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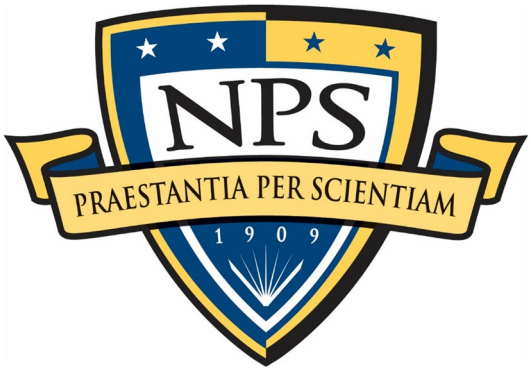
LEVERAGING INTELLIGENCE AND BIG DATA IN THE MEXICAN NAVYS PUBLIC SECURITY MISSION

Figueroa Ibarra, Ricardo Jr.

Monterey, CA; Naval Postgraduate School



NAVAL POSTGRADUATE SCHOOL

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THESIS

LEVERAGING INTELLIGENCE AND BIG DATA IN THE MEXICAN NAVY'S PUBLIC SECURITY MISSION

by

Ricardo Figueroa Ibarra Jr.

September 2022

Thesis Advisor: Rodrigo Nieto-Gomez
Co-Advisor: Carolyn C. Halladay

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When Mexican President López Obrador took office in 2018, he vowed to save the country from violence and corruption. His strategy involves creating a National Guard to fight violence and gradually withdrawing military forces from the cities. However, during its first five years, this force will be formed and trained by the military police of the Mexican Army and Navy. As other countries have leveraged technology and big data in their intelligence-led policing efforts, these tools have the potential to help the Mexican Navy in its mission to restore public security in the country and fight drug-trafficking networks. This thesis poses the question of how the Mexican Navy can implement intelligence-led security methodologies to increase the effectiveness of operations against organized crime and reduce levels of violence in the country. In applying the concepts of action research and contextual analysis of the essential issues manifest in Mexico's security policy, this thesis examines the existing legal frameworks, policies, and decision-making processes to propose a new methodology to capitalize on the Navy's strengths and opportunities while mitigating its threats and weaknesses. The thesis concludes with recommendations for Mexico to improve its intelligence-sharing platform using technological solutions and big data.

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LEVERAGING INTELLIGENCE AND BIG DATA IN THE MEXICAN NAVY'S PUBLIC SECURITY MISSION

Ricardo Figueroa Ibarra Jr.
Teniente de Fragata, Mexican Navy
M, Centro de Estudios Superiores Navales, 2021

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Approved by: Rodrigo Nieto-Gomez
Advisor

Carolyn C. Halladay
Co-Advisor

Afshon P. Ostovar
Associate Chair for Research
Department of National Security Affairs

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ABSTRACT

When Mexican President López Obrador took office in 2018, he vowed to save the country from violence and corruption. His strategy involves creating a National Guard to fight violence and gradually withdrawing military forces from the cities. However, during its first five years, this force will be formed and trained by the military police of the Mexican Army and Navy. As other countries have leveraged technology and big data in their intelligence-led policing efforts, these tools have the potential to help the Mexican Navy in its mission to restore public security in the country and fight drug-trafficking networks. This thesis poses the question of how the Mexican Navy can implement intelligence-led security methodologies to increase the effectiveness of operations against organized crime and reduce levels of violence in the country. In applying the concepts of action research and contextual analysis of the essential issues manifest in Mexico's security policy, this thesis examines the existing legal frameworks, policies, and decision-making processes to propose a new methodology to capitalize on the Navy's strengths and opportunities while mitigating its threats and weaknesses. The thesis concludes with recommendations for Mexico to improve its intelligence-sharing platform using technological solutions and big data.

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TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF TABLES

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LIST OF ACRONYMS AND ABBREVIATIONS

CISEN	*Centro de Investigación y Seguridad Nacional* (Center for Investigation and National Security)
CNI	*Centro Nacional de Inteligencia* (National Intelligence Center)
DOF	*Diario Oficial de la Federación* (Official Gazette of the Federation)
ICT	information and communications technology
ILP	intelligence-led policing
OSCE	Organization for Security and Co-operation in Europe
SEDENA	*Secretaría de la Defensa Nacional* (Secretariat of National Defense)
SEMAR	*Secretaría de Marina* (Naval Secretariat)
UIN	*Unidad de Inteligencia Naval* (Naval Intelligence Unit)
UNOPES	*Unidad de Operaciones Especiales* (Special Operations Unit)

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I. INTRODUCTION

A. RESEARCH QUESTION

How can the Mexican Navy implement big-data analysis in crime prevention through security methodologies that can increase the effectiveness of operations against organized crime and reduce levels of violence in the country?

B. RELEVANCE OF THE RESEARCH QUESTION

Since the beginning of the war against drug trafficking, initiated during the six-year term of Felipe Calderón, Mexico has implemented the "Central Pivot Strategy" against the drug cartels.[1] Military forces have tried to capture the leaders of the cartels, sometimes generating violent clashes with serious social fall-out and casualties among the civilian population and sometimes resulting in these leaders' being captured or neutralized. However, the leaders have taken advantage of this situation and started fighting among themselves to gain more territories of influence; these actions have contributed to the appearance of more drug-trafficking groups and an increase in violence.

The government responded by deploying more military troops, which increased confrontations between the cartels and the security forces, pushing drug cartels to increase forced recruitment of hired assassins and diversify their criminal activities into human trafficking, illegal immigration, and arms trafficking, among others. The country has seen a scale of systematized violence generated by both the drug cartels and military forces. These measures are ineffective because they lead to an escalation of violence, bringing it to levels of death and crime comparable to those of a country at war.[2]

On December 1, 2018, a new Mexican president—Andrés Manuel López Obrador—took office with the stated objective of saving the country from violence and

[1] Anna Grace, "The Failure of Mexico's Kingpin Strategy," World Weekly, November 29, 2017, https://www.theworldweekly.com/reader/view/4399/the-failure-of-mexicos-kingpin-strategy.

[2] Grace.

corruption.[3] Part of his strategy involves creating a National Guard to fight violence and gradually withdrawing military forces from the cities to reduce violence in the country. However, during its first five years, this force will be formed and trained by the military police of the Army and the Navy, the latter component being of special relevance to the present study; its work in the area of public security will still be of considerable relevance in the coming years while this new military force takes shape to pacify the country.

This thesis proposes that the units involved in the fight against drug trafficking belonging to the Mexican Navy develop a new framework for information management, considering how intelligence can contribute to a global database (big data) for better decision-making in the activities and programs to combat organized crime. The use of such technology allows the analysis of a significant amount of data to reduce improvisation in decision-making at the administrative and operational levels.

The implementation of new technologies also allows the management and exchange of information within the organization and with other federal agencies to increase the efficiency of operations and the use of resources. It also emphasizes the constant measurement of outcomes of decisions in operational and administrative areas. Also, the transparency and interactions with the population that these models demand can help to reduce corruption and human rights violations.[4] Last, a new approach to policing and the rationalized use of military force could help reduce the drug problem and violence, contributing to increased levels of security in Mexico and stability in the region.

[3] Mónica del Carmen Serrano Carreto, "La estrategia de seguridad de AMLO. ¿De la pacificación a la militarización?" [The security strategy of AMLO. From pacification to militarization?], *Revista del Instituto de Ciencias Jurídicas de Puebla México* [Journal of the Institute of Legal Sciences of Puebla, Mexico] 13, no. 44 (2018): 207–227, https://doi.org/10.35487/rius.v13i44.2019.615.

[4] Johanna Canaday, "How the Democratization of Technology Enhances Intelligence-Led Policing and Serves the Community" (master's thesis, Naval Postgraduate School, 2017), http://hdl.handle.net/10945/56879.

C. LITERATURE REVIEW

1. Intelligence

Intelligence in policing refers to the factual information that has been processed and the treatment given to a piece of recorded information, evaluated from the perspective of its importance in the situation being analyzed. Finally, the data in question must be interpreted to establish corresponding conclusions.[5] Such work must be carried out by intelligence officers—in other words, analysts or their equivalents. Furthermore, decision-makers must receive not only the data but also an analysis to act on the information. In addition, they must evaluate the processing of the information to verify it has been carried out correctly, obtaining as a final product material already converted into intelligence. There is a valuable caveat to intelligence work: it must be carried out within a proper democratic framework. The search for information cannot nor should not be based on illegal or even immoral actions justified in the fight against crime, which would be tantamount to fighting crime with more crime.

Crime fighting demands the search for information that helps law enforcement anticipate the actions of organized criminal groups and combat them effectively. These resources constitute intelligence because they generate knowledge as well as the techniques and skills that allow law enforcement agencies to counteract criminal actions.[6] In tasks of this nature, intelligence is needed to combat increasingly complex criminal operations. The terms *police intelligence* and *investigation activities* are commonly used interchangeably. However, they are clearly distinct; the former precedes criminal activity while the latter follows it. Nevertheless, the use of information that requires processing and interpretation to neutralize the action of criminal groups is common to both.

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[5] Cesar Inzaurralde, *Manual crimen organizado: Parte I – Métodos* [Organized crime manual: Part I – Methods] (Montevideo, Uruguay: Nacional de la Educación Policial, n.d.), 28, https://dl-manual.com/doc/manual-crimen-organizado-parte-i-metodospdf-dow1xrjej4z5.

[6] Herard Von Santos Méndez, "La formación en inteligencia policial: Análisis de la oferta educativa de la ANSP" [Training in police intelligence: Analysis of the educational offer of the ANSP]," *Revista Policía y Seguridad Pública* [Police and public safety journal] 7, no. 2 (2017), https://doi.org/10.5377/rpsp.v7i2.5464.

Police intelligence is often considered a non-material qualitative asset of law enforcement agencies, along with other intangible elements. Examples of other qualitative non-material assets include leadership, training, and education of law enforcement personnel. Counterintelligence—namely, intelligence actions that operate from criminal groups and are known to the security forces—is another qualitative non-material asset that they possess and add to the list.[7] Preparation in the area of police intelligence requires an appropriate balance between theoretical learning and its practical application. The preparation of security officers in intelligence matters involves aspects of special importance, such as information gathering, processing, and analysis. Interview techniques are equally valuable, and the respect for human rights is fundamental; should be the basis of pursuing information; and enables, from the police intelligence perspective, crime fighting.

Furthermore, processing the information collected is key to achieving the proposed objective. Therefore, police intelligence training must consider a systematic treatment of information, so it is correctly classified and evaluated. It must also go through a verification stage, so the security forces can effectively make use of it with certainty that it is truthful. From the information gathered, police intelligence agencies may prevent criminal actions that are about to occur or correct actions that are ongoing.

Before the verification phase, it is crucial to validate the sources of information. The credibility of sources, as well as the credibility of the information, is indispensable in following up with actions derived from such information. Once this step has been completed, computer and other techniques can be used to disseminate the information within the established discretionary guidelines. Police intelligence must also involve the study of applicable regulations, as respect for the law is paramount, and intelligence cannot under any circumstances avoid compliance with the law. In their actions, police officers must respect human rights, as outlined in the constitution and international treaties.[8]

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[7] Marcos Pablo Moloeznik and Manuel I. Balcázar-Villarreal, "Aproximación a la inteligencia policial (la Policía Federal de México, 2006–2012)" [An approximation to police intelligence (the Federal Police of Mexico, 2006–2012)], *Revista criminalidad* [Criminality journal] 55, no. 1 (2013): 135, http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1794-31082013000100009.

[8] Von Santos Méndez, "La formación en inteligencia policial," 104.

The real importance of intelligence in police action comes from decision-making based on accurate information and from which rational plans are elaborated. As the complexity of the situation faced defines similarly complex actions, advance information and planning of the actions promote satisfactory results.[9]

Experts delineate three levels of intelligence. The highest level is strategic intelligence, which coordinates the lower levels. The intermediate level is tactical intelligence, whose scope is smaller in time and space than strategic intelligence. Operational intelligence is the most visible level of intelligence actions; it involves the execution of planned and coordinated actions.[10] Police intelligence activities follow a process known as the intelligence cycle: (1) plan, (2) information collection, (3) processing and analysis, (4) dissemination and exploitation, and (5) feedback.[11]

2. Intelligence-Led Policing

In the 1960s, U.S. authorities identified the need for police intelligence to fight organized crime perpetrated by the Cosa Nostra, also known as the Mafia. The presidential commission that was created to combat organized crime recommended developing intelligence units in police departments of the country's largest cities. The idea was to collect as much information as possible to dismantle these criminal groups, giving rise to modern-day criminal intelligence.

As a result of this initiative, in 1971, the Department of Justice published a manual containing the theory and procedures to be followed by police agencies in combating organized crime.[13] The manual had been written by intelligence experts, describing intelligence with an intellectual character, to solve cases with sufficient processed and analyzed information. However, some have suggested that intelligence as a complementary process for solving specific situations limits its scope. Several authors have suggested that

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[9] Moloeznik and Balcázar-Villarreal, "Aproximación a la inteligencia policial," 137.

[10] Moloeznik and Balcázar-Villarreal, 138.

[11] Gustavo González Hernández, "Inteligencia policial: Concepto, origen y fundamento constitucional" [Police intelligence: Concept, origin and constitutional basis], *Bien común* [Common benefit] 23, no. 268 (July 2017): 96, https://issuu.com/frph/docs/bien_comun_268.

police intelligence should serve to understand crime in its essence and, consequently, control it, not only fight it. This philosophy is called intelligence-led policing.[12]

3. Decision-Making

Today, law enforcement agencies in many countries are integrated with intelligence commissions. Related to such organizations, Ratcliffe advocates a definition of police intelligence that emphasizes administration and more effective top-down coordination within the institution.[13] Such administration control also promotes efficient communication within the institution, supporting the processes and decision-making of the personnel in charge through constant feedback.[14]

Intelligence analysis is the basis for decision-making, influencing the evolution of objectives to facilitate better strategies, tactical management, and deployment.[15] Ratcliffe also states that intelligence-led policing is effective in managing organized crime, serious crime, public order, immigration, and border control.[16] Thanks to technologies that aid analysts with in-depth data analysis, the rationale-based approach is enhanced to provide a clear mission for prioritization, which is critical from a management and budgetary perspective, offering a useful approach for police institutions with limited capabilities.[17]

Ratcliffe and Canaday agree that the use of new technologies is a fundamental part of intelligence-led policing, as it can provide multiple sources of information and enhance analysis to create more efficient and focused policing strategies.[18] However, intelligence-led surveillance may face the roadblock of slow implementation in agencies; by the time

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12 González Hernández, 98.

13 Jerry Ratcliffe, "Intelligence-Led Policing," Trends & Issues in Crime and Criminal Justice (Canberra: Australian Institute of Criminology, April 2003), https://www.aic.gov.au/sites/default/files/2020-05/tandi248.pdf.

14 Isabelle Duyvesteyn, Ben de Jong, and Joop van Reijn, eds., *The Future of Intelligence: Challenges in the 21st Century*, Studies in Intelligence (London: Routledge, 2015).

15 Ratcliffe, "Intelligence-Led Policing."

16 Ratcliffe.

17 Ratcliffe.

18 Ratcliffe, "Intelligence-Led Policing"; Canaday, "Democratization of Technology Enhances Intelligence-Led Policing."

the technologies are fully implemented, they may be obsolete or may have been superseded by newer technologies. Ratcliffe also recognizes that police intelligence data break from the institutional culture of surveillance, which can invite a great deal of resistance.[19] He notes that police agencies are more comfortable adopting the associated terminology than the actual intelligence-led policing model.[20]

4. Big Data

Since the early 2000s, the use of information technologies and information networks has increased exponentially, and this phenomenon has evolved into ever-expanding data management, such as personal data, payments, services, work, experiences, and many more, in virtually any context through virtual platforms, computers, cell phones, and other electronic devices. These technologies and services have resulted in massive amounts of data storage—quantities that, for many, are difficult to imagine.[21]

The management and administration of such massive data are referred to as big data, also called data science or data operations. These operations are possible through a series of computer tools, software, and specialized hardware and software capable of handling a volume of data unprecedented in history, which make possible the strategic and analytical treatment of these data. The term big data suggests, much as it sounds, large volumes of digital information, which can be structured or unstructured. The management of these data has its advantages and disadvantages, so their use by companies, organizations, and different institutions is what makes them critically important.[22] A more thorough definition of the concept defines big data as information assets whereby its large

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19 Ratcliffe, "Intelligence-Led Policing."

20 Ratcliffe, "Intelligence-Led Policing"; Organization for Security and Co-operation in Europe, *OSCE Guidebook: Intelligence-Led Policing*, TNTD/SPMU Publication Series, vol. 13 (Vienna: Organization for Security and Co-operation in Europe, 2017), 58, https://www.osce.org/files/f/documents/d/3/327476.pdf.

21 Ibrahim Abaker Targio Hashem et al., "The Rise of "Big Data" on Cloud Computing: Review and Open Research Issues," *Information Systems* 47 (January 2015): 101, https://doi.org/10.1016/j.is.2014.07.006.

22 Amir Gandomi and Murtaza Haider, "Beyond the Hype: Big Data Concepts, Methods, and Analytics," *International Journal of Information Management* 35, no. 2 (2015): 140, https://doi.org/10.1016/j.ijinfomgt.2014.10.007.

volume, the speed with which it is captured, and its variety—in both its form and context—can improve the development of knowledge and allow better decision-making by those who manage the data.

D. POSSIBLE EXPLANATIONS AND HYPOTHESES

Based on the results of studies carried out by Moloeznik and Balcázar-Villarreal, Vonsantos, and Rodriguez, there is a significant consensus on the importance of gathering intelligence for public security management.[23] In this sense, the management of large volumes of information makes it possible to create a statistical database, which allows for better decision-making in the area of public security policies.

Given the growing level of conflict and violence currently taking place in Mexico, this research topic is necessary to postulate new methodologies to fight crime and drug trafficking by optimizing available resources, focusing on those critical nodes of the problem of organized crime, such as the recognition of its activities and the monitoring of routes, hideouts, and private lives, among other aspects. New modes of policing may provide police agencies with the necessary information to attack members of organized crime efficiently.

