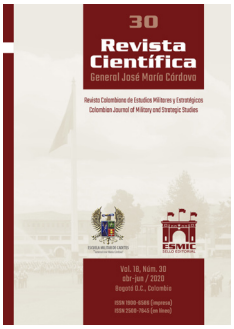

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A systemic description of the national model of community surveillance by quadrants in Bogotá

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A systemic description of the national model of community surveillance by quadrants in Bogotá

Caracterización del modelo nacional de vigilancia comunitaria por cuadrantes en Bogotá desde un enfoque sistémico

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Abstract. This article evaluates the performance of the National Model of Community Surveillance by Quadrants in the city of Bogotá. This strategy of territorial control, implemented by the National Police of Colombia, was evaluated using a systemic approach, employing the viable system model and self-transformation methodology. Unstructured interviews with retired police officers and consultation of secondary sources were used to determine the following: identity, levels of the recursive organization, structural strategy, and diagnosis. The results show that this model promotes an inclusive and flexible policing service, with a specific structure of primary processes, roles, mechanisms, and levels. It promotes a better understanding of community interactions and, ultimately, better results in the institutional objectives of security and coexistence.

Keywords: community participation; crime prevention; internal security; National Police of Colombia; self-transformation; viable system model

Resumen. Este artículo diagnostica el funcionamiento en la ciudad de Bogotá del Modelo Nacional de Vigilancia Comunitaria por Cuadrantes, una estrategia de control territorial aplicada por la Policía Nacional de Colombia. Para ello, desde un enfoque sistémico, se recurre al modelo de sistema viable y a la metodología de autotransformación. Mediante entrevistas no estructuradas a agentes de policía retirados, además de la consulta de fuentes secundarias, se siguieron cuatro pasos: identidad, definición de niveles de organización recursiva, estrategia estructural y diagnóstico. Los resultados muestran que el modelo promueve un servicio policial inclusivo y flexible, con una estructura específica de procesos primarios, roles, mecanismos y niveles, que facilita una mejor comprensión de las interacciones de la comunidad y, en últimas, mejores resultados en los objetivos institucionales de seguridad y convivencia.

Palabras clave: autotransformación; modelo de sistema viable; participación comunitaria; Policía Nacional de Colombia; prevención del crimen; seguridad interior

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Introduction

The Colombian National Police focuses its operation on the pursuit of citizen coexistence and security (Policía Nacional de Colombia, 2010). Therefore, it has implemented the National Model of Community Surveillance by Quadrants (MNVCC in Spanish). This strategy strives to identify and solve the problems generated by criminality and violence that affect citizen coexistence and security in rural and urban areas (Policía Nacional de Colombia, 2014). This model has been applied in Colombia's cities, including its capital, Bogota D.C., within the framework of the National Policy for Community Surveillance and Citizen Security, generating positive effects in terms of preventing and dealing with crime. (Tamayo & Norza, 2018).

The research presented in this article has sought to model the MNVCC using the model of viable systems (MVS) and the methodology of self-transformation (MST), as a systemic metalanguage, to present the characteristics and effectiveness of police action. The methodological concepts of Stafford Beer (1985), in the case of the MVS, and Espinosa and Walker (2013), in the case of *self-transformation*, were used to support the understanding of MNVCC using systems analysis methodologies.

The MVS is a tool that establishes the components of a system and its different levels of recursion, based on the identification of three fundamental aspects, environment, administration, and operations (Brocklesby, 2012). On the other hand, the self-transformation methodology helps to understand the functioning of the system by identifying constraints and the close relationship between adaptability and dynamics as fundamental factors of resilience (Espinosa & Walker, 2017).

This work begins with a literature review on the MNVCC and the description of the MVS and MST methodological tools. These instruments are used to reflect and act on the MNVCC, addressing structures of governance and systemic intervention. The results are presented with information obtained from the database by Sandoval and Marín (2017) and a sampling of 282 surveys by police members of the quadrant shifts in the 19 localities of Bogota, as well as the results of unstructured interviews (Páramo, 2018) with retired police officers from Bogota's Metropolitan Police (MEBOG). These interviews served to portray the MNVCC according to the personal experiences of police personnel. Then, the MST was applied, along with its four steps of identity, levels of recurrence, structural strategy, and diagnosis, resulting in the MVS model of the MNVCC as a systemic intervention for the understanding of its governance and operation. Lastly, the MNVCC model is explained to show the challenges of the Colombian National Police in the service of the community.

The national model of community quadrant surveillance (MNVCC)

According to the Colombian National Police, under the constitution, its main purpose is to maintain the conditions necessary for the inhabitants of Colombia to live in peace (Fernández-Osorio et al., 2018). Therefore, it is necessary to understand that the concept of *security* supports new and best practices with a systemic approach, without losing sight of the potential of the human dimensions (Paez et al., 2018; Palacios & Sierra, 2014). One of the contemporary societies' greatest challenges as the population increases is security and quality of life, making the design of government schemes to reduce and prevent insecurity a priority (Policía Nacional de Colombia, 2008). For several years now, the Colombian National Police has been implementing actions to approach the community and carry out joint activities to solve problems and improve the quality of life, "tailor-made actions" (Llorente, 2004). This approach has made it possible to design programs that articulate the State, police, and citizens triad, and integrate ideas and activities to promote the safeguard of society (Paez et al., 2020).

The use of quadrants or divisions based on relational studies of geographical areas and types of crime goes back to the 18th century (Román, 2013). In Latin America and the Caribbean, namely, in Colombia, the implemented citizen security programs follow an institutional process with police reforms that make them regional models to follow (Paez et al., 2018). In 1998, the principal Colombian cities of Bogota, Cali, Barranquilla, Medellín, Cartagena, Cúcuta, Bucaramanga, and Pereira implemented security by zones based on a strategy from Spain, specifically from Barcelona, which was called "Neighborhood Teams." Later, the strategy was extended to more than 50 municipalities (Ruiz, 2009); this was the origin of security by sectors, which later would be called quadrants (Policía Nacional de Colombia, 2010).

