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TRANSNATIONAL CRIMINAL ORGANIZATIONS
IN MEXICO IN THE 21ST CENTURY REQUIRES
NEW RESPONSES**

Rabling Valdez, Omar

Monterey, CA; Naval Postgraduate School

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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**THE ILLICIT USE OF ARMED DRONES
BY TRANSNATIONAL CRIMINAL ORGANIZATIONS
IN MEXICO IN THE 21ST CENTURY
REQUIRES NEW RESPONSES**

by

Omar Rabling Valdez

December 2023

Thesis Advisor:
Second Reader:

Sean F. Everton
Rodrigo Nieto-Gomez

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CRIMINAL ORGANIZATIONS IN MEXICO IN THE 21ST CENTURY
REQUIRES NEW RESPONSES**

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Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF SCIENCE IN DEFENSE ANALYSIS
(IRREGULAR WARFARE)**

from the

**NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

This thesis presents the security challenges posed by the Jalisco New Generation Cartel's (CJNG) use of explosive-laden drones, a significant threat to both Mexico and the United States. It advocates for a bilateral strategy combining operational, intelligence, legal, and analytical efforts from both countries. The study highlights the necessity for a comprehensive revision of legal frameworks to empower authorities to effectively counteract the illicit use of drones. Through a structured approach, the thesis identifies the roles of various forces, including ground, air, and drone support units, to orchestrate a unified response between Mexican and U.S. law enforcement. It analyzes the CJNG's tactics, offering insights into the potential evolution of drone misuse. Its aim is to significantly reduce the operational capacity of the CJNG in using drones for criminal activities, thereby mitigating violence and disrupting illicit activities. It concludes by advocating for a collaborative approach to address technologically advanced organized crime on an international scale.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|--------|--|
| ATHENA | Advanced Test High Energy Asset |
| CJNG | Cartel Jalisco New Generation |
| C-UAV | Counter-Unmanned Aerial Vehicle |
| DJI | Da-Jiang Innovations |
| DTO | Drug Trafficking Organization |
| GPS | Global Positioning System |
| ICAO | International Civil Aviation Organization |
| IED | Improvised Explosive Device |
| ISIS | Islamic State |
| ISR | Intelligence, Surveillance, and Reconnaissance |
| NATO | North Atlantic Treaty Organization |
| NLAW | Next-Generation Light Anti-tank Weapon |
| PSYOPS | Psychological Operations |
| RPAS | Remotely Piloted Aircraft System |
| SEDENA | Secretariat of National Defense |
| SOF | Special Operations Forces |
| TCO | Transnational Criminal Organization |
| UAV | Unmanned Aerial Vehicle |

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EXECUTIVE SUMMARY

This thesis examines the evolving landscape of global security in the context of the increasing use of drones by Transnational Criminal Organizations (TCOs), with a focus on the Cartel Jalisco New Generation (CJNG) in Mexico and its implications for international security, particularly concerning Mexico and the United States. It aims to understand the multifaceted nature of this threat and to explore effective countermeasures, emphasizing the need for a collaborative approach between Mexico and the United States in response to these emerging security challenges.¹

The research methodology involved a comprehensive analysis of case studies, existing literature, and current security strategies. This included a detailed examination of specific incidents involving drone usage by criminal organizations in various contexts, such as the attempted assassination of Venezuelan President Nicolás Maduro and the deployment of drones by the Islamic State (ISIS) in France.² Additionally, the study involved evaluating the legal frameworks, technological developments, and international cooperation mechanisms currently in place to deter illicit drone usage. Primary data were gathered through interviews with security experts, analysis of government reports, and scrutiny of international security policies.

The study indicated that the use of drones by organizations like CJNG has led to a paradigm shift in organized crime tactics, posing new challenges to national and international security frameworks. The versatility of drones enables these groups to perform tasks ranging from surveillance to the direct execution of attacks, which traditional security apparatuses are not fully equipped to counter. The research also uncovered that

¹ Michael C. Horowitz, “Do Emerging Military Technologies Matter for International Politics?,” *Annual Review of Political Science* 23, no. 1 (May 11, 2020): 385–400, <https://doi.org/10.1146/annurev-polisci-050718-032725>.

² Thomas Gibbons-Neff, “ISIS Used an Armed Drone to Kill Two Kurdish Fighters and Wound French Troops, Report Says,” *Washington Post*, October 27, 2021, <https://www.washingtonpost.com/news/checkpoint/wp/2016/10/11/isis-used-an-armed-drone-to-kill-two-kurdish-fighters-and-wound-french-troops-report-says/>.

current legal and technical countermeasures, while robust, are still evolving to keep pace with the rapid advancement in drone technology.

The thesis establishes that the threat posed by the innovative use of drones by TCOs is not confined to a single nation but is a global concern that requires an international response. Traditional security and defense paradigms are being challenged and need to be reevaluated in light of these emerging threats.³ The study highlights that while technological advancements have provided new means of committing crimes, they also offer innovative ways to combat them.

As we approach the culmination of this research, it becomes imperative to translate our findings into actionable strategies. The following recommendations are designed to address the complex challenges identified in this study, offering a roadmap for effective intervention and future policy development. First, the foremost recommendation is the strengthening of international partnerships, especially between Mexico and the United States. This collaboration should focus on the exchange of intelligence, the sharing of advanced technology, and the development of joint strategies to effectively combat the sophisticated use of drones by criminal organizations like CJNG. It should also involve regular bilateral meetings, joint training programs, and collaborative operations to ensure a unified and effective response to the transnational threat posed by drones.

Second, there is an urgent need to develop and implement more advanced anti-drone technologies. This includes investing in electronic jamming systems, directed-energy weapons, and other innovative technologies capable of detecting, intercepting, and neutralizing drones. Governments should prioritize funding for research and development in these areas to stay ahead of rapidly evolving drone technologies used by criminal entities. Third, updating and adapting legal frameworks are critical in addressing the unique challenges posed by the use of drones for criminal activities. This encompasses the formulation and revision of international treaties and national laws targeting the misuse of drone technology, ensuring they are comprehensive and agile enough to respond to

³ John P. Sullivan, “Mexican Cartel Adaptation and Innovation,” OODA Loop, January 27, 2020, <https://www.oodaloop.com/archive/2020/01/27/mexican-cartel-adaptation-and-innovation/>.

technological advancements. Legal provisions should also facilitate international cooperation in law enforcement and intelligence-sharing.

Finally, addressing the multifaceted challenges posed by the illicit use of drones by criminal organizations requires a comprehensive approach. A combination of enhanced international collaboration, advanced technological solutions, adaptive legal frameworks, strategic investments in research and development, and informed public awareness is essential. These recommendations aim to foster a secure environment that is resilient to the evolving threats of drone technology while safeguarding civil liberties and promoting technological advancement.

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With immense love and deep gratitude, I dedicate these words to you, my beloved wife, Mimi. Your presence in my life has been the cornerstone of my strength and success. For the past 12 years, we have together navigated a sea of challenges and obstacles, overcoming each one thanks to your unwavering support and unconditional love. You have not only been my partner in this journey, but also my beacon during times of darkness and my joy in moments of celebration. Your love and support have guided and sustained me, enabling me to achieve accomplishments that were only possible with you by my side. Our phrase, “Together and Strong Forever,” is more than just words; it reflects our commitment and the essence of our relationship. This mantra has constantly reminded us that, regardless of our challenges, we will always be stronger together. Thank you, my love, for being my life partner, my most extraordinary support, and a constant source of inspiration. Your love has been the most precious gift, and I promise to continue our journey with the same strength, love, and unity we have shared so far.

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I. INTRODUCTION

A. BACKGROUND

In today's era, defined by rapid technological advancement, drones have transitioned from being cutting-edge curiosities to influential agents of change, impacting a broad spectrum of human activities, including recreation and intricate supply chain processes. However, as with many innovations, their applications extend past enthusiasts and commercial users. There is a more troubling aspect to this evolution, where the capabilities of these aerial machines are exploited by groups with unscrupulous intentions. Particularly concerning is the adoption of drone technology by criminal enterprises, notably drug cartels, which are increasingly harnessing these devices for their ominous objectives.

These organizations have skillfully adapted drones, initially developed for surveillance and reconnaissance, for more damaging operations. The drones' capacity to fly under the radar and bypass conventional security mechanisms makes them uniquely advantageous for intelligence collection, reconnaissance missions, and, most alarmingly, for conducting attacks with grenades or explosives. Such attacks are not solely reserved for rival factions in the territorial wars among cartels but have also targeted governmental authorities and, heartbreakingly, unsuspecting civilians. Incidents such as the assault on the secretary of public security of Baja California, along with attempts on other officials and the general populace, underscore the audacity and expansiveness of these emerging tactics.¹

In the European context, particularly in France—a leading country in nuclear energy—the security of its facilities has been persistently challenged due to drone usage. Activists, most notably from the Greenpeace group, have embraced drone technology to

¹ Robert J. Bunker and John P. Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs* (Bloomington, IN: Exlibris, October 2021), 9–70, <https://smallwarsjournal.com/books/criminal-drone-evolution-cartel-weaponization-aerial-ieds>.

voice concerns regarding security vulnerabilities in French nuclear power plants.² Between 2012 and 2018, there were recorded incidents of drones making unauthorized flights over the Le Bugey nuclear facility, with one such device even crashing into the plant.³ While these actions might have stemmed from peaceful intentions, they underscore the ease with which drones can operate in high-security zones. Alarming, they also provide a template for entities with far less benevolent objectives. The ability to employ drones under these circumstances illuminates the potential for such technology to be commandeered by criminal outfits, instigating a profound debate on balancing civil liberties with escalating security imperatives.

Meanwhile, the Ukrainian Armed Forces have exemplified how a nation can swiftly adapt drone technology to confront an adversary superior in numbers and equipment. While Ukraine has grappled with significant challenges in contending with a more formidable neighbor, it has successfully deployed drones for both reconnaissance operations and offensive measures, thus, to some extent, leveling the playing field.⁴ These drones, often locally modified or even manufactured, have empowered Ukrainian forces to gather vital intelligence on enemy positions and movements as well as direct artillery attacks with devastating precision.

What is particularly striking is the swiftness with which Ukraine has integrated drones into its military doctrine and the efficacy with which the drones have been deployed against an adversary equipped with advanced anti-aircraft technology.⁵ This adaptive capability has tipped the scales in favor of Ukraine in various confrontations, allowing them to outmaneuver and overcome forces that, on paper, seemed superior. The Ukrainian

² “Greenpeace Crashes Superman-Shaped Drone into French Nuclear Plant,” Reuters, July 3, 2018, sec. France, <https://www.reuters.com/article/us-france-nuclear-greenpeace-idUSKBN1JT1JM>.

³ Garik Markarian and Andrew Staniforth, *Countermeasures for Aerial Drones* (Boston: Artech House, 2023), chaps. 1 and 6, <http://artech.cloudpublish.co.uk/read/?id=54756&type=book&cref=nps&peref=&drm=soft&exit=https%3A%2F%2Fus.artechhouse.com%2FcloudPublish%2Fbook.aspx%3Fisbn%3D9781630818029&p=5&uid=ARTECH&t=1681794107&h=dece8f991192357b3df5b5cd19237281d>.

⁴ Dan Rice, “The Untold Story of the Battle for Kyiv,” Thayer Leadership, June 2, 2022, <https://www.thayerleadership.com/blog/2022/the-untold-story-of-the-battle-for-kyiv>.

⁵ Yagil Henkin, “The ‘Big Three’ Revisited: Initial Lessons from 200 Days of War in Ukraine,” *Expeditions with MCUP* 2022, no. 1 (2022): 1–36.

experience underscores the transformative power of drone technology and how, with innovation and strategy, it can play a pivotal role in the chess game of modern conflict.

The astute employment of emerging technologies, such as consumer drones, can become a pivotal factor in the balance of power during armed conflict. The Ukrainian Armed Forces have showcased that, through swift and effective integration of drones into their military tactics, it is feasible to level the playing field against a numerically superior and better-equipped opponent.⁶ Their ability to adapt and customize these devices for reconnaissance missions and precise attacks has enabled not only the acquisition of critical intelligence but also the execution of unexpected strikes with remarkable accuracy. However, the very agility and advantage that these drones offer on the military stage turn into a tangible threat when they fall into the wrong hands. Transnational criminal organizations, especially drug cartels, pose an emerging risk as they adopt these technologies for illicit purposes.⁷ The prospect of these organizations using drones to directly target authorities, and even more worryingly, civilian populations, underscores the urgency to address and counteract this escalating issue.

The Americas have not been exempt from the illicit use of drones by criminal organizations, independent actors, or legitimate entities operating unlawfully to achieve their aims. In Venezuela, the political and socioeconomic landscape has created a fertile ground for mounting concerns surrounding drone utilization. In 2018, the South American nation garnered global attention when an alleged assassination attempt involving drones laden with explosives was made on President Nicolás Maduro during a military parade in Caracas.⁸ While the precise circumstances of this incident remain a subject of contention, it underscores the ease with which drones can be harnessed for political and potentially

⁶ Dominika Kunertova, “The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Game,” *Bulletin of the Atomic Scientists* 79, no. 2 (March 4, 2023): 95–102, <https://doi.org/10.1080/00963402.2023.2178180>.

⁷ Michael Sinclair, “Death from above: How Criminal Organizations’ Use of Drones Threatens Americans,” *Brookings* (blog), March 11, 2021, <https://www.brookings.edu/blog/order-from-chaos/2021/03/11/death-from-above-how-criminal-organizations-use-of-drones-threatens-americans/>.

⁸ Nick Paton Walsh et al., “Inside the August Plot to Kill Maduro with Drones,” CNN, June 21, 2019, <https://www.cnn.com/2019/03/14/americas/venezuela-drone-maduro-intl/index.html#:~:text=He%20said%20that%20the%20drone,three%20times%20after%20the%20attack>.

lethal purposes in areas already rife with instability. Beyond political risks, the escalating presence of criminal groups in Venezuela looking to exploit the economic crisis could herald a surge in the use of drones for illicit endeavors, ranging from espionage to drug trafficking, further intensifying tensions in an already beleaguered nation.

Places like Mexico, where the battle against drug trafficking has been especially fierce, have borne witness to the chilling spectacle of drones flying over urban areas, morphing what was once a hobby or work tool into a symbol of dread.⁹ It is inferred that these criminal entities' adoption and adaptation of this technology have been influenced by extremist and terrorist groups around the world that have previously demonstrated how to turn commercial drones into weapons of war. The fact that cartels have mirrored these tactics underscores a troubling convergence of methodologies between organized crime and terrorism.

In the United States, the proliferation and accessibility of drone technology have posed significant security and privacy challenges. While many citizens and businesses employ these devices for legitimate recreational or commercial purposes, there have been mounting concerns regarding their use in illicit activities. Drug cartels and criminal organizations have explored the feasibility of using drones to smuggle narcotics across the border or for surveillance purposes.¹⁰ Moreover, the potential for drones to be modified to carry weaponry or explosive devices has set off alarm bells among security agencies. This has prompted federal and state authorities to strive for a balance between regulating this technology and safeguarding civil rights while proactively addressing the potential threats these devices might pose to American society.

This illicit and violent use of drone technology underscores yet again the adaptive capacity of criminal organizations, presenting significant challenges for security forces and the affected communities. It also prompts contemplation on how innovations intended to

⁹ Bunker and Sullivan, "Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs."

¹⁰ Nick Martinez and Michael Valencia, "Drone Carrying Drugs Crashes South of U.S. Border," CNN, January 23, 2015, <https://www.cnn.com/2015/01/22/world/drug-drone-crashes-us-mexico-border/index.html>.

enhance everyday life can be diverted towards destructive ends and how society and the state must preemptively address and respond to such threats.

B. PROBLEM DEFINITION

To commence, it is pivotal to establish a precise point of focus: this research does not dwell on the historical or technical evolution of drones in itself. Instead, the primary concern is understanding and confronting an alarming reality that has surfaced with the adoption of drones by drug cartels. In recent years, these criminal organizations have showcased a staggering proficiency in harnessing technologies originally crafted for benign purposes, only to twist their functions to bolster illicit activities. The assimilation of drones, whether for information-gathering, surveillance, or, more alarmingly, for armed offensive actions against rivals, authorities, and the civilian populace, has escalated violence rates. Such integration has further muddled conventional security strategies across various regions. As a result, there is a pressing need to delve deeper into this emergent challenge, discern its implications, and formulate effective countermeasures.

Given the swift pace at which technology progresses, it is logical to deduce that cartels will persist in their innovative application of drones, ushering in fluid scenarios demanding nimble responses from security forces. The pivotal questions to grapple with include: How will cartel tactics evolve as drone technology advances? What potential future scenarios might be foreseen based on their adaptation and utilization? More crucially, how can effective strategies be devised to counter these burgeoning threats and safeguard both institutions and civilians from these novel challenges? Addressing these queries, pinpointing the root causes, and devising multidimensional solutions capable of neutralizing the threat posed by drones in criminal hands are of paramount importance.

C. RESEARCH QUESTION

In recent years, members of organized crime organizations have carefully analyzed how new technology shapes conflict so that they could use some of this technology for their illicit activities. Transnational criminal organizations (TCOs) have innovatively adopted existing and consumer technologies, such as consumer drones and internet communication technology. The Jalisco New Generation Cartel (CJNG) is one such

criminal organization. It probably has the most significant presence in Mexico. Mexican authorities and security forces spend considerable time and energy in response to the violence generated by its illicit activities.¹¹ Unfortunately, specialists and politicians do not consider the use of drones by Mexican TCOs a problem. They do not consider drones a threat to the internal security of a state or a threat to national security. However, in countries where violence prevails due to the illegal activities of criminal organizations, drones are used indiscriminately. Criminals use this technology to further their goals, perpetrate violence, and destabilize regional security. Thus, in the case of Mexico, the following question needs to be answered:

Research Question: *How can we counter the illegal use of drones by TCOs in Mexico?*

D. LITERATURE REVIEW

Over the past decade and a half, TCOs have significantly increased their activities and adapted to unconventional tactics and cutting-edge technology to carry out their illicit operations.¹² This review explores the ways in which organized criminal groups are exploiting new technologies to advance their illegal activities, particularly focusing on consumer technologies like drones and Information and Communication Technologies (ICTs).

Although several countries have adopted measures against the illicit use of drones by criminal organizations, these actions have not always been effective in countering the activities of organized crime. To limit the illegal use of new technology by criminal organizations, authorities have innovated their strategies. Cameron McDougal, in his study “From the Battlefield to Domestic Airspace: An Analysis of the Evolving Roles and

¹¹ Gary Ackerman et al., *The “New” Face of Transnational Crime Organizations (TCOs): A Geopolitical Perspective and Implications to U.S. National Security*, Report (NPS Archive, Monterey, CA: Calhoun, March 2013), <https://calhoun.nps.edu/handle/10945/30346>.

¹² John P. Sullivan, “Mexican Cartel Adaptation and Innovation,” OODA Loop, January 27, 2020, <https://www.oodaloop.com/archive/2020/01/27/mexican-cartel-adaptation-and-innovation/>.

Expectations of Drone Technology,” provides tactical situations where drone technology provides satisfactory results.¹³

Criminal organizations seek to create a network of contacts among politicians through bribery or coercion. Thomas Schelling argues that coercion must be supported by credible actions so that the adversary understands that continuing with their behavior will only lead to increased pain.¹⁴ To achieve this, criminals require communication media to obtain information about their adversaries and security forces in order to avoid confrontation with the latter, attack the former, and control the area or region for the freedom to act.¹⁵ Criminal organizations adapt technology to the military tactics they use against adversaries, security forces, and the population.¹⁶ However, the use of similar technology by TCOs can produce panic in the population, affecting people’s activities and forcing them to leave their homes. June S. Beittel emphasizes that the JNGC uses drones loaded with improvised explosive devices (IEDs) to attack police infrastructure, their rivals, and even the local population.¹⁷ The use of drones by JNGC threatens civilians who do not support the JNGC’s activities and violates the rule of law and the internal security of Mexico.