By reflecting on the ideas of the scholars and writings presented in the literature review, this author developed the empirical hypothesis that this thesis explores: the Mexican Navy's development of a public security methodology guided by big data in intelligence will increase the level of effectiveness of operations against organized crime and reduce the levels of violence in the country. In articulating this hypothesis, the necessary mechanisms for formulating and designing the methodology could be established.

E. RESEARCH DESIGN

This thesis provides a contextual analysis of the essential issues in the implementation of a security policy based on intelligence data in Mexico. It begins with a

[23] Moloeznik and Balcázar-Villarreal, "Aproximación a la inteligencia policial," 131–51.

broad review of the last 12 years of security performance by the Navy in Mexico, the period when the "kingpin strategy" was implemented in the war against the drug cartels.[24] The objective was to develop a public security methodology guided by the management of big data in intelligence to increase the effectiveness of operations against organized crime and reduce the levels of violence in the country. In adopting the process of action research, this thesis aimed to "obtain recommendations of good practices."[25] Action research has been described by Hernández Sampieri and colleagues as an "empowerment procedure," and its use is becoming more and more popular in education and research as practitioners identify a need for changes or improvements.[26]

This study required the analysis of legal documents, statistics, news, reports by non-governmental organizations, and academic publications related to the drug war and its implications for public security in the region. Therefore, the design of this thesis is bibliographic-documentary in nature because the source material was predominantly from these secondary sources. To this end, this study is contextualized using categories derived from the specific objectives. To respond to the general objective, as well as to the specific ones, a review, survey, analysis, and contrast of multiple bibliographic sources, both national and foreign, were completed; this process also involved consulting computer media and incorporating suggestions from experts and officials related to their research or public functions. To achieve this purpose, the researcher resorted to such techniques as content analysis of the information collected and a process of categorization and analysis, which corresponded with the objectives of the work.

F. THESIS OVERVIEW

This work consists of six chapters. Chapters II and III explore the legal framework and intelligence policies for public security and the use of big data in Mexico. Chapter IV

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[24] Grace, "The Failure of Mexico's Kingpin Strategy."

[25] Paloma López de Ceballos, *Un metodo para la investigacion-accion participative* [A method for participatory action research], 3rd ed. (Madrid: Popular, 1998), 8. Please note that all direct quotations from sources originally published in Spanish have been translated into English by this author.

[26] Roberto Hernández Sampieri, Carlos Fernández Collado, and María del Pilar Baptista Lucio, *Metodología de la investigación* [Research methodology], 5th ed. (Santa Fe, MX: McGraw Hill, 2010), 17, https://www.icmujeres.gob.mx/wp-content/uploads/2020/05/Sampieri.Met.Inv.pdf.

details the contemporary use of big data and intelligence by the Mexican Navy. Chapter V proposes an intelligence-led policing methodology for employing big-data analysis to help analysts identify ideal indicators for strategic decision-making and improve SEMAR's operations in matters of public and national security, thus facilitating the distribution of intelligence with other institutions. Chapter VI offers conclusions, such as the relevance of efficiently exchanging intelligence between national and international institutions and the need to implement new technologies that enable the analysis of big data—distributed using the aforementioned methodology—which provides decision-makers with situational and visual awareness for greater efficiency in the design of strategies, operations, and actions at the tactical level.

II. MEXICO'S INTELLIGENCE AND PUBLIC SAFETY PROTOCOLS

Intelligence-led policing (ILP) is a term used in a variety of contexts; the definition is subject to its diversity of applications. Still, these definitions offer some consistent themes: intelligence principles drive the methodology and present particular advantages in decision-making, analysis, and accountability and transparency. This thesis adopts the definition proposed by the U.S. Bureau of Justice Assistance because it comprises these central factors:

> Intelligence-led policing is a collaborative enterprise based on improved intelligence operations and community-oriented policing and problem solving, which the field has considered beneficial for many years. . . . Intelligence must be incorporated into the planning process to reflect community problems and issues. Information sharing must become a policy, not an informal practice. Most important, intelligence must be contingent on quality analysis of data. The development of analytical techniques, training, and technical assistance needs to be supported.[27]

The Bureau of Justice Assistance considers intelligence central to improving the efficiency of operations and stresses the importance of establishing an efficient channel to exchange information between security institutions.[28] It also notes that for modern intelligence institutions, the ability to provide accountability and transparency is a requirement that implies constant analysis of information and results.

A. PUBLIC SECURITY AND INTELLIGENCE IN MEXICO

The militarization of public security in Mexico began with the use of military forces to fight drug trafficking. Gradually, the government handed over more and more security responsibilities to the military, combining—even confusing—national security with public

[27] Marilyn Peterson, *Intelligence-Led Policing: The New Intelligence Architecture*, NCJ 210681 (Washington, DC: Bureau of Justice Assistance, 2015), vii, https://www.ojp.gov/pdffiles1/bja/210681.pdf.

[28] Peterson.

security.[29] The *Estrategia Nacional de Seguridad Pública* (National Strategy for Public Security), enacted by the Mexican government for 2018–2024, charges the newly created Mexican National Guard with overseeing public security, as the guards in France and Spain have done.[30] To this end, the armed forces have been tasked with training the new service. With this strategy, the Federal Police were ostensibly deemed incapable of effectively combating crime on their own and were disbanded, and their remaining elements incorporated into the National Guard. For these reasons, military elements became involved in citizen security issues, and the subsequent disintegration of the police was justified.

The legalization of military participation in Mexican public security issues had been postponed on several occasions. Numerous attempts were made to incorporate the military, including a proposed declaration of internal security and the power of the Mexican president to promote the use of the armed forces in situations threatening the internal security of the country, given that the civilian authorities were incapable of containing such threats.[31] However, none of the proposals were ratified.

1. Role of the National Guard

The creation of the National Guard was approved on March 26, 2019, thus culminating all the efforts made to legalize the use of military forces in public security.[32] Its creation was based on Article 69 of the Political Constitution of the United Mexican States, which grants the president of the republic the right to present before the Senate his

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[29] Marcos Pablo Moloeznik, "Organized Crime, the Militarization of Public Security, and the Debate on the 'New' Police Model in Mexico," *Trends in Organized Crime* 16 (2013): 177–194, https://doi.org/10.1007/s12117-013-9186-4.

[30] Secretaría de Seguridad y Protección Ciudadana, *Estrategia Nacional de Seguridad Pública* [National Strategy for Public Security] (Mexico City: Secretaría de Seguridad y Protección Ciudadana, 2019), 41.

[31] Lisa María Sánchez Ortega, *Paz y seguridad: La militarización de la seguridad pública en México y sus fundamentos legales* [Peace and security: The militarization of public security in Mexico and its legal foundations] (Mexico City: México Unido Contra la Delincuencia and Friedrich Ebert Stiftung, 2020), 17, https://www.mucd.org.mx/wp-content/uploads/2020/11/SANCHEZ-MILITARIZAC-SDAD-ME%CC%81X.pdf.

[32] Sánchez Ortega, 21.

proposal for the national public security strategy for approval.[33] Once the president's 2019 proposal was approved on March 26, 2019, the newly created National Guard was charged with administering public security, as detailed in the *Diario Oficial de la Federación* (Official Gazette of the Federation; DOF).[34] According to the approved legislation, the National Guard is an institution equivalent to the police, attached to the *Secretaría de Seguridad y Protección Ciudadana* (Secretariat of Security and Civilian Protection).[35] The leadership is civilian, but as the National Strategy for Public Security describes, the training of its personnel is of a military nature. Such training indicates the level of discipline and preparation expected in hopes of better performance against crime.[36]

Since the 1980s, security management in Mexico has turned to intelligence principles in government plans, particularly with a focus on information and intelligence as strategies for achieving national security. The policy aims to guarantee Mexico's national security, like that of any other country, considers intelligence work to identify possible risks, and defines the actions required to counteract them, if necessary.

The drug-trafficking situation in Mexico came to be a matter of national security, which, contrary to regular threats, came from internal agents. Consequently, it had to be treated as such, thus demanding it be handed over to the military and dealt with using criminal intelligence.[37] This policy broadened the scope of national security, going beyond the limits of public security and eventually justifying the militarization of public security to combat drug trafficking first and foremost and, subsequently, all actions that threaten

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[33] Constitución Política de los Estados Unidos Mexicanos [Political Constitution of the United Mexican States], CP, Diario Oficial de la Federación [DOF] 05–02-1917, Última reforma DOF 10–02-2014 (Mex.), Articulo 69, https://www.gob.mx/cms/uploads/attachment/file/148929/01_Constitucio_n_Poli_tica_de_los_Estados_Unidos_Mexicanos.pdf.

[34] Decreto por el que se reforman, adicionan y derogan diversas disposiciones de la Constitución Política de los Estados Unidos Mexicanos, en materia de Guardia Nacional [Decree amending, adding and repealing various provisions of the Political Constitution of the United Mexican States, regarding the National Guard], DOF 26–03-2019, Articulo 10, https://dof.gob.mx/nota_detalle.php?codigo=5555126&fecha=26/03/2019#gsc.tab=0.

[35] Decreto por el que se reforman, adicionan y derogan diversas disposiciones, Articulo 10.

[36] Decreto por el que se reforman, adicionan y derogan diversas disposiciones, Articulo 10.

[37] Tony Payan, *The Three U.S.-Mexico Border Wars: Drugs, Immigration, and Homeland Security*, 2nd ed. (Santa Barbara, CA: Praeger Security International, 2016), 62.

the security of citizens.[38] In this sense, intelligence work gradually expanded to handle public security matters as well.

Thus, the National Strategy for Public Security explores creating a national intelligence system, which has not yet been established.[39] All the actions aimed at strengthening the competencies of the agencies in charge of guaranteeing national security will have a positive impact on public security. In particular, the strategy discusses the possibility of implementing National Guard detachments in each zone of the country, considering the importance of each one; depending on the population it serves and its vulnerabilities, a detachment will rely on its assigned resources for investigation and intelligence work.[40]

The aforementioned initiatives were ratified in the statement made in the National Strategy for Public Security regarding the concepts of national security, public safety, and peace. The document describes national security in strategic terms, with actions that make it possible to anticipate threats and neutralize them. In addition, the strategy points out the interconnection between national security and citizen welfare.[41] In this relationship, the proposed intelligence actions to address national security have repercussions for public security, as an integral administration.[42]

Mexican security plans clearly propose the strengthening of military, naval, and civilian intelligence systems. They refer to public security as internal security and establish

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[38] Jorge Alberto Vidal Urrutia, "La generación de inteligencia para la seguridad nacional en México, acercamiento a su estudio y análisis" [The generation of intelligence for national security in Mexico, an approach to its study and analysis], *Díkê: Revista de investigación en derecho, criminología y consultoría jurídica* [Research journal in law, criminology and legal consulting] 11, no. 21 (2017): 310, http://dx.doi.org/10.32399/rdk.11.21.395.

[39] David Vicenteño, "Anuncian la creación del Sistema Nacional de Inteligencia" [Announcement of the creation of the National Intelligence System], Excelsior, May 1, 2014, https://www.excelsior.com.mx/nacional/2014/05/01/956670.

[40] Secretaría de Seguridad y Protección Ciudadana, *Estrategia Nacional de Seguridad Pública*, 46.

[41] Secretaría de Seguridad y Protección Ciudadana, *Estrategia Nacional de Seguridad Pública: Segundo informe anual* [National Strategy for Public Security: Second annual report] (Mexico City: Secretaría de Seguridad y Protección Ciudadana, 2021), 127, https://www.gob.mx/sspc/documentos/estrategia-nacional-de-seguridad-publica-273311.

[42] Secretaría de Seguridad y Protección Ciudadana, *Estrategia Nacional de Seguridad Pública*, 34.

the need to maintain it through the joint action of the armed forces and the National Guard. The National Strategy for Public Security recognizes the armed forces' lack of preparation in matters of citizen control, so it requires that they go through a process of learning police techniques as the National Guard takes complete control of public security.[43]

Finally, the plan considers the creation and strengthening of financial intelligence units. These units will combat crime using the enrichment plan detailed in the strategy. Intelligence units of this type will facilitate the investigation of criminal networks, such as drug-trafficking cartels, that generate high revenue, which is difficult to hide. In short, Mexico's public and national security are unified, and state intelligence is placed in the service of the citizens through public security tasks.[44] The militarization of public security brings with it the military training of such forces complemented with police training to combat the crimes that affect citizens.

National security, according to the vision of the Mexican people, involves the protection and well-being of citizens. Moreover, crime and drug trafficking threaten not only national security but also citizen security.[45] The National Strategy for Public Security is a clear example of the interrelation between national security and public security, in an approach that moves from considerations of peace and public order, through arms resources, to a more humanistic concept.[46]

In Mexico, as in all countries of the world, national security is under the control of the state—the entity responsible for the policies that guarantee the defense of the nation. Regarding public security, the state relies on the different levels of government, that is, the

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[43] Secretaría de Seguridad y Protección Ciudadana, *Estrategia Nacional de Seguridad Pública*, 44; Secretaría de Seguridad y Protección Ciudadana, *Segundo informe anual*, 128.

[44] Secretaría de Seguridad y Protección Ciudadana, *Segundo informe anual*, 226.

[45] Secretaría de Seguridad y Protección Ciudadana, 226.

[46] José María Ramos García, "Seguridad ciudadana y la seguridad nacional en México: Hacia un marco conceptual" [Citizen security and national security in Mexico: Towards a conceptual framework], *Revista Mexicana de ciencias políticas y sociales* [Mexican journal of political and social sciences] 47, no. 194 (2005): 35, http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0185-19182005000200033.

federal and municipal levels, to meet the needs of citizen protection.[47] All these agencies work to protect the integrity of citizens, guarantee order and peace, and prevent crimes and punish those who commit them. This task has become one of the greatest problems of the Mexican state, as public insecurity has increased vertiginously in recent years.[48]

In fact, security problems regularly stem from situations associated with problems of a military or external nature that place the country at risk. Mexico, for its part, finds that its security problems are mostly of internal origin, as a result of poverty, social differences, institutional crises in the face of a growing population, and the state's inability to resolve them.[49] Thus, the growing public security situation has required a change in strategy to ensure that the institutions charged with security achieve the best possible balance between preventive and corrective functions.

Criminal intelligence is the work carried out by police forces in the process of gathering and analyzing information to identify criminal actions and criminals early, so they may be prevented.[50] This process is not new; presumably, these activities have been carried out for many years but have not been systematized in any way.[51] The term intelligence, however, has been used in a national and military context. Intelligence on matters of national interest, as well as military matters, was generally characterized by confidentiality. This means that both the content of the information and the officials

[47] Reglamento Interior de la Secretaria de Seguridad y Protección Ciudadana [Internal regulations of the Secretary of Security and Citizen Protection], DOF 30–04-2019, Capítulo VII, Sección I, https://dof.gob.mx/nota_detalle.php?codigo=5558990&fecha=30/40/2019#gsc.tab=0.

[48] Juan Carlos Montero Bagatella, "Inteligencia para la seguridad pública en las entidades federativas de México" [Intelligence for public security in Mexican states], *Revista de estudios en seguridad internacional* [Journal of international security studies] 6, no. 2 (2020): 194, http://dx.doi.org/10.18847/1.12.11.

[49] Józef Pruchniak, "Dysfunction of Mexico in Terms of Personal Security," *Security Dimensions*, no. 36 (2021), https://doi.org/10.5604/01.3001.0015.0493.

[50] Collen McCue, *Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis* (Oxford: Elsevier, 2015), 338.

[51] José Manuel Ugarte, "Desarrollo, situación y probable evolución de la inteligencia criminal en Latinoamérica" [Development, situation and probable evolution of criminal intelligence in Latin America] (Buenos Aires: Universidad de Buenos Aires, 2019), 5.

involved in the intelligence cycle were in the domain of a select few.[52] These types of intelligence were intended to support the defense of the country and the security of the state.

Criminal or police intelligence, as its also known, has another aim: to ensure public security. The use of criminal intelligence does not apply to just any type of crime—it must threaten public security and constitute a potential risk to national security. These are crimes for which traditional tactics are insufficient and must be the object of new policing methods to neutralize them.[53] This is the case of drug trafficking in Mexico, whose countermeasures necessarily require guidelines derived from criminal intelligence actions.

As criminal intelligence is linked to police work, it integrates intelligence characteristics into activities aimed specifically at achieving citizen protection. It has grown and developed in a manner equivalent to the development of criminal activity, which involves increasingly complex and sophisticated technical resources and, consequently, cannot be counteracted with improvised activities. Thus, it manages strategic, operational, and tactical intelligence levels, as mentioned previously. In simple terms, the strategic intelligence level is the one that allows early warnings of possible crimes. The tactical level is directed at actions aimed at dismantling criminal organizations, and the operational level is the direct application of police actions in the fight against crime.[54]

2. Criminal Intelligence

Created in 1989, the Mexican *Centro de Investigación y Seguridad Nacional* (Center for Investigation and National Security; CISEN), attached to the Ministry of the Interior, was charged with generating strategic, tactical, and operational intelligence for the country's national security. It has since been replaced by the *Centro Nacional de*

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[52] Sergio Aguayo, *La Charola: Una historia de los servicios de inteligencia en México* [La Charola: A history of intelligence services in Mexico] (Editorial Ink, 2014).

[53] Luis Gustavo Arteaga Suárez, "Sistemas de inteligencia para la seguridad nacional en México: De la comunidad a la fusión" [Intelligence systems for national security in Mexico: From community to fusion] (master's thesis, Instituto Tecnológico y de Estudios Superiores de Monterrey, 2013), 28, https://repositorio.tec.mx/bitstream/handle/11285/628920/33068001113034.pdf?sequence=1&isAllowed=y.

[54] Ugarte, "Desarrollo, situación y probable evolución de la inteligencia criminal," 4.

Inteligencia (National Intelligence Center; CNI), with broad powers with respect to its predecessor and under the guidance of military authorities.[55] Notably, this institution acted as a political police force for the 71-year-long regime occupied by the *Partido Revolucionario Institucional* (Institutional Revolutionary Party), which detracted and delayed the evolution of intelligence in its true field of application and responded only to political interests. As a result, the institution was on the verge of dissolving with changes to the elected presidential party, but it eventually restructured, changed its name, and became subordinate to the *Secretaría de Seguridad y Protección Ciudadana* (Secretariat of Security and Civilian Protection), despite internal resistance. As part of these changes, the National Guard was also structured as a gendarmerie to cover public security tasks.