A decade later, in 2009, the National Plan for Community Surveillance by Quadrants was fully designed and planned in Bogota (Ruiz & Páez, 2016). The strategy was to reach out to the community and control crime by restoring the civil nature of the police, making the identification of criminal and violent activities possible (Llorente et al., 2011; Román, 2013). In 2014, it was consolidated under the name of the National Model of Community Surveillance by Quadrants (MNVCC) throughout the Colombian territory (Policía Nacional de Colombia, 2014). **Table 1** shows the chronological evolution of the security models adopted by the National Police.

Table 1. Security models adopted by the Colombian National Police

Model/Strategy	Year	Description
Community involvement	1993	The police start becoming part of the community and interact with it.
Community policing	1998	Work is carried out by sectors of the community, and models of surveillance service are created.
Community watchdog	2006	Shock or reaction group trainings.
National Community Surveillance Plan by Quadrants	2009	Through higher interaction with the citizens, a more timely response is achieved, integration with the community and co-responsibility are generated, and phenomena that affect the quadrant are recognized.
MNVCC	2014	Jurisdictions are created, security is stabilized, and strategies are created to respond to emerging social demands.

Source: Created by the authors based on Ruiz and Paez (2016).

The MNVCC establishes quadrant jurisdictions within the city's localities, to which a special police team is assigned to be responsible for their security and surveillance (Weisburd & Gill, 2014). Each quadrant is assigned technical information according to its geographical demarcation. They are classified by social, economic, demographic, geographical, contraventional, and criminal characteristics to establish the specific attention that the police must provide each area (Policía Nacional de Colombia, 2014). One of the advantages of this model is that it receives feedback from different sources, making it able to execute preventive actions continuously to improve security and effectiveness against crime. To this end, it uses a networked communications strategy that allows information to be transmitted rapidly between quadrants, thus optimizing the effectiveness and response time of police personnel (Sandoval & Marín, 2017).

However, it has been challenging to evaluate the results and monitor the MNVCC. Under this evolving context of community participation implemented by the Colombian National Police, where proposals are aimed at providing welfare to communities in a way that promotes a better quality of life (Quintero, 2020), the security strategy of each district government in Bogota has changed according to its public policies (**Table 2**).

Table 2. Security strategies in each period of government in Bogota

Government	Period	Strategy
Sánchez	1986-1988	Creation of the Immediate Attention Centers (IAC) / Koban Japan
Pastrana	1988-1990	Good neighbor
Peñalosa	1997-2000	Zero tolerance; Broken windows
Mockus	2001-2003	Citizen safety program with a strategy of control, coexistence, and civic culture. Creation of observatories.
Garzón	2004-2007	Local security contracts (Mayor's office/guilds)
Moreno	2008-2011	The 31 critical areas (*Hot spot policing*)
Petro	2012-2015	Plan 75/100, high-crime areas
Peñalosa	2016-2019	754 critical areas (*hot spots*)

Source: Created by the authors based on Ruiz and Paez (2016).

Ultimately, it can be stated that the MNVCC has evolved by proposing security work in conjunction with the community and citizens in general; above all, police action has been assigned a social character combined with the security service (Policía Nacional de Colombia, 2010).

Model of viable systems (MVS) and model of self-transformation (MST)T1

The analysis methodologies of the *model of viable systems* (MVS) by Stafford Beer (1985) and the *model of self-transformation* (MST) by Espinosa and Walker (2013) are useful tools to diagnose the operational fundamentals of organizations in general. In turn, modeling is a practical tool that provides scientific criteria to direct organizational focus, reveal leadership and control problems, and determine the basis for the design of information systems that show a set of dynamic interrelationships with the environment and provide reasons. Moreover, it helps to predict the success or failure of the organization (Beer, 1985).

The MVS is based on the most important laws of cybernetics, feedback, and the required variety. Upon them, it develops an organizational model with high probabilities of survival and adaptation in a changing environment (Brocklesby, 2012). In this sense, the MVS analyzes the organization as a whole, integrating the different organizational units in continuous feedback and watches over its survival under present and future forces (Oliveira & Gascón, 2011). This model has three major application components, *environment*, *operation*, and *administration* (**Figure 1**). Through these

components, it represents the interaction system versus society, which ensures social survival while maintaining society as the primary focus.

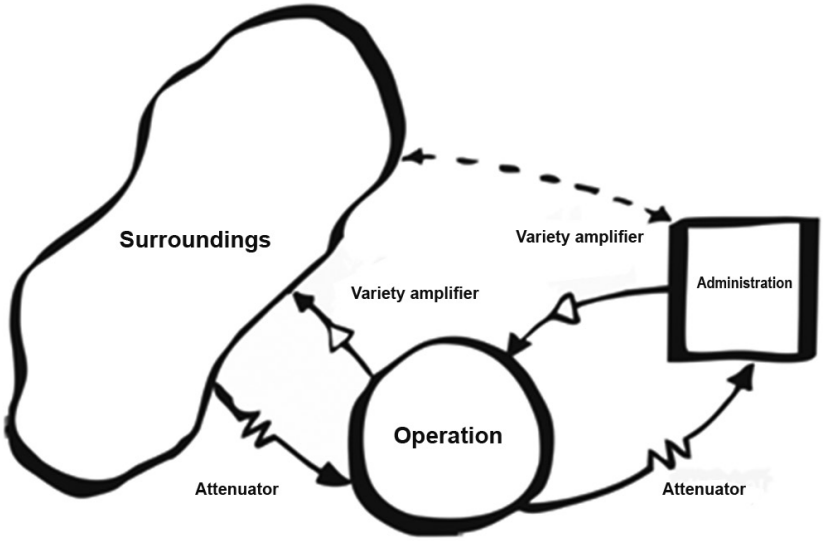

Figure 1. Model structure with a variety of amplification and attenuation. Source: Adapted from Beer (1981 p. 27).