Mexican authorities must design an asymmetrical response rather than a regular operation to counter the conflict faced by authorities in Mexico. The Mexican Armed Forces are facing criminal organizations in an Asymmetric Conflict, in which criminals try to avoid an armed confrontation against the authorities (armed forces), and the armed forces constantly search for the location of criminal groups on the ground.¹⁸ The success

¹³ Cameron McDougal, “From the Battlefield to Domestic Airspace: An Analysis of the Evolving Roles and Expectations of Drone Technology,” *PublicINReview* 1, no. 2 (March 17, 2013): 92–102.

¹⁴ Thomas C. Schelling, *Arms and Influence* (Hartford, United States: Yale University Press, 1967), <http://ebookcentral.proquest.com/lib/ebook-nps/detail.action?docID=3421294>.

¹⁵ June S Beittel, “*Mexico: Organized Crime and Drug Trafficking Organizations*” (Congressional Research Service, June 7, 2022), https://media.proquest.com/cdn/media/hms/PFT/1/qmnEN?_tm=1668453400303&_cfs=o5y2fimmYdjlCLJNU33%2BxBi7gDmjaO0%2BOqR42SfWJSE%3D.

¹⁶ Rice, “The Untold Story of the Battle for Kyiv.”

¹⁷ Beittel, “Mexico: Organized Crime and Drug Trafficking Organizations.”

¹⁸ Thomas M. Sanderson, “Transnational Terror and Organized Crime: Blurring the Lines,” *The SAIS Review of International Affairs* 24, no. 1 (2004): 49–61.

of hybrid operations is dependent on the production and management of intelligence. Military forces find efficiency in the appropriate application of strategies due to good governance and communication of intelligence regarding criminal organizations.¹⁹ Once a group is located and individuals are identified as being related to a criminal organization, those individuals are arrested.

In conclusion, it is crucial for the security forces and government to develop a strategy to combat the unlawful use of drones by TCOs in Mexico. The use of drone technology has become increasingly important in TCOs' illicit activities, and the response of authorities must be adaptive and effective to limit criminal organizations' success.

E. THESIS APPROACH

The initial chapter explores the dual nature of drone technology: while offering significant benefits, drones have also been exploited for harmful purposes by criminal groups and extremist factions. Illustrative examples from across the globe, spanning from the Americas to Europe, paint a vivid picture of an international dilemma that is as creative as it is menacing.

As the exploration of these multifaceted narratives unfolds, Chapter II elevates the discourse by delving deeper into the intricacies of specific real-world incidents. This chapter is where the abstract meets the concrete and the general narratives of drone misuse are crystallized into tangible, discernible events.

Each incident in Venezuela, the United States, and France reveals the evolving, intricate nature of security challenges posed by drones.²⁰ They are no longer isolated instances but elements of a complex, interconnected global puzzle. The narrative unearths the need for a unified, cross-border approach to mitigate these pervasive threats.

From the broader landscape, the narrative transitions into the personalized insights of a seasoned Mexican officer. It is an evolution from global perspectives to an intimate,

¹⁹ Anibal Aguirre Jr., John T. Mullany, and Brandon R. Ratner, "The Power Behind Transnational Criminal Organizations: An Inside Look at Mexican Drug Cartel Networks" (master's thesis, Naval Postgraduate School, 2018).

²⁰ Sinclair, "Death from above."

firsthand account, where abstract challenges are grounded in the pragmatic and tangible experiences of combating illicit drone use.

In Chapter III, we unveil the intricacies of legal, technical, and international dynamics in play, drawing from enriched experiences in the field.²¹ The chapter provides a grounding perspective, bridging the chasm between global phenomena and their localized impacts and responses, and pivoting the narrative to a space of resilient optimism amidst evolving challenges.

While Chapter III immerses readers in a specialized perspective, Chapter IV broadens the horizon, drawing parallels and contrasts between nations and their adaptive strategies in the face of common yet contextually unique challenges.

Ukraine's narrative of drone integration is meticulously unraveled, presenting both a tale of military adaptation and an ominous forewarning of potential exploitation by criminal entities like CJNG. It is a balanced narrative of technological empowerment and emerging vulnerabilities, setting the stage for a deep dive into criminal innovation.

As Ukraine's story of adaptation and resilience concludes,²² the narrative seamlessly evolves, introducing the ominous yet fascinating world of CJNG. It is a transition from state actors to non-state entities, from adaptation to exploitation, and from defense to offense.

Chapter V provides an analysis of CJNG's strategic evolution, unveiling a world where crime, technology, and global security converge in an intricate dance. This chapter illuminates the multifaceted nature of the challenges and opportunities precipitated by drone technology, bringing the reader to the precipice of global strategic imperatives.²³

²¹ "Norma Oficial Mexicana NOM-107-SCT3-2019, Que establece los requerimientos para operar un sistema de aeronave pilotada a distancia (RPAS) en el espacio aéreo mexicano.," [Official Mexican Standard NOM-107-SCT3-2019, Which establishes the requirements for operating a remotely piloted aircraft system (RPAS) in Mexican airspace], Federal Civil Aviation Agency, 2019, <http://www.gob.mx/afac/acciones-y-programas/rpas-drones>.

²² Kunertova, "The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Game."

²³ Bunker and Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs*.

Each revelation and analysis in Chapter V builds a bridge to the final reflections. It is a harmonious progression where the examination of intricate, localized criminal innovations leads to holistic reflections, encapsulating the global, multifaceted security ecosystem.

The concluding chapter draws from the wealth of insights garnered throughout this research, presenting an introspective analysis of a world in transformation. It encapsulates the profound implications and resilient human and international responses to the permeable boundaries between technology, crime, and security, concluding the thesis on a note of hopeful realism.

The harmonious blend of these chapters constructs a rich tapestry of insights, challenges, and opportunities in the era of drone technology. From their dark utilizations to the resilient spirit of human ingenuity and international collaboration, the thesis unveils a world in transition—where challenges are as global as the collective efforts to mitigate them, marking pathways toward a future of security, peace, and human flourishing. Each chapter, with its nuanced focus and detailed exploration, contributes to a symphony of insights, echoing the profound complexities and resilient hopes of a world navigating the intricate dance of technology, security, and innovation.

II. EMERGING THREATS: CASE STUDIES FROM FRANCE, VENEZUELA, AND THE UNITED STATES, AND FUTURE CHALLENGES OF DRONE TECHNOLOGY

A. FROM WARFARE TO WELFARE: THE EVOLUTION, APPLICATION, AND ETHICAL IMPLICATIONS OF DRONE TECHNOLOGY

1. Historical Origins and Military Roots: Tracing the Emergence of Drones in Warfare

Over the past 30 years, the world has witnessed a surge in technological advancements that have enormously enriched human life. These advancements have overhauled our ways of connecting and traveling, transformed our day-to-day living, overhauled construction methods, and markedly bettered health care and home living. Technology's deep and far-reaching influence is clear. Yet, as with all progress, there exists a dual potential. While many have channeled these advancements to uplift and advance society, there are those who have turned these new capabilities towards destructive ends, leveraging them to inflict damage and societal harm.

Among the many technological marvels that have emerged, drones, also known as unmanned aerial vehicles (UAVs), hold a special place. These remarkable devices trace their origins to the early 20th century, when the pioneering models were developed and operated by the United States and the United Kingdom using rudimentary radio controls.²⁴ Their potential was further realized during the World War II, when the U.S. Armed Forces exponentially expanded their use. The strategic advantage offered by these drones, particularly in aerial reconnaissance and surveillance, was invaluable. They not only provided a vantage point but also became pivotal assets in military responses, especially when countering the sophisticated aerial technologies employed by the Germans to further their military endeavors.

²⁴ Ralph DeFrancesco and Stephanie DeFrancesco, *The Big Book of Drones* (Boca Raton, FL: CRC Press, 2022), <https://doi.org/10.1201/9781003201533>.

2. The Cold War Era: Drone Technology and Geopolitical Maneuvering

Following the end of World War II and throughout the Cold War, significant strides were made in the fields of engineering and technology. This period of rapid innovation facilitated the emergence and development of increasingly sophisticated drones designed for a myriad of applications. These advancements, when viewed in the broader context, were largely a product of the burgeoning Information Age and the nuances of electronic warfare. Consequently, the U.S. Armed Forces, complemented by the country's intelligence agencies, found a renewed interest in harnessing this cutting-edge technology, particularly within the realms of Intelligence, Surveillance, and Reconnaissance (ISR). Their overarching strategic imperative was to counter the swelling tide of socialist and communist ideologies in Western countries.²⁵

The tactical and strategic utilization of drones was intricately aligned with broader geopolitical objectives, primarily to undermine the formidable influence of the Soviet Union. This was done in an attempt to thwart the Soviet Union's efforts to propagate socialist policies in nascent nations searching for external allies to support their development trajectory. However, it is noteworthy that drone technology, given its covert nature, did not immediately pique the interest of the commercial sector during this era. This lack of interest was compounded by inadequate investments, the apparent absence of a broader vision for drone applications outside of military spheres, and limited funding from private entities.²⁶

3. From Modern Defense Era to Civilian Skies: The Transformation and Adaptation of Drones

Societal acknowledgment and acceptance of drones lagged behind. It was not until the 1990s that drones began to carve out a more pronounced role within military operations. Beyond their conventional surveillance capabilities, drones were increasingly being

²⁵ Katharine Hall Kindervater, "The Emergence of Lethal Surveillance: Watching and Killing in the History of Drone Technology," *Security Dialogue* 47, no. 3 (June 1, 2016): 223–38, <https://doi.org/10.1177/0967010615616011>.

²⁶ Kindervater.

repurposed as offensive assets against ground-based targets.²⁷ During this transformative phase, the strategic goal of drone deployment shifted towards gathering crucial intelligence for impending operations targeting terrorist outfits. Once a potential target was identified, drones were deployed not only for surveillance but also for precision strikes. The aftermath of these strikes was closely monitored to evaluate the efficacy and implications of the attack. Throughout this period, the U.S. military extensively leveraged drones for surveillance, target identification, and offensive operations against enemy paramilitary and military outfits. It is imperative to highlight that while these operations were aggressive, there were stringent protocols in place to ensure non-combatant civilians were not inadvertently targeted.

During the first decade of the 21st century, society experienced a profound shift in its attention toward drone technology, marking a pivotal 360-degree turn in drone perception and application. The evolution of consumer drone technology began its meteoric rise in the industry around 2014, spearheaded by the innovative creations of Frank Wang, the founder of Da-Jiang Innovations (DJI).²⁸ Wang's vision materialized with the design of a sleek, user-friendly drone that was both compact and capable of producing high-quality aerial imagery. Controlled via remote and equipped with features enabling even novices to pilot it, this groundbreaking drone revolutionized the landscape of personal aviation.

4. Drones: Multifaceted Tools and Their Ethical Implications

With the introduction of these innovative flying devices, the drone industry expanded its horizons. The primary focus of these devices was to capture stunning aerial views, whether it was of infrastructure projects or the breathtaking vistas offered by nature. However, the utility of drones was not limited to imagery; their application branched out to agricultural surveillance and emergency response. Drones started playing a pivotal role in precision agriculture, assisting farmers in monitoring, irrigating, and spraying their fields more efficiently. Another significant advancement was the drones' capability to carry

²⁷ Kindervater.

²⁸ Bunker and Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs*.

hoses for firefighting.²⁹ This was particularly beneficial in areas that were challenging or hazardous for firefighters to access. By using drones in such situations, firefighter safety was enhanced, as firefighters could be deployed to other areas where their expertise was critically required.

The vast majority of people recognized the multifaceted benefits of these drones, from aiding in agricultural tasks to bolstering firefighting efforts. Many sought to harness the positive potential of drones, exploring ways they could simplify human lives or enhance safety. However, like any transformative technology, drones were not immune to misuse. Some individuals began to exploit the advantageous features of drones for illicit activities. This unfortunate deviation from their beneficial applications led to legal challenges, as seen in instances involving activists in Europe. The misuse of drone technology underscored the need for robust regulations and ethical guidelines to ensure their constructive utilization in society.

B. CASE STUDY: DRONE AGGRESSIONS IN FRANCE AND BEYOND – FROM NUCLEAR FACILITIES TO TERRORIST STRIKES

The emergence of commercial drones and their widespread availability have introduced new and alarming challenges for global security. France has witnessed several drone-related incidents that have raised concerns, ranging from activism to acts of terrorism. However, this phenomenon extends beyond European borders, reaching regions where drug cartels employ this technology in both innovative and threatening ways.

1. Illicit Drone Incursions: Exposing Strategic Vulnerabilities in Nuclear Infrastructure

France, recognized as a global leader in nuclear energy production, finds itself at the forefront of addressing contemporary technological challenges, especially regarding the security of its extensive nuclear facilities. Generating an impressive 75 percent of its electricity from nuclear energy sources, the country stands as a testament to the potential of atomic power.³⁰ Yet, the very reliance on this energy form necessitates an unwavering

²⁹ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

³⁰ Reuters, “Greenpeace Crashes Superman.”

commitment to ensuring the safety, integrity, and protection of these pivotal infrastructures.

Surprisingly, the potential threats to these facilities have not primarily emerged from traditional adversaries, hostile nations, or even recognized terrorist entities. Instead, they have come from an unexpected quarter: environmental activists, most notably Greenpeace members. These activists, driven by concerns about nuclear energy's environmental impact and perceived security lapses, have employed sophisticated methods, including the use of drones, to draw attention to their cause.

While their primary intention may be to spotlight vulnerabilities and advocate for enhanced safety measures, their actions have inadvertently exposed a significant gap. The ability of such non-state actors to deploy drones near critical infrastructures has sounded alarm bells within France's security apparatus. These actions raise pressing and profound questions about France's readiness and capability to defend its vital nuclear installations against both conventional and unconventional threats.

In their comprehensive research, Markarian and Staniforth detail a series of incidents that transpired at the Le Bugey nuclear plant between 2012 and 2018. These events were punctuated by illicit drone activities, with evidence suggesting involvement by Greenpeace members.³¹ In one striking incident from 2018, a drone shaped like Superman was intentionally crashed into the facility, an act intended to spotlight perceived vulnerabilities within the nuclear infrastructure.³²

While Greenpeace disavowed any association with certain drone overflights in 2014, its consistent and dramatic demonstrations have galvanized the French government into action. In response to these security concerns, the authorities have embarked on a thorough reevaluation and subsequent strengthening of security protocols at their nuclear establishments.

³¹ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

³² Reuters, "Greenpeace Crashes Superman."

These provocative actions have set off a ripple effect across the national security landscape. While Greenpeace has successfully highlighted potential vulnerabilities in the protection of nuclear facilities, it has also demonstrated how drones can be readily adapted for harmful applications. This stark realization not only prompted a parliamentary inquiry in France concerning nuclear safety but has also unwittingly paved the way for other groups to view drone technology as a viable instrument for advancing their agendas. The consequences of such recognition are widespread and potentially more serious, as organizations might be encouraged to take advantage of these susceptibilities with increasingly harmful intentions.

2. Emergent Threats: The Drone Attack by ISIS that Wounded French Elite Forces

The widespread dissemination of drone technology in the global marketplace has introduced complex challenges in both military engagement and terrorism, complicating the landscape of international security. Initially perceived as benign or for recreational purposes, drones have shown their potential for substantial misuse when in the hands of unauthorized operators. A clear indication of this evolving threat is the increased use of commercially available drones by insurgent groups and terrorist organizations. These factions have adeptly integrated this readily available technology into their warfare and terrorist operations, highlighting the diverse and intricate threats that contemporary security forces are now compelled to address.

Another illustrative example of this burgeoning security dilemma emerged in October 2016 in Northern Iraq. ISIS, infamous for its savage tactics and adaptability, utilized an explosive-laden drone to strike both Kurdish and French positions within the country. The immediate aftermath of this assault resulted in the death of two Kurdish fighters and severe injuries to French elite soldiers.³³ Thomas Gibbons posits that the precise nature of the attack—whether the drone simply dispensed explosives or operated as an aerial kamikaze—remains a subject of contention and scrutiny, given the ambiguity

³³ Ulrike Franke, “Flying IEDs: The Next Big Threat?,” War on the Rocks, October 13, 2016, <https://warontherocks.com/2016/10/flying-ieds-the-next-big-threat/>.

surrounding the aggressive technique employed.³⁴ This sort of uncertainty presents augmented challenges for defense forces. They are now tasked not only with neutralizing such threats but also with deciphering the evolving methodologies and tactics underpinning these assaults.

This emerging *modus operandi* carries grave implications for military forces operating in conflict zones, particularly those inadequately equipped to counter aggressions from drones and explosive devices. When embedded with local troops, they grapple with the challenge of identifying the looming threat posed by drones, especially when these devices can be virtually indistinguishable from those employed for non-hostile purposes. A further complication arises when considering whether Western troops, with their distinctive uniforms and specialized equipment, become more conspicuous targets, thus increasing their vulnerability on the battlefield. These mounting challenges underscore the pressing need to devise new defensive strategies and technologies to counteract drone threats in the near future.

3. Expanding Threat Landscape: Beyond Conventional Concerns

The threat posed by drones is no longer confined to environmental activist groups like Greenpeace. A confidential report leaked from France's Anti-Terrorism Unit warns of potential terrorist attacks using drones at densely populated events, such as soccer matches. Furthermore, the European Union's Commissioner for Security, Julian King, has voiced concerns regarding the use of drones for hostile acts. As such, the landscape of potential threats is rapidly evolving, underscoring the need for heightened vigilance and updated security protocols in the face of this emerging challenge.³⁵

Moreover, beyond Europe, in regions plagued by drug trafficking, there is a noticeable trend of drug cartels adopting this drone technology. They utilize drones not only for transporting and trafficking illicit substances but also for surveillance and

³⁴ Gibbons-Neff, "ISIS Used an Armed Drone to Kill Two Kurdish Fighters and Wound French Troops, Report Says."

³⁵ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

attacking rivals, authorities, and local communities.³⁶ This adaptation of tactics, reminiscent of those employed by terrorist organizations, introduces a new challenge to the security and stability of many nations. It amplifies violence and places innocent civilians in increased jeopardy.

4. Conclusion

While drone technology offers immense benefits, it has concurrently emerged as a significant challenge to security. From environmental activists to insurgent groups and drug cartels, the potential misuse of this technology has manifested in various ways. As the threat landscape concerning drones becomes increasingly diverse, there is a pronounced emphasis on the need for innovative countermeasures, robust security protocols, and international collaboration to tackle these challenges. It is vital for nations to recognize the escalating threat posed by drones in the wrong hands and to work together in devising effective strategies to prevent and counter their illicit use.