The extent of drug trafficking and organized crime in Mexico is cause for a civilian body to administer public security—but with an obvious military formation and philosophy. Furthermore, given the complexity of these criminal models, criminal intelligence is indispensable for analyzing and acting on the best, most complete information possible and neutralizing these criminal actions and their actors. This coordinated work, whereby the armed forces work jointly with the National Guard to oversee Mexico's public security, requires an exchange of information, achieved through strategic intelligence actions, to reach consensual, well-founded decisions.[56]

In sum, Mexico uses criminal intelligence in strategic operations to combat criminal actions. In this sense, everything considered susceptible to intelligence activities—namely the military sphere and the defense of the state and its sovereignty—had to broaden its scope, as the subordination of the National Guard as a new branch of the *Secretaría de la Defensa Nacional* (Secretariat of National Defense; SEDENA) makes manifest that the fight against organized criminal elements will continue to be in the hands of military forces but, in this case, with police adaptation.

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[55] Ugarte, 22.

[56] Arteaga Suárez, "Sistemas de inteligencia para la seguridad nacional," 59.

3. Big Data in Intelligence Gathering

Since 1995, Mexican legislation has been in place to ensure that the different levels of government—namely, federal, state, and municipal—can share the information they possess related to public security, using available technology. In this way, the transmission of information facilitates criminal intelligence work and makes it possible for all citizen control authorities to have the necessary information available about a specific event, regardless of its location, in real time. Of course, in the past, technological resources were not robust enough to ensure that information was transmitted instantly. There were many deficiencies, considering the abundance of information and its continuous growth, so this thesis recognizes the increasing management of information data and the imperative to transmit intelligence products to those who need them most just when they need them.

The platforms developed for data storage and transmission in Mexico soon proved insufficient in terms of capacity and speed for their task.[57] In 2007, the Mexican government renewed its technological structure, which culminated in the development of the information and intelligence system called *Plataforma México* (Mexico Platform). This system is fed by the National Telecommunications Network, created in 1999, and the Unified Criminal Information System. For the platform's implementation, a global evaluation of the technology was made available to all law enforcement agencies in the country with the purpose of making system updates.

In 2008, the government implemented a new mechanism for citizen protection called the *Estrategia Nacional de Prevención del Delito y Combate a la Delincuencia* (National Strategy for Preventing and Combating Crime). One of the axes of this strategy was clearly oriented toward strengthening the Mexico Platform and designed to generate and transmit intelligence to all the interconnected levels that work in pursuit of public security. That same year, the Federal Police Command Center was established, providing intelligence through the Mexico Platform to all police forces in the country at different

[57] Otto René Cáceres Parra, "El sistema de información e inteligencia Plataforma México" [The information and intelligence system Platform Mexico], *URVIO: Revista Latinoamericana de estudios de seguridad* [Latin American journal of security studies], no. 21 (2017): 178, https://doi.org/10.17141/urvio.21.2017.2916.

levels of government. In addition, a cooperation agreement was signed with Interpol's global police communication system so that intelligence could be exchanged through the platform. These mechanisms translate into receiving and sharing a high volume of records that contribute to Mexico's public security.

One of the advantages of the Mexico Platform is the security of the information transmitted through it due to the protection mechanisms implemented in the different linked resources. The reason is obvious: the information contained therein is crucial for decision-making in strategic national security operations, and consequently, its confidentiality and handling must be especially guaranteed. Moreover, its veracity, which is equally valuable, is guaranteed by all the elements involved in intelligence analysis through the interconnected information networks of the Mexico Platform.[58] Unfortunately, the platform has become increasingly limited given the demands of Mexico's intelligence systems, thus necessitating a leap toward new technologies.

The call to adopt new technologies is not exclusive to Mexico; currently, the security of many countries has undergone the implementation of cutting-edge information systems that guarantee not only the speed of transmission but also the storage capacity of the information. The robustness of the selected technology is key in maintaining the operation of the information systems.[59] The loss of information, either in content or in timeliness of availability, can be critical for decision-making that impacts the security of citizens of any country in the world.

For example, the David System—after the biblical namesake who slew Goliath—is an information platform that contains and transmits data for use by the national police of Ecuador. Parallel to the Mexico Platform, the David System links different levels of security in that country, including the ministry of justice, prosecutors' offices, and national police agencies, among many other users. With the system's information, users may

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[58] Cáceres Parra, 184.

[59] Mónica Torresano Melo and Jaime Calles López, *La gestión de la información para la prevención del delito: El caso del Departamento de Análisis de Información del Delito (DAID)* [Information management for crime prevention: The case of the Crime Information Analysis Department], IDB-DP-620 (Guayaquil, Ecuador: IDE Business School, 2018), 23, https://publications.iadb.org/publications/spanish/document/La-gestion-de-la-informacion-para-la-prevencion-del-delito.pdf.

characterize crimes and identify areas of high crime or other specific information.[60] With these data, public security officers can make valuable decisions in the best interest of the safety of community residents. This is certainly one of the many examples of information systems in place worldwide to handle high volumes of information in real time from various locations simultaneously, all of which support the intelligence work of public security factors.

In short, technology is becoming indispensable in managing the information processed for ILP, sustaining the transition from traditional analysis, and addressing the limitations of intelligence transmission in Mexico. Without an upgrade, communications will lose their effectiveness. The inefficiency or failure of systems will have an effect on security because absent or untimely decisions may facilitate criminal action.[61]

The Mexico Platform is a valuable proposal that, if properly operated, should serve its intended purpose. If the technology proves to be sound, the human resources involved in its management must be shielded. Because information gives power to those who possess it, authorities must ensure there is no risk of its convenient or personal use among those responsible for feeding the information systems, databases, and networks that transmit intelligence. It is necessary to leverage the government's situation to facilitate new platforms to exchange information, as well as its analysis, relying on national manufacturing, thus avoiding high international costs, and taking a step forward for intelligence in Mexico.

B. BIG DATA

Many companies and industries, even governments, have recently recognized the importance of big data and invested different resources to take advantage of this important tool. Professionals are increasingly specializing in the interpretation of such data, given the demands of the current market and its dynamism. From the appropriate reading and analysis of behaviors, patterns, and affinities, given the group of interest, it is possible to

[60] Torresano Melo and Calles López, 35.

[61] Cáceres Parra, "El sistema de información e inteligencia Plataforma México," 187.

regenerate strategies and action plans focused on the results of big-data analysis. Different authors deal with society in the information age, referring to people and organizations that learn to handle, administer, and manage information; this society will have a significant advantage at the time of making important decisions to solve, for example, commercial, logistical, administrative, security, military, or even social problems.

The term *big data* is of English origin, translating to a large volume of data, either structured or unstructured. The management of this large volume of data has its advantages and disadvantages, so the use by companies, organizations, or different institutions imparts big data's importance. A more complete, elaborate concept defines big data as information assets whose large volume, the speed with which they are captured, and the variety presented—both in their capture and their context—can improve the development of knowledge and allow better decision-making by those who manage the information.

Due to the great evolution of this science, more specifically in the sphere of information and communications technology (ICT), large companies and organizations have had to face the great challenge of handling, managing, storing, searching, and analyzing large volumes of data. A similar situation has arisen for security institutions that increasingly receive massive amounts of information that must be analyzed to generate operationally actionable products. Thus, the term *big data* also conveys these great challenges of processing and analyzing large volumes of data.[62]

It is also understood that big data involves the enormous amount of data that has been generated in recent years with all kinds of devices capable of collecting information through computing. Therefore, one aim of big data is to uncover the best ways to take advantage of the volume of data available. This phenomenon was first explored in 2003 when cyber giant Google publicized how it handled and managed its data to create value—thus heralding the beginning of software programming and technological innovations to manage large volumes of data for global socioeconomic development, which are still

[62] David López García, "Análisis de las posibilidades de uso de big data en las organizaciones" [Analysis of the possibilities of using big data in organizations] (master's thesis, Universidad de Cantabria, 2014), 3–10, https://repositorio.unican.es/xmlui/bitstream/handle/10902/4528/TFM%20-%20David%20L%C3%B3pez%20Garc%C3%ADaS.pdf?sequence=1.

proliferating and evolving today.[63] Big data involves the collection and processing of large amounts of information, both data and macro data.

Big data has opened the doors for a new approach to understanding and gaining knowledge for better decision-making, describing a huge amount of data that would not be possible through traditional methods. These data are treated through stable mathematical models of relatable matrices, so the search for information can cover variables and parameters as desired by the interested party. Big data benefits not only businesses—in areas such as marketing, product orientation, and user acquisition—but also the state, which can leverage this tool to design more efficient public policies in areas such as the economy, security, health, education, and recreation. This information management can provide a country with a beneficial international status, as technological advances can mean greater guarantees of social, public, military, and economic security.[64]

Big-data analysis plays an important role in promoting and protecting human rights. This concept has gained prominence in the philosophy of sustainable development, whereby technological tools improve the quality of life for future and present generations. Such analysis is an important tool for the generation of new knowledge in an information-dominated society, given the public's extensive access to and management of information through big data and the virtues of processing data in the field of ICT.[65]

In this developmental sense, macro data analytics can drive the promotion and protection of human rights for all the aforementioned benefits, but it can also "be used to violate those same rights and should, therefore, be regulated in a timely manner. Thus, it is necessary to generate clear and sufficient information for individuals to understand how the use of certain technologies can affect their human rights."[66] Notably, the burden of

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63 López García, 3–10.

64 López García, 3–10.

65 Evelyn Téllez Carvajal, "Análisis documental sobre el tema del big data y su impacto en los derechos humanos" [Documentary analysis on the subject of big data and its impact on human rights], *Derecho PUCP: Revista de la Facultad de Derecho* [Journal of the law school], no. 84 (2020): 155–206, https://doi.org/10.18800/derechopucp.202001.006.

66 Téllez Carvajal, "Análisis documental sobre el tema del big data," 155–206.

protecting the large volume of data generated by users through various technologies rests on the governmental and private entities that process and store the information.

The problem is there are not enough legal regulations to limit the use and processing of data, so personal information can be treated as mere merchandise. In this way, ethical management is not guaranteed and people's human rights can be violated in numerous ways, such as through infringement of privacy; exposure to illicit acts such as extortion; and breaches of personal data, demographics, and locations. Thus, as in the case of intelligence activities, entities that manage data must comply with clearly defined legal regulations and submit to external supervision.[67]

C. MEXICAN NAVY

Most countries have an armed defense force that governs and safeguards the sovereignty and security of their territory within their land and maritime borders, as the case may be. The Mexican Navy carries out territorial defense operations, the purpose of which is to safeguard the coasts, territorial sea, exclusive economic zone, and all areas related to these aspects. Its scope includes the defense and inspection of inland waters, navigable waterways, and lakes, as well as the response to any contingency or natural disaster, as outlined in the Constitución Política de los Estados Unidos Mexicanos (Political Constitution of the United Mexican States), laws, and international treaties.[68]

Mexico has an advantageous geopolitical situation because its extensive coasts communicate with the Atlantic Ocean and the Pacific Ocean. The country is encompassed by more than 11,000 kilometers of coastline distributed to the east with the Gulf of Mexico and the Caribbean Sea and to the west and south with the Pacific Ocean, boundaries that constitute a coastal country. Beyond the coastlines, the borders extend to the oceans, where hundreds of islands belong to Mexico. According to international maritime law,

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67 Téllez Carvajal, 155–206.

68 Ramón Antonio Márquez Rivera, "Análisis de la percepción mediática y social de la Secretaría de Marina-Armada de México y la implicación en su Unidad de Comunicación Social" [Analysis of the media and social perception of the Secretariat of the Navy of Mexico and the involvement in its Social Communication Unit] (master's thesis, Instituto Tecnológico y de Estudios Superiores de Monterrey, 2018), 18–26, https://repositorio.tec.mx/handle/11285/628163.

The country's oceanic borders are determined as the territorial sea of 12 nautical miles wide, which includes all waters adjacent to its coasts where national sovereignty is absolute, and the exclusive economic zone, which covers up to 200 nautical miles from the shores of the straight baselines, in which all living or mineral resources existing on the continental shelf of those waters, their bed, and subsoil are property of the nation.[69]

Notably, Mexico comprises 62 percent more marine territory than total land area. Given Mexico's important extension, it borders more than 70 countries, including those that share maritime routes, which means the possibility of commercial exchange as well as political, social, military, and even criminal interconnections. Given Mexico's geopolitical positioning, international business opportunities extend to practically all continents, a wide diversity of wealth can be found along its coasts, and it boasts proximity to the United States, the world's leading power. These characteristics give Mexico the opportunity to be a world power, too. Nevertheless, such possibilities point to the importance of a well-functioning defense of national sovereignty via Mexico's coasts.[70]

As a sovereign nation and with the gradual recognition of the importance of safeguarding the coasts and maritime routes, Mexico's geopolitical importance has evolved over the years through consolidation of legislation, institutions, and other entities linked to the proper development of its naval areas, inside and outside the territory. From Spanish invasions to the modern problems of illicit smuggling and other irregular activities, the vast maritime domain has challenged Mexico's defense capabilities. The *Secretaría de Marina Armada de México* (Naval Secretariat; SEMAR) has acquired a leading role in national security issues through its experiences and updates to its security systems and plans, as well as internationally as an important axis for North American commerce.

1. Foundation of the Navy

In 1917, the Political Constitution of the United Mexican States was enacted and established the legal foundation of the Mexican Navy, both military and merchant

[69] Márquez Rivera, 18.

[70] Márquez Rivera, 18–26.

divisions. Article 32 explains that national ships should be manned only by Mexicans. That same year, through the constitution, the *Ley de Secretarías de Estado* (Law of Secretaries of State) was established, providing for the division of maritime affairs into merchant and military domains, thus assigning two different departments. The *Departamento de la Marina* (Department of the Navy) was left in the hands of the *Ministerio de Guerra y Marina* (Department of War and Navy), as a unit of the *Ejército Mexicano* (Mexican Army).[71] While debates of the constituent congress in Querétaro established the need to create an independent administration for the Navy, the idea went nowhere.

During the government of General Lázaro Cárdenas, interest in the Mexican Navy arose again in September 1939, illustrating that maritime affairs could not remain in the background. Cárdenas also gave rise to the construction of port infrastructure and promoted the cause of improving the conditions of the Navy and its personnel, as well as initiating the creation of a merchant marine fleet. On December 30 that same year, the *Ley de Secretarías y Departamentos de Estado* (Law of Secretaries and Departments of State) was published in the DOF, wherein the *Departamento de la Marina Nacional de México* (Department of the National Navy) was officially founded.[72]

The purpose of this department was to manage and direct Mexican affairs of the sea, its mission dispersed across several agencies; however, such an arrangement produced irregularities and different points of view on the same subject. The Department of the National Navy in 1939 comprised the following:

> the Navy, naval schools, nautical schools, and arsenals; docks and dry docks; the merchant marines; navigable waterways, coasts, ports, and lighthouses; maritime and fluvial zones; meteorological and astronomical

71 Márquez Rivera, 18–26.

72 José Herón Pedro Couto, "Autonomía y creación de la Secretaría de Marina (1920–1946)" [Autonomy and creation of the Naval Secretariat (1920–1946)], in *Memoria y prospectiva de la Secretaría de Marina Armada de México a cien años de vigencia de la constitución de 1917* [Memory and prospective of the Secretariat of the Armed Navy of Mexico upon one hundred years of validity of the constitution of 1917] (Coyoacán, México: Instituto Nacional de Estudios Históricos de las Revoluciones de México, 2017), 109–28, https://archivos.juridicas.unam.mx/www/bjv/libros/12/5913/7.pdf.

services on coasts and ports; inspections and surveillance of fishing vessels; and jurisdiction over uninhabited islands.[73]

Given these responsibilities, the new department oversaw all infrastructure and marine works of Mexico, inside and outside its coasts, and was responsible for the recruitment and training of personnel.

Subsequently, on December 31, 1940, the Law of Secretaries and Departments of State was amended and elevated the Department of the National Navy to a department of state—SEMAR—with the same responsibilities but with a greater role in the planning and policies of the country.[74] It was then that its character and main functions at sea were first defined in the service of the Mexican state.[75] This appointment brought with it the need to install weapons on ships to protect maritime commerce and other productive activities, as well as prepare men capable of fighting for the security of marine waters.

SEMAR finds its legal basis in Article 1 of the *Ley Orgánica de la Administración Pública Federal* (Organic Law of the Federal Public Administration), which explains that SEMAR, through the Mexican Navy, exercises naval power for external defense and collaborates in defense of the country's interior. Likewise, the missions of the SEMAR which together form the Mexican armed forces, are based on Article 73 of the constitution. As established in the constitution, the high military command is chosen by the president of the republic, from the Mexican Army and SEMAR, which is responsible for operating and administering naval power.[76]

SEMAR would be attributed several functions, not only military but civilian as well, with the objective of having a single body for all maritime affairs of Mexico. This policy boosted Mexican economic activity, with guarantees offered by the operation of the ministry. The country saw great benefits for the fishing industry, maritime commerce, port

[73] Márquez Rivera, "Análisis de la percepción mediática y social de la Secretaría de Marina-Armada de México," 25.

[74] Márquez Rivera, 25.

[75] Subsequently, the term *Armada* has been used to describe the entire marine force, in accordance with world trends, whereas the Navy exercises military functions.

[76] Márquez Rivera, "Análisis de la percepción mediática y social de la Secretaría de Marina-Armada de México," 18–26.

structures, and other naval constructions that leveraged the country's maritime system. Likewise, its purpose has been to preserve peace and security in the sea and fluvial channels, a mission strictly military in nature. Its structure administers the directorates of the Navy, merchant marines, maritime works and architecture, fishing and related industries, naval construction, and dredging department.[77]

Due to the new need for adapting to national and international regulations and statutes, as well as new demands at a national level, on August 30, 1944, the *Ley Orgánica de la Armada de México* (Organic Law of the Navy of Mexico) was decreed, the first one issued for SEMAR. This law established a new primary objective for the Navy—to defend the sovereignty and integrity of the nation, occupy the spaces of the sea, wage war if necessary with the Mexican Army, preserve the constitution, and maintain the internal order of the country. The guidelines involved centralization of direction, decentralization of execution, unity of doctrine, collaboration, and initiative. Moreover, the law required that the Navy operate and organize itself in times of war and peace.[78]

From its beginnings to the present day, SEMAR has had to update its policies and plans to face the challenges imposed by Mexico's vast maritime space, as well as its important geopolitical position. Being the neighbor of a power such as the United States represents challenges that have to be addressed on a daily basis in terms of security, specifically regarding migration and drug trafficking. Central American countries in recent decades have been characterized as countries with high crime and poverty rates, which have led to the proliferation of illicit businesses and increased migrants heading north in search of a better future; this situation has brought serious security problems.