Beer set out by considering these three components in analogy with the human being and its world, as three main parts that interact, body, brain, and environment (Espinosa & Walker, 2017). He analyzed the MVS in the following five systems: operation, coordination, control, intelligence, and policy. Thus, it is essential that the functions fulfilled by each system are correctly implemented in the organization.

- *System 1. Operation.* This is made up of autonomous and adapted basic operating units, which carry out the primary activities of the organization, and, therefore, are those that directly interact with the environment. These functional units are in charge of executing the main processes of the organization to achieve the mission (Peón, 2015).
- *System 2. Coordination.* This is responsible for synchronizing the differences that may arise in each of the subsystems to ensure that they all have a common language with institutional rather than local objectives (Espinosa & Walker, 2011). This function dampens oscillations and improves self-regulation in the fulfillment of the system's activities (Cardoso, 2019).
- *System 3. Control.* This represents the structures and controls that are put in place to establish the rules, resources, rights, and responsibilities of the sys-

tem, for internal regulation, improvement, and synergy. It acts as a monitoring channel, the "here and now," throughout the system (Espinosa & Walker, 2017).

- *System 4. Intelligence.* This is responsible for the "outside and the then." Its focus is on the outside world. It analyzes the trends and future scenarios, allowing it to identify threats and opportunities to generate plans that adapt to new circumstances (Espinosa & Walker, 2011).
- *System 5. Policy.* This is the process that regulates internal stability in the face of external change. It defines the system's appropriate pace of change by regulating the relationship of the system with its environment. In other words, it is a process of understanding that regulates the rate of change (Peón, 2015).

Table 3 describes the five systems of the MVS more schematically.

Table 3. System description of the MVS

System	Description
System 1	Operation: main activities of the system in focus.
System 2	Coordination: damping oscillations.
System 3	Control: synergy and performance of operational interaction (audit)
System 4	Intelligence: environmental exploration in the outside world.
System 5	Policies: identity and *ethos*.

Source: Created by the authors based on Espinosa and Walker (2017).

This is a methodology that helps understand organizations as an interconnected whole with the capacity to adapt to growth and change. It allows us to visualize the processes that define the purposes of the system, as well as its conversion into activities and results (Espejo, 1990). The systems must be defined in the context and the corresponding scope within the model under study. Figure 2 shows the interaction of the three fundamental aspects (environment, operation, and administration) and the systems proposed by the MVS incorporated in each of them, in such a way that they reflect self-organization and learning, and imply a continuous reflection on the sustainability of the system.

As for the applications of the MVS, it is used in the operation of security schemes, community organization, and government proposals. In the United Kingdom, the model has been used to understand complex security systems in intelligence agencies concerning actions to combat crime (Brocklesby, 2012). It has also helped to simplify

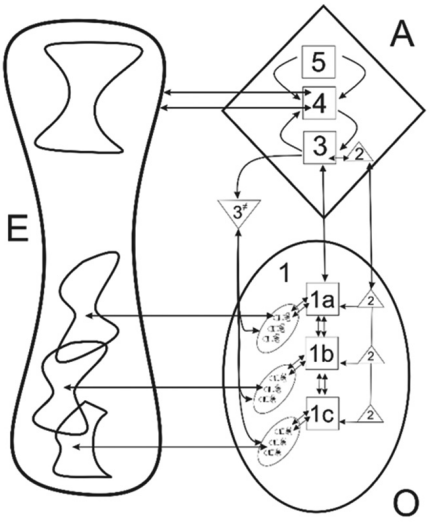

Figure 2. Schematic representation of the MVS.
Source: Espinosa and Walker (2017, p. 69).

operational planning and define autonomous systems for crime detection in changing environments (Kinloch et al., 2009). In the United States, a systemic approach has been developed to contribute to the decrease of terrorism by relying on social guarantees and educational policies (Ackoff & Strümpfer, 2003). This approach has had a significant impact on government proposals for technology, culture, and open economy in the National Innovation System (Devine, 2005).

In the area of social application, the model has served to learn about different communities, as is the case with Irish eco-communities, where levels of recurrence and primary activities were identified by disaggregating the five systems of the model (Espinosa & Walker, 2013). It has also been applied to a study of communities in the Amazon (Espinosa & Duque, 2017) and, in Latin America, as a dynamic cultural region (Espinosa et al., 2015). In conclusion, the MVS model provides a framework for discussing the relationship between nature and society, based on self-organization and systemic approaches, where knowledge about self-organized processes can be structured.

The MST methodology, in turn, helps understand the functioning of the system, identifying constraints, and recognizing the close relationship between adaptability and dynamics as fundamental factors of resilience (Espinosa & Duque, 2017). The MST is based on the MVS as a meta-language, allowing people to participate, in a structured manner, in decisions concerning the organization's viability and adaptability. This is how the actors design mechanisms to improve their possibilities of

long-term viability, thus obtaining a better structural context for the implementation of the strategy (Espinosa et al., 2015).

The MST offers a systemic learning process for the actors involved in the object of study based on the fundamental principles of autonomy, adaptability, agility, resilience, transparency, ethics, leadership, and shared responsibility. In other words, it is the study of the resilience capacity of systems based on the definition of organizational levels. To this end, it follows a series of sequential steps (**Figure 3**), identity, recursive levels, structural alignment, MVS diagnosis, implementation, and monitoring and support. These steps are necessary elements to achieve changes in the system (Espinosa & Walker, 2017).