It can be discerned that drug Trafficking Organizations (DTOs) have managed to amplify the level of violence during their confrontations by leveraging the strategic efficacy offered by drones in conjunction with the criminals' aggressive tactics. This escalation in violence transcends traditional criminal activities such as drug trafficking or extortion. Criminal entities now emulate the use of drones armed with explosives to target their adversaries. As highlighted by Robert J. Bunker and John P. Sullivan in their book *Criminal Drone Evolution*, the paramilitary Islamic group ISIS has extensively utilized drones against its foes in Iraq and Syria. It has employed drones not only for reconnaissance to guide mortar fire during confrontations but also for releasing grenades on various ground targets with significant precision.³⁷

Such events demonstrate that the efficiency of drones has considerably impacted the landscape of warfare and criminal operations. These capabilities have become so influential that terrorist entities began harnessing this technology to gather intelligence

³⁶ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

³⁷ Bunker and Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs*.

about their adversaries, obtain terrain data for prospective operations, and attack their foes directly. This underscores the importance of recognizing the adaptability of criminal and terrorist groups in utilizing emerging technologies to further their agendas.

Criminal organizations have exhibited a remarkable ability to adapt and learn, incorporating techniques and tactics traditionally associated with terrorist groups into their own modus operandi. The deployment of drones by DTOs stands as a lucid testament to this adaptive prowess. Originally emerging as reconnaissance and surveillance tools, drones' offensive potential was swiftly recognized and harnessed by entities like ISIS, integrating them as both tactical and strategic assets on the battlefield. Such evolutions underscore the blurring lines between conventional warfare and organized crime. As technology advances, these groups have shown a propensity to modify and deploy these innovations to suit their specific operational needs, reinforcing the necessity for continuous adaptation in countermeasures and intelligence efforts.

C. THE AERIAL ASSAULT IN VENEZUELA: DRONES AS INSTRUMENTS OF AGGRESSION AND THEIR IMPLICATIONS FOR GLOBAL SECURITY

1. The Drone Attack on Maduro: A Paradigm Shift in Political Aggression

In the Americas, numerous drone attacks by criminal organizations have been recorded. One of the most notable was against the secretary of public security in Baja California, Mexico. The attack took place at the residence of Gerardo Sosa Olachea, Baja California's head of public security.³⁸ This assault involved two drones and fragmentation grenades, seemingly intended to target the state government official. While it is not uncommon for criminal groups, such as terrorist organizations and DTOs, to carry out such actions, it is deeply concerning that individuals who appear to be working legitimately would resort to these illicit activities due to political disagreements.

³⁸ Bunker and Sullivan.

2. The Unintended Consequences of Technological Progress: A Looming Security Challenge

The technological revolution of recent decades has had an unparalleled impact on virtually every facet of human life. From the ways people communicate to how they consume information, shop, or manage their daily affairs, technology has introduced conveniences once deemed the stuff of science fiction. It has streamlined industrial processes, simplified intricate tasks, and enabled a global connectivity that has brought people and markets closer together than ever before. Yet, simultaneously, this technological evolution has presented society with challenges and dilemmas demanding immediate attention, particularly in the realm of security.

In a world once dominated by direct and clearly defined confrontations, the modern era has witnessed the emergence of tactics and threats that defy established norms. These unconventional activities are defined by the Institute for Defense Analyses as “asymmetric threats.” In the context of security, these refer to challenges that do not align with traditional or conventional conflict patterns.³⁹ One of the most evident and concerning manifestations of this trend is the use of drones by non-state actors. Such actors range from organized criminal groups and terrorist cells to lone individuals with personal agendas. What is alarming is how these drones, originally designed for purposes like aerial photography, infrastructure inspection, or package delivery, are being repurposed for more insidious and destructive ends.

3. Aerial Assault: The Use of Drones in Political Attacks and International Implications

The assassination attempts of political leaders on the global stage stand out as an alarming reminder of the urgency with which this issue must be addressed. Venezuela has witnessed unsettling incidents involving armed drones in assassination attempts against President Nicolás Maduro. A significant event took place in August 2018 during a military parade when drones, allegedly operated by opposition members, targeted him with the

³⁹ John C. F. Tillson et al., *Learning to Adapt to Asymmetric Threats*, IDA Document D-3114 (Alexandria, VA: Institute for Defense Analyses, 2005), <https://apps.dtic.mil/sti/citations/ADA442427>.

intent to overthrow his government.⁴⁰ According to Carlos Vargas and Brian Ellsworth of Reuters, Salvatore Lucchese, a former municipal police chief and opposition activist, admitted to having played a role in orchestrating the attack alongside anti-government militants. What stands out from this incident is not just its audacity but also how it mirrors the readiness of criminal organizations, including powerful drug cartels, to adopt and adapt emerging technologies to challenge the status quo and solidify their power.

It is alarming to see individuals, despite holding legitimate and professional positions in society, resorting to illicit and violent acts due to their political disagreements. This behavior highlights a growing global trend of turning to extreme tactics in political conflicts. And it is not just in Venezuela where drone incidents have occurred. In December 2018, Gatwick Airport in London suspended operations because of drone sightings in its restricted airspace, causing chaos during the peak holiday season.⁴¹

There are political figures who seize upon these kinds of aggressions to justify their actions and lay blame on other international actors. This behavior could potentially ignite conflicts on the global stage. A case in point is Venezuelan politician Jorge Rodriguez, who pointed to Colombia as the alleged culprit behind drone attacks against President Maduro. However, he presented no evidence to support these claims.⁴² The threat posed by the illegal use of armed drones for assassination attempts against a head of state marks a significant evolution in attack methodologies within the international arena. This not only emphasizes the vulnerability of world leaders but also illustrates the ease with which technology can be repurposed for destructive ends.

4. International Responses and Preventive Measures

The examination of these emerging threats must be thorough and span multiple disciplines. Primary data collection—from such sources as press reports, interviews with

⁴⁰ Walsh et al., “Inside the August Plot to Kill Maduro with Drones.”

⁴¹ James O’Malley, “The No Drone Zone,” *Engineering & Technology* 14, no. 2 (March 2019): 34–38, <https://doi.org/10.1049/et.2019.0201>.

⁴² “Venezuelan Parliament Denounces Attempted Assassination with Drones against Maduro,” CE Noticias Financieras, July 14, 2021, <https://www.proquest.com/docview/2551989285/citation/4FF9291484A44D16PQ/1>.

security experts, and official statements— needs to be integrated with in-depth academic research and technical analysis. Pioneers in this domain, like Robert J. Bunker and John P. Sullivan, have laid a foundation by identifying and studying the burgeoning trends in the criminal use of drones. Their insights offer a valuable framework for grappling with the wider implications of this issue.⁴³

Many governments have recognized the rising threat of drones and have thus instituted measures to counteract the deployment of drones by criminal outfits. These measures have, to an extent, shielded the general public and the authorities that are pitted against TCOs. Given the gravity of the situation, it is crucial that security agencies and political leaders prioritize investments in the research and development of effective counter-drone measures and other nascent technological threats.

Proper training, coupled with the establishment of robust regulatory frameworks, is of paramount importance. In an era where technology evolves rapidly, staying ahead of potential threats and ensuring the safety of citizens necessitates a proactive and well-informed approach.

5. Anticipating Tomorrow: The Future Implications and Challenges for Global Security

Throughout history, technological advancements have continuously influenced the balance of power. In today's world, where organized crime and terrorism are prevalent, the pace and scale at which technology impacts this dynamic are unprecedented. Drones, cyberattacks, and artificial intelligence are examples of modern tools that are being repurposed for harmful purposes. The quick evolution of these technologies requires law enforcement and security agencies to respond with agility and develop equally innovative countermeasures.

In conclusion, the current global security landscape is characterized by adaptation and evolution. Criminal organizations, with their nimble ability to quickly harness new tools and tactics, continuously challenge authorities. In this technological race,

⁴³ Bunker and Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs*.

underestimating the opponent's capabilities and failing to adequately prepare can have dire consequences for public safety. Hence, prevention, regulation, and adaptation are not just essential; they are paramount for the protection and well-being of societies worldwide. In an era where change is the only constant, proactive foresight and unwavering diligence become the beacon guiding our collective path forward.

D. BEYOND SMUGGLING: THE RISE OF DRONES IN ILLICIT OPERATIONS AND THEIR IMPACT ON U.S. SECURITY

Up to this point, one might ask, what does it mean when criminals harness new technology to deceive people and achieve their goals? Additionally, what is the overarching connection between technological utilization and criminal activities?

First and foremost, it is pivotal to understand that this emergent technology has not gone unnoticed by criminal syndicates. Both terrorist factions and drug traffickers have tapped into the potential of these devices globally. In recent years, there has been an escalating trend where criminal organizations increasingly deploy commercial drones to facilitate illicit operations. Valencia and Martínez have highlighted how drug traffickers have adopted drone technology, capitalizing on its capability to infiltrate hard-to-reach areas and convey sizable payloads.⁴⁴

However, these drones are not solely reserved for drug deliveries; they also serve reconnaissance purposes in crucial locations such as ports or prisons. In highlighting the scale of the issue, Christopher Woody has noted that a drone weighing around 45 kg can transport an impressive 100 kg of cocaine in a single trip.⁴⁵

This innovative application of drone technology poses a formidable challenge for security forces aiming to counteract drug trafficking. Henry points out that the most commonly transported substances via this method encompass methamphetamines, heroin,

⁴⁴ Martinez and Valencia, "Drone Carrying Drugs Crashes South of U.S. Border."

⁴⁵ Christopher Woody, "Colombian Traffickers Have Added Drones to Their Smuggling Arsenal," Business Insider, November 18, 2016, <https://www.businessinsider.com/colombian-cocaine-drug-smuggler-using-drones-2016-11>.

cannabis, and cocaine, underscoring the versatility and allure of drones for drug trafficking operations.⁴⁶

Moreover, the rapid evolution of technology, combined with its accessibility, challenges traditional security paradigms. As these tools become more ubiquitous, it is imperative for security forces to invest in research, development, and strategies that can effectively deter and neutralize these newfound threats.

The use of drones by criminal organizations introduces a novel dimension to illicit activities, enabling the organizations to overcome physical barriers and enhancing their capability to evade security forces. Moreover, drones play a significant role in deterring rival drug cartels that could obstruct their illegal operations.

As cited in a report by Robert Brzenchek from May 25, 2018, criminal syndicates utilize UAVs to gather intel on authorities' operations. One telling incident shared by a Federal Bureau of Investigation agent depicts how a criminal faction identified and targeted members of a hostage rescue team. The agent recounted, "The team members heard the distinct buzzing of a small drone overhead." The drone aggressively buzzed over the agents multiple times, attempting to intimidate and ward them off.⁴⁷ This particular instance underscores how criminal organizations leverage UAVs as a means to deter and confound law enforcement.

From such observations, it becomes evident that criminal entities have increasingly embraced cutting-edge technologies to facilitate their illegal undertakings. This integration has culminated in the regular incorporation of drones into a myriad of their illicit activities. As these technologies continue to evolve, the spectrum of their utilization by criminals is bound to expand, posing new challenges for law enforcement and security agencies globally. Addressing these challenges requires an interdisciplinary approach, combining technological innovation, intelligence gathering, and updated legal frameworks.

⁴⁶ Janie Henry, "High Tech Drones Own the Sky: The Next Wave in Drug Trafficking," Patch, June 22, 2015, <https://patch.com/illinois/chicagoheights/high-tech-drones-own-sky-next-wave-drug-trafficking>.

⁴⁷ Robert Brzenchek, "How Gangs Are Using Drones to Disrupt Law Enforcement," Police1, May 25, 2018, <https://www.police1.com/gangs/articles/how-gangs-are-using-drones-to-disrupt-law-enforcement-Zm0bioryLmbzRInd/>.

1. The Dangerous Shift in Gangs' Use of Drones in the United States

Even states boasting advanced security systems and clearly articulated laws on technology use have not been immune to the illicit activities perpetrated by criminal organizations. Gangs within the United States have swiftly harnessed drone technology to jeopardize the safety and functioning of law enforcement agencies. Brzenchek points out that these adversarial groups have utilized UAVs not only to employ intimidating tactics against hostage rescue teams but also as advanced instruments for espionage purposes.⁴⁸ Such drones offer an unprecedented advantage, allowing these organizations to meticulously observe police operations and gather pivotal intelligence. The scope of their application does not end there; these devices have further been exploited for smuggling purposes across borders and, in an even more disturbing trend, have been equipped with explosives, posing a formidable challenge to any interception efforts. As we delve deeper into this issue, it becomes evident that the future implications of such advancements could be profound and unsettling.

Gangs have undergone an evolution in their criminal operations, integrating advanced technology for intimidation, espionage, and smuggling purposes. This underscores not only the agility and adaptability of these organizations but also the escalating challenge that law enforcement agencies face in staying one step ahead. Reflecting upon these shifts, it is evident that the trajectory of such evolutions poses profound future complications for security and enforcement strategies.

Moreover, based on data provided by Brzenchek, the technological landscape has grown even more complex, with gangs demonstrating the ability to hack drones, especially those manufactured by DJI, a Chinese company. Despite warnings and restrictions from the Department of Defense, these DJI-made devices have been procured by police departments, exposing them to significant security risks.⁴⁹ Gangs, capitalizing on these technological vulnerabilities, have managed to interfere with, seize control of, and even bring down these UAVs. This interference capability underscores the urgency to

⁴⁸ Brzenchek.

⁴⁹ Brzenchek.

continuously reevaluate and adapt security strategies to confront these emerging threats. Delving deeper into this scenario, the potential ramifications for the future become alarmingly clear.

The ability of gangs to hack drones not only exposes the technological vulnerabilities inherent in these devices but also underscores the pressing need to reevaluate and strengthen our security strategies. That these gangs can compromise police surveillance tools marks a concerning shift in the balance of power.

2. The Challenge of Drones in U.S. Correctional Facilities

U.S. correctional facilities are witnessing a surge in contraband threats, now inclusive of potential drone deliveries. According to the National Institute of Justice, this technological challenge has escalated the need to detect illicit drone flights and pinpoint their operators. Drone technology's evolution and sophistication pose multiple threats to the correctional system, ranging from contraband delivery to aerial surveillance.⁵⁰ This technology introduces significant challenges for developers and authorities, particularly in light of the current legal and technological constraints related to drone detection and mitigation. Drones' evolving capabilities have expanded the vulnerabilities of prisons, necessitating a continuous adaptation and review of security policies and strategies. The balance between technological response and legal constraints presents a complex landscape for penitentiary authorities.

Prisons' adaptability to the escalating drone threat has been impeded by several factors. Current detection methods, frequently tailored for military use, do not always meet the operational and budgetary demands of correctional institutions. Further complicating matters, the National Institute of Justice report indicates that there is no clear operational standard for guiding drone detection and mitigation within the penal system.⁵¹ As technology progresses, producing drones with enhanced autonomy, longer flight durations,

⁵⁰ "Addressing Contraband in Prisons and Jails as the Threat of Drone Deliveries Grows," National Institute of Justice, June 2, 2023, <https://nij.ojp.gov/topics/articles/addressing-contraband-prisons-and-jails-threat-drone-deliveries-grows>.

⁵¹ National Institute of Justice, "Addressing Contraband in Prisons and Jails as the Threat of Drone Deliveries Grows."

and superior evasion capabilities, authorities are turning to more flexible solutions like acoustic and radar systems that encounter fewer legal hurdles. This unfolding scenario underscores the pressing need for proactive measures in an increasingly complex security landscape.

Correctional facilities' response to the drone threat necessitates both technological and operational adaptation. Solutions must not only excel in detection and mitigation but also remain viable from legal and financial perspectives. The quest for holistic and adaptive strategies is vital in this rapidly changing and formidable landscape.

3. The Oklahoma Case and Beyond: The Illicit Transformation of Drones in the 21st Century

Even nations with advanced security systems and clearly defined laws governing technology usage have fallen victim to illicit activities orchestrated by criminal organizations. There have been numerous instances where criminals have either successfully smuggled or attempted to smuggle contraband into prisons across the United States using innovative methods.

A particularly notable case occurred in October 2015, when a drone was used in an attempt to deliver contraband into an Oklahoma prison. Criminals sought to introduce drugs, weapons, and other prohibited items with the aid of this drone. However, during its flight, the drone apparently collided with a wire, causing it to crash to the ground. This mishap drew the immediate attention of the prison staff, who swiftly secured the contraband.⁵²

The use of drones by criminals to illicitly transport goods highlights how technology, originally designed for positive and constructive purposes, can be misused and repurposed for illicit activities. Such incidents underscore the ongoing adaptability and evolution of criminal techniques in response to advancements in security measures. The fact that criminal organizations are resorting to drones suggests they are in search of more

⁵² Elisha Fieldstadt, "Drone Carrying Package with Drugs and Blades Found in Oklahoma Prison Yard," NBC News, October 27, 2015, <https://www.nbcnews.com/news/us-news/drone-carrying-package-drugs-blades-found-oklahoma-prison-yard-n452221>.

discreet and less hazardous means to transport goods, avoiding direct human interaction and thereby reducing the chance of apprehension.

The Oklahoma case is not an isolated incident but rather a reflection of a growing trend observed not only in the United States but globally. Drones provide criminals with the benefits of rapid access, high reach, and discreet delivery, qualities that position the devices as ideal tools for smuggling operations. The ability to transport items such as drugs, weapons, and communication devices covertly alters the dynamics of how criminal organizations function and poses significant challenges to existing security measures. These aerial devices, initially designed for recreational and professional purposes, have found their way into illicit activities, underscoring the need for adaptive and forward-thinking strategies in law enforcement and security domains.

4. Advanced Drone Use for Smuggling in Maryland Prisons: A Looming Challenge for the Future

The increasing sophistication of criminal networks has led criminals to adopt cutting-edge technologies like drones for smuggling operations in prisons. According to a report published by Tiffany Watson on May 25, 2023, 15 individuals were charged in connection with three distinct conspiracies to smuggle contraband into the Roxbury Correctional Institution in Hagerstown, Maryland.⁵³ Central to these operations was the meticulous use of drones, piloted from the outside, to fly over and drop drugs, tools, and electronic devices over the prison's tall security fences. This strategy came to a head on September 7, 2022, when authorities thwarted a delivery attempt, leading to the arrest of Guy Austin and Miya Scott. Reports suggest that they had crashed a drone the previous night in a similar endeavor.⁵⁴ This alarming trend underscores the pressing need for advanced security measures and vigilance to combat the evolving threats that modern technology can pose in the wrong hands.

⁵³ Tiffany Watson, "15 People Indicted in Maryland Prison Contraband Conspiracy Involving Drones," WBFF, May 25, 2023, <https://foxbaltimore.com/news/local/15-people-indicted-in-maryland-prison-contraband-conspiracy-involving-drones>.

⁵⁴ Watson.

5. Implications and Consequences of Drone Tactics

The unveiled strategy reveals not only audacity but also the intricate engineering behind smuggling operations. Jose Tapia, an inmate, even resorted to using social media to recruit external collaborators, highlighting how the convergence of digital and physical technologies can be exploited by criminal entities. This tactic underscores vulnerabilities within prison security infrastructure and raises pressing questions about how to counteract these advanced smuggling methods in the future.⁵⁵ This evolving landscape demands innovative solutions and strategic foresight in the face of such sophisticated threats.

6. Conclusion: The Pressing Need for Proactive Responses

The recent unveiling of these conspiracies highlights a concerning oversight by correctional authorities in anticipating the adaptability and resilience of criminal networks. The swift advancement of technology, exemplified here by drones, coupled with its adoption by illicit organizations, poses a significant challenge to security institutions. If authorities fail to act proactively, recognizing and adapting to these emerging threats, there is a looming risk that criminal organizations will continue leveraging these technological advantages. This not only strengthens their illegal operations but also jeopardizes the safety of the government institutions and the general public. The future demands urgent attention and adaptation to these ever-evolving threats.

⁵⁵ Watson.