The United States places great responsibility on Mexico in terms of security and drug trafficking, for the aforementioned reasons. The authorities of both countries rely on the Mexican armed forces. Mexico has faced and tried to solve the crisis that civilian institutions normally charged with public security issues have undergone. Under this

[77] Pedro Couto, "Autonomía y creación de la Secretaría de Marina," 109–28.

[78] Pedro Couto, 109–28.

premise, the Mexican government uses its military forces to confront organized crime, considering this problem derives from other structural problems in the region.[79]

The armed forces have a clear leading role in guarding and preserving the internal order of the nation; however, different academic and societal sectors question the extrajudicial work performed by the military forces to combat drug trafficking and organized crime, and all the problems as a consequence. This situation will always be debated in the court of public opinion, but it must be understood that these activities are inherent to the functions of the Army. Likewise, Mexico's collaboration in U.S. military plans to combat drug trafficking and terrorism has been controversial. This cooperation is mutual and has a long history, with different contexts depending on the government in power. The relationship with the United States is a very important factor in the development of the country, but not everything has been negative; these bilateral relations have also had positive aspects from many points of view, considering the broad economic and security cooperation.[80]

The benefits that relations with the United States have brought to Mexico are remarkable; there is an important generation of economic resources, as well as remarkable structural and economic development. Also, the training and education of the armed forces has strengthened Mexico's performance in security matters. Nevertheless, Mexico's sovereignty is disputed by the giant to the north, which has created a certain distrust in segments of the population but is to be expected given the history of wars between the countries. Since World War II, however, a special relationship of collaboration and support has arisen between the Mexico and the United States that leverages each other's strengths.[81] In recent years, the increase in organized crime and flagrant drug trafficking from and through Mexican territory has led to a greater presence of military forces in the area of public security, thus exceeding their competencies.

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[79] Secretaría de Marina-Armada, *Historia general de la Secretaría de Marina-Armada de México: Las políticas navales 1940–2012* [General history of the Secretariat of the Navy of Mexico: Naval policies 1940–2012] (México City: Secretaría de Marina-Armada, 2012), 383–87.

[80] Secretaría de Marina-Armada, 383–87.

[81] Secretaría de Marina-Armada, 383–87.

The presidential administrations of the last 30 years have gradually given greater prominence to the military forces in the public sphere, including political participation and influence, which have grown exponentially under the government of President Lopez Obrador, who has moved away from the country's legislation so that modifications and updates can be made to the systems to support their presence.[82] He states, "Even though the complexity of the criminal world requires the participation of the armed forces in security tasks, doing so without controls, support, and evaluation is as or more detrimental than not doing so and prevents the construction of a safer, more just and peaceful country."[83]

Despite the intentions of the president, between the positive and the negative, Mexico's security risks have increased due to its geopolitical position and its situation as a neighbor of the most powerful country on the continent. However, this challenge has served as a bridge to develop its infrastructure in favor of a better quality of life for its citizens, as well as to update and train its military forces, while overcoming the adversity and work overload facing SEMAR.

2. Organizational Structure

The organizational structure of SEMAR was recently updated in the *Official Gazette*, and its *Manual de Organización General de la Secretaría Marina* (General Organization Manual of the Marine Secretariat) indicates the following organization.[84] The head of this institution is the secretary of the Navy, who reports directly to the president of the republic. Reporting directly to the secretary of the Navy are the Department of Inspection, the General Comptroller of the Navy, the General Staff of the Navy, the Unit for the Promotion and Protection of Human Rights, the Legal Unit, the Board of Admirals, and the Naval Board, as well as the Naval Intelligence Unit, direct advisor to the command, along with the Special Operations Unit.

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[82] Sánchez Ortega, *Paz y seguridad*, 1

[83] Sánchez Ortega, 2.

[84] Secretaría Marina, *Manual de Organización General de la Secretaría Marina* [General Organization Manual of the Naval Secretariat], Acuerdo secretarial Núm. 011/2021 (Mexico City: Secretaría Marina, 2021), 16–17.

Next, there is a Deputy Secretary's Office, which is divided into the Directorate of Naval Construction and the Directorate General of General and Hydrographic Services. The General Officer's Office is divided into the General Directorate of Human Resources, the General Directorate of Administration and Finance, and the Naval University.

The following operational units serve as direct arms of the secretary of the Navy: naval forces, regions, zones, and sectors; high-command headquarters; the Naval Intelligence Unit; the Special Operations Unit of the Mexican Navy—including marine infantry and special forces, important bastions in the defense of the nation—the Port Captaincy and Maritime Affairs Unit; the Technological Research and Development Unit; and the Naval Police Unit.

3. Security Missions

Article 1 of the Organic Law of the Army and Air Force establishes a series of missions for the military:

- Defend the integrity, independence and sovereignty of the Nation
- Guarantee internal security
- Assist the civilian population in cases of public necessity
- Carry out civic actions and social works that promote the country's progress
- In cases of disaster, provide assistance to help maintain order, assist people and their property, and the reconstruction of affected areas.[85]

The same article stipulates that the Mexican Navy's mission is to contribute to the internal security of the country through naval power. The fight against drug trafficking is a fundamental element of this last point as this illicit activity triggers a series of adverse situations that alter the proper functioning of Mexican society.[86]

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[85] RESDAL Latin American Security and Defence Network, *Primary and Secondary Roles of the Armies: Comparative Case Studies from Latin America* (Buenos Aires: RESDAL, 2018), 9, https://www.resdal.org/ing/assets/regional_final_esp.pdf.

[86] Alejandro de la Fuente Alonso, "Las misiones de las fuerzas armadas en el Estado Mexicano" [The missions of the armed forces in the Mexican state], in *Régimen juridico de las fuerzas armadas* [Legal regime of the armed forces] (Universidad Nacional Autónoma de México, 2011), http://ru.juridicas.unam.mx/xmlui/bitstream/handle/123456789/31941/las-misiones-de-las-fuerzas-armadas-en-el-estado-mexicano.pdf?sequence=2&isAllowed=y.

The Mexican armed forces comprise SEMAR and SEDENA. The Mexican Army has a fundamental role in public security issues, and its challenges have been highlighted over the last 30 years, given its proximity to the United States and all that this implies, as well as its geopolitical position as a scenario for drug trafficking from Central America and Colombia. In 2017, Congress passed a law on internal security in to regulate and evaluate its participation in aspects of public security.[87] Notably, the integration of the National Guard within the branches of SEDENA, despite the government's effort to make it a gendarmerie, categorizes it as an armed force, an extra arm of SEDENA that doubles its budget and human capacities.

The missions executed by the Mexican Army include maintaining public order. In this way, it performs support operations for the regular civilian institutions of public security to counteract the strong attacks made by organized and street crime—in the same way it has the mission to protect the state from any attack or armed political movement that challenges the constitution. The 2017 Organic Law of the Army and Air Force does not allow the Army to participate in social demonstrations or protests of any kind in order to preserve human rights.[88]

The Army and Navy also have the mission of protecting the nation's strategic infrastructure, as well as see to its proper functioning. Among their responsibilities are ensuring border control, which is linked to collaboration with public security; fighting human trafficking; arresting people and turning them over to the appropriate authority; and neutralizing the smuggling and trafficking of arms, ammunition, and explosives, which are sometimes linked to drug trafficking. Since 2007, the Mexican Army has carried out actions against drug trafficking and participated in mechanisms at the federal and state level, as well as generated efforts with neighboring countries—the United States being a great ally in combating this problem and its significant social and economic consequences.[89]

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[87] RESDAL Latin American Security and Defence Network, *Primary and Secondary Roles of the Armies*, 10–18.

[88] RESDAL Latin American Security and Defence Network, 10–18.

[89] RESDAL Latin American Security and Defence Network, 10–18.

Other outstanding missions include territorial integration and communication; technological modernization, which is necessary to strengthen the fight against drug trafficking, such as the use of better security devices based on new international technologies, and the use of big data to analyze statistics to make decisions regarding new events or forms of crime. The armed forces also actively participate in the defense of the country's natural resources. All these missions in new areas such as public security of the country open doors for the military force to have more weight in the civilian sphere and to display political activism that escapes Mexican legislation. However, the law has evolved to accommodate civil–military relations as a fundamental pillar in the protection of Mexico.[90]

Based on these missions stipulated by Mexican law, *planes de defensa nacional* (defense plans; DN) were developed for the armed forces, designated as DN-I, DN-II, and DN-III, which indicate that military armament must be in accordance with the war plans. DN-I is a war plan with a possible external aggressor. DN-II details how to combat serious disturbances of public order—that is, when the regular security forces are overwhelmed and the Army will act in support. These situations include public insecurity, drug trafficking, and terrorism, hypothetically, the most common mission of the armed forces. The DN-III plan outlines how to assist the population during natural disasters.[91]

D. CONCLUSION

In Mexico, violence and crime have increased exponentially over the last 30 years, attributed to the deteriorating quality of life of the general population and the increasingly evident corruption, made manifest in the inefficient public security forces. Drug trafficking is a million-dollar business in the nation. Initially, Mexico served as a corridor for the transportation of illegal substances from Central America and Colombia to the United

[90] Raúl Benítez Manaut, "México: Seguridad nacional, defensa y nuevos desafíos en el siglo XXI" [Mexico: National security, defense and new challenges in the 21st century], in *Seguridad y defensa en América del Norte: Nuevos dilemas geopolíticos* [Security and defense in North America: New geopolitical dilemmas] (San Salvador: Fundación Guillermo Manuel Ungo, 2018), 154–79, https://www.casede.org/PublicacionesCasede/seguridad-y-defensa-en-america-del-norte/seguridad-y-defensa-en-america-del-norte-Benitez-Wilson-161-211.pdf.

[91] Benítez Manaut, 160.

States. Then, Mexico took control of the production and transportation of drugs because the enterprise produced billions of dollars annually. Thus, it has permeated the population and citizens of all kinds, including civilian and military security entities, which is why corruption and social depression form an endless cycle.[92]

The population is concerned about the Army's participation in public security because its harsh techniques may violate human rights. Public opinion presumes that the main problem (poverty) will not be solved with the use of the armed forces. Mexico's policies and institutions need a profound improvement in procedures, doctrine, training, and budget to address social insecurity, accounting for the adversities previously detailed.[93]

Currently, Mexico's legal framework has undergone modifications to give the armed forces official authority in the country's public security, bringing as a consequence substantial modifications to the country's democratic doctrine, thus increasing military participation in civilian issues, including politics, a relationship that has historically caused totalitarian regimes with military overtones. As described by Sánchez Ortega,

> The national legal framework has undergone constant alterations, which, in order to accommodate the growing powers of the armed forces, ended up warping the concept of public security to incorporate notions of national security. Under this logic, today in Mexico, guaranteeing the security of the state is more important than guaranteeing the security of the people.[94]

Given the social and security problems described in this chapter, the Mexican armed forces have an important role in preserving peace in the nation. The problem of drug trafficking and all its consequences must continue to be fought by evolving and implementing technologies that enable successful operations. Intelligence work and information gathering from different sources form the main axis in fighting this scourge, which is also evolving and overcoming difficulties. Mexico has to weigh the pros and cons posed by its position, its transformation, and other territorial characteristics.

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[92] Benítez Manaut, 162.

[93] Benítez Manaut, 162.

[94] Sánchez Ortega, *Paz y seguridad*, 27.

III. MEXICO'S INTELLIGENCE POLICIES AND DECISION-MAKING FOR PUBLIC SECURITY

Each country considers its national security differently, but for countries that make up the United Nations, their security forces may adopt the structural guidelines outlined in the 1979 United Nations Code of Conduct for Law Enforcement Officials and its 1989 Supplementary Guidelines, both of which were developed by the United Nations Office on Drugs and Crime.[95] In the case of Mexico, since 1999, it has been modernizing its police force, providing it with modern facilities, equipment, and duly qualified personnel to carry out this activity to its fullest.

Defining key terms is a necessary first step in analyzing the intelligence actions for such organizations as the Mexican National Guard. Rosales Pardo defines *national security* as follows:

> A situation of life in which there is no threat to the sovereignty or integrity of the territory and its inhabitants; a situation in which there is no threat to the normal exercise of authority or to the proper functioning of institutions; and a situation in which both public and private activities can be carried out without hindrance to the attainment of the highest standards of peace, freedom, cultural, civic, moral, and economic prosperity.[96]

Based on this definition, a process and structuring are required for not only intelligence but also its use within the divisions that make up the Mexican National Guard—as national security involves actions and decisions at the macro and micro level of the country, as well as in specific regions or sectors.

Police intelligence, as summarized by Moloeznik and Balcázar-Villarreal, is the set of activities aimed at gathering data of interest—the work of police officers in the service

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[95] United Nations Office on Drugs and Crime, *Policing: The Integrity and Accountability of the Police*, Criminal Justice Assessment Toolkit 2 (Vienna: United Nations Office on Drugs and Crime, 2006), https://www.unodc.org/documents/justice-and-prison-reform/cjat_eng/2_Integrity_and_Accountability_Police.pdf.

[96] Ignacio Antonio Rosales Pardo, "La inteligencia en los procesos de toma de decisiones en la seguridad y defensa" [Intelligence in decision-making processes in security and defense], *Cuadernos de estrategia* [Strategy notebooks], no. 130 (2005): 36, https://dialnet.unirioja.es/descarga/articulo/1150032.pdf.

of the government—to identify and prevent criminal activities that could affect the whole country or a region; this must be done with prior planning for assertive decision-making.[97] Moreover, they define *intelligence* as "the knowledge obtained from the collection, processing, dissemination, and exploitation of information for national security decision-making."[98]

Notably, within the concept of national security, the action of police intelligence is circumscribed by public security; that is to say, the latter is developed based on the parameters, theory, and structure of the former, which is carried out in part by the militia. The Mexican case contemplates two levels of intelligence execution: the strategic, which is the detection of possible crime hotspots, and the tactical, which makes use of the results of the strategic or its execution, in which the decisions taken by the decision-makers of such strategy—high government officials or the state in charge of national security to prevent and combat crime—are implemented.

Police develop their intelligence work at a tactical level by collecting relevant information in a careful and timely manner. It can be extracted from street work or the systematic review of digital data, either by voice, images, or documents. These are analyzed and organized with statistical and georeferencing tools by a team of officers, putting them at the disposal of those in charge of elaborating the action strategy—the government officials who decide where, when, how, and with whom to act. In this respect, Moloeznik and Balcázar-Villarreal state,

> It is important to point out that the design of the operational intervention force has as input the intelligence products built with the search, information gathering, and analysis plan, since these phases synthesize the nature and scope of the criminal phenomena for the attention of the National Guard.[99]

Complementing the previous levels, the operational level of Mexican police intelligence action is more visible and its duration shorter than the strategic and tactical, which are long

[97] Moloeznik and Balcázar-Villarreal, "Aproximación a la inteligencia policial," 134.

[98] Moloeznik and Balcázar-Villarreal, 137.

[99] Moloeznik and Balcázar-Villarreal, 146.

term and attached more closely to the planning of the subsequent action, which might entail extirpating a criminal group.

While the police organization is part of the federal, state, or municipal government, all intelligence efforts are concentrated with the Mexican National Guard, an organization closely linked to the former CISEN, now the CNI, the civilian body in charge of intelligence at the national level. This is not to say that municipalities and states do not carry out intelligence work, but it is done with a different intensity. Despite the Mexican National Guard's having six divisions, including the intelligence division, the work of each involves different intelligence practices that are constantly unified by proactive, permanent communication to produce transversal intelligence, which unites the efforts of each department to offer adequate and timely information to the agencies that make the final decisions.

Intelligence officers follow a basic plan, with the provision of equipment, implements, personnel, physical headquarters, training, recruitment, and selection of officer candidates, among other important elements—such as the application of controlled force and the mental health of the officers. As outlined by Moloeznik and Balcázar-Villarreal, the basic plan comprises a) conventional public security, b) reactive strategies, and c) investigations and actions based on the trilogy of severity of the offense, arrest history, and rehabilitation.[100] According to Moloeznik and Balcázar-Villarreal, in addition to the three components of the basic plan, intelligence officers perform the following tasks: analysis and police intelligence, operations and deployment, and operational control (radio center).[101] All of these elements form the initial work in obtaining information inputs for the Mexico Platform, which connects all state, National Guard, and municipal police entities. These inputs influence governmental decisions to use such techniques as initiating undercover operations, intercepting private communications for investigations, and developing, maintaining, and supervising confidential informants.[102]

[100] Moloeznik and Balcázar-Villarreal, 140.

[101] Moloeznik and Balcázar-Villarreal, 141.

[102] Moloeznik and Balcázar-Villarreal, 141.

A. DECISION-MAKING

Each government bases its national and public security management on strategic decisions relating to national security. According to Rodríguez-Cruz and Pinto, these decisions are "an essential task for top management, as it allows organizations to align their resources and capabilities with the threats and opportunities that exist in the environment. . . . They are choices whose impact is far-reaching."[103] These choices are made with the indispensable input of the information gathered by the appropriate agency (i.e., the National Guard)—in the environment, from questioning citizens to monitoring daily events that require government attention, or in uncertain and emergency contexts from external threats, even from other countries—and the transformation of the information; hence, it becomes intelligence. In the case of Mexico, decisions are based on the National Guard's intelligence relating to national and public security, regarding crimes such as drug trafficking, among other major or minor offenses that might be connected.

Cooperation is required between all the actors of the information system. As the environments where information is collected evolve, those involved in the intelligence process between the two extremes—decision-makers and police officers—must be attentive and adjust to such changes. Moreover, the information collected and exploited is generally abundant, thus presenting an obstacle for its correct interpretation and use, especially in decision-making. Regarding this point, the complexity of the data collected and the process to turn it into a simple, timely, complete, verifiable, and accessible finished product—thanks to analysis, classification, and the generation of reports, maps, or routes—are the starting point for a well-executed strategic decision.