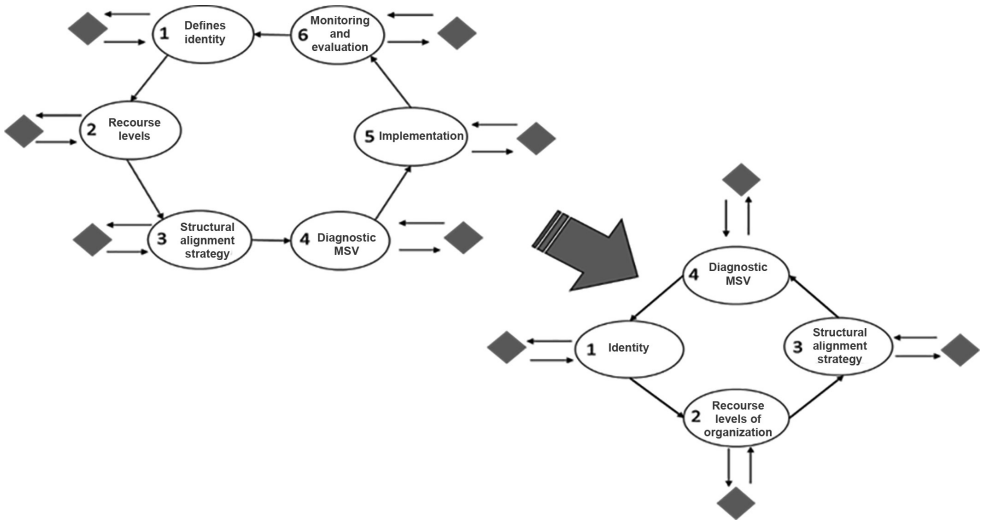

Figure 3. Representation of the MST.
Source: Adapted from Espinosa and Walker (2017, p. 97).

The first two stages are intended to produce a robust construction of the organizational identity and the current interaction of the organization with its niche. At this point, the parameters of the organizational system under study are agreed upon; this is known as "the system in focus." The next two stages, structural design and diagnosis, from the view of the MVS, help to recognize those who participate in the exercise to jointly map, analyze, and decide on the structural improvements that would allow the organization to overcome its main obstacles. The MST suggests analytical techniques and criteria for each stage. Some of them can be used in diagnostic or design modes on the production of models of organizational complexity (Espinosa & Walker, 2017).

It is also important to clarify that sustainability must be defined by means of this methodology, and it is equally relevant to the development of the MVS mod-

el because it contains a large strategy of environment and system response analysis. Therefore, the MVS and MST are very helpful given their integrated graphic scheme, which explains the interaction between the system and its external influences, taking into account a defined environment (Paez, 2020). In this sense, the application of these methodologies has been fundamental in characterizing the MNVCC.

Results and application of methodologies

It was necessary to use data from the Sandoval and Marin study (2017) to understand the layout of the MNVCC. Six questions were selected to determine the perception of the performance of the MNVCC from the police operators. The answers correspond to MEBOG quadrant agents in 19 locations. Stratified random sampling with a finite universe was used to select the segment (Murray & Larry, 2009) so that all locations could be adequately represented in the sample. The formula used was:

$$n = \frac{Z^2 \sigma^2 N}{e^2(N-1) + Z^2\sigma^2}$$

(Murray & Larry, 2009).

Where:

n is the size of the population sample to be obtained.

Z is the value obtained through confidence levels. Its value is constant at 1.96 for 95% confidence.

σ is the standard deviation of the population. It is a constant value of 0.5.

N is the size of the total population.

e represents the acceptable limit of sampling error.

Accordingly, by taking a population $N = 1051$, which are the quadrants determined by the National Police for Bogota, a 95% confidence level that is normalized in value $Z = 1.96$, a margin of error $e = 0.05$, and assuming a standard deviation of $\sigma = 0.5$, 282 survey results were needed in the 19 locations. Subsequently, the following formula was used to calculate the sample by localities.

$$ni = n * \frac{Ni}{N}$$

(Murray & Larry, 2009).

Where:

ni is the size of the population sample by location to be obtained.

n is the total population sample size (282 surveys).

Ni is the size of the population (no. of quadrants) by location.

N is the size of the total population (1051).

Table 4 shows the sample size, which is statistically 282 by location.

Table 4. Quadrant and sample participation by location

Location	Number of quadrants *(Ni)*	Number of samples per location		
		ni	***ni* (approximately)**	**% of participación**
Usaquén	59	15,83	16	5,67%
Chapinero	57	15,29	15	5,32%
Suba	121	32,47	32	11,35%
Barrios Unidos	36	9,66	10	3,55%
Teusaquillo	39	10,46	10	3,55%
San Cristóbal	64	17,17	17	6,03%
Usme	36	9,66	10	3,55%
Tunjuelito	25	6,71	7	2,48%
Rafael Uribe	39	10,46	10	3,55%
Ciudad Bolívar	85	22,81	23	8,16%
Bosa	79	21,2	21	7,45%
Kennedy	125	33,54	34	12,06%
Fontibón	44	11,81	12	4,26%
Engativá	72	19,32	19	6,74%
Santa Fe	54	14,49	14	4,96%
Mártires	34	9,12	9	3,19%
Antonio Nariño	29	7,78	8	2,84%
Puente Aranda	32	8,59	9	3,19%
Candelaria	21	5,63	6	2,13%
Total	**1051**	**282**	**282**	**100,00%**

Source: Created by the authors.

The following results were obtained, according to the MST, applied in four steps (identity, recursion levels definition, structural strategy, and MVS diagnosis).

Identity

The Tascoi technique, which determines the Transformation, Actors, Suppliers, Clients, Organizers, and Interveners, was used to attain an approximation to the identity of the MNVCC system, which is defined by the relationships of roles that constitute it, particularly by identifying the intervening actors. This technique was used to establish the identity in use, as the purpose was to determine what the MNVCC actually does. Thus, from this, a systemic vision of the operation is obtained, and clear concepts are used (Espejo & Reyes, 2016). The result of this technique (**Figure 4**) shows all the actors involved in the object of study.