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III. UAV COUNTERMEASURES: SAFEGUARDING SECURITY IN MEXICO AND THE UNITED STATES AGAINST ILLICIT DRONE AND ARMED DRONE USAGE

A. LEGAL ASPECTS OF NATIONAL REGULATIONS CONCERNING THE USE, COMMERCIALIZATION, AND RESTRICTIONS OF DRONES IN MEXICO

The proliferation of drones, formally known as Remotely Piloted Aircraft Systems (RPASs), in Mexico has underscored the need for clear regulations to define their operation and governance. In this context, Mexican regulations are framed within the scope of the Civil Aviation Law and the international conventions to which Mexico is a signatory.

1. Legal Framework

Civil Aviation Law Article 6, Section IX, grants the secretariat of communications and transport the relevant authority in civil aviation matters, including the power to issue Official Mexican Standards.⁵⁶ Additionally, Article 4 of the same law stipulates that international treaties, such as the International Civil Aviation Convention signed in Chicago in 1944, also govern civil aviation.⁵⁷ It is through these regulations that specific guidelines for the use and operation of drones are delineated.

2. International Standards and Safety

The International Civil Aviation Organization (ICAO), in *Annex 8 - Airworthiness of Aircraft*, emphasizes that manufacturers and the Civil Aviation Authority must ensure the crew's and third parties' safety. The increasing illicit use of drones has compelled authorities in various countries to scrutinize Annex 8 of the ICAO, which outlines the norms and procedures related to aircraft airworthiness.⁵⁸ Historically, these regulations

⁵⁶ "Ley de Aviación Civil," [Civil Aviation Law], Chamber of Deputies, DOF 03-05-2023, (Mexico City, May 3, 2023), <https://www.diputados.gob.mx/LeyesBiblio/pdf/LAC.pdf>.

⁵⁷ International Civil Aviation Organization, "Convention on International Civil Aviation – Doc 7300," ICAO, 2006, <https://www.icao.int/publications/pages/doc7300.aspx>.

⁵⁸ International Civil Aviation Organization, *Annex 8 – Airworthiness of Aircraft* (Montreal, Canada: ICAO, Twelfth Edition, July 2018), <https://ffac.ch/wp-content/uploads/2020/09/ICAO-Annex-8-Airworthiness-of-Aircraft.pdf>

have been applied to manned aircraft rather than drones, largely because incidents involving emerging technologies like RPASs were previously less prevalent.⁵⁹

Additionally, Annex 2 of the ICAO, known as *Annex 2 - Rules of the Air*, provides specific guidelines to ensure the safe operation of all aircraft in international airspace.⁶⁰ Although these norms were initially created with manned aircraft in mind, they are equally applicable to drones or RPASs. This annex provides an initial framework that could be used to regulate the illicit use of drones. It sets parameters such as permissible flying altitudes and zones where flight is restricted.⁶¹ The challenge lies in how to adapt these existing norms to address cases where drones are used for criminal purposes. It is worth noting that the concept of airworthiness is fundamental in these norms, whose main objective is to maintain the conditions necessary for the safe operation of aircraft. In the case of RPASs, which are unmanned, the idea is that their operation should not present greater risks than manned aircraft do.

Annex 17 is more directly focused on security measures to prevent illicit interference in civil aviation.⁶² It could be especially relevant for addressing the use of drones by transnational criminal organizations for activities such as smuggling or unauthorized surveillance. Its strength lies in its focus on security and the prevention of illicit acts, making it a crucial pillar for tackling the illicit use of drones.

3. International Conventions (Chicago Convention)

Within the framework of the Chicago Convention, Articles 8, 12, 13, and 28 are particularly relevant in the context of the illicit use of drones by transnational criminal organizations.⁶³ Strict enforcement of these articles could effectively deter transnational

⁵⁹ Federal Civil Aviation Agency, [Agencia Federal de Aviación Civil], “NORMA Oficial Mexicana NOM-107-SCT3-2019.”

⁶⁰ International Civil Aviation Organization, “Annex 2 – Rules of The Air,” ICAO, July 2005, <https://store.icao.int/en/annex-2-rules-of-the-air>.

⁶¹ International Civil Aviation Organization.

⁶² International Civil Aviation Organization, *Annex 17 – Aviation Security*, 12th ed. (Montreal, Canada: ICAO, April 2006), <https://store.icao.int/en/annex-17-security>.

⁶³ International Civil Aviation Organization, *Convention on International Civil Aviation*.

criminal organizations from using drones for illicit activities. Any action involving the illicit use of drones could be interpreted as violating these articles, thereby implicating international responsibilities for the state from which the drone was operated. Article 3 also addresses the use of weapons against civil aviation and could be applicable in extreme cases, such as acts of terrorism.⁶⁴

4. Regulation and General Standards in Mexico

In Mexico, drone regulation is overseen by a set of official standards that differentiate drone usage by the size and purpose of the RPAS, especially in the Official Mexican Standard NOM-107-SCT3-2019. Except for military and scientific research applications, all RPAS operators are required to adhere to a specific set of regulations corresponding to their drone's classification.⁶⁵ The standards delineate what is considered acceptable and safe use within Mexican airspace, but they also add layers of complexity for operators and manufacturers attempting to navigate the legal landscape. Each drone category comes with its own set of operational limitations, safety precautions, and registration requirements, making compliance challenging.

5. Airspace Security

The criticality of airspace security cannot be overstated, particularly concerning proximity to vital infrastructures such as airports and heliports. In Mexico, there is a stringent requirement to immediately report any sighting of an RPAS near such areas. Failure to do so can result in serious legal repercussions. Moreover, if a drone operation results in property damage, endangers public safety, or causes injury, operators are mandated to file a detailed report within five days.⁶⁶ These measures underscore the government's intent to maintain tight control over drone activities, particularly in sensitive areas where the risks are magnified.

⁶⁴ International Civil Aviation Organization.

⁶⁵ Federal Civil Aviation Agency, [Agencia Federal de Aviación Civil], "NORMA Oficial Mexicana NOM-107-SCT3-2019."

⁶⁶ Federal Civil Aviation Agency.

6. Responsibilities of the Operator and Pilot

Mexican legislation is unequivocal when it comes to assigning liability for drone operations. Both pilots and operators are held fully accountable for any incidents or damages that occur during drone flights. This liability extends to the handling and use of data collected during the flight, adding another layer of responsibility. Strict prohibitions are also in place against operating drones under the influence of alcohol or any other substances that impair cognitive function.⁶⁷ The accountability framework is robust but raises questions about insurability and the readiness of legal systems to adjudicate drone-related incidents comprehensively.

7. Limitations and Challenges in Regulation

While the primary aim of drone regulation in Mexico is to ensure safety and responsible usage, the current framework presents several challenges for different stakeholders. These range from compliance complexity due to strict categorization to operational restrictions that limit the full utility of drones for commercial or specialized applications. The regulations also broach concerns related to data protection and privacy, given the capabilities of modern drones for surveillance and data collection.⁶⁸ This regulatory landscape necessitates not just compliance but also an understanding of the broader legal implications, including those related to intellectual property and privacy laws.

8. Conclusion

The drone regulatory environment in Mexico is a complex amalgamation of standards aimed at ensuring safety and security. However, as technology continues to advance, the legal frameworks will also need to evolve to balance the innovative potential of drones with the imperatives of public safety and privacy.

⁶⁷ Federal Civil Aviation Agency.

⁶⁸ Federal Civil Aviation Agency.

B. CHALLENGES AND COUNTERMEASURES: DRONE USAGE IN THE GLOBAL LANDSCAPE AND SECURITY RESPONSES

1. The Double-Edged Sword of Drones: Innovation and Risk in the Skies

In *Countermeasures for Aerial Drones*, Garik Markarian and Andrew Staniforth explore the rapid growth and proliferation of drones (UAVs) across various sectors, from emergency services to logistics. These devices, which have military roots, have evolved into disruptive commercial tools, impacting consumers, industries, and businesses globally.⁶⁹ While they offer numerous positive applications, such as enhancing agricultural yields and delivering medical supplies to remote areas, there has been a rising concern over the illicit use of drones. The range of applications, from agricultural optimization to medical services in distant regions, showcases the versatility of these devices. However, a pertinent issue emerges: the misuse of drones for illicit purposes. This contrast underscores that while technology has the potential to improve people's lives, it can also be exploited for harmful activities.

The advantages of UAVs, such as their ability to operate remotely and cost-effectively, have driven their adoption by sectors like package delivery and public health. In the wrong hands, however, drones can cause harm and destruction and, when used for terrorist purposes, pose a lethal threat.⁷⁰ Additionally, there has been an increase in security incidents resulting from pilots who lack experience or choose to ignore flying regulations. The danger arises not only from individuals with harmful intentions but also from novice drone operators whose lack of skill or awareness could unintentionally cause harm.

2. Drones in the Shadows: The Rise of Aerial Smuggling and the Challenge of Cross-Border Security

As the drone industry has expanded, legislation and regulations have struggled to keep pace, leading to a burgeoning threat landscape.⁷¹ This gap between the rapid growth

⁶⁹ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

⁷⁰ Ash Rossiter, "Drone Usage by Militant Groups: Exploring Variation in Adoption," *Defense & Security Analysis* 34, no. 2 (2018): 113–26, <https://www.tandfonline.com/doi/epdf/10.1080/14751798.2018.1478183?needAccess=true&role=button>.

⁷¹ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

of the drone industry and the sluggish adaptation of regulations and laws has allowed for the unchecked deployment of this technology. This mismatch has culminated in an increasingly volatile environment, where potential threats are amplified due to the lack of proper oversight.

The technological advancement of UAVs has facilitated their equipping with advanced imaging technology and has enhanced their payload capacity. Markarian and Staniforth highlight that this civilian-accessible technology offers possibilities for individuals with hostile intentions, such as terrorists and criminals, who utilize them for hostile reconnaissance or the collection of information for harmful objectives.⁷² These actors aim to detail profiles of identified targets and evaluate security measures and other aspects.

Globally, organized crime has capitalized on technology and the borderless nature of today's connected world. Criminal organizations have swiftly integrated new technologies, such as UAVs, into their operations.⁷³ Given the advantages these organizations gain from employing this kind of technology, especially those involved in drug trafficking, they are likely to invest in drones to evade controls at borders and ports.

The use of drones for drug trafficking is growing. In 2015, a drone carrying 28 lbs. of heroin crossed the U.S.–Mexico border.⁷⁴ Despite efforts by U.S. agencies to curb drug smuggling using drones, this tactic continues to rise. The DEA points out that Mexican criminal organizations use drones to transport drugs and monitor police at the border.⁷⁵ As early as 2012, the United States intercepted 150 drug-laden drones at the border.⁷⁶

⁷² Markarian and Staniforth.

⁷³ Markarian and Staniforth.

⁷⁴ Tim Wright, "How Many Drones Are Smuggling Drugs Across the U.S. Southern Border?," *Air & Space Magazine*, June 2020, <https://www.smithsonianmag.com/air-space-magazine/narcodrones-180974934/>.

⁷⁵ Drug Enforcement Administration, *2020 National Drug Threat Assessment*, DEA-DCT-DIR-008-21 (Washington, DC: Department of Justice, 2021), <https://www.dea.gov/documents/2021/03/02/2020-national-drug-threat-assessment>.

⁷⁶ Amar Toor, "Drone Packed with Crystal Meth Crashes near US-Mexico Border," *The Verge*, January 22, 2015, <https://www.theverge.com/2015/1/22/7870651/drone-drugs-crystal-meth-tijuana-us-mexico-border>.

The rapid adoption of drone technology by transnational criminal organizations along the U.S.–Mexico border poses a significant challenge for security agencies. The accessibility and versatility of UAVs make them effective tools for reconnaissance and drug trafficking. To counter this illicit use, measures that go beyond mere detection will be required. Solutions might encompass advanced interference technologies to disable or take control of unauthorized drones, specialized training of personnel in anti-drone tactics, and international collaboration to implement stricter regulations and share intelligence. Additionally, investing in tracking and detection technologies, as well as artificial intelligence platforms capable of predicting suspicious flight patterns, may be vital in staying ahead of the ever-evolving tactics of cartels.

3. Neutralizing the Skies: Strategies and Challenges of Counter–UAV Systems at the Border

The study by Markarian and Staniforth shows how counter–unmanned aerial vehicle (C–UAV) systems have been developed to provide a technological foundation to counter drones through a complex, multi-stage process that involves interaction between various systems and human operators.⁷⁷ Typical neutralization techniques encompass signal jamming, spoofing, hacking, laser weapons, high-powered microwaves, water cannons, net guns, interceptor drones, birds of prey, firearms, and missile systems.⁷⁸ However, the choice of the ideal countermeasure depends on factors such as interference in communication and navigation systems, collateral damage, range, accuracy, ease of use, and legal compliance.

Regarding neutralization tools, jamming, or signal interference, is the most common technique.⁷⁹ Mexican authorities employ this method in coordination with operations carried out by the armed forces in support of security forces. Although simple in concept, disrupting the communication between the drone and its operator can have secondary implications, such as affecting other devices in the vicinity. Jamming within the

⁷⁷ Markarian and Staniforth, *Countermeasures for Aerial Drones*.

⁷⁸ Markarian and Staniforth.

⁷⁹ Markarian and Staniforth.

C-UAV context is only activated when a drone is detected and classified, minimizing disruptions to other legitimate users.

The issue of illicit drones operated by transnational criminal organizations, especially in regions such as the Mexico–U.S. border, necessitates an integrated and dynamic response. Considering the countermeasures presented by Markarian and Staniforth, a customized C-UAV system could be developed for the region, combining multiple detection and neutralization techniques. Authorities could benefit from a multisensory approach that merges data from various sensors for a more comprehensive view of the threat. Furthermore, given the speed at which these drones can operate, it is crucial to implement artificial intelligence solutions that expedite the decision-making process. Lastly, binational collaboration between Mexico and the United States could facilitate the deployment of C-UAV systems across the border, sharing resources and intelligence to effectively prevent and counter the threats from illicit drones.

4. Potential Anti-drone Tools for the Mexican Armed Forces: A Contemporary Perspective

The Mexican Armed Forces face a contemporary challenge with the rising use of drones, whether for illicit purposes or even armed with explosives, by drug cartels in Mexico. In the face of this threat, it is imperative to consider various techniques and procedures that could be adopted to neutralize these devices and ensure national security. Techniques and procedures to consider include:

- **Interceptor Drones:** Markarian and Staniforth note the creation and use of drones designed to neutralize threatening drones.⁸⁰ Examples include Drone Defence's AeroSnare and the system patented by Lockheed Martin. These drones are valuable because they act as an immediate and direct response to aerial threats, allowing for rapid intervention in areas where a threat may be imminent.

⁸⁰ Markarian and Staniforth.

- **Lasers:** Tools such as the advanced test high energy asset (ATHENA) system, also mentioned by Markarian and Staniforth, use laser precision to take down drones in mid-air.⁸¹ This technology's primary advantage is its ability to target and neutralize objectives with high precision and speed. Additionally, if the system's energy source is suitable, it can allow for an unlimited series of shots, making it highly efficient in high-risk situations.
- **Spoofing:** This technique is essentially an act of deception.⁸² It focuses on taking control of a UAV by manipulating its navigation system. While there are historical instances of its success, such as the case with the Lockheed Martin RQ-170 Sentinel, actual field implementation is challenging and requires a deep understanding of the target UAV.
- **Specialized Drone Weapons:** Specifically designed for drones, these devices, such as NetGun X1 and SkyWall Auto, use physical projectiles (like nets) to capture drones in mid-air. Their application is particularly useful in urban or populated areas where other countermeasures might be less effective or potentially harmful to civilians.⁸³
- **Aerial Surveillance:** Kratky and Farlik emphasize the significance of early detection.⁸⁴ Given their compact size and distinct flight characteristics, many drones pose unique challenges in terms of detection. To overcome these challenges, various specialized technologies can be employed for their early identification, which is crucial for effective neutralization.

⁸¹ Markarian and Staniforth.

⁸² Markarian and Staniforth.

⁸³ Markarian and Staniforth.

⁸⁴ Miroslav Kratky and Jan Farlik, "Countering UAVs – the Mover of Research in Military Technology," *Defence Science Journal* 68, no. 5 (2018): 460–66.

- **C-UAV Sensors:** Accurate identification is paramount. According to Kratky and Farlik, this involves a series of specific technical tasks that optimize the detection and tracking of UAVs.⁸⁵
- **Command and Control (C2) Systems:** These systems are vital for processing real-time information and making swift decisions. The ability to respond rapidly to threats is a critical component of defense against UAVs.⁸⁶
- **Neutralization:** Kratky and Farlik discuss both destructive and non-destructive techniques. As the authors point out, the existence of multiple ways to neutralize a UAV underscores the complexity and diversity of threats these devices pose.⁸⁷

5. Synergistic Defense: Integrating Anti-drone Technologies into Mexico's Security Strategies

The deployment of advanced techniques to counter illicit drone activities offers an opportunity to bolster security operations in Mexico. As Mexican authorities integrate and adapt these methodologies, they can effectively combine them with the strategies already being employed by the nation's armed forces. For instance, drone detection systems could be synchronized with air and ground patrols from the Secretariat of National Defense (SEDENA) and the National Guard, enhancing the responsiveness to unmanned aerial threats.

Moreover, signal interference and drone neutralization tools, when merged with the counterinsurgency tactics of the Army and Navy, could act as a deterrent or disrupt criminal activities leveraging these technological advancements. This synergy between anti-drone techniques and military strategies would forge a more resilient defense framework tailored

⁸⁵ Kratky and Farlik.

⁸⁶ Kratky and Farlik.

⁸⁷ Kratky and Farlik.

to current technological challenges and in tune with the overarching mission of ensuring national security.

In an era where technological advancement often outpaces regulatory and defensive measures, Mexico's adoption of such sophisticated anti-drone measures would signify not just a reactive approach but a proactive stance in security preparedness. By staying ahead of the curve and integrating cutting-edge solutions into traditional security protocols, the nation would be better positioned to protect its airspace, critical infrastructure, and, most importantly, its citizens from potential threats.

The integration of drone interceptors alongside the traditional tactics employed by the Mexican armed forces could herald a transformative era for the country's defense and national security strategy. These devices, specifically engineered to detect, track, and neutralize illicit drones, would instate a pivotal layer of protection against unconventional threats in the airspace. When harmonized with the operations of regular military forces, special forces units, and the National Guard, the responsive capacity against unsanctioned incursions would be significantly enhanced.

The coordinated deployment of interceptors with these entities would not only amplify immediate responses but would also curtail collateral risks, given the precision with which these devices operate. Their strategic positioning would serve as a formidable deterrent against criminal factions contemplating the use of drones in their operations, solidifying Mexico's stance at the forefront of technological security.

In a landscape where adversaries are increasingly harnessing technology for hostile purposes, Mexico's integration of drone interceptor technology signifies the nation's commitment to modernizing its defense capabilities and staying ahead of emerging threats. Incorporating advanced technology into its military infrastructure, Mexico is positioning itself as a vigilant and proactive defender, safeguarding its airspace and national sovereignty by not just reacting to threats but actively working to preempt them.