In contrast, according to Arteaga Suárez, erroneous decisions may originate in the following moments: "1) the intelligence cycle, 2) the interpretation of the results, or 3) the execution—or failure to act on—the decisions."[104] This first possible error means that the

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[103] Yunier Rodríguez-Cruz and María Pinto, "Modelo de uso de información para la toma de decisiones estratégicas en organizaciones de información" [Information use model for strategic decision-making in information organizations], *Transinformação* [Transformation] 30, no. 1 (2018): 53, https://doi.org/10.1590/2318-08892018000100005.

[104] Arteaga Suárez, "Sistemas de inteligencia para la seguridad nacional," 23.

information was insufficient, of poor quality, or ill-timed, so the decisions produce bad results. In the second and third types of error, in Arteaga Suárez's opinion, the decision-maker may not adequately interpret the information, or the choices made may not be well executed. Regarding the role and expertise of administrators, "Decision-makers can be politicians from the executive and legislative branches, as well as managers of public—even private—companies. . . . [and] the decisions take effect because they are implemented by the corresponding operational bodies within the intelligence services."[105] Finally, other elements may influence inappropriate choices, such as internal problems within the bureaucracy where the final decision-makers are employed.

More directly related to drug trafficking, the corresponding decision-making at the highest governmental level is a priority for the state, which is partly why national security requires the establishment of international cooperation networks, especially with neighboring countries, such as those in Latin America or the United States, where groups or individuals dedicated to this crime establish bridges for transferring drugs. As Moloeznik and Balcázar-Villarreal consider,

> The search plan has served to determine both the type of data to be obtained from criminal organizations and the means required to have a basic descriptive knowledge of the criminal phenomena with the greatest impact, which in the national reality correspond to the actions of organized crime, particularly in the expressions of drug trafficking and extortion.[106]

In order to achieve this important premise in eradicating drug trafficking in Mexico, the cooperation of not only the National Guard and the military but also other institutions, such as ministries, health centers, and universities, and the general population will be necessary, with the support and interconnection of the most sophisticated technology.

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[105] Arteaga Suárez, 24.

[106] Moloeznik and Balcázar-Villarreal, "Aproximación a la inteligencia policial," 144.

1. Technologies

The Mexico Platform has played a crucial role in managing the intelligence cycle and applying intelligence successfully in the actions of law enforcement agencies against crime. According to Moloeznik and Balcázar-Villarreal, the platform was

> integrated by a national telecommunications network that allowed for the creation of the Single Criminal Information System [Sistema Único de Información Criminal]. According to President Felipe Calderón Hinojosa, "Plataforma México's technological tools have become the cornerstone for the exchange of criminal information among the three levels of government."[107]

The information age has brought as its main problem the management of large volumes of data circulating on the network, which poses challenges to selecting data that truly serve national security. This amount of information has been described by Jiménez as "massive amounts of data collected over time that respond to the concept of big data."[108]

Data generated on the internet are unstructured, requiring special programs and equipment to analyze and store them, which is quite costly. There are different ways to obtain store, analyze, and use information. Thus, once data are routed through programs that handle special computer languages, they are processed into graphics that can be understood by certain technical specialists in the computer area. To be clear, data received from the cloud or between computers are encoded, and a computer engineering specialist must interpret that type of information. Once processed, data become semi-structured or structured through the intelligence cycle, which turns raw material or unstructured data into information suitable for use for national security purposes.

In this data decoding process, a large amount of available equipment comes into play to store all the decoded data. As highlighted by Jiménez, the following characteristics are desirable in such equipment: scalability, or the distribution of data among computers;

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107 Moloeznik and Balcázar-Villarreal, 141.

108 Carlos Maté Jiménez, "Big data. Un nuevo paradigma de análisis de datos" [A new data analysis paradigm], *Anales de mecánica y electricidad* [Annals of mechanics and electricity] (2014): 11, https://www.iit.comillas.edu/documentacion/IIT-14-153A/Big_data._Un_nuevo_paradigma_de_an%C3%A1lisis_de_datos.pdf.

economy, determined by the use of disk space; and efficiency and reliability in maintaining copies of data.[109] Presumably, enormous amounts of human, material, and financial resources are required for the intelligence system.

2. Resources

For Mexico, preventing and fighting crime has been a priority, especially during the 21st century, and successive governments have made certain efforts that resulted in a substantial change to what is now its main technological and information resource, the Mexico Platform. Cáceres defines it as "an information and intelligence system supported by the most advanced technological tools for the generation of information and intelligence that would allow for better investigative work through the interconnection of the three levels of government."[110] The Mexico Platform centralizes the collection, classification, interpretation, analysis, and use of intelligence and connects all government agencies, together with a long list of institutions related to the information concentrated in the platform, such as the National Guard Intelligence Center, the Federal Public Administration, the Federal Attorney General's Office, the SEDENA and SEMAR, the National Security Commissioner, and police detachments at the state, municipal, and federal government levels.[111]

In this way, the personnel who access and use the information concentrated in this platform can plan and act accordingly to prevent and fight organized or common crime. Cáceres estimates the number of officers assigned to citizen protection:

> In 2010, Mexico had an average of 366 police officers per 100,000 inhabitants compared to the 300 recommended by the United Nations or the 225 based on the international average. The case of Mexico City is noteworthy because it far exceeds countries such as the United States and Canada with 300 and 276, respectively.[112]

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[109] Jiménez, 13.

[110] René Cáceres, "La eficiencia del sistema de información e inteligencia Plataforma México" [The efficiency of the information and intelligence system Platform Mexico] (PhD thesis, Universidad Autónoma Metropolitana, 2020), 326.

[111] Cáceres, 320.

[112] Cáceres, 311.

These figures give an idea of how many users this platform has in order to guarantee its technical performance. The platform was equipped with a series of modules for its efficient management: connection and equipment administration, users, and police stations. Additionally, it contains databases with certified police reports, a national registry of public security personnel, and prison information, among others, which require strict, ethical management in their access to ensure that sensitive data do not fall into the hands of criminals—a responsibility that rests on all those who use the platform.

3. Responsibility and Transparency

The accountability of the actions of those in charge of public and national security—the police and military—as well as the verifiable transparency in the use of official resources of a financial, material, or human nature in their functions must be in accordance with Mexican law, represented by various legal instruments, which according to Martínez, include the Political Constitution of the United Mexican States, the *Ley General que Establece las Bases de Coordinación del Sistema Nacional de Seguridad Pública* (General Law Establishing the Bases for Coordination of the National Public Security System), and the *Ley de la Guardia National Guard* (Law of the National Guard), among many others.[113] These laws describe the duties of the police officer in defense of security and the responsibility entailed in respecting the rights and freedom of the common citizen, not to mention adherence to the legal framework.

As a safeguard for the populace, an application was developed for the Mexico Platform whereby citizens could file complaints against officers who violated these norms—as the Mexican police force has been notoriously one of the most unreliable in the world due to the prevalence of taking bribes or demanding dues, mistreating and extorting citizens, and other serious offenses. For example, as Martínez recounts, "A survey conducted in Mexico City of more than 3,660 people at the end of 2004 . . . showed that

[113] Fernando Martínez, "Mecanismos de responsabilización policial en México" [Police accountability mechanisms in Mexico], Working Paper No. 3 (Santiago: Centro de Estudios en Seguridad Ciudadana, Universidad de Chile, 2008), 1, https://www.cesc.uchile.cl/publicaciones/sd_05_doctres.pdf.

the most frequent abuses were concentrated in the request for money (29 percent of all contacts)."[114]

The aforementioned laws and others serve to regulate the conduct of the National Guard, which acts at different levels of government (i.e., federal, municipal, and state) and imparts a sense of justice to resolve the misdeeds of the police in the performance of their duties. However, the abundance of regulations has brought nothing but confusion in regulating police management. At the same time, a set of community organizations influences public opinion on police accountability, says Martínez, with "importance attached to the auditing of the use of public resources" and the defense of the population's human rights.[115]

4. Human Rights

In the context of democratic systems, new theories have defined security in the context of human rights—emphasizing respect not only for the law and those responsible for enforcing it but also for life and human beings. This perspective on citizens and human security, with all the rights that correspond with it, according to Bernal Ballesteros, "is related to human development as a new dimension of human security. It seeks to place the human being at the center of development and correlates with factors such as human rights, health, the environment, democracy, [and] food security."[116]

These principles conflict with the current actions of the Mexican police force, considered one of the most corrupt in the world for the reasons outlined in the previous subsection. Neither the internal affairs offices focused on the investigation of transgressive police conduct nor the proposal of internal measures and policies to prevent police infractions has eliminated this scourge. It seems that the discretion of law enforcement officers cannot be properly reined in even under public scrutiny, through the media and

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[114] Martínez, 1.

[115] Martínez, 2.

[116] María José Bernal Ballesteros, "La función policial desde la perspectiva de los derechos humanos y la ética pública" [The police function from the perspective of human rights and public ethics], *Revista del Instituto de Ciencias Jurídicas de Puebla, México* [Journal of the Institute of Legal Sciences of Puebla, Mexico] 13, no. 44 (2019): 255, https://doi.org/10.35487/rius.v13i44.2019.441.

non-governmental organizations dedicated to investigating the numerous cases of police abuse.

In situations where police officers decide to use force and the means of force—or when emergencies precipitate their decision—the solution may be to impose a set of institutional and social controls on police misconduct. In this regard, some computerized scoring mechanisms have been implemented for police activity whereby society can access a disciplinary and reward program. Both imply adequate information management, administration, and communication systems so that the policies, training, mandates, and values of the institution are assimilated in practice by each element and officer, especially with regard to respect for human rights, and while these behaviors are adjusted internally and externally, officers will be more efficient in all their functions.

B. INTELLIGENCE-LED POLICING

ILP is defined by the Organization for Security and Co-operation in Europe (OSCE) as "systematic gathering and evaluation of data and information, through a defined analysis process, turning it into strategic and operational analysis products, which serve as basis for improved, informed and evidence-based decision-making."[117] As mentioned earlier in this chapter and in Chapter II, police forces have implemented information management systems such as the Mexico Platform. However, crime reduction still awaits better statistical results, which require a more contemporary management of police action and the expanded use of computer technologies and updated tools for intelligence analysis. Additionally, Mexican intelligence efforts must respect the private data of the information handled and the human rights of all persons involved in the intelligence cycle—police officers, citizens, and institutions—as well as the different levels of federal, state, and municipal government.

According to its legal framework and political and territorial organization, each country designs a model that serves the purpose of integrating all the parties involved, with efficiency and effectiveness in information management. In this sense, it is relevant to

[117] Organization for Security and Co-operation in Europe, *Intelligence-Led Policing* 6.

divide the whole cycle into parts—from collecting, to analyzing, to exploiting the information, to using it—so the crime in all its modalities can be fought with greater assertiveness. As provided by the OSCE, these distinguishable parts for which a country must have a policy, include identifying criminal threats; analyzing the information, which also involves the process of obtaining data; obtaining operational and strategic products to be used; disseminating these products to their final recipients or decision-makers, those involved in operations or strategists; and executing the necessary tasks to combat, for example, terrorism or drug trafficking. All these tasks must be framed in quality-control processes with permanent supervision and feedback to the developers and analysts, if necessary, to develop specific indicators that identify the progress made.[118]

It should be noted that each country has its own legal, geographical, social, technological, and other circumstances that require a model tailored to its specific requirements; no one model will fit all cases. One of the main conditions for success in the application of a model lies in the cooperation of those involved during its phases—that is, the key human factor in the integration between the different governmental, police, or organized society institutions—so it is essential to seek buy-in of both new procedures and technologies that allow the country to champion a more preventive approach to organized crime.

In order to integrate personnel dedicated to the intelligence cycle, a substantial change of culture focused on joint achievement is required, with a sense of participative leadership that influences measurable results—even if it involves repeating or restarting the early stages of the process. Most important are quality and precision in fulfilling the final goal—fighting crime and acting in the interest of the collective good—despite resistance, thus generating a radical change of mentality that executing a plan of this nature implies. Along this line, it will be impossible to implement a model fully if there is no political will to develop it. Historically, in Latin American countries, the political orientation of their leaders influences the operation of police or military forces; hence, with successive changes of government in each country, there will also be changes in those in

[118] Organization for Security and Co-operation in Europe, 54.

charge of the tasks inherent to the operation of intelligence processes, such as those in Mexico, so the opportunity that the new change of government provides must be leveraged.

No less important is that, when implementing such models focused on ILP, the legal framework of the country in question should be adjusted to regulate not only the police forces but also the entities and institutions that oversee their conduct in accordance with the law, as well as the accountability of their actions. The evolution toward a method that establishes direct communication channels from the bottom, which collects information, to the very top, which responds by making decisions jointly with national and international entities, is essential to enhancing the actions of the security forces of any modern state. It is also time to make a leap toward the analysis and presentation of information by exploiting technologies that allow a wide coverage of the context and information, as well as its deep analysis with the identification of indicators visually represented to decision-makers.

1. Operation

The use of ILP must adhere to several principles so that those who benefit from it most are the citizens—they will be the final consumers of citizen or human security if it respects their rights and adjusts to a democratic government, supporting the current government's search for violence reduction. The actions that the government should implement include creating real channels of government–population communication, which help the government ensure that the processes in place respect the rights of the people. Respect of the citizenry requires oversight mechanisms such as means and legislative backing for the public to complain if it loses confidence in the government; strong laws and regulations, which can have a neutralizing or positive effect in this regard; the publication, by the government, of actual crime statistics; and a paradigm shift of police leadership.[119]

[119] United Nations Office on Drugs and Crime, *Handbook on Police Accountability, Oversight and Integrity* (New York: United Nations Office on Drugs and Crime, 2011), 87–89, https://www.unodc.org/documents/justice-and-prison-reform/crimeprevention/PoliceAccountability_Oversight_and_Integrity_10-57991_Ebook.pdf.

2. Implementation Cases

Several countries have adopted ILP with marked success. ILP was first implemented in the United Kingdom in 1990. Police investigations and criminal profiling were successfully carried out and obtained results in citizen security with the implementation of the National Intelligence Model, which is "as much a management decision-making model as a description of intelligence processes and products. The critical factor in securing reduction in crime is the proactive role of law enforcement management."[120] This program was followed by the police in North Rhine-Westphalia, Germany. Then, in 2013, Montenegro implemented an interagency plan based on its Serious and Organized Crime Threat Assessment program. In Sweden, where ILP has been used since 2015, the national chief of police through the National Strategic Management Group headed the initiative. Finally, in 2016, the Republic of Serbia adopted a new system to implement ILP with its Law on Police.

3. Public Security and ILP

With the implementation of ILP, public security, in which the police have contact with common citizens, has been the subject of profound reforms in different countries. A model expressly designed for this type of security might be a subprocess within the macro plan required at the national level, partly because the legislation and the political-territorial division require adjustments for its implementation.

How a police force uses its personnel in pursuit of ILP is one of the most crucial considerations. Although hiring personnel is among the first needs of some countries in their respective police forces, in Mexico, this has not been a problem, as already touched on in this chapter. The ideal in the application of ILP for this country, contrary to popular belief, is not to increase the number of officers but rather to plan more effectively how to deploy them in critical situations. Because random patrolling does not always result in crime reduction, other simpler policing tactics that require less time and personnel at a single crime hotspot should be considered. In this case, employing alternatives to profiling

[120] Organization for Security and Co-operation in Europe, *Intelligence-Led Policing*, 68.

that produce measurable evidence of criminal behavior rather than making discriminatory assumptions may be more useful as a policing tool.

It is also essential that the federal, state, and municipal levels of government communicate and cooperate constantly with the police forces that serve their jurisdictions. In this sense, the OSCE states, "The ILP model incorporates clear organizational and management structures including decision-making and tasking mechanisms at the local, regional and national levels."[121] At the police station or local level, plans, operations, and investigations are supported through police intelligence in several ways: fighting urban or common crime; assisting operational police services in maintaining security and public order at the local level, which is the domain of police stations; and providing analytical support to local or police station investigations, among other modalities.

Due to ongoing insecurity in Mexico, and based on the need to apply a model to solve it, Montero Bagatella believes, "When we speak of intelligence for public security, we mean the generation of knowledge, through the analysis of public security information, for the design of strategies and public policies that have an impact on security. . . . Security is more than just police action."[122] In this sense, the complexity of public security in Mexico depends on the administrative management model. Thus, even when there are budgetary limitations, police action must be guided by intelligence or ILP and based on evidence-based policies, with a preventive rather than reactive orientation.

C. INTELLIGENCE AND DECISION-MAKING

For the defense of Mexico's national security, a path forward has already been outlined and followed; however, both public security and the country's security, from a purely military perspective, are equally important because they suffer from fractures and problems similar to those found in the different police forces at the three levels of government. Within the Navy's domain, the country's borders, the root of this problem is the same: the need to adopt a model that changes the national security paradigms in terms

[121] Organization for Security and Co-operation in Europe, 23.

[122] Montero Bagatella, "Inteligencia para la seguridad pública," 17.

of leadership and adequate, timely distribution of intelligence. Relating to this paradigm shift, Paz indicates the need for a "culture of intelligence," defined as "the knowledge of intelligence as the main function of the state for the benefit of development and security in order to achieve the common good."[123] According to Paz, it is worth noting the lack of knowledge among some members of the Mexican Navy's high command regarding what intelligence is in its administrative dimension, confusing it with espionage, perhaps like in the movies.

In light of this confusion, the Mexican government implemented a legal framework that bolstered the body charged with marine security, as well as created the School of Intelligence for National Security and the Naval Intelligence Unit in SEMAR, all of which are oriented toward the training that the government has deemed necessary in developing this important sector of national interest. Article 7 of the corresponding law defines the purpose of these initiatives: "To generate and systematize knowledge of the highest level in matters of intelligence and national security."[124] A primary goal of this training effort is to foster an understanding of intelligence and the importance of its proper management, among Mexican military components, in preventing and combating drug trafficking and other crimes.

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123 José Gabriel Paz, *Inteligencia estratégica Latinoamericana: Perspectivas y ejes predominantes para la toma de decisiones estratégicas ante un mundo en cambio* [Latin American strategic intelligence: Perspectives and predominant axes for strategic decision-making in a changing world] (Buenos Aires: Ministerio de Defensa, 2016), 333, https://www.casede.org/BibliotecaCasede/libro-inteligencia-web.pdf.

