provides panoramic views and access to hard-to-reach areas, aiding information collection and action planning. However, implementing this technology also presents challenges, as highlighted by Brown (2017), especially concerning legal and ethical issues.

## V. CONCLUSION

The use of RPAs by the Judicial Police in Brazil represents a significant contribution to the country's public safety. This research identified numerous benefits derived from this technology, such as faster and more efficient evidence collection, access to hard-to-reach areas, and discreet location monitoring. However, challenges and limits must also be considered. In terms of challenges, legal and ethical issues surrounding privacy and data protection stand out. Establishing clear guidelines to regulate RPA use is essential to ensure respect for citizens' fundamental rights and prevent abuse by authorities. Additionally, training security agents is an urgent need, ensuring they possess adequate technical and operational knowledge for responsible and efficient RPA use. Regarding limits, RPAs are not a universal solution to all challenges faced by the Judicial Police. Although a powerful tool, they have limitations, such as dependence on favorable weather conditions, flight restrictions in certain areas, difficulties obtaining aerial images in enclosed environments or locations with physical obstacles, and the need for specific regulation for investigation use. The findings from this research validated the hypothesis about the benefits of RPA use. The ability to collect evidence more quickly, access hard-to-reach areas, monitor events, and ensure team and public safety were confirmed aspects supported by identified sources. Thus, RPAs have the potential to significantly contribute to investigation and monitoring activities performed by the Judicial Police. However, the need to establish boundaries for their use is also evident, aiming to protect human rights and preserve the legitimacy of produced evidence. By correlating this study's findings, the main challenges were highlighted. Among them are the constant need to update legislation to keep up with technological advances, ensure compatibility with human rights, and continuously train security agents to operate RPAs technically and responsibly. The research also identified certain limitations, such as the lack of specific studies on RPA use by the Judicial Police in

Moreover, establishing clear guidelines and protocols for using RPAs as an innovative tool in police investigation is essential. Implementing appropriate policies and defining ethical standards are critical to ensuring legality and transparency in police actions involving RPAs. As Martinez (2020) emphasized, these guidelines should address RPA operational limits, obtaining authorization for overflights in specific areas, and protecting collected data.

Brazil and the limited availability of data and statistics on the topic. These challenges underscore the importance of investing in future research in this area. The results achieved suggest continued research, exploring other relevant issues arising from this context. These include deeper investigations into legal and ethical aspects of RPA use by Brazilian Judicial Police, the costs of acquiring and maintaining RPAs, and developing strategies to improve these devices' interoperability with other security systems. It is believed that this research's proposed objectives were satisfactorily answered. By analyzing RPAs' contributions to legal security, it was possible to perceive tangible benefits for the Judicial Police, assisting in strengthening investigative processes and obtaining crucial information for the criminal justice system. The methodology employed in this research was effective in addressing the proposed problem. Analyzing existing studies and research conducted by experts in the field provided a comprehensive understanding of RPA use challenges and contributions by the Judicial Police. By highlighting the benefits and challenges of RPA use by the Judicial Police, this research aimed to deepen the debate on these devices' role in public safety, especially in police investigations, and to develop guidelines balancing their use with respect for human rights.

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