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IV. ADAPTIVE STRATEGIES: LESSONS FROM UKRAINE'S CONFLICT AND THE CJNG'S ILLICIT ACTIVITIES

A. LEVERAGING UKRAINE'S LESSONS: ANTICIPATING TCO ADAPTATION THROUGH INSIGHTS FROM INTERNATIONAL CONFLICT

In recent years, transnational criminal organizations (TCOs) have significantly enhanced their military tactics and technology to exert coercion or inflict harm upon authorities. Moreover, members of organized crime meticulously analyze the developments in international conflicts or wars and incorporate military tactics. For instance, the ongoing conflict between Russia and Ukraine offers valuable insights into how to confront adversaries during an invasion. In general, the technology and tactics the Ukrainians employ have compelled the Russian Army to retreat or withdraw to its own territory. Such forms of coercion and pressure have not gone unnoticed by TCOs, which have adjusted their activities to align with these military tactics. However, it was only a few years ago that the governments of the United States and Mexico recognized that TCOs could challenge the authority of a state, contaminate legal and societal activities, and inflict harm on the economy.

Analyzing how technology combines with new operational methods has enabled the Ukrainian Army to secure victories on the battlefield against its adversaries. This understanding allows for a comprehension of how TCOs could leverage these tactics to coerce or harm law enforcement agencies and government officials in Mexico, similar to the military tactics employed in the conflict between Russia and Ukraine. However, action should not be delayed until Mexico is on the brink of becoming a failed state. To prevent TCOs from further undermining the rule of law within a nation, it is imperative to design a comprehensive strategy by integrating an operational force, an intelligence force, legal personnel, and a support and analysis force for the population aimed at countering the tactics employed by TCOs.

Another strategy is to establish a cooperation agreement among the states affected by the violence of criminal organizations and design an inter-American group to confront

and coerce TCO activities. Governmental stability will enable investment and social development in a region.

B. UKRAINE’S STRATEGIC RESPONSE: DEFENDING AGAINST AGGRESSION AND LEVERAGING RESOURCES

One powerful reason for a state to exert its power over another state or non-state actor is the strong interests the aggressor has in its target. These interests can be economic, political, military, or even the appropriation of natural resources. This is one of the main reasons why Russia invaded Ukraine in 2014. Ukraine possesses significant oil and gas resources, with many gas reserves in the eastern region.⁸⁸ Before the Russian occupation of the Crimean Peninsula, Ukraine had signed some production-sharing agreements. It was projected that in approximately 15 years, Ukraine and its partners would have the capacity to produce gas “not only to meet all the country’s needs but also to export it to countries in Central and Eastern Europe.”⁸⁹ The need for this type of natural resource, along with other political and geostrategic objectives, drove Russia to invade Ukraine.

Every country must learn to defend itself against internal and external threats that seek to coerce a government into acting against its will. Since 2014, Russia has occupied the Crimean Peninsula, and Ukrainian forces have anticipated immense aggression from the Kremlin. The government and soldiers have prepared to confront their adversary.⁹⁰ They predicted that the Russian Army would advance toward Kyiv from multiple directions, with the main effort coming from the north. Aware of their military disadvantage, Ukrainian leaders strategically ceded territory to gain time and prepare a well-structured and organized counterattack. First and foremost, they demolished some bridges on the road to Kyiv to impede the Russian advance and lead the enemy to a location where they could confront them effectively. Furthermore, Ukrainian forces created an

⁸⁸ Mykhailo Honchar, Oksana Ishchuk, and Ihor Stukalenko, *Energy Aspects of the Occupation of Crimea and the Strategy for Overcoming Its Effects* (Kyiv, Ukraine: Centre for Defence Strategies, February 2022), <https://defence.org.ua/en/energy-aspects-of-the-occupation-of-crimea-and-the-strategy-for-overcoming-its-effects/>.

⁸⁹ Honchar, Ishchuk, and Stukalenko.

⁹⁰ David R. Marples, “War Dead and (Inter)-Communal Ethics in the Russian-Ukrainian Borderlands: 2014–2018,” in *The War in Ukraine’s Donbas: Origins, Contexts, and the Future*, ed. David R. Marples, (Vienna: Central European University Press, 2021), 14, <https://doi.org/10.7829/j.ctv26jp68t>.

obstacle near the Irpin River to hinder the advance of the Russian airborne mechanized unit. This action allowed the Ukrainians to ambush the Russian forces and annihilate them.⁹¹

The Ukrainian forces needed to train their soldiers in skills that could prove useful if war broke out. Therefore, the soldiers began training with drone technology to gain situational awareness (as if the drones were their eyes).⁹² These armed drones were equipped with grenades and other anti-tank weapons. Ukrainian leaders identified one of the primary objectives in psychological operations (PSYOPS) as tracking and weakening the morale of Russian soldiers, which they achieved from the outset. Leaving signs on buildings, walls, and other locations, placing obstacles in Russian troops' path to hinder their advance, and hitting their enemy hard to compel them to cease fighting were all part of their strategy.

Another powerful tool was social media, which the Ukrainian Army used to showcase the destruction of Russian tanks and how soldiers fled the battlefield out of fear and hunger due to the lack of Russian supplies. Another important psychological factor was the dissemination of Ukrainian drones targeting Russian vehicles and troops on the ground. Witnessing a small but well-trained force destroy a very powerful army can undermine the morale of that army's members.

C. UKRAINE'S INNOVATIVE RESILIENCE: LEVERAGING TECHNOLOGY AND ADAPTIVE TACTICS AGAINST AGGRESSION

The Ukrainians were aware that Russian forces would use Electronic Warfare to disrupt communications, which forced the Ukrainians to employ couriers to secure their communications. Another action they took was decentralizing their leadership by allowing commanders of small units to make decisions on the battlefield rather than receiving orders from the central headquarters. NATO countries provided military assistance to Ukraine by supplying weapons, drones, and ammunition, enabling the Ukrainian Army to repel the invading enemy. Ukrainian soldiers used advanced weaponry from Western countries, such

⁹¹ Rice, "The Untold Story of the Battle for Kyiv."

⁹² Rice.

as anti-tank weapons like the Javelin and the Next-Generation Light Anti-Tank Weapon.⁹³ This type of advanced armament, combined with the irregular-style dispersed formations Ukrainian soldiers were using, yielded extraordinary results. Ukrainian forces managed to destroy Russian tanks by striking them from the flank, thanks to the close formations often employed by Russian armored vehicles.

The Ukrainian forces were at a significant numerical disadvantage compared to the large Russian Army (around 30 to 1). However, this did not deter Ukrainian soldiers from continuing to fight and leveraging the support of the civilian population.⁹⁴

Civilian support is crucial in warfare, and Ukrainian leaders used their citizens' initiative to persuade citizens to assist the war effort. For example, during one battle, a local farmer reported to the Ukrainian forces the presence of many hidden tanks in the northern part of Moschum. Thanks to artillery shells, the Ukrainian Forces were able to locate the enemy and engage them.⁹⁵ Another example of civilian support came from a young person who played a pivotal role in assisting the Ukrainian military during the Irpin battle. He managed to breach Russian computer systems, providing the Ukrainian commander with valuable intelligence obtained from Russian drone footage. Ukrainian forces were able to incapacitate the entire Russian airborne battalion, representing a noteworthy accomplishment in the conflict.

The bold integration of drones into the tactics employed by Dmytro Zaretsky (Ukrainian Army Major) on the battlefield was particularly noteworthy. By using drones to pinpoint the location of Russian forces, his troops were able to maneuver on their flanks, annihilating both troops and armored vehicles. For instance, once his troops destroyed the lead and rear vehicles in a Russian airborne battalion column using NLAWs, they

⁹³ James Marson and Daniel Michaels, "The Ukraine Crisis: Defense Forces Adopt Ambush Tactics -- Using NATO Weapons, Outgunned Ukrainians Target Russia's Weak Spots and Supply Lines," *Wall Street Journal*, March 23, 2022, <https://libproxy.nps.edu/login?url=https://www-proquest-com.libproxy.nps.edu/newspapers/ukraine-crisis-defense-forces-adopt-ambush/docview/2641736943/se-2?accountid=12702>

⁹⁴ James Marson, "Ukraine under Russian Fire: Hiding in Basements, Helicopters Overhead; Attacks Fill Skies with Aircraft, Rockets—and Send Civilians Diving for Cover," *Wall Street Journal*, February 24, 2022, <https://www.proquest.com/docview/2632239250/citation/791E08218B814A55PQ/1>.

⁹⁵ Rice, "The Untold Story of the Battle for Kyiv."

effectively trapped the remaining vehicles. With well-positioned machine guns and communication via WhatsApp, Zaretsky coordinated artillery attacks on the convoy, decimating the enemy force.⁹⁶ This rapid adaptation allowed Zaretsky to engage his troops in a swift and decisive attack against the Russian forces, demonstrating the democratizing effect of technology on the battlefield. Drones also played a critical role in intelligence gathering, as a local hacker gained access to images from Russian drones, providing real-time information on enemy movements.⁹⁷

This bold approach not only highlights the adaptability of the Ukrainian forces but also underscores the importance of harnessing readily available technology in modern conflict. Major Zaretsky's ingenuity in combining drones, online resources, and conventional military tactics serves as a compelling example of how innovation can level the playing field against better-equipped adversaries.

At the beginning of the conflict, while Russian forces employed siege tactics, the defender adopted a two-pronged strategy, engaging the enemy through brief encounters (hit-and-run tactics) with small units in open terrain and fortifying major cities. The type of defense adopted by the Ukrainians aimed to hinder the advance of the Russian Army, with the idea that "Ukraine's main goal is to make the war as bloody as possible for Russia."⁹⁸ The asymmetric operations carried out by Ukrainian forces aimed to disperse Russian attacks and compel them to abandon their weapons and return to their own country.

One tactic employed by the Ukrainian Forces is agile, rapid, and dispersed insurgency. Combining this tactic with the organization of small units allows Ukrainian units to take the initiative. This initiative gives them the confidence to strike and ambush Russian logistics positions. As a result of these operations, Russian forces are weakening their operational capacity. The fast, precise, and violent manner in which Ukrainian forces

⁹⁶ Rice.

⁹⁷ Rice.

⁹⁸ Dan Lamothe, Alex Horton, and Karoun Demirjian, "Ukraine's Military Adapts Tactics after Enduring Russia's Initial Invasion," *Washington Post*, March 5, 2022, <https://www.proquest.com/docview/2635866546/citation/E1AA802D5700438EPQ/1>.

operate makes them unique, exciting, and appealing to the activities carried out by TCO groups.

One advantage of the Ukrainian forces is the decentralization of their units, which operate at the battalion level semi-independently without the need to transmit orders or information to their superiors. In 2014, Ukrainian forces made the strategic decision to depart from Soviet-era tactics and embraced a more flexible and creative style.⁹⁹ This tactical shift proved to be essential in their ability to counter the Russian invasion that occurred in early 2022 and adapt their combat approach to thwart the Russian threat. This would not be possible without the presence of another key factor, the capability of low-level commanders in the field. As U.S. Marine Corps Colonel John Barranco stated, “The Ukrainians have developed a very competent army with good lower-level leadership and are motivated.”¹⁰⁰ The ability to manage their subordinates provides them with a good opportunity to carry out the operation successfully. The analysis focuses on how this decentralization helps maintain soldier motivation and facilitates the achievement of positive outcomes in their mission. TCOs can use these same methods to manage their subordinates, even though the hierarchies and leadership within TCOs are linear and centralized, always seeking to gain the support of their collaborators through coercion.

D. TRANSFORMING THE BATTLEFIELD: LOW-COST TECHNOLOGY’S IMPACT ON CONFLICT DYNAMICS

After conducting ineffective operations since the onset of the invasion of Ukrainian territory in late February 2022, Russian leaders gathered their forces in the Donbas region in eastern Ukraine to launch an offensive and gain control of that area. As Henry Foy et al. points out, “Ukraine’s military successes in the first two months of the war were due to the use of guerrilla tactics and the innovative use of short-range anti-tank and anti-aircraft

⁹⁹ “War Dead and (Inter)-Communal Ethics in the Russian-Ukrainian Borderlands: 2014–2018,” 14.

¹⁰⁰ Jaime Dettmer, “Ukraine Tactics Disrupt Russian Invasion, Western Officials Say,” *Asia News Monitor*, March 28, 2022, <https://www.proquest.com/docview/2643664334/citation/DEA4863EDE4E4EA3PQ/1>.

weapons.”¹⁰¹ From the outset, Ukrainian forces took the initiative by employing various tactics, operating in small units, allowing ground forces to make tactical decisions, and using technology such as drones to communicate with artillery units via satellites to target enemy objectives. These types of operations have been successful in repelling many Russian attacks, limiting areas for Russian forces.¹⁰²

Both Russia and Ukraine have leveraged the advantages of commercial and military drones to gain tactical advantages on the battlefield. A notable example of this was the recent massive kamikaze drone attack by Russia in Kyiv.¹⁰³ These Iranian-manufactured drones posed a significant threat to the city. Although most were shot down by Ukrainian forces, this event highlights Russia’s willingness to use both commercial and military technology to achieve its goals.

Dominika Kunertova’s observation regarding Ukraine’s adaptability in repurposing low-cost drones is a highlight of the conflict, as it underscores the country’s determination to develop its own loitering munitions systems. This approach reflects Ukraine’s need to harness all available resources in its struggle against the Russian invasion, showcasing its initiative amid significant challenges. Furthermore, the successful attack on a Russian naval base using drones and drone boats underscores Ukraine’s effectiveness in deploying these resources on the battlefield, demonstrating its adaptability and capacity to inflict damage on its opponents in key strategic situations.¹⁰⁴

Both countries have recognized the advantages offered by commercial and military drones in terms of reconnaissance, tactical strikes, and disruptions behind enemy lines.¹⁰⁵

¹⁰¹ Henry Foy, John Paul Rathbone, and Felicia Schwartz, “The Battle for Donbas: ‘The Real Test of This War,’” *Financial Times*, 2022, <https://www.proquest.com/docview/2668816189/citation/BDCFBB7512C3494CPQ/1>.

¹⁰² European Parliamentary Research Service, “Russia’s War on Ukraine: Background,” *European Parliament*, July 4, 2022, 15, https://www.europarl.europa.eu/EPRS/TD_Russia_war_Ukraine.pdf.

¹⁰³ Valentyn Ogirenko and Gleb Garanich, “Russia Unleashes Largest Drone Attack on Ukrainian Capital, Crowds Mark Kyiv Day,” Reuters, May 29, 2023, sec. Europe, <https://www.reuters.com/world/europe/explosions-rock-kyiv-russias-night-raid-air-defence-downs-targets-mayor-says-2023-05-27/>.

¹⁰⁴ Kunertova, “The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Game.”

¹⁰⁵ Kunertova.

However, they have also experienced the limitations of these technologies, such as limited range and vulnerability to electronic interference. Ultimately, the conflict in Ukraine reflects how nations in conflict seek to leverage any available resource, whether commercial or military, to gain an advantage on the battlefield.

Commercial drones have become a tool exploited by non-state groups on the battlefield due to the limitations the groups face in terms of resources and capability. Although these drones are less advanced and entail higher risks compared to high-grade military systems, they offer non-state combatants an economical and adaptable option to enhance their capabilities. This translates to improvements in areas such as intelligence, surveillance, and reconnaissance (ISR), precise target acquisition, more accurate aerial attacks, disruption capability, and propaganda.¹⁰⁶ For non-state groups lacking prior aerial ISR systems or arsenals, the use of these commercial drones represents a significant advancement in their capabilities. However, their impact on states with fully developed intelligence communities and air forces is more limited. Despite the skepticism of the armed forces regarding the use of commercial drones, non-state groups have demonstrated a remarkable ability to make the most of these technologies, achieving surprisingly effective results.

In response to an existential threat, Ukraine has demonstrated remarkable adaptability in its strategic approach amid the protracted conflict with Russia. Despite significant challenges in terms of military capability compared to its adversary, Ukraine has deployed commercial drones at the tactical level as an effective tool to level the battlefield. This strategic decision is based on the affordability and versatility of commercial drones, which have allowed Ukraine to overcome resource constraints and gain tactical advantages in an ongoing conflict situation.¹⁰⁷

Furthermore, modern warfare between state powers has evolved into a costly and complex scenario, driving the need for agile reconnaissance units on the battlefield.

¹⁰⁶ Kerry Chávez and Ori Swed, “Emulating Underdogs: Tactical Drones in the Russia-Ukraine War,” *Contemporary Security Policy* 44, no. 9 (September 21, 2023): 592–605, <https://www.tandfonline.com/doi/epdf/10.1080/13523260.2023.2257964?needAccess=true>.

¹⁰⁷ Chávez and Swed.

Commercial drones have emerged as an ideal solution for this purpose, offering a unique combination of affordability, replaceability, and ease of use without requiring advanced production facilities or highly specialized personnel. This strategic adaptation has enabled Ukraine to obtain real-time information from an advantageous position in the theater of operations, which has played a crucial role in its ability to counter the Russian threat.

It is important to note, however, that the indiscriminate use of drones in the conflict between these two countries has had devastating consequences for the civilian population. The concentration of kamikaze drone attacks, loaded with explosives, has terrorized civilians and wreaked havoc in residential areas of Kyiv. These attacks do not discriminate between military and civilian targets, posing an extreme danger to innocent people. An illustrative example of this is the attack in October 2022, where a four-story residential building was hit, resulting in the deaths of at least four people, including a pregnant woman and her husband.¹⁰⁸ Furthermore, attacks on energy facilities and other non-military targets demonstrate a lack of consideration for civilian safety.

To date, these drone attacks continue to kill innocent civilians who are not involved in the war, constituting a blatant war crime. The widespread use of drones in the conflict has significantly increased the risk to the civilian population. While some of these drones can be programmed for precise targets using GPS, their use in densely populated areas raises the likelihood of collateral damage. Although Western nations have promised to bolster Ukraine's air defenses to shoot down drones, the arrival of these systems is delayed, and the civilian population continues to face constant danger.¹⁰⁹ In this context, the conflict in Ukraine exemplifies the dangers of the proliferation and indiscriminate use of drones in wartime, endangering the lives of innocent civilians and creating an atmosphere of terror in affected cities.

As the conflict in Ukraine highlights the dangers of drone warfare for civilians and the need for international intervention, it also demonstrates how a less powerful nation can

¹⁰⁸ "Civilians Killed as Russia Launches Deadly Drone Strikes on Residential Area of Kyiv," Canadian Broadcasting Corporation (CBC), October 17, 2022, <https://www.cbc.ca/news/world/ukraine-kyiv-explosion-drone-1.6618736>.

¹⁰⁹ CBC.

use cost-effective drones to shift the balance in a confrontation with a stronger adversary. Ukraine's resourceful adaptation to drone technology has not only countered Russia's invasion but also showcased the strategic use of low-cost resources.

The case of Ukraine in its confrontation with Russia provides an interesting perspective on how a relatively weaker country can use available resources, such as civilian technology and commercial drones, to shift the dynamics of a conflict with a more powerful opponent, both militarily and economically. Ukraine has stood out for its ability to adapt and make the most of low-cost resources in its fight against the Russian invasion. The use of low-cost drones has proven to be an effective tool for neutralizing or destroying expensive military hardware, enabling Ukraine to regain territory invaded by Russia and change the conflict's position in Ukraine's favor.

The use of low-cost drones in the conflict has resulted in a significant shift in the balance of power. These devices have demonstrated their ability to attack and destroy key targets of Russian forces, which was previously challenging for Ukraine due to its disadvantage in terms of conventional military capacity. This shift in power has allowed Ukraine to reclaim territory and undermine Russia's combat capability.

However, while Ukraine demonstrates the effectiveness of harnessing low-cost technology in a military conflict, it also highlights the risks associated with this trend. The proliferation of drones and other low-cost technologies means that transnational criminal organizations, such as terrorist groups and drug cartels, can also access these tools to carry out their illicit activities. These organizations can use drones for drug trafficking, arms smuggling, or even terrorist attacks in areas where there is no military conflict. This poses a significant challenge to global security, as these technologies are within the reach of non-state actors seeking to exploit them for criminal purposes.