124 Paz, 199.

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IV. THE MEXICAN NAVY'S USE OF BIG DATA AND INTELLIGENCE IN PUBLIC SECURITY

Today, one of the greatest threats to public security is transnational organized crime, which knows no borders nor limits to its violence, as is the case in Mexico. Throughout the different democratic administrations that have governed Mexico since 2000, public security has been one of the main priorities of their political agendas. To this end, a variety of policies and strategies have been created to address the problem, such as the militarization of public security, the deployment of the armed forces, the fight against institutional corruption, the purging of police forces, among others, and the creation of new public security.

In this context, one of the most effective strategies to address the problem has been the creation of criminal intelligence and information platforms, which follow a preventive rather than reactive model. These platforms have allowed the use and management of large amounts of data and information to carry out intelligence activities and generate useful products for decision-making. In this sense, intelligence has made it possible to reduce uncertainty and guide the actions of deployed forces, such as those belonging to SEMAR.

A. BIG DATA AND PUBLIC SECURITY

The highly globalized and technicized environment that characterizes today's world makes the collection of data and information one of the areas with the greatest potential for tackling drug trafficking and organized crime—due to the uses of these new data and information for modes of operation and patterns that characterize the criminal activities already known. Therefore, the use of new technologies, methodologies, and state-of-the-art procedures in data collection, handling, analysis, and interpretation, together with highly trained personnel, is essential. Crucially, these tools and methods help to organize interdiction operations, schedule patrols in specific areas, detect new actors within the cartel structure, and make better use of available human and material resources.

Technologies, methodologies, and procedures enable computer models of the criminal environment, which are useful when carrying out operations against organized

and common crime—to reduce violence and lawlessness in Mexico. Characteristics including volume, speed, veracity, and value make big-data methodologies useful in such a complex and systematic environment as public security. Large volumes of information must be processed quickly to preserve their quality and veracity while, at the same time, make them valuable and useful for decision-making.

The data and information collected and generated from the criminal environment is the raw material of intelligence processes and is used to generate models, proposals, and action plans useful to influence, through decision-makers, the criminal environment. Nowadays there are many possible sources of information that can be accessed thanks to the massive and general use of ICT by society.[125] ICT produces a large volume of data and information that, properly filtered and processed through the appropriate tools, can form part of the existing criminal environment models, making them more accurate, predictable, and complete.[126]

Having more complete and accurate models of the criminal environment is valuable in guiding the operations of both civilian and military law enforcement agencies and in land and maritime scenarios. In this sense, predictive models generated through information and the appropriate processing of big data can be useful for the Navy when determining the probabilities of entry by illegal vessels through specific areas of the territorial sea. Similarly, in the land scenario, they are equally useful in estimating or predicting the urban routes and vehicles most likely to be used for the trafficking of illegal goods, based on available historical information, and in carrying out special operations by identifying and locating relevant leaders of criminal groups.

B. TECHNOLOGY AND PUBLIC SECURITY

Technology involves constantly changing and evolving tools through which people can perform a series of activities and tasks that would be impossible without them. In the field of public security and homeland security, ICT plays an increasingly relevant role,

[125] Espinoza-Ramírez et al., "Sistemas de información geográfica," 238.

[126] Espinoza-Ramírez et al., 240.

positioning itself as a means through which activities, processes, and operations are made more efficient.[127] These are carried out to guarantee internal security, control violence, reduce crime, promote crime prevention, and confront transnational organized crime and drug trafficking.

The use of ICT to ensure public and homeland security has applications in the administrative, operational, and inter-institutional areas. It establishes communication channels between agencies that promote collaboration, cooperation, and flow of information, producing situational awareness for all elements and levels that make up the public security system and the state. As previously discussed, the Mexico Platform is an ICT-based infrastructure that allows access to and sharing of information, as well as real-time communications with the rest of the entities that make up the platform.[128] This platform is an essential component of the current public security system as it connects a large number of databases, records, and information sources from both public and private institutions. The potential of this platform in the field of security lies in its use in carrying out investigation processes, intelligence activities, and police procedures through updated data and information.

Technological platforms such as the Mexico Platform help to guide and direct the actions of police and military operations for the benefit of public security and internal security, making use of police intelligence and criminal information.[129] Therefore, it is also necessary to protect police and military operatives from potential growing threats that occur in cyberspace, which directly threaten security systems, infrastructure, and

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[127] United Nations Development Programme, *Analysis on Innovation in Citizen Security and Human Rights in Latin America and the Caribbean* (Panama: United Nations Development Programme, 2020), 60, https://www.latinamerica.undp.org/content/rblac/en/home/library/democratic_governance/analisis-sobre-innovacion-en-seguridad-ciudadana-y-derechos-huma.html.

[128] Cáceres, "La eficiencia del sistema de información e inteligencia," 315.

[129] José Andrés Sumano Rodríguez, "La incorporación del paradigma de Policía Guiada por inteligencia en México: Aplicabilidad y brechas de implementación de un modelo policial derivado de la nueva gerencia pública a un contexto latinoamericano" [The incorporation of the intelligence-guided police paradigm in Mexico: Applicability and implementation gaps of a police model derived from the new public management in a Latin American context], *Revista DOXA* 9, no. 16 (2019): 31–43, https://journals.sfu.ca/doxa/index.php/doxa/article/view/42/57.

technological platforms. Thus, cybersecurity capabilities are indispensable in protecting and maintaining technological infrastructure considered strategic.[130]

1. Administrative

Throughout the variety of operations carried out by public security forces, both civilian and military, the data sets usually generated are useful for the entire public security system. Therefore, the development of reports, documents, and records—such as geo-referenced complaints, use of weapons, detention of vehicles and persons, and status of officers, among others—are part of the administrative activities related to security.[131] These activities must be carried out and processed using technology, so they can be used by the rest of the relevant institutions that make up the system. In this sense, ICT makes it possible to keep the records and databases that feed the Single Criminal Information System up to date.[132]

2. Operational

The general operations carried out by the police and the armed forces are supported by a technological platform that expedites certain routine procedures, such as background checks and verifications of people, weapons, and vehicles. With this support, it is possible to streamline the performance of operations, reduce uncertainty, and increase the chances of success against crime. In addition, by having a better understanding of the criminal environment, it is possible to carry out preventive and deterrent patrols in specific areas

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130 Sonia Alda Mejías and Susana De Sousa Ferreira, eds., *La multidimensionalidad de la seguridad nacional: Retos y desafíos de la región para su implementación* [The multidimensionality of national security: Challenges of the region for its implementation] (Madrid: Instituto Universitario General Gutiérrez Mellado, 2015), 520, https://iugm.es/wp-content/uploads/2016/06/2015-1325_Interiores_SIN_MARCAS.pdf.

131 Abraham Espinoza-Ramírez et al., "Sistemas de información geográfica y su análisis aplicado en zonas de delincuencia en la Ciudad de México" [Geographic information systems and its applied analysis in crime zones in Mexico City], *Información Tecnológica* 29, no. 5 (2018): 235–244, https://doi.org/10.4067/S0718-07642018000500235.

132 United Nations Development Programme, *Citizen Security and Human Rights in Latin America and the Caribbean*, 58, 60, 71, 77, 108.

based on the information available about the times of occurrence and the dynamics of the areas.[133]

Special operations carried out to capture a criminal leader, intercept the transit of an illicit shipment, or deter the commission of a crime, for example, are usually based on prior knowledge of intelligence. Such information is obtained employing technological intelligence tools to analyze, process, and interpret large amounts of data and information available through technological platforms. This is achieved by working hand in hand with competent, specialized, vetted personnel to navigate these tools.

3. Interorganizational

The use of ICT by organizations belonging to the public security system has made it possible to create an infrastructure through which to share data and information in the form of text, image, video, or audio in real time. In addition, operators can access a large database with information on vehicle registration, weapons, crimes, personal identification, geo-referenced complaints, arrest warrants, and police reports.[134] This system requires strict access control and credentials that allows the different federal, state, and municipal agencies, along with other public and private agencies, to access this information in a secure environment. In this way, the police, National Guard, Army, and Navy can gain situational awareness of the criminal environment through the data and information found on the platform, using them to carry out investigative and intelligence processes aimedº at crime prevention, risk identification, and operational planning.[135] The latter may be focused on targets of strategic importance, such as main actors within the criminal structure or specific criminal operations, based on the results of the intelligence process.

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[133] Espinoza-Ramírez et al., "Sistemas de información geográfica," 236.

[134] Espinoza-Ramírez et al., 237.

[135] Daniel Sansó Rubert, "El papel de la información en la lucha contra la delincuencia organizada transnacional" [The role of information in the fight against transnational organized crime], UNISCI Discussion Paper No. 12 (Madrid: Unidad de Investigación sobre Seguridad y Cooperación Internacional, 2006), 203–227, https://www.ucm.es/data/cont/media/www/pag-72529/UNISCISanso12.pdf.

C. THE NAVY'S ROLE IN PUBLIC SECURITY

Public security is a responsibility of the state aimed at maintaining and preserving the rule of law, the well-being of the population, and the development of its activities in the social, political, and economic spheres, among others. In Mexico, even before the transition to democracy in 2000, after seven decades of authoritarian government, insecurity, common delinquency, and organized crime were on the rise. Even then, these were seen as potential threats to the rule of law and public security.

During the 1990s, a series of changes began to take place in the agencies responsible for public security, due in part to the increase in common crimes, the presence of organized crime, and drug trafficking in the country. These activities in Mexico have been encouraged by the country's geographic characteristics, serving as a "bridge" or logistical channel to enter the United States, given that it shares a land and maritime border. Among the most notable changes that took place during this period was the increasing participation of the armed forces in fighting organized crime and drug trafficking.[136]

Then, the arrival of the democratic administration in 2000 brought with it a weak and vulnerable government, fragmented by the change that represented the end of the authoritarian government that had ruled until then. This change made it easier for organized crime to penetrate and corrupt public institutions for its own interests, thus generating in some sectors a certain impunity and complacency toward criminal activities, something difficult to confront given the disintegration and lack of cooperation between the federal, state, and municipal levels of government.

Over the years, common crime, as well as activities related to organized crime and drug trafficking, proliferated, increasing the citizens' perceived sense of insecurity. This public sentiment led the state to implement new public security policies and strategies, targeting the police, armed forces, intelligence agencies, and National Public Security

[136] Lucía Carmina Jasso López, "Seguridad nacional, inteligencia militar y acceso a la información en México" [National security, military intelligence and access to information in Mexico], *URVIO: Revista Latinoamericana de estudios de seguridad* [Latin American journal of security studies], no. 21 (2017): 140–56, https://doi.org/10.17141/urvio.21.2017.2931.

System in general. All this is a reflection of the importance that the issue of public security gained in the political agenda, which became one of the country's main priorities.

Initially, the cartels' territories and activities were segmented, and there was no relevant war between them.[137] However, from 2007 onward, cartel violence increased precipitously over previous years, producing for the first time a considerable rise in homicides. This can be attributed to two reasons: 1) the violent fight between cartels for the control of routes and spaces belonging to other cartels and 2) the fight declared by the government against drug trafficking and organized crime that year. This fight was framed in a series of security measures that militarized public security, established criminal leaders as priority targets, and considerably raised the level of the fight against drug trafficking.

As a result of the actions taken by the Mexican government at the time, SEMAR and SEDENA, together with other institutions, increasingly began to participate in the fight against drug trafficking. In this sense, it is worth highlighting the operational participation of the Army and the Navy as direct actors, which enjoyed greater social approval and trust than the Federal Police.[138] Under this approach, military measures and strategies began to be implemented in public security and against drug trafficking, which represented a tactical action force with greater capabilities.

During this period, the development of the Mexico Platform also began, which allowed access to a large amount of data and information from various institutions. Access to this platform is controlled but encompasses the three levels of government and a variety of public and private institutions, including SEMAR. The platform connects different civilian and military intelligence agencies, such as CISEN, now CNI, the *Sistema de Inteligencia Militar* (Military Intelligence System), and the *Unidad de Inteligencia Naval*

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137 José Efraín Martínez Talamantes, "Gestión del liderazgo estratégico y talento en las fuerzas especiales de la Armada de México" [Management of strategic leadership and talent in the special forces of the Mexican Navy], *Revista del Centro de Estudios Superiores Navales* [Journal of the Center for Higher Naval Studies] 40, no. 2 (2019): 11–32, https://cesnav.uninav.edu.mx/cesnav/revista_pdf/2019/2019-2.pdf.

138 Jasso López, "Seguridad nacional," 150.

(Naval Intelligence Unit; UIN), the latter belonging to SEMAR.[139] The creation of the Mexico Platform and cooperation between intelligence agencies is an effective strategy that puts prevention and police intelligence before the use of force.

This focus on the use of information and intelligence is necessary because today's threats revolve around the citizenry and not the state, as in the past. This requires the use of different strategies to face these threats, which are more diffuse, invisible, global, and of an internal nature. The use of information technologies for the collection, processing, and analysis of large volumes of data to guide decision-making is fundamental and requires the adoption of more modern and efficient information systems. For this strategy to be effective, human factors, ethics, morale, and the level of training of the system's operators—as well as those in charge of collecting, interpreting, processing, and updating the information contained in the platform—must also be taken into account.

In this sense, it is important to highlight the prestige and capacity of the UIN, which is responsible for generating the necessary information to guide decision-making in the preparation, conduct, and deployment of SEMAR's operations both on land and at sea.[140] For this purpose, it also works together with other national and international intelligence agencies and dependencies. The management of large volumes of information held by the UIN, as well as those shared by other agencies, must be carried out quickly, but without compromising the quality and veracity, much less operational usefulness. The performance of land and maritime operations against drug-trafficking cartels and transnational organized crime will depend on this.

In the maritime sector, the increase in port activities in Mexico, due to a more-globalized free market and trade environment, provides a breeding ground for the illicit

139 Secretaría de Marina, *En el mar, en el aire, en la tierra . . . para servir a México* [In the sea, in the air, on the land . . . to serve Mexico] (Mexico City: Secretaría de Marina, 2019), 65, http://repositorio.uninav.edu.mx/xmlui/bitstream/handle/123456789/507/en-elmar.pdf?sequence=3&isAllowed=y.

140 Secretaría de Marina, 65.

activities of transnational organized crime.[141] On the one hand, these organizations take advantage of import and export activities to carry out their illicit operations. On the other hand, they use the country's extensive maritime territory to illegally enter or extract drugs, arms, and people. To deal with this, intelligence work and information management are very useful, as they allow analysts to know the mode of operation, trafficking trends, countries of origin, and maritime areas of entry, among other variables with potential. They can be used to optimize the use of human and material resources to produce better results in operations.

In the case of the Navy's land operations, the Marines and the *Unidad de Operaciones Especiales* (Special Operations Unit; UNOPES) carry out these missions. These elite military units were created in 2014 and, since then, have been involved in numerous special operations to combat drug trafficking and organized crime.[142] These units use war tactics because the characteristics of the enemy they face require it, as the cartels are heavily armed and, in many cases, extremely violent. All UNOPES operations are carried out by making extensive use of data, information, and intelligence to locate strategic targets, establish criminal relationships, and ensure the success of precision counter-narcotics operations.

D. INTELLIGENCE COLLECTION

Given the characteristics of public security in Mexico, which tend toward the militarized, the role played by the armed forces in fighting drug trafficking is an element to be highlighted. This dynamic is especially reflected in the military capabilities of SEMAR, both in its land and maritime elements, playing a role with police characteristics in favor of public security and internal security. This role became even more relevant once the level of countermeasures in the war on drug trafficking and organized crime increased in 2008, which led to an increase in the number of Marines. In the maritime element, this

[141] Marcos Pablo Moloeznik, "La Armada de México frente a sus pares de América Latina" [The Mexican Navy compared to its peers in Latin America], *Revista del CESLA* [International Latin American studies review], no. 14 (2011): 39–71, http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.desklight-0824fbfd-f09b-493a-8717-83404cee537e/c/39-71_Esej_Marcos_Moloeznik.pdf.

[142] Martínez Talamantes, "Gestión del liderazgo estratégico y talento," 15.

increase in personnel is manifest in the large number of coastal patrol boats used in the territorial sea to intercept and deal with illegal vessels.[143]

In this sense, SEMAR's law enforcement role and its land and maritime elements in the country's public security and internal security, as well as in the fight against drug trafficking, have been accompanied by social acceptance and high levels of trust by society. This sentiment is due, to a great extent, to the public's diminished trust in other security agencies such as the police and the successful results of the operations carried out by SEMAR in combating drug trafficking. However, these results are the joint product of the analysis and interpretation of data and information by the UIN, which, by producing useful intelligence, allows the Navy, UNOPES especially, to successfully carry out its operations.

The UIN carries out data collection, analysis, and interpretation processes to produce useful intelligence for decision-making, planning, and land or naval operations. To obtain information, the UIN makes use of any collection method it deems appropriate, as long as it does not affect the individual guarantees of persons or their human rights. In this sense, telephone tapping, bank movements, criminal informants, databases, and public or private records are sources of information. Access to these may be made possible through the UIN itself or be enhanced through joint work with other intelligence agencies or state institutions.

Cooperation and information flow between public security agencies is also beneficial to SEMAR and its fight against drug trafficking. But such relationships with other agencies, in many cases, are difficult to achieve, mainly due to differences of interest, bureaucracy, distrust, information leaks, or technological limitations, thus creating the need for common communication interfaces and adequate controls.[144] As a result, the UIN, depending on its capabilities and needs, may choose to operate individually, establishing specific relationships with other national or international agencies, as has happened in the

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[143] Moloeznik, "La Armada de México frente a sus pares," 51.

[144] Günther Maihold and Jost Stefan, eds., *El narcotráfico y su combate: Sus efectos sobre las relaciones internacionales* [Drug trafficking and its fight: Its effects on international relations] (Bonn, Germany: Konrad-Adenauer-Stiftung, 2014), https://www.kas.de/c/document_library/get_file?uuid=399b3a95-db0f-9fa9-ff1b-22c9e0998e8e&groupId=266027.

case of Interpol and the U.S. Drug Enforcement Administration. It should be noted that SEMAR, being part of the National Public Security System, also has responsibilities with the Mexican Platform and its use.

The UIN, in addition to carrying out intelligence and counterintelligence work for SEMAR, also has the capacity to operate in cyberspace.[145] In this scenario, it performs both preventive and reactive cybersecurity tasks, seeking to preserve its image and trust in the eyes of society and prevent potential threats to its platforms. It also carries out efforts aimed at understanding the cyber environment and its use as a source of information for intelligence gathering.