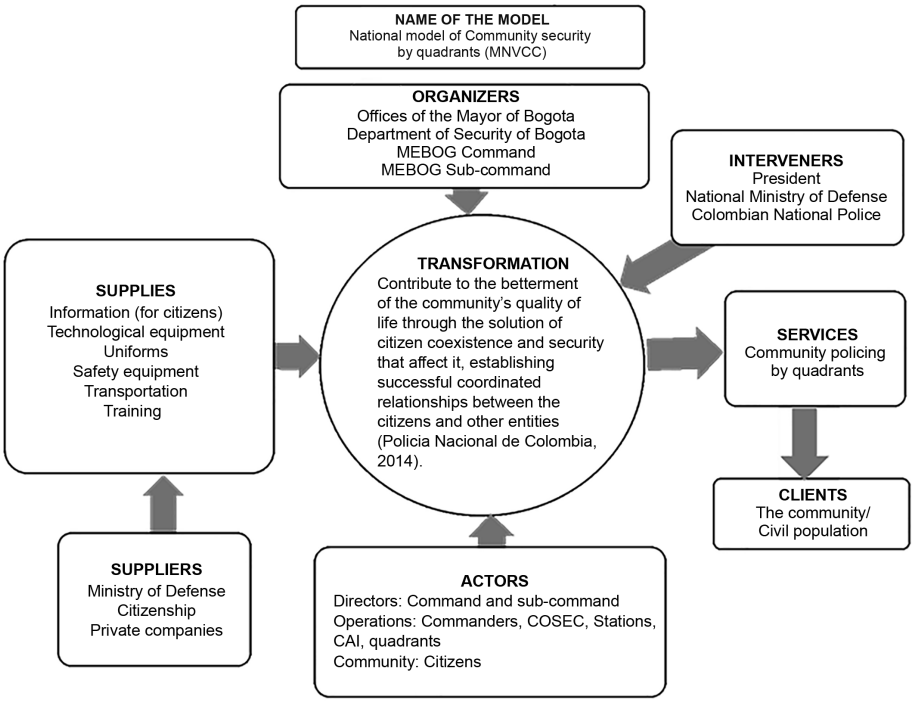

Figure 4. Identity of the MEBOG MNVCC represented by the Tascoi method. Source: Created by the authors.

Levels of recursive organization

Recursive organization levels are those that group primary activities into different entities or roles within a system. Each circle is an operational unit, potentially a viable system in itself, which must fulfill some primary activities, represented in each circle. Each level is integrated or linked to the parent unit by an arrow. All structural inserts

must continue to be modeled until the entire team is integrated (Espinosa & Walker, 2017). This work proposes six levels in total, which are listed below.

- Level 0: MEBOG command
- Level 1: MEBOG Sub-command
- Level 2: Citizen Security Operational Command (COSEC)
- Level 3: MEBOG police stations
- Level 4: Immediate Attention Centers (CAI)
- Level 5: MEBOG Quadrants (**Figure 5**)

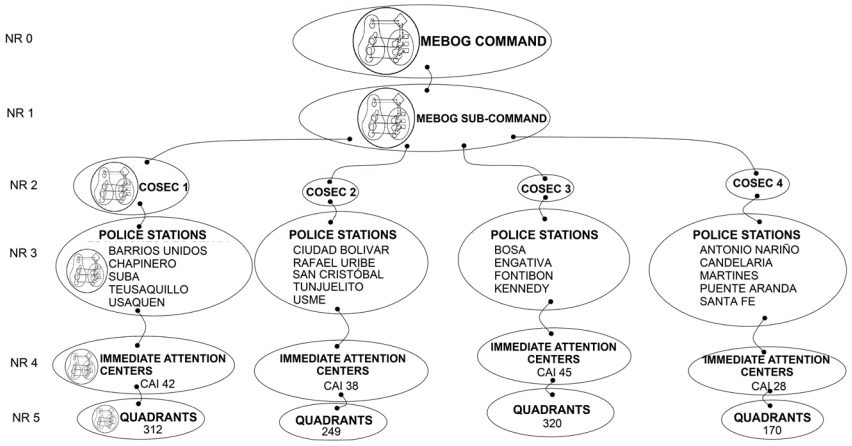

Figure 5. Graphic explanation of the levels of the MNVCC recursive organization.
NR: Level of recursive organization.
Source: Created by the authors.

Specific information on quantities and details of the structure levels in Bogota is presented in **Table 5**.

Table 5. MEBOG's recursive organization levels

Level	Role	Quantity
0	MEBOG Command	1
1	MEBOG Sub-command	1
2	Citizen Security Operational Command (COSEC)	4
3	Stations	19

Table cotinues...

Level	Role	Quantity
4	Immediate Action Command (CAI)	153
5	Quadrants	1051

Source: From interviews with retired MEBOG police officers.

Based on the interviews and exploratory research, each role with its respective mechanisms is defined as follows:

- Command: in charge of generating policies, monitoring, controlling, and evaluating the MNVCC. It constitutes the strategic vigilance committee.
- Sub-command: forms planning teams, in charge of looking outside the system with the support of the strategic information centers.
- COSEC: in charge of directing, executing, and articulating their systems of responsibility.
- Stations: distribute the human talent to ensure the execution of the model, supervise the CAIs, and control quadrant patrol shifts. They make the operational surveillance committee. They update diagnostics, manage information systems, and coordinate the implementation of inter-institutional solutions to the identified issues.
- CAIs: are in charge of having contact with the citizens, supporting, and conducting patrols in their daily work, and collecting information of interest for the continuous improvement of the model.
- Quadrants: geographical areas with a police force assigned for surveillance and security, according to social, economic, demographic, and criminal characteristics.

Each level has assigned functions within the MNVCC organization, which can be specific or integral to the relationship. They differ in that specific functions are not repeated at another level, while integral or relationship functions may be common to different levels.

Structural strategy

The structural strategy is the planned design of execution and implementation of the different primary functions within a model that seeks the fulfillment of a proposed objective. For this research, the structural strategy of the MNVCC was established through the policies of the model together with the National Police's general objective, which is the pursuit of the citizens' security and coexistence, focused on a specific area. This focus strengthens the understanding of the specifics area and, therefore,

improves police action. It is developed through a comprehensive model supported by technological and management tools with quality principles (Policía Nacional de Colombia, 2010).