In summary, the case of Ukraine illustrates how a country can use low-cost technology to change the dynamics of a conflict. However, it also underscores the need to address the risks associated with the proliferation of these technologies in the hands of non-state actors, which poses additional challenges for international security.

The potential acquisition of military tactics and technologies by ruthless drug cartels operating in the border region between Mexico and the United States poses an existential threat to the national security of both countries and the well-being of their citizens. These cartels, known for their cunning and adaptability, are constantly seeking new opportunities to advance their criminal empire. The incorporation of commercial drones and low-cost combat strategies into their arsenal could transform the landscape, enabling them to evade authorities and maintain an even tighter grip on their illicit activities.

In particular, the introduction of drones into the hands of cartels could revolutionize the cartels' drug trafficking operations along the border. These devices could stealthily transport narcotics shipments through remote territories and urban areas, posing a significant challenge to law enforcement agencies. Furthermore, the adoption of military tactics could dramatically increase violence and the cartels' capacity to confront security forces.

Faced with this imminent threat, it is essential for Mexico and the United States to collaborate decisively and strategically. Regional security depends on a joint and coordinated response involving both nations in a concerted effort to eradicate this dangerous convergence between military conflict and drug trafficking. International cooperation and strengthening security measures are imperative to confront this growing threat and ensure the stability and security of the region as a whole.

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V. NAVIGATING THE DYNAMIC LANDSCAPE OF TRANSNATIONAL CRIMINAL ORGANIZATIONS

A. THE EVOLUTION OF DRONES AS INSTRUMENTS OF COERCION BY TRANSNATIONAL CRIMINAL ORGANIZATIONS

This chapter presents an examination of the use of drone technology by TCOs, specifically focusing on the Jalisco New Generation Cartel (CJNG). Drones, often associated with national defense and technological progress, have been repurposed by these organizations for illicit activities. The CJNG, known for its significant violence, has effectively used drones as weapons, repurposing advanced technology for illicit purposes. While globally, many appreciate the defensive innovations brought by drones, communities in Mexico face challenges due to the misuse of this technology by the CJNG. This situation highlights the critical need for international discussions and strategies to address the misuse of drone technology by TCOs. The severity of this issue extends beyond regional boundaries and represents a global security challenge. This calls for swift and collective solutions. The inappropriate use of drones by the CJNG emphasizes the urgency for international intervention.

Drone technology presents a clear contrast: while it symbolizes progress and innovation, it also poses potential threats. The CJNG's use of drones demonstrates a concerning development in criminal tactics. Drones, once seen as symbols of technological progress, are now used for illicit activities, including surveillance, smuggling, and carrying explosives.¹¹⁰ The presence of these devices has introduced new security concerns in the skies, which has created a palpable sense of unease in many Mexican communities. Both law enforcement and military entities are challenged by rapidly evolving threats that reshape contemporary security paradigms. The presence of a drone, previously seen as a testament to technological progress, now instills caution. The purpose of this investigation is to gain an understanding of the complex issues arising from the criminal adoption of

¹¹⁰ Bunker and Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs*.

drone technology, aiming to propose holistic strategies to ensure aerial safety and reestablish societal tranquility.

This study underscores the considerable dangers linked to the improper use of drones, which test the boundaries of regulatory systems, compromise public safety, and violate national boundaries. This concern goes beyond simple airspace violations; it touches upon broader communal security and national integrity issues. Within this discussion, the scale of the threat is clearly evident, highlighting diminished confidence in institutions and the susceptibility of the general public. The deployment of drones by criminal groups, notably the CJNG, represents not just a security concern but also an undermining of national unity and values. Each unauthorized drone presence signifies an escalating issue that requires immediate, thorough, and determined measures to ensure territorial integrity, safety, and peace.

The emergence of the CJNG utilizing drones as tools for illicit activities highlights a multifaceted security and ethical challenge. Every drone deployed represents not only a violation of national airspace but also an impact on the psychological well-being and values of society. These devices are more than just technological advancements; they demonstrate the adaptability of an organization like the CJNG to turn technological progress into tools for illicit purposes. The use of drones by the CJNG reflects a worldwide threat that goes beyond specific regions or jurisdictions. Skies, previously symbolizing freedom and progress, are now potential conflict zones, highlighting the need for combined, diverse solutions. The issue extends beyond mere security concerns, also encompassing ethical and humanitarian dimensions. It necessitates a unified approach that combines legislative measures, technological advancements, and human resources to address an adversary that operates beyond ethical and legal parameters.

Confronting an opponent that acts boldly in both hidden and visible realms requires immediate, firm measures. The focus is on dealing with a growing technological threat that calls for adaptive and robust responses. The challenge extends beyond traditional security frameworks; it is about regaining control of national airspace, ensuring societal tranquility, and upholding international security. This situation calls for a coordinated, global effort as determined and persistent as the ongoing airborne threats encountered.

The infiltration of the aerial realm by criminal groups such as the CJNG highlights a growing transnational danger. Both the United States and Mexico are primarily affected, and they are combating a complex network that threatens not only national security but also societal foundations. The CJNG's threat is not limited to its militarized drones; it signifies the intricate interplay between illicit trade and violence entrenched in communities. Its covert operations, evident in every unauthorized drone operation and delivered explosives, emphasize the pressing necessity for bilateral collaboration and updated defense approaches.

This challenge goes beyond national boundaries, highlighting the need for collective action. The CJNG's use of technology for harmful purposes, combined with the complex overlap of crime and terror, calls for a versatile and comprehensive approach. The partnership between the United States and Mexico is vital; every coordinated effort and exchanged intelligence strengthens the framework of a robust defense system. Together, these two countries confront a foe that utilizes international airspace, converting areas that should represent unity into battlegrounds. Therefore, their counteractions must be as complex and steadfast as the networks of criminal activity they aim to dismantle.

In the subsequent sections, The strategy outlined encompasses military accuracy, legislative changes, and technological advancements. In the face of the threat posed by the CJNG's drones, the collective effort of Mexico and the United States highlights avenues toward achieving security and sovereignty. They are not simply observers; they are directly involved in the dynamic interplay of challenges and solutions. Their shared destiny and the well-being of their citizens depend on a unified, resolute approach to confront the emerging challenges of transnational criminal groups. The airspace compromised by these threats should once again symbolize peace, cooperation, and mutual growth.

The CJNG, classified as a TCO, highlights a growing capacity to penetrate and disrupt on a global scale. Its integration of drones with illicit tactics presents a rising threat. What was once a space of freedom in the sky has become an area of potential threat. By adapting commercial drones, the CJNG has turned a symbol of innovation into an instrument of fear. Every drone used represents both a defiance of societal values and an indication of the CJNG's broadening criminal framework. This bold and innovative

criminal group poses challenges beyond traditional security measures, pushing both countries towards a confrontation that puts their norms and national security at risk. They are on the verge of a different kind of conflict, not defined by clear battle zones but by the increasing presence of drones in their airspace. In examining the intricate operations of the CJNG, the importance of international collaborations, especially between the United States and Mexico, becomes evident. Similar to their interconnected skies, their mutual borders call for a coordinated and flexible response to an elusive and relentless adversary.

The well-being of their nations and the safety of their citizens depends on a balanced mix of knowledgeable and resolute measures. Every unveiled tactic of the CJNG provides the two countries with a deeper understanding of their shared enemy, bolstering their joint defenses. Their aim should not only be to regain control of their skies but also to fortify their borders, assure their citizens, and reinforce their national security. Within this intricate interplay of challenge and endurance, they need to find the means to shift from a story of intimidation to one of success against TCOs like the CJNG.

The threat presented by the CJNG transcends conventional conflict; it signifies a united struggle to uphold the essential tenets that sustain the fabric of society, now at risk due to the combination of sophisticated technology and hostile intent. Within this context, each unauthorized drone intrusion represents a test of national sovereignty, necessitating a cohesive strategy among the affected nations. The aim is to alter the discourse, turning every act of criminal coercion into a story of victory, where endurance, collaborative action, and steadfast resolve act as the ramparts against the threat of criminal force.

The United States and Mexico are not merely combating criminal organizations; they are striving to regain their sovereignty, autonomy, and safety. Each success against the CJNG adds to a larger narrative of shared determination and triumph. Their partnership, rooted in mutual principles and strengthened by coordinated efforts, counters the dark influence of transnational criminal groups. Every action and approach should emphasize the strength of a persistent coalition determined to restore peace and security.

The United States, recognized for its capabilities against external threats, now faces the necessity of addressing internal security challenges brought about by TCOs such as the

CJNG. Their interlinked security concerns with Mexico, highlighted by their shared borders, mean that issues arising within one nation resonate with both. The TCO threat, marked by advanced technology and bold actions, merges the distinction between domestic and global security challenges. This necessitates a unified approach that combines diplomatic, military, and economic resources to address this emerging threat.

The rise of TCOs, especially the CJNG, highlights the urgent requirement for a strategy that is both reactive and proactive. This evolving threat landscape goes beyond geographical or jurisdictional boundaries, reflecting the complex interactions of security, socioeconomic, and geopolitical factors. The advancement of TCOs showcases their ability to adapt and take advantage of weaknesses both within and across nations. Addressing the interconnected challenges of domestic security and international relations calls for a united, diverse approach.

Conclusively, the overarching strategy to tackle TCOs hinges on its diverse facets, harmonizing domestic security measures, technological advancements, and strategic global collaborations. This comprehensive approach addresses the intricate nexus of domestic vulnerabilities and international political challenges. Every strategic pillar, from shared intelligence operations to deploying advanced technologies, is pivotal in fortifying defenses against aggressive encroachments from groups such as the CJNG. The enduring safety and stability of nations and regions depend on a synergized, adaptable, and holistic strategy adept at navigating the nuanced contours of an ever-evolving threat landscape.

B. UNDERSTANDING ORGANIZED CRIME TRANSFORMATION: INSIGHTS FROM THE RUSSIA–UKRAINE CONFLICT AND THE EVOLUTION OF TRANSNATIONAL CRIMINAL ORGANIZATIONS

Organized crime groups closely study international conflicts and wars, aiming to adapt and improve their own strategies. The conflict between Russia and Ukraine is a prime example of this learning process. Ukraine's effective use of technology and innovative tactics not only strengthened its defense but also prompted the Russian military to

reconsider its strategy and retreat.¹¹¹ This highlights the importance of adaptability and the role of technology in modern conflict situations.

In the ever-changing realm of asymmetrical combat and criminal ingenuity, entities like the CJNG have co-opted technological progress to serve their unsanctioned agendas. This evolution surpasses traditional conflict, ushering in unpredictability that tests the established methods of policing and security protocols. The hybrid strategies of the CJNG, merging novel criminal techniques with flexible tactics, demand an equally agile and resourceful counteraction.

The transition from mere organized crime to operations resembling military tactics highlights a concerning transformation in the realm of security threats. The merging of criminal activities with technological adaptability by entities like the CJNG intensifies the multifaceted issues facing nations. This disturbing shift emphasizes a growing threat that transcends national boundaries and traditional security frameworks, necessitating a response characterized by innovation, flexibility, and cross-border collaboration.

With the rise in technological and tactical capabilities of TCOs, notably the CJNG, the countermeasures can no longer solely depend on conventional security and law enforcement methods. The nimble and evolving nature of these groups requires a correspondingly agile, inventive, and comprehensive approach. Triumph over such fluid adversaries is predicated on the versatility of countermeasures, the novelty of strategies, and the fortitude of communities. This uptick in criminal flexibility serves as both a test and a call to arms, emphasizing the need for heightened tactical innovation, technological progression, and cooperative steadfastness.

In essence, engagement with groups like the CJNG symbolizes a shifting combat zone where the amalgamation of technology, agility, and global unity takes center stage. The alarming progression of these entities, underscored by their tactical prowess and technological adeptness, calls for a renewed and innovative approach from security and law enforcement institutions. This struggle will be relentless, defined by a ceaseless cycle

¹¹¹ Kunertova, “The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Game.”

of evolving threats and countermeasures. Within this complex interplay of strategy and adaptability, community resilience and the modernization of security protocols emerge as crucial bulwarks. Every technological advancement and tactical shift by TCOs not only represent a challenge but also spur transformative innovations in governmental and societal defenses. This contest, dynamic in its essence, requires steadfast commitment and foresight-driven adaptability.

Furthermore, a meticulous examination of the transformative role of technology in shaping on-ground tactics is imperative. Such adaptability was instrumental in the Ukrainian Army's successes in combat scenarios.¹¹² Delving into this technological integration provides valuable perspectives on the modus operandi of TCOs. Proactive measures should not be contingent on a nation nearing state failure. Addressing criminal factions that consistently undermine legal structures necessitates a holistic approach, harmoniously combining objectives, methodologies, and assets. Otherwise, the efficacy of any endeavor remains vulnerable and uncertain.¹¹³

Such amalgamation necessitates a seamless collaboration of operational troops, intelligence agencies, legal experts, and units focused on demographic analytics and assistance. This diverse methodology is tailored to counteract the tactics employed by TCOs. Embedding a holistic strategy within the framework of each nation's national security strategy is imperative. As Yarger articulates, strategists aiming to forge effective objectives that guide toward an envisaged end state must possess a nuanced comprehension of both the domestic and global contexts.¹¹⁴

The development of these objectives calls for cooperative treaties among nations facing the adverse actions of criminal groups. The creation of an inter-American coalition to confront and reduce the operations of TCOs is paramount in this scenario. The essence

¹¹² Marson and Michaels, "The Ukraine Crisis."

¹¹³ Harry R. Yarger, "Toward a Theory of Strategy: Art Lykke and the Army War College Strategy Model," in *Theory of War and Strategy*, ed. J. Boone Bartholomees (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2006), 107–112, <https://www.jstor.org.libproxy.nps.edu/2048/stable/resrep12025.12>.

¹¹⁴ Yarger.

of government stability not only draws in investment but also fosters societal progress, emphasizing its pivotal role.

In this complex tapestry of strategy, technology, and engagement, the essence of adaptability and innovation becomes paramount. The battleground is both a tangible expanse and a dynamic arena for shifting tactics and technologies. The Ukrainian military's success is not merely a reflection of its valor but a showcase of the indispensable role of technological acumen and strategic flexibility. This story resonates starkly and unsettlingly in the *modus operandi* of TCOs. Within this confluence of national defense mechanisms and criminal machinations, the urgency for strategic metamorphosis, technological agility, and resolute measures stands out distinctly. The ramifications are profound, and the spectrum of engagement continually diversifies and morphs.

The economic windfalls amassed by these criminal syndicates stem from a broad array of illicit ventures they partake in, encompassing drug trade, extortion, abduction, and more. Over recent years, the broadening of unlawful activities, together with collaborations established between various criminal entities, has endowed TCOs with unique advantages. This newfound clout not only enables them to contest state sovereignty but also to intimidate law enforcement agencies and competing criminal groups, thus guaranteeing the continuity of their illegal operations.¹¹⁵

The transformation of criminal entities highlights an ever-changing landscape where unlawful actions and aggression are seamlessly integrated into a multifarious web of dominance, sway, and governance. These syndicates, through their diverse illicit undertakings, evolve into powerful adversaries that not only challenge public order but also imperil national security and the overall health of society. The sophisticated networks, shifting *modus operandi*, and boldness to confront state powers underscore the urgent requirement for novel, comprehensive approaches to mitigate this growing menace.

¹¹⁵ Gary Ackerman et al., *The "New" Face of Transnational Crime Organizations (TCOs): A Geopolitical Perspective and Implications to U.S. National Security* (NPS Archive, Monterey, CA: Calhoun, March 2013), <https://calhoun.nps.edu/handle/10945/30346>.

Engaging in pacts with both governing bodies and competing factions, TCOs seek to dominate specific regions or zones, a notion articulated by John Sullivan as a “plaza.”¹¹⁶ Nonetheless, when these accords deteriorate, skirmishes arise, prompting TCOs to unleash aggressive tactics that invariably harm the innocent civilian populace. Arreguín-Toft delineates such violent outbursts as acts of “barbarism used to destroy an adversary’s will and capacity to fight.”¹¹⁷ A principal strategy of these criminal entities is to exploit non-combatants, intending to debilitate the operational strength of their adversaries.

For example, direct action against adversarial infrastructure, weaponry, commanders, and political leaders is among the primary responsibilities of the Russian Special Forces.¹¹⁸ Yet, in the ongoing Ukraine war, Russian actions have transcended targeted operations, manifesting in widespread acts of barbarism that have cultivated a pervasive aversion to the Russian presence.¹¹⁹ Such coercive tactics find parallels in the modus operandi of TCOs. This approach is emblematic of the CJNG. Confronted with the escalating violence stemming from the illicit endeavors of the CJNG, Mexican law enforcement and security agencies are continually pressed into action. Organizations like the CJNG not only challenge the sovereignty of the state but also imperil the civilian population’s security. Consequently, there is an imperative for a synchronized and resolute strategy to safeguard at-risk communities and reestablish a sense of stability and justice.

Within this struggle for domain supremacy, innocent civilians find themselves ensnared, their existence perpetually clouded by looming peril. The methodologies wielded by these criminal factions bear an unsettling similarity to acts of barbarity evident in global conflicts, epitomizing a troubling convergence of conventional criminality and militant tactics. The manifestation of such a hybrid threat environment punctuates the pressing need

¹¹⁶ Sullivan, “Mexican Cartel Adaptation and Innovation.”

¹¹⁷ Ivan Arreguín-Toft, “How the Weak Win Wars: A Theory of Asymmetric Conflict,” *International Security* 26, no. 1 (2001): 93–128, <http://www.jstor.org/stable/3092079>.

¹¹⁸ Ruslan Pukhov and Christopher Marsh, *Elite Warriors: Special Operations Forces from around the World* (Minneapolis: East View Press, 2017), <https://cle.nps.edu/access/content/group/9ed15df2-c6c0-4dde-a785-43363b1d3781/Week%203-1/Ramm%20Russian%20Military%20Special%20Forces.pdf>.

¹¹⁹ United Nations Office of the High Commissioner for Human Rights, “New Report by UN Human Rights Shows the Shocking Toll of the War in Ukraine [EN/RU/UK],” ReliefWeb, June 29, 2022, <https://reliefweb.int/report/ukraine/new-report-un-human-rights-shows-shocking-toll-war-ukraine-enruuk>.

for potent, cohesive countermeasures calibrated to mitigate the threats posed by TCOs, while simultaneously prioritizing the twin pillars of national integrity and the sanctity of civilian life.

The inherent dynamics within TCOs compel them to continuously evolve in their operational methodologies, armament, transport modalities, and technological capabilities to exert influence over rival factions, governmental entities, or policing agencies. Frequently, these targets acquiesce to the formidable pressure, given the palpable menace and potential acts of aggression that these criminal syndicates might unleash. Such a potent threat spectrum undermines the safety and equilibrium of the broader populace, rendering them vulnerable to the tumultuous and often brutal machinations of these criminal groups.¹²⁰

Consequently, it is incumbent upon governments to devise a holistic approach, harnessing every facet of national power, to foster and ensure the most cardinal of national prerogatives: the preservation of the state devoid of violent disruptions.¹²¹ The deployment of federal resources must be strategic, determined, and powerful to counteract the harmful activities of TCOs that threaten public safety. The dangers posed by these criminal groups underscore the urgency for a comprehensive and coordinated strategy that extends past typical law enforcement methods to preserve the nation's stability and the public's collective welfare.