Intelligence forms a fundamental part of the actions of SEMAR's maritime and land forces, something evident in the track record of the most outstanding intelligence-led operations carried out by UNOPES. Among these missions, operators have captured or neutralized several crime bosses and leaders of various criminal organizations related to drug trafficking—the apprehension of Joaquín "El Chapo" Guzmán in 2014 and 2016 being one of the most notable. SEMAR's operations stand out from those of other public security forces due to the "surgical" nature with which they are carried out, creating a solid track record of successful operations that supports and positions them.[146]

E. DRUG-TRAFFICKING RISK MAPS AND INTELLIGENCE GATHERING

Mexico's position in the drug-trafficking chain to the United States produces a very particular criminal dynamic in the country.[147] It covers the entry of drugs through the sea and land, from the central and southern regions of the Americas, to their exit through the northern border, including endogenous production at a lower level than in other countries, but still present. All of this is facilitated by the country's geographical position and

[145] Paloma Mendoza Cortés, "Inteligencia y contrainteligencia militar frente a fallos y desafíos: El caso de Culiacán, México (2019)" [Military intelligence and counterintelligence facing failures and challenges: The case of Culiacán, Mexico], *URVIO: Revista Latinoamericana de estudios de seguridad* [Latin American journal of security studies], no. 26 (2020): 37–56, https://doi.org/10.17141/urvio.26.2020.4225.

[146] Mendoza Cortés, 39.

[147] Martínez Talamantes, "Gestión del liderazgo estratégico y talento," 17.

distribution, with access to the sea from both sides and a single border that condenses all land trafficking from the south to the north.

The fight between drug cartels for control of territory and routes has become more intense since 2008. This has resulted in a high number of murders characterized by substantial violence against opposing criminal organizations, civilian organizations, and security forces. These assassinations are usually carried out by heavily armed criminal groups such as the Zetas, initially composed of former members of the Mexican and Guatemalan special forces.[148] See Figure 1 for a map of the cartels' drug-trafficking territory in Mexico.

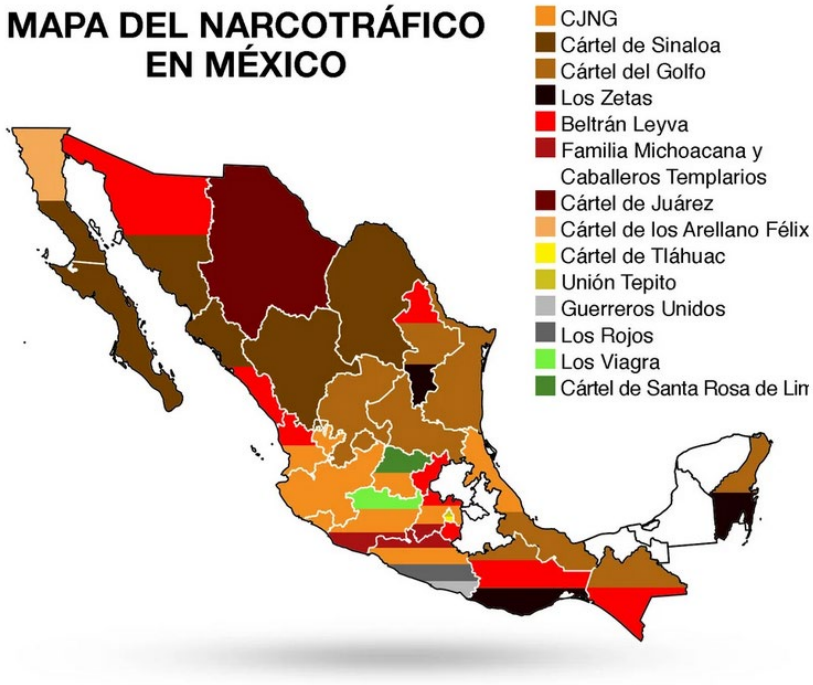

Figure 1. Map of Drug Trafficking in Mexico[149]

[148] Martínez Talamantes, 17.

[149] Source: "Quién es quién en el mapa del narcotráfico en México: Estos cárteles dominan en 2021" [Who is who on the map of drug trafficking in Mexico: These cartels dominate in 2021], Infobae, July 3, 2021, https://www.infobae.com/america/mexico/2021/07/03/quien-es-quien-en-el-mapa-del-narcotrafico-en-mexico-estos-carteles-dominan-en-2021/. The source attributed to this image is the *Gabinete de Seguridad* (Security Cabinet of Mexico).

The main cartels in Mexico are the Sinaloa, Juarez, Tijuana, and Gulf cartels, but the Zetas, the Knights Templar, the Jalisco Cartel–New Generation, and the Beltran-Leyva count themselves among a number of other smaller criminal organizations.[150] As a result, there is currently no region of the country without the influence of a cartel or, at the least, a criminal organization. The activities of these criminal groups include areas other than drug trafficking, such as contract killings, extortion, kidnapping, and the collection of illegal taxes, among others. They also are a cause of alterations and fragmentation within the governmental structure through assassinations or criminal influence in political issues, all of which is done in pursuit of impunity, control, and power.

Given that each criminal organization has its own structure and mode of operation, each geographic area under criminal control of a particular group suffers a series of criminal trends with potentially predictable patterns of operation. Thus, in order to deal with each criminal group, the characteristics of the cartel and the area in which law enforcement operations are carried out must be considered. Intelligence work will be useful for this purpose, utilizing the data and information available of a particular geographic region and the mode of operation of the predominant criminal organization being confronted.

However, the information available on a particular region is generally related to the organizations and institutions that feed the Mexico Platform, which are, for the most part, collected and produced by officials. Nevertheless, as Espinoza-Ramírez et al. point out, "There are crimes and events that escape what officials, through the institutions, can collect and process, since there are events and reports that, due to lack of trust in the security system, are simply not made,"[151] This notable gap suggests a need for a system to collect more information from citizens, creating a foundation of trust whereby more data and information can be accessed and used to address violence, crime, and delinquency.

There is currently a large amount of data and information to which there is no access, such as those generated by citizens, companies, and public institutions, bolstered

[150] Martínez Talamantes, "Gestión del liderazgo estratégico y talento," 17.

[151] Espinoza-Ramírez et al., "Sistemas de información geográfica," 240.

by the perspectives of officials. In addition, data are constantly being generated in cyberspace, some of which have the potential to be used in detecting threats and taking preventive actions against crime, violence, and illicit activities. While these data have the potential to feed intelligence work for preventive purposes, they cannot be obtained in most cases without the prior consent of the parties to whom they correspond, thus making voluntary social participation crucial.[152]

Given that most of the population has smartphones, computers, and internet access, the public can serve as information generators that, under specific protocols, can be useful in fighting crime. An example of this is reflected in the use of the technologies available in smartphones and their potential to generate geo-referenced reports or record possible threats or crimes, which can be created by society itself in a participatory act.[153] This type of use, and others like it, has the potential to feed a massive data and information network through which intelligence and investigation can be carried out. By relying on information generated by the population, it is possible to increase the understanding of the criminal environment and its dynamics while at the same time increasing predictive capacity and reducing violence and crime.

The use of these data and the extensive information generated by citizen participation can facilitate the identification of dangerous areas, peak times for crime, criminal trends, and modes of operation by zone. This information is useful for the UIN in its intelligence work and understanding of the criminal environment, as well as for the Navy in deploying Marines in specific areas and determining the number of troops proportional to the intensity of the area. In the maritime field, real-time geo-referenced reports can be of great use for the deployment and patrolling of units, facilitating the location of vessels that witness a threat or irregular traffic.

Special operations conducted by UNOPES are the most likely to benefit from this type of strategy because they are carried out under the direct support of previous information and intelligence processes. In this sense, the deployment of UNOPES is more

[152] Espinoza-Ramírez et al., 241.

[153] Espinoza-Ramírez et al., 241.

efficient in terms of use of resources and results, as it can be carried out with the strategic deployment of a reduced group of units, guided by a solid knowledge of the area. In this way, operations are more likely to be successful and, in case of unforeseen events, there is greater situational awareness to act.

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V. BIG-DATA METHODOLOGY FOR DECISION-MAKING IN MEXICO'S FIGHT AGAINST DRUG TRAFFICKING

Given that intelligence constitutes those activities aimed at collecting and analyzing information relevant to formulating and implementing national security policies—and those relating to counterintelligence vis-à-vis a nation's adversaries—a country must continuously update and integrate different intelligence tools that contribute to achieving its goals.[154] In this sense, the Mexican Navy is considered "the only institution [in Mexico] with the capacity to carry out the surgical operations and urban operations" required to combat drug trafficking.[155] In the face of challenges posed by technological advances, it is not unusual to evaluate the incorporation of such specialized knowledge to strengthen intelligence activities, which are the basis of national security policies and the protection of the nation. This chapter culminates in a strengths-weaknesses-opportunities-threats (SWOT) analysis of the Mexican Navy's public security activities and a proposed methodology for using big data in fighting drug trafficking in Mexico.

A. THE NAVY'S PUBLIC SECURITY POLICIES

In the Latin American context, legislation has evolved regarding the missions of the armed forces in the dynamics of each country—marked by changes in international and regional spheres—by incorporating other roles beyond military defense, one of the most relevant of which concerns public security. Mexico's federal organization brings with it a complex organization of security forces, functions, roles, and missions whereby the armed forces are attached to two ministries: SEDENA and SEMAR. Among the roles granted to them by law are the maintenance of public order within the legal framework; protection of the nation's strategic infrastructure; border control; and the fight against human and drug trafficking and smuggling, as well as trafficking of arms, ammunition, and explosives.

154 Alejandro Martínez Serrano, "Tres momentos para entender la seguridad nacional de México" [Three moments to understand the national security of Mexico], *Revista del Colegio de San Luis* 4, no. 7 (2014): 236–55, https://www.redalyc.org/pdf/4262/426239582011.pdf.

155 Mendoza-Cortés, "Inteligencia y contrainteligencia militar frente a fallos y desafíos," 37–56.

In particular, SEMAR focuses on risks in the marine environment, including strategic naval installations, maritime borders, and natural disasters, and stands out for its structure in terms of intelligence and effective counter-narcotics operations, being classified as the only institution with the capacity to take action against organized crime and consider cyberspace a theater of operations, with emphasis on the following aspects.

1. Intelligence and Security

The relevant literature highlights some common elements regarding the importance of strategic intelligence in security matters, both public and national : strategic prevention plans against criminal actions, organized crime, and drug trafficking; and an orientation toward the long term and articulated with the other levels of intelligence (tactical and operational), which enable the necessary inputs to visualize crime trends and respond to the nation's objectives in terms of safeguarding the population and the state.

These require the participation and coordination of different agencies, the integration of information, the technological capacity to process and manage the multiplicity of data and sources, and personnel trained in both intelligence and technical aspects, who can stay current with new data processing and analysis tools. Such tools leverage big data, with the possibility of incorporating the influx of information from informal networks (especially on issues such as terrorism and organized crime); digital collections of evidence from all kinds of electronic devices; and platforms that make connections and link relationships of events to criminal activity—all the while respecting the rigorous handling of information that the security of citizens demands in these times.

This balance between preventive actions guided by strategic intelligence and crime control in operational and tactical terms equates with public security policy actions that demonstrate their efficacy with a greater impact on crime reduction, for which the allocation of necessary human and financial resources is required.

2. Transparency and Human Rights

Within the frameworks of most modern security paradigms, violence and crime are conceived as multi-causal phenomena that must be addressed through comprehensive and

multi-sectoral strategies with respect for human rights (both for victims and offenders), managed using evidence and rigorous data and statistics with respect for the rule of law; and mitigated by trained human capital of the security forces and the participation of citizens as actors in the various actions aimed at preventing criminal acts.

3. Technology

The integration of innovations in information and communications technologies is fundamental in fighting crime and drug trafficking in particular, given the great challenges that strategic intelligence implies with its dimensions and complexities. Invaluable in the development of strategic intelligence to address public policies to prevent crime are information sources such as big data, which is capable of handling and processing huge amounts of databases from multiple sources (institutional and personal); geo-references; monitoring systems; emails; social networks; medical devices; e-commerce; computers; cell phones; and sensors, among others. Through predictive applications, such sources can help identify relationships immersed in the data through patterns, interdependencies, or correlations between the different databases and serve as inputs to the planning process.

The Mexico Platform, as an instrument to support security policies, has the technological infrastructure through which significant progress has been made in the collection of data from institutions at the three levels of government—federal, state, and municipal—as well as federal agencies, including SEMAR. However, the platform is not without its weaknesses in terms of due and timely registration of data, its processing, utilization by the various agencies, and training of those involved, who often focus more on its tactical and operational applications rather than its potential in strategic intelligence. From the strategic perspective, the platform could address public and national security proactively, addressing the multiple causes of the problem—related to the dissatisfaction of basic needs and human rights of the population—through integrated strategies between the different civilian and military security agencies.

4. Internal Policies

As part of the public security policies and the role of the Mexican armed forces, combating drug trafficking and organized crime, promoting public security, and assisting

the population in the event of natural disasters are addressed through technological modernization and intelligence activities, wherein the Navy is an active element of the approach adopted by Mexico, through the National Public Security Council. Innovations and best practices in public security policies are aimed at incorporating "into the analysis inputs such as official crime statistics, victimization surveys, citizen consultations, [and] diagnoses endorsed by specialized sources, among others," the purpose of which is to establish the scope and boundaries of the problem and its implications.[156]

Public security policies with a vision oriented by strategic intelligence for crime prevention, as well as tactical and operational actions, allow the design of comprehensive crime reduction strategies, with the allocation of necessary human and financial resources, and accountability mechanisms to guarantee performance evaluations and rebuild trust. The adequate management of these policies depends on the quality of the information available, as well as the effective integration between the different levels and agencies; the technological capacity; the training of personnel to incorporate advances and new tools in the processing and analysis of the immense data integrated from different sources to support strategic intelligence, which supports crime prevention; and the safeguarding of public security and citizens' rights.

B. THE ROLE OF BIG DATA IN FORMULATING AND DESIGNING SECURITY PLANS

Given the increasing amount and complexity of data, as a tool, big data helps to improve existing capacities and identify solutions to problems, through analysis and transformation into relevant information, as a basis for advancing the preventive paradigm in the field of public security; defining public policies; planning with an eye to attacking the causes of criminal acts; and making timely decisions in anticipation of their occurrence for the protection of citizens. In general terms, the application of big data aims to capture and use immense amounts of data to associate sensors, perceptions, and decisions from

156 Francisco Sánchez Espinoza and Claudia Juárez Jaimes, "Política de seguridad en México: Combate al narcotráfico. Entre la seguridad nacional y la seguridad pública" [Security policy in Mexico: Fight against drug trafficking. Between national security and public security], *Revista del Instituto de Ciencias Jurídicas de Puebla* [Journal of the Institute of Legal Sciences of Puebla] 13, no. 44 (2019): 244, http://www.scielo.org.mx/pdf/rius/v13n44/1870-2147-rius-13-44-229.pdf.

autonomous systems to significantly expand the understanding of situations and environments by both analysts and security officials. Thus, big data offers potential application in areas such as border surveillance and security, cyber defense, cyber security, terrorism, organized crime, drug trafficking, fraud, citizen security, intelligence, tactical mission planning, and more. The literature identifies 12 specific application areas whereby big data can offer advantages in developing new security capabilities:

1. Detection of physical intrusion in large open spaces or infrastructure; identification of possible threats, their classification, localization, and tracking for use in perimeter and border security surveillance; and physical security of critical infrastructure, of special interest in the fight against drug trafficking.[157]

2. Encrypted information computing, which addresses issues associated with the improvement of secure multi-party computing and hardware and software optimization, of interest in achieving secure communications and encrypted data processing, such as in the case of data banks for financial transactions, homeland security, intelligence, and defense.[158]

3. Automatic analysis of network vulnerabilities, whereby the application of big data reduces the time analysts spend discovering cyberattacks by grouping and correlating disparate data sources and increasing the accuracy, rate, and speed of detection of cyber-threats, making it essential for telecommunications protection, cyber defense, cybersecurity, and critical infrastructure protection.[159]

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[157] Marie Lowman, ed., *A Practical Guide to Analytics for Governments: Using Big Data for Good* (Hoboken, NJ: Wiley, 2017), 6.

[158] Haridas M., "Redefining Military Intelligence Using Big Data Analytics," *Scholar Warrior* (Autumn 2015): 72, 74, https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.731.570&rep=rep1&type=pdf.

[159] Paul B. Symon and Arzan Tarapore, "Defense Intelligence Analysis in the Age of Big Data," *Joint Force Quarterly* 79, no. 4 (2015): 6, https://ndupress.ndu.edu/Portals/68/Documents/jfq/jfq-79/jfq-79_4-11_Symon-Tarapore.pdf.

4. Computational criminology, which in terms of security focuses more on the functions of storage, searches, and analysis of large amounts of data related to criminal activities (e.g., criminal data mining, cluster analysis, learning of association rules for crime prediction, analysis of criminal networks, and analysis of multilingual texts), enhancing the possibilities of neutralizing the threats they represent, especially regarding actions aimed at combating terrorism, organized crime, drug trafficking, fraud, identity theft, pedophilia, and child exploitation networks.[160]

5. Detection of fraudulent use of corporate or sensitive resources, analyzing in real time access session data, identifying patterns of behavior and legitimate use of resources of special importance in information technology security and knowledge management in large organizations.[161]

6. Real-time video analysis, searches, and fast retrieval in video libraries, allowing analysts to alert authorities about activities and events of interest as they occur, even predictively, based on patterns identified from known facts, facilitating the detection of potentially suspicious actions, of particular relevance in perimeter and border surveillance, such as physical security of critical infrastructures, public safety, and military intelligence.[162]

7. Visual intelligence in machines, enhancing the capacity of intelligent cameras to automate their ability to learn and reason later about what happens in the scene, strengthening actions in perimeter and border

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[160] Lowman, *A Practical Guide to Analytics for Governments*, 4, 6–7.

[161] Irina Pencheva, Marc Esteve, and Slava Jankin Mikhaylov, "Big Data and AI—A Transformational Shift for Government: So, What Next for Research?" *Public Policy and Administration* 35, no. 1 (January 2020): 32, https://doi.org/10.1177/0952076718780537.