The strategy is also evidently focused on the delineation of policies at the recursive organization levels 0 and 1, while the communication and feedback activities, involving the citizenship, are at levels 2, 3, 4, and 5. Lastly, levels 4 and 5 concern execution and operation (**Figure 5**). The results of the Sandoval and Marin (2017) study segment analysis were used to define the structural strategy; this yielded the operators,' representing levels 4 and 5, perception of the model. **Table 6** describes the relevant data for the questions taken from this study.

Table 6. Survey results for police operators

Question	Description/Question	Yes	f	No	f
1.	Perception of more police officers in the MNVCC	135	48%	147	52%
2.	Average response time in perimeter areas of the quadrant is higher compared to similar crimes in other areas of the quadrant	76	27%	206	73%
3.	Most frequent crime in quadrant	-	-	-	-
4.	Knows the primary objectives of the MNVCC	268	95%	14	5%
5.	The MNVCC model is functional	259	92%	23	8%
6.	Would change the pattern of communication	18	7%	264	93%

Source: Created by the authors based on Sandoval and Marín (2017).

For Question 1, 52% of the surveyed consider that there is no need for more police officers in the quadrant. According to them, the number of police operators within the quadrant is sufficient. Regarding Question 2, 73 % of the respondents indicated that slower response times to perimeter areas than to other areas of the quadrant is no longer an issue. The results of Question 3 (**Figure 6**) show that the most frequent crime in the quadrants is theft at 75%; thus, theft predominates at 80% (**Figure 7**). According to

these results, more attention should be focused on the crime of theft, as it increases and disrupts the perception of insecurity in the city (Gélvez, 2018).

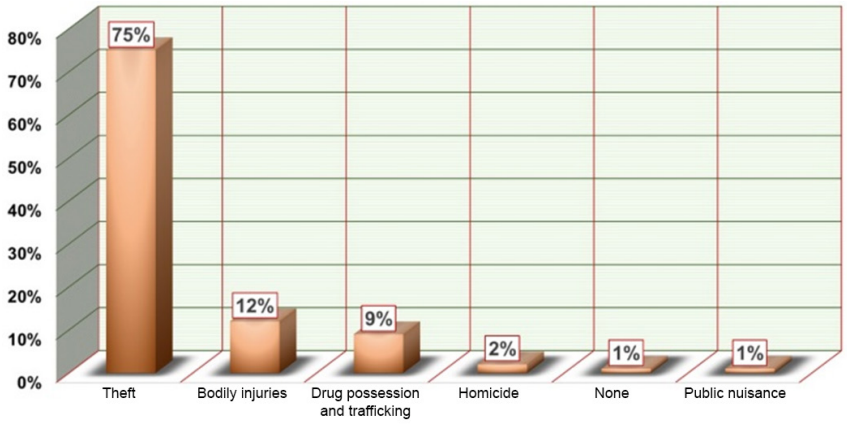

Figure 6. Percentage share of the most frequent crimes in Bogota's quadrants.
Source: Created by the authors.

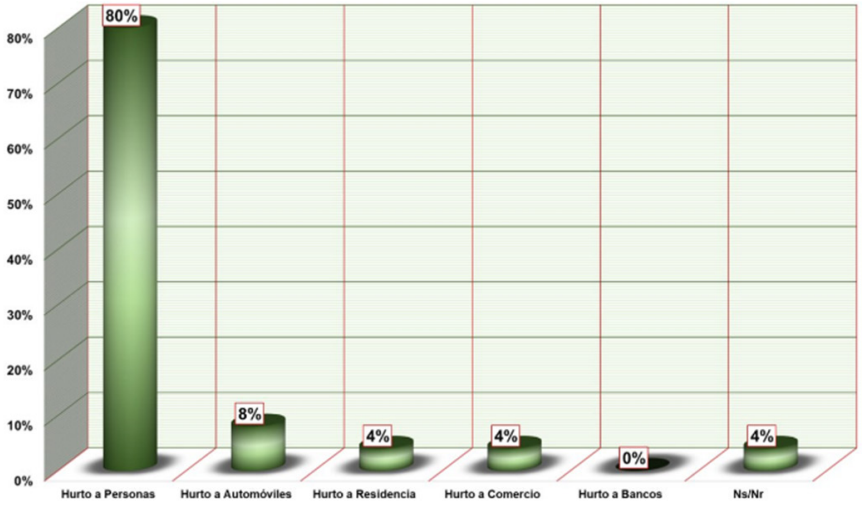

Figure 7. Classification of thefts and percentage participation in the quadrants of Bogota.
Source: Created by the authors.

The responses to Question 4 evidenced that 95% of the respondents were clearly aware of the model's five primary objectives. Thus, there is a high level of awareness of the model's identity, which allows for the recognition and exercise of the functions

to fulfill these objectives. Regarding Question 5 on the functionality of the MNVCC, 92% of the responses reflected a positive perception regarding its functionality in MEBOG, in turn, reflecting the program's performance and effectiveness. Finally, for Question 6, 93% of respondents expressed support for the current communication scheme, indicating that it should not be changed. In this sense, police operators perceive that the MNVCC works effectively; this is also reflected in the positive results in crime reduction (Fundación Ideas para la Paz [FIP], 2012).

MVS Diagnostics

This diagnosis is understood here as the representation of areas and processes within a complex model to facilitate training and support corrective proposal procedures. In this case, the three components already seen in the MVS were used as a diagnostic tool. The MNVCC is composed of two of these components, the *operation*, which carries out all the primary activities, and *administration*, which allows the articulation and synergy between the components of the system. The third element, *environment*, receives the operation and services of the model (Espinosa et al., 2008). Therefore, a functional and structural analysis was performed, from which the first system component model is presented (**Figure 8**).