Successfully neutralizing the influence of transnational criminal outfits, such as CJNG, requires an all-encompassing strategy that surpasses the scope of conventional security and policing actions. Delving into foundational issues, including pervasive corruption, economic disparities, and frail institutional structures, is paramount. Bolstering good governance, championing the rule of law, and improving socioeconomic landscapes stand central to eroding the stronghold of these illicit organizations.

Cross-border cooperation remains pivotal in this battle. Given the intricate and evolving nature of entities like the CJNG, there is an imperative need for collaborative

¹²⁰ Schelling, *Arms and Influence*.

¹²¹ Yarger, "Toward a Theory of Strategy."

intelligence, pooled resources, and state-of-the-art technological approaches. The global reach and implications of the challenges introduced by these groups demand a concerted international effort, underscoring its non-negotiable nature.

C. CRIMINAL INNOVATION AND SECURITY RESPONSE: EXAMINING THE EVOLUTION OF TRANSNATIONAL CRIMINAL ORGANIZATIONS AND STRATEGIC ANTICIPATION IN COMBATING THE CJNG

In an era marked by unprecedented interconnectedness and rapid information dissemination, a unified, enlightened approach becomes imperative for safeguarding national integrity, ensuring regional equilibrium, and promoting global harmony. Crafting a cohesive alliance, wherein disparities are mitigated and endeavors synchronized, holds the promise of shifting the discourse from one of criminal dominance to a resilient and victorious stand against formidable adversaries such as the CJNG.

Criminal organizations frequently harness cutting-edge technologies intended for surveillance and advanced mobility. They also capitalize on internet communication technology (ICT) for intelligence-gathering and monitoring of their opponents.¹²² As pointed out by Horowitz, the uptake of cyber capabilities parallels developments in the intelligence sector—a fact well-recognized by criminals. This is evident when they synchronize drone operations with personnel responsible for tracking law enforcement actions or when TCOs combine this technology with armed groups' tactics.¹²³

A 2015 episode serves as a stark testament to the cartels' ingenuity and adaptability in illicit drug distribution. As documented by Amar Toor in a report released on January 22 of that year via the Associated Press and Vice News, a drone loaded with crystal methamphetamine came down near the U.S.–Mexico border.¹²⁴ Such incidents shine a light on the unyielding and audacious evolution of drug trafficking techniques by cartels, accentuating an urgent call for law enforcement and security agencies to not just match but

¹²² Sullivan, "Mexican Cartel Adaptation and Innovation."

¹²³ Horowitz, "Do Emerging Military Technologies Matter for International Politics?"

¹²⁴ Amar Toor, "Drone Packed with Crystal Meth Crashes near US-Mexico Border," The Verge, January 22, 2015, <https://www.theverge.com/2015/1/22/7870651/drone-drugs-crystal-meth-tijuana-us-mexico-border>.

exceed cartels' agility and foresight. The real challenge does not solely lie in tracking these advancements but also in proactively predicting and negating the subsequent stratagems that cartels will undeniably employ in their ceaseless quest for dominance and financial gains.

This incident underscores the continuous ingenuity and boldness of criminal syndicates that increasingly challenge established security measures. This modern paradigm of criminal activity, now intertwined with technological nuances, serves as a stark reminder that the arenas of combat have expanded beyond traditional landscapes to encapsulate cyber and aerial frontiers. To effectively counteract these modern tactics, there is an imperative for law enforcement strategies to equally evolve, prioritizing foresight, adaptability, and nimbleness. Within this dynamic interplay of innovation and counter-innovation, the storyline of dominance and resistance perpetually evolves. It will indelibly influence the architecture of national security, societal safety, and the bedrock of societal norms as the 21st century progresses.

The imperative to integrate sophisticated surveillance tools, artificial intelligence, and big data analytics into the security infrastructure is undeniable in the face of rapidly evolving criminal methodologies. Such technological enhancements are not mere additions but vital instruments in the modern toolkit of law enforcement. As criminal enterprises capitalize on the latest technologies to further their agendas, it is paramount for law enforcement agencies to keep pace, harnessing technological advancements for proactive defense and counteraction. The perpetual evolution in the realm of crime and technology necessitates a dynamic response mechanism, ensuring that the scales of justice and public safety remain steadfastly balanced.

Another significant innovation in the operations of TCOs is the deployment of “non-traditional tactics.”¹²⁵ The utilization of drones laden with explosives to target terrestrial objectives exemplifies a blend of technology and audacity designed to inflict damage upon individuals or installations.¹²⁶ Drawing parallels with the military context,

¹²⁵ Sullivan, “Mexican Cartel Adaptation and Innovation.”

¹²⁶ Horowitz, “Do Emerging Military Technologies Matter for International Politics?”

Ukrainian armed forces have been documented using drones against the Russian Army, a tactic echoing the modus operandi of organized crime.¹²⁷ The deployment of explosive-laden drones represents a deliberate and strategic evolution in the modus operandi of criminal factions. Such drones, meticulously equipped with precision-crafted explosives, are used as airborne instruments of terror, targeting adversaries, governmental entities, or even innocent civilians to instill fear and exert control. As highlighted by Callard and Faber, true innovation emerges as “a reciprocal or bilateral process where opponents develop and improve their capabilities in reaction to one another.”¹²⁸ This tactic embodies more than just technological advancement, though; it is a manifestation of a conscious decision to harness airborne technology in the service of intimidation and supremacy, further challenging traditional security paradigms.

John P. Sullivan provides a clear picture of how fast things are changing. He shows that innovation and being able to adapt are not just side issues. They are at the heart of how groups like the CJNG and other criminal organizations work.¹²⁹ What is worrying is that authorities are not just dealing with criminals who react to the police; the criminals are continually thinking of new ways to commit their crimes. It is like a never-ending battle against an enemy that is always changing and coming up with new tricks.

The CJNG stands out for its notable ability to adjust and refine its approaches over time. This organization’s evolutionary shifts are not just incidental but form core aspects of how it operates. Rather than adhering strictly to conventional organized crime methods, the CJNG has shown an inclination to embrace and modify new technologies and strategies. A prominent example is its sophisticated employment of commercial drones for

¹²⁷ Marcos González Díaz, “Minas terrestres, drones y ‘narcotanques’: cómo los carteles en México están usando armas no convencionales como si fueran ejércitos en guerra,” [Landmines, drones, and ‘narcotanks’: how the cartels in Mexico are using unconventional weapons as if they were armies at war], BBC News Mundo, March 24, 2022, <https://www.bbc.com/mundo/noticias-america-latina-60486794>.

¹²⁸ James Callard and Peter Faber, “An Emerging Synthesis for a New Way of War: Combination Warfare and Future Innovation,” *Georgetown Journal of International Affairs* 3, no. 1 (2002): 61–68, <https://www.jstor.org/stable/43133476>.

¹²⁹ Sullivan, “Mexican Cartel Adaptation and Innovation.”

harmful activities, as evidenced in the 2018 attack on the residence of the secretary of public security in Baja California.¹³⁰

In this scenario, a static methodology is insufficient. Addressing the challenge posed by drug cartels necessitates an approach that is as fluid, innovative, and adaptable as they are. The objective should transcend merely eliminating a criminal group; it should be aimed at thwarting an evolving threat that, if left unaddressed, will continually modify its tactics and potentially undermine and jeopardize the stability of communities.

Each evolution by groups such as the CJNG highlights the necessity for security apparatuses to progress correspondingly. Their approaches need to surpass traditional frameworks by embracing technological advancements and fostering cross-disciplinary partnerships. In this perpetual struggle, adopting agile and adaptive strategies is not merely beneficial—it is crucial. The authorities' role should not only be to counteract an adversary but to continuously adapt within this changing landscape. Adaptation, innovation, and fortitude are pivotal as authorities strive to protect communities from the expanding influence of organized crime networks.

Several years prior, due to the increasing usage of armed drones by the CJNG for its assault operations, Mexico's secretariat of national defense initiated definitive actions to counteract this menace. The CJNG's ability to adapt and innovate was recognized as not only audacious but also remarkably effective. To preemptively address and mitigate this risk, dedicated anti-drone units were instituted, representing a significant shift in the approach to combat the advanced strategies of organized crime.

The establishment of these units marked a notable shift in security and defense strategies, highlighting the necessity for agility and adaptability in countering the inventive tactics of groups such as the CJNG. As the aerial domain emerged as a new avenue for criminal activities, these anti-drone units became an essential tool, symbolizing a transformative approach to comprehending and combating organized crime. These units were tailored to not only confront but also deter the evolving tactics of organized criminal

¹³⁰ Bunker and Sullivan, *Criminal Drone Evolution: Cartel Weaponization of Aerial IEDs*.

groups. In an environment characterized by the continuous advancement of criminal methodologies, the anti-drone units exemplified the adaptable, enduring, and forward-thinking ethos of the defense and security agencies' preparedness for a time where the boundaries of criminal confrontations are as ever-changing and multifaceted as the opponents they aim to neutralize.

The creation of these anti-drone units highlighted the flexibility and endurance of Mexico's security apparatus. Every captured drone and thwarted attack emphasized the nation's steadfast dedication to foreseeing, adjusting to, and surmounting each novel strategy employed by the CJNG. Upon reviewing this period, it is clear that the relationship with criminal groups such as the CJNG is perpetually evolving, and thus, adaptability and innovation emerge as paramount skills.

In a period defined by technological progress and the rising boldness of criminal groups such as the CJNG, the anti-drone units represented a forward-looking and predictive defensive stance. They embodied a security philosophy rooted not only in reaction but also in foresight, perseverance, and adaptive ingenuity. It was more than just addressing a current menace; it was about designing a defensive framework equipped to adapt alongside a perpetually evolving opponent.

D. ADAPTATION AND COLLABORATION: DEALING WITH THE EVOLUTION OF ORGANIZED CRIME

In 2021, a significant increase in the complexity of operations carried out by criminal organizations became glaringly evident. The CJNG demonstrated advanced operational tactics in Michoacán, Mexico. It targeted police units that had recently dismantled a roadblock set up by CJNG operatives.¹³¹ The cartel's methods, tailored for their illicit goals and augmented with technological advancements, bear a striking resemblance to military-level precision. The Michoacán incident serves as a case in point. The operation was systematically planned: an expert would initiate aerial surveillance using drones, focusing on regions believed to be occupied by competing criminal groups or law enforcement. These drones provided live updates, ensuring accurate coordinate

¹³¹ Bunker and Sullivan.

tracking. Following this, another drone equipped with an improvised explosive device (IED) was launched, delivering its lethal cargo at the determined coordinates, thereby achieving precise and anonymous strikes.

This advancement in methodologies highlights a scenario in which criminal organizations are not merely improving their operational procedures but are also capitalizing on technological progress to augment their potential for aggression and deception. The CJNG's incorporation of drones into its tactical arsenal is not a singular development; it represents part of a larger trend of ingenuity and adaptability.

Addressing an opponent such as the CJNG, known for its technological adaptability, requires a diverse strategy. This involves not only technological parity but also anticipatory tactics, advanced intelligence, and a comprehensive method that merges law enforcement, technological advancements, international cooperation, and community involvement. Every drone attack by the CJNG simultaneously emphasizes the need for a timely and thorough adaptation in the methods used to safeguard citizens, maintain legal stability, and uphold national sovereignty in the face of a swiftly changing threat environment.

Within the broader context of global security and power relations, nuclear capability serves as a tool for states to influence or deter other nations. As Schelling points out, nuclear weapons effectively induce “pain and damage and fright,”¹³² positioning them as powerful instruments that signify geopolitical might and act as a deterrent.

Addressing the challenges posed by criminal organizations necessitates a tailored strategy that diverges from traditional state conflict paradigms. The theater of operations is distinct, marked by its fluid nature, covert maneuvers, and non-traditional tactics. The state's considerable power and resources need to be leveraged with finesse, flexibility, and a profound comprehension of the specific complexities presented by such criminal groups. In countering criminal organizations, operational planners do not necessitate the sheer might often associated with nuclear power. Rather, they need a detailed and carefully

¹³² Schelling, *Arms and Influence*, 177.

crafted approach. Central to this approach is intelligence—the capacity to foresee, assess, and gauge the possible tactics and technological advancements that criminals could adopt.¹³³ The insights from this strategic analysis ought to be channeled into actionable countermeasures implemented by both the military and police forces. The emphasis on adaptability is crucial. The objective is not solely to employ overwhelming might but also to utilize specific, informed measures that cater to the distinctive and ever-changing challenges posed by these criminal organizations.

Addressing organized crime presents an inherently asymmetrical challenge. The ever-adaptable, unpredictable, and technologically innovative tactics of these groups necessitate a similarly dynamic and agile response from state actors. This highlights the need for continuous refinement in methods, technology usage, and intelligence acquisition. Such an approach must be part of an overarching strategy that emphasizes adaptability, accuracy, and the ability to preemptively identify the shifting threats posed by organized crime groups.

International cooperation is fundamental in addressing this challenge. Given the cross-border operations of TCOs, it is imperative to adopt a collaborative, multinational approach in intelligence dissemination and tactical implementations. As criminals adapt their strategies without consideration for national borders, the counterstrategies should similarly transcend territorial confines in both planning and execution. Staying ahead requires both anticipation and readiness. It entails cultivating institutional capabilities anchored in intelligence and innovation, ever poised to foresee and confront the progressive shifts of organized crime. Security entities should embrace the ethos of learning institutions, perpetually evolving and refining their methods, ensuring they are not only addressing current threats but also forecasting upcoming challenges.

TCOs have begun to exhibit a degree of specialization akin to military operations. Central to their operational method is the integration of individuals possessing specialized expertise. This showcases an advanced adaptation of both offensive and defensive strategies typically seen in military confrontations.

¹³³ Schelling.

TCO tactical shifts necessitate corresponding advancements in countermeasures. This means weaving together technological, psychological, and social facets to guarantee responses that are not just prompt and efficient but also enduring and robust, targeting the core pillars that sustain criminal organizations. Ultimately, the objective is to foster a society that is both secure and fortified, systematically diminishing the pervasive grip of organized crime.

To successfully mitigate organized crime, it is crucial to formulate and execute strategies that tackle both the visible acts and the foundational systems that sustain these organizations. This necessitates an all-encompassing methodology that includes disrupting their financial lifelines, improving intelligence-gathering and monitoring mechanisms, and strengthening international partnerships to monitor and combat these entities across international boundaries.

Within the ever-changing arena of organized crime, where criminal organizations are in a perpetual state of evolution, the enhancement and adaptability of security measures become indispensable. This need for flexibility emphasizes the imperative of a coordinated and methodical response to the complexities inherent in organized crime. Harnessing advanced technology, data-driven insights, and human intelligence is crucial in forging an environment in which security mechanisms are anticipatory, not just reactive, effectively foreseeing and adeptly navigating changes in criminal strategies.

In sum, as nation-states navigate further into a period characterized by the intricate nexus of technology, security, and organized crime, the refinement and fortification of security measures emerge as essential. This shifting framework accentuates the need for tactics that mirror the dynamism, innovation, and complexity of the criminal organizations they aim to neutralize, reinforcing the overarching theme of security, resilience, and societal prosperity in confronting organized crime.

In recent times, a noticeable amplification in the intricacy and refinement of organized crime methodologies has been observed. Criminal organizations have progressively integrated individuals proficient in the art of devising IEDs, showcasing a myriad of improvised fabrication methods. Such IEDs, commonly constructed using

materials like oxygen cylinders, fire suppression devices, or PVC conduits, are deliberately placed to blockade thoroughfares or peripheral zones of municipalities, serving as defensive mechanisms against potential intrusions into their bases or safe houses.¹³⁴

A prominent example of the nexus between technological advancements and military strategies within the realm of organized crime can be drawn from recent occurrences in Mexico. In early 2022, Aguililla, Michoacán, emerged as a center of intensified military activity. The Mexican Armed Forces were entrusted with the responsibility of neutralizing in excess of 1,000 IEDs believed to be the handiwork of the CJNG. This situation accentuates the complex confluence of technological prowess and militaristic criminal conduct.¹³⁵ The heightened military involvement stemmed from an earnest plea from the inhabitants of Michoacán. The local community urgently sought federal action to address the escalating violence permeating the Tierra Caliente region. Heeding this pressing appeal, the secretary of national defense mobilized military units endowed with the specific directive to counter and suppress the criminal elements perpetuating instability and fear in the vicinity.

This situation highlights a significant metamorphosis in the realm of organized crime. The integration of IEDs represents a transition towards more militarized strategies, unveiling an organized crime framework that is both extensive and infused with technical and tactical proficiency. The sophisticated fusion of traditional craftsmanship and modern technology, as seen in the fabrication and utilization of IEDs, sheds light on the changing dynamics of organized crime.

In addressing this multifaceted challenge, the importance of adaptable and responsive security strategies cannot be overstated. The effective fusion of technological advancements, intelligence collection, and tactical responsiveness is crucial in countering

¹³⁴ John P. Sullivan and Robert J. Bunker, "Mexican Cartel Strategic Note No. 34: Anti-Vehicle Mine Targeting SEDENA Convoy between Tepalcatepec and Aguililla, Michoacán," *Small Wars Journal*, February 16, 2022, <https://smallwarsjournal.com/jrnl/art/mexican-cartel-strategic-note-no-34-anti-vehicle-mine-targeting-sedena-convoy-between>.

¹³⁵ Jose Luis Ramos Colin, "Ejército saca al CJNG de Aguililla después de nueve meses de ocupación," [Army expels CJNG from Aguililla after nine months of occupation], *Publimetro México*, February 10, 2022, <https://www.publimetro.com.mx/noticias/2022/02/10/ejercito-saca-al-cjng-de-aguililla-despues-de-nueve-meses-de-ocupacion/>.

the pervasive growth and complexity of organized crime. In this context, the amalgamation of localized knowledge, national policies, and international cooperation stands as a fundamental pillar in the endeavor to reestablish security, stability, and societal well-being in regions afflicted by the activities of organized criminal groups.

To accomplish the Mexican government's goal of effectively combating criminal organizations, a thorough examination of the situation was conducted to formulate a comprehensive strategy. The two-star general in command was provided with a contingent of highly skilled Special Operations Forces (SOF) and Airborne Units closely linked with anti-drone units. A critical element of the general's choices was the integration of combined arms teams to engage and free populations impacted by multiple threats.

The close coordination of these teams played a pivotal role. The synchronized operation, marked by effective communication and strategic cooperation, enabled the successful accomplishment of the general's mission in an impressive seven-day timeframe. This efficiency underscores the essential importance of strategic planning, operational flexibility, and interdisciplinary collaboration in addressing organized criminal entities.

This example also highlights the seriousness and complexity of the challenges presented by contemporary criminal organizations. They have expanded beyond conventional criminal pursuits to integrate military tactics and technologies into their operations. This evolution heightens the level of threat, elevating it to a matter of national security.

The involvement of these criminal organizations in militarized tactics emphasizes the need for a dynamic and multifaceted response. This necessitates the integration of advanced technology, strategic intelligence, and coordinated operational tactics to effectively address the changing threat environment.

In this context, leadership plays a pivotal role. The strategic expertise of the two-star general, the specialized skills of the SOF and Airborne Units, and the technological proficiency of the anti-drone cells collectively represent a responsive and adaptable security framework. The close collaboration and operational coordination demonstrated in

this mission highlight the essential elements of a comprehensive strategy to combat the evolving threat posed by organized crime.

To effectively counter these threats, it is crucial for security forces to be well-equipped, trained, and ready to address a wide range of scenarios. This includes tasks such as disarming IEDs, conducting counterinsurgency operations, and engaging in counterintelligence activities. International cooperation, the exchange of information, and flexible tactics are of utmost importance in identifying, tracking, and neutralizing these complex and highly mobile criminal organizations.