[162] Symon and Tarapore, "Defense Intelligence Analysis in the Age of Big Data," 6.

surveillance, such as physical security of critical infrastructure, public safety, and military intelligence.[163]

8. Identification of anomalies, patterns, and behaviors in large volumes of data, enabling automatic detection of potential threats and operations based on the analysis of a large amount of complex data from multiple sources to support time-critical decision-making and actions, such as those required in operations against drug trafficking and organized crime.[164]

9. Text analysis to support real-time decision-making from, for example, the internet or mobile telephony, which can reveal key data about events or relationships between involved actors, contributing to tactical planning and decision-making during security operations.[165]

10. Situational awareness, whereby the use of big data facilitates the assimilation of multiple sources and types of information to achieve contextual understanding and identify threats in complex environments through the development of machine learning systems, linking "visual intelligence" knowledge bases in machines, correlations, and aggregated data, for example.[166]

11. Large-scale machine translation, which, in a globalized context in different fields including criminal analysis, requires the ability to detect threats, terrorist activities, and organized crime and make decisions in security operations, regardless of the language.[167]

12. Event prediction through textual analysis methods, characterization, and continuous monitoring of social networks and interest groups; extraction

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[163] Pencheva, Esteve, and Mikhaylov, "Big Data and AI," 34.

[164] Haridas M., "Redefining Military Intelligence Using Big Data Analytics," 75.

[165] Haridas M., "Redefining Military Intelligence Using Big Data Analytics," 74–75; Jeremy W. Crampton, "Collect It All: National Security, Big Data and Governance," *GeoJournal* 80 (2015): 523–24, https://doi.org/10.1007/s10708-014-9598-y.

[166] Haridas M., "Redefining Military Intelligence Using Big Data Analytics," 73.

[167] Pencheva, Esteve, and Mikhaylov, "Big Data and AI," 25–26.

> of temporal trends; detection of nodes to identify hidden subnetworks and flow of resources, whether they be information, money, or influence in social networks, with application in operations in urban environments, crowd control, and behavior; citizen security; and security preparation for singular events. This application takes on special relevance due to the use of social networks demonstrated by drug traffickers to generate risk situations for the population during security operations.[168]

C. BIG DATA IN THE MEXICAN NAVY'S SECURITY METHODOLOGY

The interconnection of databases from various institutions and sources achieved through big data provides multiple advantages for the planning of crime prevention activities, operational work, investigation, and apprehension of criminals. Big data's ability to analyze structured and unstructured data of diverse nature—e.g., demographic data, personal data, images, video, and text—helps to reveal pertinent information, patterns, threats, relationships, correlations, characterizations, classifications, and predictions of events latent in the data. The use of big data, as detailed in the previous section, positions it as a key tool in the development of strategic intelligence for the planning of preventive and criminal combat actions by the Navy.

In this sense, to define public policies for the success of investigations at all levels of government, the following will be indispensable: strengthening cooperation and coordination between the different agencies involved in public security; leveraging the technological capacity of the Mexico Platform, its tools, and complementarities, beyond the operational and tactical level; and incorporating data in all their new forms, derived from the development of technology (e.g., the internet, social networks, and internet of things), accompanied by the training of both field and administrative officials in its operation—all in the face of criminal activity whose actors, capacities, and areas of action evolve in an increasingly global, complex environment. As such, Table 1 presents a SWOT

168 Symon and Tarapore, "Defense Intelligence Analysis in the Age of Big Data," 6; Haridas M., "Redefining Military Intelligence Using Big Data Analytics," 74–756; Lowman, *A Practical Guide to Analytics for Governments*.

analysis of the Mexican Navy to deepen its potential in public security activities, applying the principles of intelligence analysis and the latent potential of big data.

Table 1. SWOT Analysis of the Mexican Navy

Strengths	**Weaknesses**
• Center for Advanced Naval Studies • Solid intelligence structure • Naval Intelligence Unit	• Saturated information environment
Threats	**Opportunities**
• Discretionary use of national security • Lack of coordination and cooperation among intelligence agencies • Limited academic spaces dedicated to the study of national security • Government officials and police officers linked to organized crime and drug trafficking • Use of cyberspace by criminal organizations • Organized criminal intelligence agencies	• Change of focus in the concept of national security • Advancement in technological tools for big-data analysis • Inclusion of new security actors

1. Strengths

The first strength, the Center for Advanced Naval Studies, administered by SEMAR, is one of two institutions in the country dedicated to the study of national security whereby military and civilian students may earn a master's degree in national security, information security, geopolitics, or informatics and intelligence or a doctorate in defense and national security. The center contributes high-level training for military and civilian personnel in specific areas of security and technology.

Second, SEMAR's solid, consolidated intelligence structure, comprising the second section of the General Staff of the Navy, the naval regions and zones, and the Command and Control Center as the operational body, is equipped with

> infrastructure, equipment, and information and communications systems for the transfer of information, as well as personnel trained to integrate, process, and analyze information from both internal and external sources that influence naval operations or affect the civilian population; likewise, it coordinates and cooperates with national and international commanders, naval units and civilian or military authorities.[169]

Third, the UNI, as previously detailed, is the area responsible for providing the intelligence required by the different levels of command, particularly the Naval Secretariat. As described by Mendoza-Cortés, the UNI "designs and implements institutional counterintelligence strategies and specializes in the fusion, coordination, and cooperation in intelligence matters" and boasts a long track record of successful relationships with these agencies to achieve precision operations (surgical and urban operations).[170]

2. Weaknesses

The principal weakness is the saturated information environment. Intelligence officers are often overwhelmed with the influx of information from different sources and in real time, which can lead to errors when detecting relationships between variables with significant relationships and assessing their relevance to national security.

3. Opportunities

The analysis yielded three primary opportunities. The first is changing the focus in the concept of national security. As the concept has evolved, national security has improved. Acknowledging the different areas affecting the nation has meant including the population (e.g., poverty and vulnerability to environmental disasters) and institutions; legality of migratory, commercial, or other types of flows; crime and organized crime; and drug trafficking—thus giving national security a multidimensional focus. Second, advances in technological tools for data analysis have achieved progress toward processing

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169 Rubén Alfonso Vargas Suárez, "El desarrollo institucional de la Secretaría de Marina desde la perspectiva del poder marítimo" [The institutional development of the Naval Secretariat from the perspective of maritime power], *Revista del Centro de Estudios Superiores Navales* [Journal of the Center for Higher Naval Studies] 41, no. 1 (2020): 98, https://cesnav.uninav.edu.mx/cesnav/revista_pdf/2020/2020-1.pdf.

170 Mendoza-Cortés, "Inteligencia y contrainteligencia militar frente a fallos y desafíos," 37–56.

huge amounts of data—i.e., big data, previously considered unusable for analysis—constituting an opportunity to discover new relationships for intelligence activities. Third, the inclusion of new security actors, particularly civilian intelligence agencies, e.g., CNI, and private companies, offers the potential to develop synergetic relationships that contribute to the strengthening of intelligence and security activities.

4. Threats

This section details the abundance of threats the Navy faces in its public security mission. The first is the discretionary use of national security—the use of national security intelligence activities for political purposes, which are different from the interests of the state. Second is the lack of coordination and cooperation among the different intelligence agencies, both civilian and military, which affects the effectiveness and efficiency of the activities and operations in this field. Third, there are limited academic spaces dedicated to the study of national security. In Mexico, only a few institutions—universities, research and teaching centers, technological institutes, or schools—have courses or at least subjects (compulsory or optional) focused on national security issues. Such education would contribute to the professionalization of the activities and the incorporation of analysis and research for their advancement and innovation.

Threats related to organized crime predominate. The fourth threat involves government and police official links to organized crime and drug trafficking. As shown in the past, these links are a threat to the success of anti-crime operations and the safety of citizens and the country in general. Fifth, criminal organizations access cyberspace and social networks—often more effectively than the security forces—to sow disinformation and achieve their objectives. This nascent scenario must be addressed. Sixth, organized criminal intelligence agencies are a factor to consider given the network of informants that they manage, an array of technological advances, and sufficient economic resources to use both people and technology to develop criminal activities, especially drug trafficking.

5. Summary of the Analysis

The SWOT analysis carried out shows SEMAR's institutional strengths, which serve as a solid base to face the threats posed by the evolution of criminal action and

leverage the opportunities represented by technological advances and new ways to conceive of public and national security. These strengths enable SEMAR to contemplate incorporating advancement strategies to strengthen the training of civilian and military personnel in the areas of national security, information security, geopolitics, and informatics and intelligence, with updated knowledge regarding the new actors, paradigms, and concepts of public security and national security. Also, technological tools oriented toward the development of strategic intelligence complement and reinforce their solid intelligence structure and strategies aimed at counteracting threats and strengthening institutions and crime prevention.

In addition, the strategies of potential growth are made manifest in the inclusion of new actors as protagonists of the commitment to achieve security, whereby citizens are a source of information and participants in the actions to ensure the safety of their communities. These changes are made possible with the use of new technological tools, such as big data, by institutions to generate strategic, operational, and tactical intelligence to address security at its roots for prevention.

Finally, the Navy must consider the threats, derived fundamentally from the lack of coordination and cooperation between agencies—the fracture of the institutional floor and the permeability of the security forces in the face of organized crime and drug trafficking. Defense strategies include the strengthening of human capital in an integral manner, including the increase of internal capabilities to manage the immense flow of information, which means taking measures of internal control and detecting deviations by officials that affect national security and the use of cyberspace by criminal organizations, as well as their own intelligence activities.

D. PROPOSED METHODOLOGY

The dynamics of society and criminal activities, marked by globalization and technological innovations, represent great challenges for the different institutions responsible for defining public policies in national security, so this author proposes a methodology aimed at incorporating big data in the process that leads to decision-making:

- Commit to cooperate and integrate among the different agencies related to national security, supported from the highest level, to avoid the fragmentation of information among the different levels and actors and achieve the definition of guidelines, public policies, and plans in the area of national security, particularly those aimed at combating drug trafficking.

- Define strategic planning based on diagnoses from crime statistics, citizen consultations, and specialized sources, among other actors, for the definition of common public policies and comprehensive long-range plans, considering the particularities arising from the dynamics in each state and municipality in order to underpin planning at the operational and tactical levels with intelligence, minimizing the gap between plans and the reality of each territory where criminal acts are carried out.

- Design training programs for all personnel, from the municipal to the federal level and other agencies, on registration, system management, and use of technological tools for intelligence activities, as well as on the legal and ethical framework related to the management and use of information.

- Taking advantage of big data's strengths within the framework of inter-institutional cooperation, develop the Navy's capabilities for specialized training of personnel (both civilian and military) in the areas of homeland security, information security, geopolitics, and informatics and intelligence, with updated knowledge of the new actors, paradigms, and concepts of public security and national security, ethics and institutionalism, and technological tools oriented to the development of strategic intelligence for the prevention of drug-trafficking crime.

- Update and strengthen the training of technical personnel for new technological advances in data collection, processing, and analysis, structured and unstructured, such as big data, to provide robust

> information to support strategic, operational, and tactical intelligence activities in and border security and surveillance, critical infrastructure and network protection, secure communications and networks, financial data banks, cybersecurity, organized crime and drug trafficking, mission planning, real-time operational decision-making, and event security, to name a few.

These personnel will also be responsible for identifying and developing new applications in which big data has the potential to contribute to security tasks—and fight drug trafficking in particular—especially in intelligence, planning increasingly complex missions that include urban environments (in which the risk to the civilian population increases), surveillance, and border security.

It is necessary to monitor and apply in security advances in data analysis capabilities (new, more-efficient, scalable algorithms; new data aggregation and correlation algorithms; and multidisciplinary teams); and new search and visualization techniques oriented by the speed of obtaining information for the planning and execution of operations, marked by an increasingly dynamic technological ecosystem where technical solutions are evolving rapidly, and the use of open sources is increasing. This will require resources for systems (hardware and software) with the capacity to handle greater volumes of data, at greater speed, and with greater diversity of data (e.g., videos, images, and texts), coming from both in-house and external sources that feed such analyses.

It is also necessary to contemplate the appropriate planning for the inclusion of citizens in different activities aimed at crime prevention—from the collection of information, to its transmission to the security forces, to the protection of their communities, to the risks that may be identified, always from the perspective of prevention.

The methodology should involve forming multidisciplinary and interagency teams for the design of comprehensive strategic plans that allow the coordination of joint actions with the definition of individual and group areas, based on strategic intelligence derived from the analysis of data obtained from various sources (including civil society and communities), aimed at the prevention of criminal activities through the generation of

conditions for citizen security (e.g., education, culture, labor, and legal), with special emphasis on drug trafficking.

It should also establish accountability mechanisms for the institutions and their members, resources (e.g., human, technical, and financial) in the execution of the plans and their impact on public security, including their impact on human rights. On this point, it is particularly important to use these same technological capabilities for the early detection of anomalies in the behavior of data related to public force officials and identify possible links with illicit activities, with an eye to strengthening institutions and citizen confidence in them in the face of pressures from organized crime and drug trafficking.

Finally, the methodology should incorporate the analysis of results under the public policy cycle approach in order to extract lessons learned that feed back into the process, generating new knowledge to support decision-making and corrective actions to ensure greater effectiveness of plans and efficiency in the use of human, technical, technological, and financial resources.

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VI. CONCLUSIONS AND RECOMMENDATIONS

SEMAR's track record in support of public security, particularly in actions to combat drug trafficking, indicate that the organization will continue to seek options for institutional strengthening by adapting to new security missions and perspectives, coordinating and cooperating with other civilian and military agencies, and incorporating technological advances. Strengthening its human capital training capabilities and its intelligence structure will allow it to advance its preventive approach in security policies based on the incorporation of technological advances in data analysis and processing such as big data and its multiple applications in areas as diverse as perimeter and border surveillance and security, cyber defense, cybersecurity, terrorism, organized crime, drug trafficking, citizen security, intelligence, and strategic, tactical, and operational mission planning, to name a few.

Consequently, exploring the research question posed in this study—How can the Mexican Navy implement big-data analysis in crime prevention through security methodologies that can increase the effectiveness of operations against organized crime and reduce levels of violence in the country?—led to the following findings.

Although the Navy focuses on risks in the marine environment, it stands out for contributing to intelligence and public security in the effective fight against drug trafficking and organized crime and considering cyberspace a theater of operations with emphasis on intelligence and security, transparency and human rights, technology, and internal policies.

The methodological proposal presented for the use of big-data analysis was based on the necessary articulation, coordination, and inter-institutional cooperation of the agencies involved in national security at different levels. Its purpose is to exchange data and information that will allow diagnoses based on statistics and behaviors detected with these tools, generating strategic intelligence that will serve as a basis for the definition of policies and plans under the premise of preventing crime by addressing its causes, in balance with tactical and operational actions, and considering the specificities derived from the dynamics of each state and municipality.

This intelligence-gathering protocol by means of big data in the field of public security in Mexico is based on the I-intelligence models of European countries and North America. In them, the collection of information forms one of the central elements of the activities focused on intelligence. This protocol is composed of a national intelligence system, which contemplates the joint work of the various public security agencies in the communities, which through field work with the support of informants, undercover agents, and investigations, gather the necessary resources to collect intelligence. The security methodology of the Mexican Navy should be oriented to develop its own model of ILP in decision-making, toward using computer programs that allow the analysis of statistical data of activities related to drug trafficking, providing recommendations to the directors and commanders of the units of the Mexican Navy who approve the necessary military operations to attack drug-trafficking groups.

These models will be based on the use of big data in intelligence, which will allow a better decision-making process, capable of focusing available resources on capturing negative leaders and neutralizing clandestine drug laboratories; such activities can complement the use of big data in combating criminal activities related to drug trafficking such as arms trafficking, human trafficking, money laundering, and the illicit fuel trade. This computer intelligence process must include the installation of a national data network that allows citizen participation through mobile applications and anonymous calls, which can be triangulated with previous intelligence data to verify the information and develop immediate actions.

One of the key areas for improvement at the operational and organizational level involves deficiencies of the Mexican Navy in the processing of intelligence data in the fight against drug trafficking. Strengthening these institutional weaknesses requires effort and decision-making in an environment saturated with information, which requires the preparation of personnel capable of fulfilling intelligence analysis roles and the use of computer programs capable of guiding the decision-making process. From the operational perspective, the Navy's Center for Advanced Naval Studies has the necessary human and academic capital to prepare personnel, as well as an intelligence structure capable of working in the national environment.

Therefore, a big-data analysis methodology for the decision-making process in the fight against drug trafficking allows the use of large volumes of data that must be constantly analyzed in the battlefield against drug-trafficking groups, maximizing the military activities of the Mexican Navy, which boasts the complex transportation system, response capacity, and firepower necessary to face any group and whose precise strikes can disable the activities and leaders of these organizations.

Data processing is intended to quickly provide any available information on the activities of drug-trafficking groups, the daily lives of their leaders, and logistical methods, enabling the organization of operations capable of attacking them using the fewest resources possible. At the same time, using combat in urban areas in a rational, ethical manner reduces the level of violence and avoids the risk of collateral damage to the civilian population from such operations.

Notably, the content of the I-intelligence programs and methodology must be adapted to the needs and circumstances of Mexico's public security, from the support of military operations in the fight against drug trafficking. Therefore, communication and interagency work are fundamental at the tactical and organizational levels, which are capable of creating a sufficient structure at the planning level to direct the necessary operations to neutralize the critical nodes of the drug trafficking problem, be they social, economic, or political.

This thesis concludes with the following recommendations:

- Establish a command center composed of officers and other members dedicated to the collection and evaluation of the information contained in the Navy's big data in order to recommend actions in relation to the illicit activities of the various criminal groups and detect their potential routines and supply routes to cut off or alter their logistics.

- Form a multi-agency group composed of other federal agencies capable of acting tactically in urban and rural areas in order to organize raids or capture operations quickly by means of aerial support, such as helicopters, to prevent drug-trafficking groups from saturating the security forces.

- Develop a digital intelligence network in areas under the control of drug-trafficking groups to collect as much intelligence as possible to improve law enforcement activities in the communities.
- Deepen the use of intelligence through web platforms, social media, emails, and banking transactions to optimize online monitoring of the activities of suspects or criminal groups in order to determine their locations and possible hideouts.

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