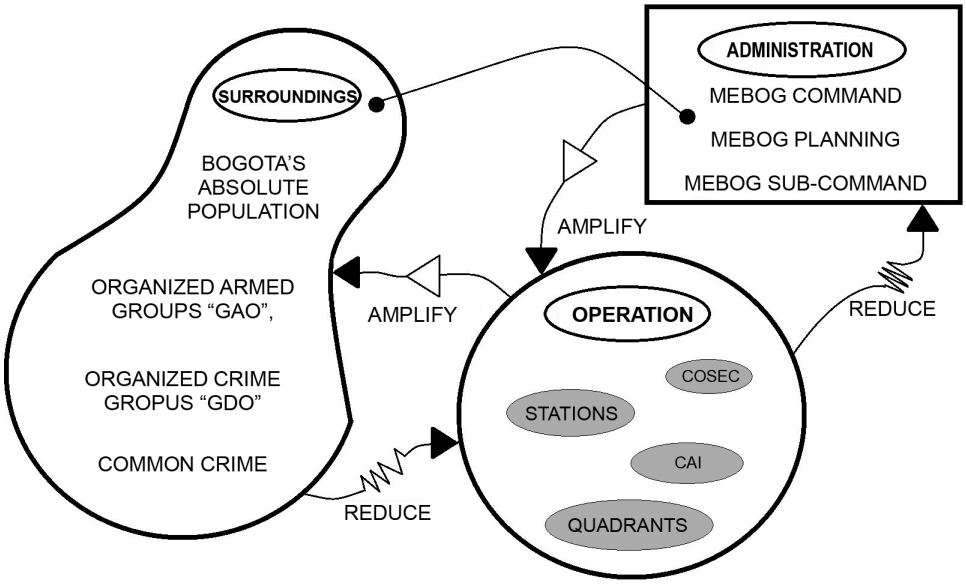

Figure 8. Elements of the MNVCC.
Source: Created by the authors.

Figure 8 shows the three elements of the system in general. A characterization is provided below.

- Environment: is understood as the absolute population that inhabits the 19 localities, and, specifically, as the relevant parties of criminal networks, which are the target of the law enforcement actors working together in the MNVCC.
- Operation: is composed of systems S1 and S2 (see Table 3), where the primary functions and coordination activities are carried out to create synergy. Four primary roles were identified in the MNVCC (1A, 1B, 1C, and 1D) (Figure 9).
- Administration: are the services that ensure the operation of the MNVCC. It contains the staff that generates policies, intelligence, regulations, auditing, supervision, and control. It is composed of systems S3, S4, and S5 (see Table 3). Their job is to monitor the balance between internal and external issues.

The interviews with the retired police officers of the MNVCC, the literature review of official Colombian National Police (2008, 2010, 2014) documents were used as a reference. Also considered were the results of Question 4 (see table 6) in which the operators' knowledge of the MNVCC in its level of recursive organization 5 is evident (see figure 5), as well as its processes. Based on this, five primary processes represented by letters (A, B, C, D, and E) were defined and articulated (**Table 7**).

Table 7. MNVCC primary processes

A	Diagnose indicators of violence and crime (analysis of citizen security)
B	Exercise vigilance
C	Promote citizen participation
D	Respond in a multi purposely to citizen requirements
E	Implement preventive activities

Source: Created by the authors.

This demonstrates not only the operators' knowledge of the MNVCC but also their satisfaction with the effectiveness and compliance of its five primary processes; this allows the graphing of the MNVCC through the MVS (**Figure 9**).

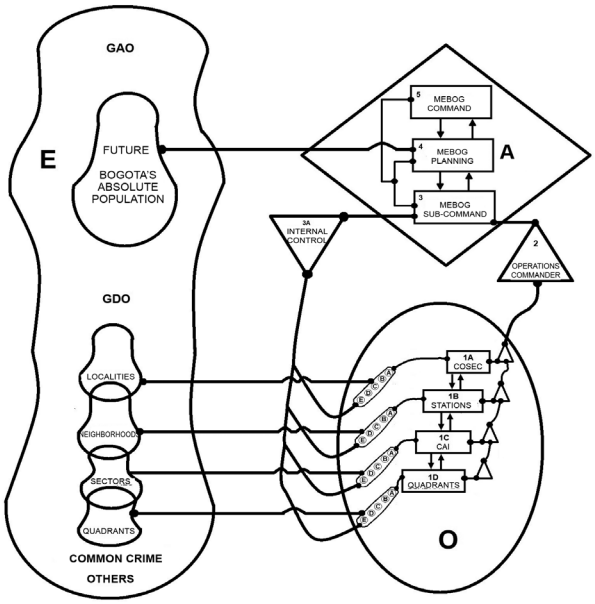

Figure 9. MVS for the MNVCC in the city of Bogota.
Source: Created by the authors.

According to the MVS diagram, the necessary descriptions of the systems represented in Figure 9 are presented below.

- System 1, which corresponds to *operations*, has roles and mechanisms within the MNVCC, including the COSEC, stations, CAIs, and quadrants. In addition, it contains the five relevant activities already mentioned (A, B, C, D, and E).
- System 2, which corresponds to *coordination*, has the roles of the operation commander and is in charge of articulating the primary operators, according to the operations described.
- System 3, which corresponds to *control and audits*, has the roles of MEBOG deputy commander, whose functions are in the supervision, audit, and evaluation of the MNVCC operation.
- System 4, which corresponds to *planning and forecasting*, is directly related to the future of the model. It is represented by the MEBOG planning role and receives support from the strategic information center.
- System 5, which corresponds to *policies*, is represented by the role of the MEBOG commander and receives support from the Directorate of Citizen Security (DISEC).

This study intends to model (see Figure 9) a community service program that has a trajectory of more than ten years, to ensure that it continues to be viable and sustainable as a service to citizens. In this sense, from the MVS, the primary roles and mechanisms that exist between the different actors and levels of recursive organization of the MNVCC have been plotted to evaluate its functionality.