At the core of these efforts, there should be a multifaceted approach that combines military operations, law enforcement, intelligence, and development initiatives to tackle both the visible manifestations and the root causes of organized crime. A relevant case study in this regard is the Mexican Army's operation to dismantle the CJNG and diminish its authority and impact in the Michoacán region. These units exhibited a high degree of unity, a concept often described by scholars like Ben Connable et al. as stemming from "the social and organizational bonds that foster will to fight."¹³⁶ In the intricately planned operation, the military not only displayed tactical prowess but also highlighted a remarkable sense of cohesion, emphasizing the effectiveness of collaborative efforts and a shared sense of purpose in executing such intricate missions. As a result, the Mexican Army successfully incapacitated around 380 CJNG operatives in the Michoacán region, prompting others to flee the area. The operation culminated in the reclamation and safeguarding of several communities within the municipality of Aguililla, Michoacán, representing a noteworthy advancement in the ongoing struggle against organized crime.

This successful operation highlights the vital importance of readiness, flexibility, and cooperation within security and law enforcement endeavors. It underscores the necessity for a comprehensive strategy that integrates cutting-edge technology, tactical intelligence, and strong international collaboration, all with the goal of methodically dismantling the complex networks of organized criminal organizations. As organized

¹³⁶ Ben Connable et al., *Will to Fight: Analyzing, Modeling, and Simulating the Will to Fight of Military Units* (Santa Monica, CA: RAND Corporation, 2018), 65, <https://doi.org/10.7249/RR2341>.

crime continues to evolve, displaying heightened sophistication and adaptability, the methods of response must also progress accordingly. A comprehensive, agile, and multifaceted approach, marked by ongoing adaptation, the incorporation of technological innovations, and the promotion of international alliances, becomes imperative in navigating the intricate and ever-changing terrain of combating organized crime.

This degree of cohesion and coordination is crucial in ensuring operational effectiveness when dealing with complex and adaptable criminal organizations such as the CJNG. Organized crime has become progressively sophisticated, employing advanced tactics, techniques, and procedures to elude detection and counter security operations. The response to these groups must be equally dynamic and multifaceted, necessitating a combination of precise intelligence, effective tactical operations, advanced technology, and close collaboration among various security and defense agencies. Furthermore, community engagement and public support are essential for ensuring long-term security and stability in areas affected by organized crime violence. The task of reclaiming territories and restoring security in regions impacted by organized crime is not solely a military and security challenge but also a social and economic imperative.

The reconstruction of public trust, improvement of services and infrastructure, and the facilitation of economic opportunities are vital components to guarantee that security achievements are enduring, allowing communities to prosper in an environment characterized by peace and stability. These aspects underscore the broader need for a comprehensive approach that integrates security measures with socioeconomic development initiatives.

In the ongoing battle against organizations like the CJNG, a strategic model that harmonizes military and police endeavors with social and economic revitalization becomes indispensable. The intricacies of organized crime, particularly its adaptability, demand responses that are not solely rapid and robust but also well-thought-out and enduring. This calls for a convergence of initiatives involving security agencies, governmental entities, and civil society to cultivate an environment where security and development intersect, rendering regions resilient against the infiltration and sway of organized crime.

In summary, addressing the modern landscape of organized crime requires a well-rounded integration of force, intelligence, technology, and community engagement. This approach is designed not only to dismantle criminal organizations but also to tackle the underlying causes and effects of their influence, ultimately ensuring the restoration of law, order, and socioeconomic vitality.

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VI. JOINT ENDEAVORS: SHAPING A COMPREHENSIVE RESPONSE TO TRANSNATIONAL CRIMINAL INNOVATIONS

A. NAVIGATING THE UNCHARTED WATERS OF AERIAL THREATS: A GLOBAL PERSPECTIVE ON THE PERILOUS INTERSECTION OF DRONES AND TRANSNATIONAL CRIMINAL ORGANIZATIONS

The transition of drones from tools of convenience to potential security threats highlights the evolving challenges faced by nations worldwide. Various incidents, from governmental settings in Venezuela to prison facilities in the United States and defense operations in France, demonstrate the widespread nature of this security concern. The episode in Venezuela, where drones were utilized with hostile intent against presidential protection, underscores the complex and advancing landscape of contemporary security challenges. In the United States, the use of drones by criminals to penetrate the secure boundaries of correctional facilities highlights the diverse aspects of this evolving risk. It is not solely about the carried materials; it is also about the innovative and adaptable use of these aerial devices. This underscores a period in which conventional defense methods are continuously evaluated and sometimes circumvented. And in France, the use of drones by ISIS against defense forces revealed a significant vulnerability, emphasizing the need for international awareness and coordinated action.

The intersection of technological progress and criminal adaptability is particularly evident in the strategies of TCOs, especially the Cartel Jalisco Nueva Generación (CJNG) in Mexico. The cartel's use of drones, not only for surveillance but also for transporting narcotics and potentially harmful materials, indicates a change in organized crime methods and emphasizes a tangible risk to national and public safety. The combined accounts of security violations, political attacks, and criminal advancements paint a picture of a world where conflict is not limited to the ground. Traditionally overseen by national defense forces, the airspace has become a disputed area. Here, drones operated by non-state actors, criminals, and terrorists operate with increasing frequency and concern. Within this changing threat environment, nations cannot remain isolated or complacent. The events in France, Venezuela, and the United States are not unique; they represent a larger and more

intricate security concern that transcends borders, disregards national sovereignty, and presents both unforeseen and significant challenges.

B. THE COLLECTIVE PURSUIT OF SECURITY

As entities like the CJNG expand their tactical methods, using drones' diverse technological and operational capabilities to further their nefarious goals, a clear challenge presents itself. The need is not only to defend but also to forecast, innovate, and cooperate. Security becomes a collaborative effort, requiring international partnerships, shared intelligence, and technological advancements to address an elusive and substantial threat. Using drones for assault is not a future consideration; it is a current threat, urging nations, security agencies, and international organizations to move beyond established defense strategies. With drones equipped not only with potential explosives but also the intent for illicit activities, there exists a new threat to global security. As such, vigilance, adaptability, and collaboration are essential not only for national protection but also for the preservation and stability of the international order.

The transformation of drones from utility tools to instruments of disruption has increased the intricacy of global security challenges. This shift has created an aerial environment that challenges traditional defense frameworks and transcends national boundaries.

As an experienced officer in the Mexican Armed Forces, close observation of the changing security dynamics, particularly the unauthorized use of drones led by criminal groups such as the CJNG. This thesis has explored the multifaceted nature of a threat that highlights the legal, technical, and international collaboration aspects essential for addressing and mitigating the threat.

C. AUGMENTED LEGAL FRAMEWORK AND ENFORCEMENT

Navigating the nuances of legal structures can be likened to a sophisticated chess match where foresight and strategic coordination are paramount. Although Mexico's Civil Aviation Law is comprehensive, it faces challenges due to the swift technological progress utilized by TCOs. As legal frameworks broaden, criminal groups such as the CJNG

advance in inventive methods. International regulations, notably the ICAO's Annexes, are valuable but not without vulnerabilities. Enforcement requires detailed accuracy, adaptability, and the incorporation of evolving intelligence mechanisms. Given the transnational character of these criminal groups, there is a pressing need for comprehensive international collaboration, shifting enforcement from a national scope to a global level.

D. AMPLIFIED TECHNICAL COUNTERMEASURES

The integration of technology and strategy has led to the development of various countermeasures, each designed for accuracy and effectiveness. Interceptor drones represent more than mere tools; they symbolize the dedication to addressing aerial challenges. Each operation and interception involves a careful combination of technology, strategic planning, and professional expertise. Laser systems, such as ATHENA, represent the merging of technology and tactical accuracy. In countering drones, speed, precision, and flexibility are the primary considerations. Techniques like spoofing, while intricate, reflect the intricate balance between intrusion and defense, with the manipulation of navigation systems serving as a significant countermeasure.

E. THE NEXUS OF STRATEGIES

The approach advocated here combines foundational legal principles with technical expertise. Aerial surveillance, enhanced by the advanced application of artificial intelligence, is not an isolated effort but a cooperative undertaking shaped by legal guidelines, operational accuracy, and international cooperation. C-UAV sensors, serving as aerial monitors, exemplify this nuanced interplay. Their capacity to detect, distinguish, and trigger appropriate measures reflects an active, adaptable, and responsive legal structure. Each detection and subsequent action represent a story intricately tied to legal enforcement, technical accuracy, and international collaboration.

F. FORWARD MOMENTUM

As the intricate landscape of national security is examined, punctuated by the notable presence of entities such as the CJNG, the story is one of determined optimism rather than despair. The combined strength of refined legal frameworks, advanced technical

solutions, and solid international collaboration represents not merely a strategy but also steadfast dedication. Mexico is positioned not on the edges of vulnerability but on the firm grounds of legal consistency, technological advancement, and international collaboration. The developing story of drones, challenging as it might appear, can be confronted with the unwavering determination of a nation and its military forces, steadfast and resolute.

Within the constantly changing security environment influenced by the unauthorized use of drones, a comprehensive approach emerges, integrating legal, technical, and international collaboration efforts. This adaptive challenge is not merely a legal endeavor but also an innovative struggle, defined not by hesitation but by a firm dedication supported by legal strength, technological expertise, and global cooperation.

G. ADAPTATIVE MILITARY STRATEGY

The strength of such dedication is evident in the resilience and adaptability demonstrated by Ukraine within its conflict environment. It has effectively utilized drones for diverse purposes. Amid its conflict with Russia, Ukraine has showcased an exceptional ability to integrate cost-effective drones into its military strategies. These unmanned aerial vehicles (UAVs) have been proficiently employed for surveillance, reconnaissance, and defensive measures. In confronting an adversary with a superior conventional military capacity, Ukraine's strategy of incorporating drones has demonstrated efficacy. The use of drones has provided Ukraine with real-time intelligence regarding the actions of its opponent, proving pivotal for both tactical and strategic decisions. Additionally, these UAVs have underscored their significance in combat by accurately targeting the adversary's strategic points.

A salient feature of Ukraine's strategy has been its capacity to incapacitate or eliminate the adversary's costly military assets. This stands as a considerable accomplishment, given Ukraine's resource constraints and conventional military disadvantages relative to its opponent. As a result of this approach, Ukraine has reclaimed territories formerly under Russian control and diminished Russia's combat effectiveness.

H. TRANSNATIONAL CRIMINAL ORGANIZATIONS POTENTIAL EXPLOITATION OF DRONE TECHNOLOGY

Nevertheless, this instance also underscores a potential global risk. The widespread availability of cost-effective drones and their associated combat methodologies might be utilized by TCOs like the CJNG. Such organizations, known for their resourcefulness and versatility, might leverage these technologies to advance their unlawful endeavors, encompassing drug distribution and weapon smuggling. The incorporation of drones by TCOs has the potential to significantly alter their operational dynamics and their capacity to elude law enforcement. This presents a considerable challenge to regional stability, as TCOs might circumvent monitoring systems and augment their capability to engage with policing agencies. Additionally, the utilization of military-style strategies by these entities could result in heightened violence, posing severe implications for public safety.

I. INTERNATIONAL COLLABORATION FOR REGIONAL SECURITY

Consequently, it becomes imperative for the Mexican and U.S. governments to engage in deliberate and strategic collaboration to counter this escalating menace. Enhanced international collaboration and fortifying security protocols are paramount to safeguarding the region's stability and security, shielding citizens from the potentially catastrophic repercussions stemming from the interplay between military confrontations and TCO operations. Ukraine's proficient incorporation of economic drones highlights both potential risks and advantages. Yet, the widespread availability of this technology signals potential misuse by TCOs, such as the CJNG. This situation emphasizes the pressing need for strategic collaboration, bolstering regional security and the safety of citizens through strengthened intergovernmental cooperation, as exemplified by the imperative collaboration between Mexico and the United States. The emergent strategies of criminal groups like the CJNG place Mexico and the United States at a pivotal crossroads where technological and strategic advancements are not mere options but essential imperatives.

J. THE EVOLUTION OF CRIMINAL TACTICS

Within the ever-evolving realm of global security, a marked shift is observable in the strategies employed by TCOs, with the CJNG standing out prominently. The CJNG has showcased a remarkable capacity to innovate, incorporating technology seamlessly into its illicit operations and thus redefining the conventional paradigms of organized crime. In particular, drones, once used primarily for surveillance, have been transformed into weaponized instruments of hostility that are frequently armed with IEDs, signifying a refined escalation in the cartel's combative toolkit.

The adaptability and discretion offered by drones have made them indispensable assets for the CJNG. Their capability to access isolated and fortified regions, convey payloads with unerring accuracy, and circumvent traditional detection systems marks a transformative moment in the domain of organized crime. For policing and military entities, this progression denotes an emergent tier of erratic and deleterious challenges, necessitating a thorough reevaluation of defensive tactics and counter-strategies.

K. THE UTILIZATION OF DRONES BY THE CJNG

The nuanced drone operations of the CJNG manifest deeply in their multifaceted applications. Functions such as reconnaissance, intelligence acquisition, specific eliminations, and the spread of dread among civilian communities delineate the diverse uses of these aerial instruments. In regions like Aguililla Michoacán, drones serve not merely as mechanisms of combat but also as instruments of psychological subjugation, instilling apprehension and ambiguity among both civilians and security personnel.

The complexities highlighted by the CJNG's activities emphasize their operational acumen and the shifting security challenges confronting Mexico and comparable states. The operational potential of these drones transcends mere physical damage; they act as instruments of intimidation, inducing fear, unsettling civil society, and challenging the traditional capabilities of national defense structures. Each drone operation represents a multifaceted fusion of criminal ambition, technological advancement, and psychological strategizing.

L. RESPONDING TO THE AERIAL THREAT

In reaction to the heightened risk from armed drones, security forces have established specialized anti-drone units. These are designated groups proficient in the complex techniques of detecting, intercepting, and neutralizing drones. Utilizing cutting-edge technologies, such as electronic jamming devices, anti-drone nets, and directed-energy weaponry, these units endeavor to reduce the aerial superiority previously leveraged by cartels.

However, the inherent dynamism of drone technology and the ongoing evolution of criminal strategies require that these anti-drone units be consistently updated, retrained, and re-equipped. It is not solely about addressing the current threat but also about foreseeing future developments and ensuring that security forces stay ahead of criminal advancements. This makes the task multidimensional and perpetually adaptive.

M. JOINT TASK FORCES AND COLLABORATIVE ENDEAVORS

The formation of joint task forces represents a strategic shift in addressing the multifaceted threats posed by TCOs such as the CJNG. These task forces combine military precision, law enforcement's investigative expertise, and intelligence agencies' strategic acumen. Each operation involves a sophisticated coordination of diverse skills, resources, and capabilities, aiming for targeted precision in disrupting and dismantling criminal networks.

The strategic objectives of these task forces transcend short-term tactical successes. Their operations involve a complex interplay of intelligence, technology, and strategy, with each element enhancing the others. This collaborative synergy is not solely operational but also encompasses information and technology, forging an ecosystem characterized by seamless interactions, swift responses, and flexible strategies. These elements are continuously adjusted in real time to counter the evolving tactics of adversaries such as the CJNG.

N. FUTURE DIRECTIONS

In the dynamic arena of combating organized crime, international cooperation stands as a crucial resource. In a time when criminal organizations such as the CJNG operate beyond national boundaries, the responses to these threats are fundamentally international in nature. This global response is built on the pillars of shared intelligence, joint operations, and the exchange of technology. It is a mosaic of diverse yet cohesive efforts, with each contributing a thread of expertise to the complex fabric of global security.

Technology, especially, stands out as a central pillar in this cooperative effort. Tools such as artificial intelligence, machine learning, and advanced surveillance technologies serve not only as reactive measures but also as predictive resources. They significantly improve the ability not only to react to threats but also to foresee them, to unravel the complex structures of criminal organizations, and to neutralize them before they escalate. Each piece of shared intelligence and every joint operation represents a stride towards a global security ecosystem that is adaptive, forward-looking, and unwavering in its commitment to a world unburdened by the impacts of organized crime.

O. IN SUMMATION

The development of criminal organizations like the CJNG and their sophisticated utilization of technologies such as drones mark a new era in global security. This period is characterized by a complex interaction between crime, technology, and international cooperation. Each drone utilized by the CJNG and every IED detonated represents not only a criminal action but also a complex challenge that requires international, technological, and strategic responses.

In this multifaceted narrative, hope, and capability stand out as steadfast constants. The specialized anti-drone units, the joint task forces, and international collaboration all serve as resounding evidence of the global community's resilience. This is a story of ceaseless evolution, featuring security assets and strategies as dynamic, complex, and steadfast as the threats they face. Within this ongoing saga, each operation, every intelligence report, and every technological advancement contributes to a global narrative of resilience, innovation, and unwavering dedication to security and peace.

The CJNG's strategic use of drones marks a significant transformation in organized crime. The defense and security sectors' reaction to this change is reflected in the establishment of specialized anti-drone units and joint task forces, demonstrating global resilience. International cooperation, technology, and strategy must be interwoven in this complex environment. Every piece of shared intelligence and joint operation sheds light on the path toward a resilient and adaptive global security ecosystem.

P. FINAL REFLECTION

Transitioning from the detailed analysis presented in the previous chapters, it is crucial to reflect on and analyze the significant implications of a world in which the lines between technology, crime, and global security are increasingly blurred. The narratives examined in this thesis do not just suggest a changing world; they emphasize a global landscape already undergoing profound transformation, driven by the swift advancement of technology and its adoption by criminal entities such as CJNG.

In this multifaceted interaction involving innovation and wrongdoing, defense strategies and offensive measures, and both domestic and international contexts, governments must recognize the labyrinth of complexities. These challenges do not exist in isolation; instead, they constitute a complex tapestry. Within this tapestry, each aspect—from the audacious deployment of drones by criminals and the ensuing legal and ethical issues to the adoption of innovative counter-strategies—is intricately linked, contributing to a comprehensive global security ecosystem.

Two critical insights become starkly apparent in this nexus of challenges and innovations. Firstly, the conventional frameworks of security, defense, and criminal activity are undergoing relentless transformation. We are observing not just incremental shifts but a profound overhaul in which the rules of engagement, the mechanisms of defense, and the characteristics of threats are being simultaneously redefined.

Secondly, among these formidable challenges, there emerges a resilient display of human creativity and global unity. Every threat addressed, and each innovation embraced represents a testament to the unyielding human spirit, which remains undaunted even in the face of daunting challenges. The international collaborations, swift technological

advancements, and strategic shifts we have examined serve as symbols of a world that, despite being under siege, stands resilient and undeterred.

Considering the road forward, it becomes evident that the challenges Mexico faces are not isolated but shared. The emerging threats posed by technology-enhanced criminal activities do not respect national boundaries and are not limited to individual countries. These threats are both global in nature and widespread, necessitating a response that is equally multifaceted and international in scope.

Mexico stands at a critical crossroads where the shape of global security will be determined not solely by the threats it faces but, more significantly, by the partnerships it builds, the innovations it embraces, and the resilience it demonstrates. Every strategy implemented, every technological advancement undertaken, and every alliance formed represents not just a measure to counter immediate dangers but a step towards forging a future where security, peace, and technological progress converge, lighting the way to a world characterized by peace, safety, and human progress. Every nation, organization, and individual must play a crucial role in this relentless struggle, rendering every action, no matter how subtle, an essential piece in the complex tapestry of global resilience and safety.

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