Discussion

Here, we attempt to clarify some of the results on the MNVCC in Bogota analyzed in this research. First, it can be established that the results obtained show that the operators' perception of the model is that it is efficient. However, it must be noted that there is a difference between the measurements on the efficiency of the model, established by the reduction of crime, and the perception of insecurity of the citizens receiving the police services. Gélvez (2018) addresses this observation. He states that "there is not enough evidence to show whether these types of surveillance models have any relation to the rate of perception of insecurity." (Gélvez, 2018)

Nevertheless, it is possible to find elements that prove that –at the time– the National Plan for Community Surveillance by Quadrants (PNVCC in Spanish) was effective in reducing citizens' perception of insecurity (Bonilla, 2013). In this sense, the report made in 2012 by the Ideas for Peace Foundation (FIP) can be cited. It establishes the following:

> The strategy generated a 6.32% reduction in the perception of insecurity in the neighborhood that 12.8% more people claim to have seen the policeman of the quadrant. […] The great conclusion is that the citizens of Bogotá believe that the PNVCC generates better security conditions when it is implemented correctly. (2012, p. 8)

Thus, it is impossible to determine whether its results have been adequate in reducing crimes, such as homicide, from the study with the MNVCC operators (Buitrago & Norza, 2015). We can, therefore, establish that even though the implementation and evolution of both the PNVCC and the MNVCC have yielded successful results, currently, there are no clear indicators for measuring the model's effectiveness (Sherman, 2012).

Another noteworthy item is the scant existing analysis on the MNVCC in Bogota. There is a considerable period between the formulation of the model and the consideration of its effectiveness. Only in 2011 can we find reports and studies, such as the work by Llorente et al. (2011) and the FIP (2012). There is a gap in the evaluation and documentation of the model to the study carried out by Sandoval and Marín (2017), Gélvez (2018), and this article.

Despite the previous, some reviews on the MNVCC can be found in other cities, such as the study carried out in Cali by Myriam Román (2013) and the study in Bucaramanga by María Bonilla (2013). These studies made an in-depth evaluation of the model and its application. This article attempts to contribute to the representation of the MNVCC in Bogota to demonstrate the police operators' compliance with the primary processes.

Conclusions

The MNVCC has been the result of different security strategies in the city, which had its beginning with the concept of *community surveillance.* It recognizes relevant actors in the community to involve them using more participatory approaches and designs specific interventions directed towards the complex issue of crime.

The model incorporates clear and precise definitions, such as the definition of prevention, to maintain crime rates low. It prioritizes and outlines faster solutions to the problems identified in the quadrant zones. It grants complementarity regarding the participation of and support for different entities and helps to promote citizen participation. Moreover, it highlights versatility, as it offers a response in various aspects of safety and human quality.

Its diagramming offers a learning process that identifies the roles, mechanisms, and levels to provide the participating actors with a better understanding of community interactions. Here, recursive mapping becomes necessary to propose interventions of self-government and sustainability. Specifically, as a diagnostic tool, the MVS reveals a conceptual framework of data that, when filtered, allows quadrant police officers to identify, analyze, and agree upon priorities for systemic intervention according to context, which develops into the safety of the population.

It was also evident that the model is efficient concerning the good use of the Colombian National Police's resources because it seeks decentralization as a concept of citizen security and increases the ability to respond to criminal acts.

As primary operators, the CAIs and the quadrants (recursive organization levels 4 and 5), find the model functional, given the communications scheme that allows responding to the needs in real-time and creates a participatory environment. The MEBOG also expresses that the MNVCC model is effective, given that this work methodology of the police service is aimed at characterizing the different types of violence and criminality that affect the population's coexistence and security and promotes their improvement. The model used (Figure 9) presents the characteristics that determine a functional organization, in which its primary activities are sufficiently autonomous and independent to improve the operation and results of the model.

Systemic intervention, in turn, is an innovative application that provides a more effective learning context at its different levels of recursive organization to understand self-organization processes and examine its operations and activities. This is shown in **Figure 10**, where, for a citizen security model such as the MNVCC, the surroundings component, which receives services, must be embedded in the operation and administration components to achieve adaptation, and joint response capacity, which may lead to more comprehensive organizational solutions.

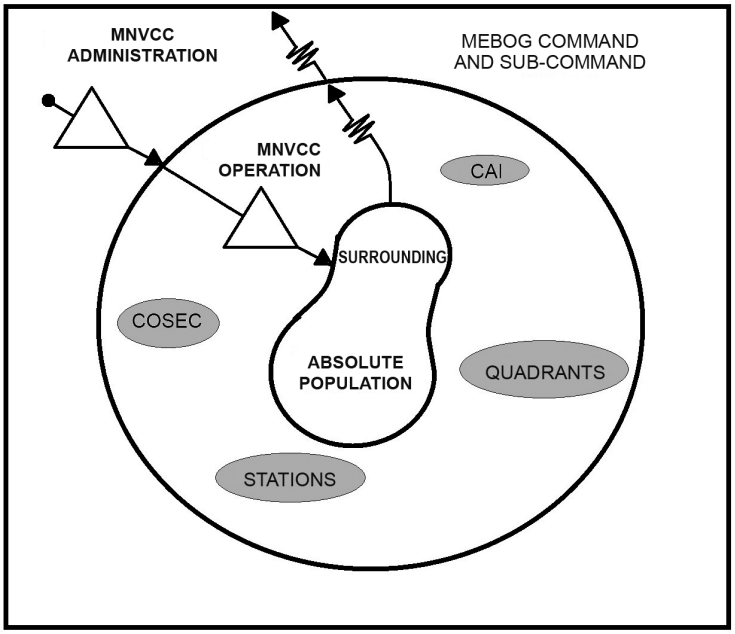

Figure 10. MNVCC elements in action.
Source: Created by the authors.

From a systemic approach, This work contributes to a better understanding of the MNVCC to show the efforts of the Colombian National Police to build resilient models in the fight against crime.

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