FARC Terrorism in Colombia: A Clustering Analysis

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Abstract

This paper applies clustering analysis to the Colombian armed conflict. Indeed, when applied to a FARC terrorist act database, this statistical procedure finds a natural clustering of the different FARC units according to the different types of terrorist acts they commit and identifies the military hard core of the FARC. The facts revealed in this paper should be useful not only for future military strategies, but also to determine a better priorization and geographical allocation of the scarce military resources.

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1. INTRODUCTION

Colombia has experienced a severe domestic conflict during the previous decades. The main actors of the conflict are, on one side, the FARC-EP (Armed Revolutionary Forces of Colombia-People's Army) and the ELN (National Liberation Army), the two major leftist guerrilla groups, and, on the other side, the legitimate armed forces and the majority of civil society[1].

Despite the fact that an increasing percentage of GDP has been systematically allocated to military spending during the previous years, the conflict has lasted almost 5 decades. Of course, the irregular nature of the conflict makes victory extremely difficult for the legitimate army forces. Moreover, it can be argued that even though the fraction of GDP that is allocated to military spending has increased during the previous years, it is still insufficient to guarantee victory. Yet, the irregularity of the conflict and the scarcity of resources is something that Colombian society (both civil and military) has to live with. Hence, the development of different intelligence tools aimed at priorizing the use of scarce military resources (while taking into consideration the irregular and guerilla warfare type of conflict that Colombia endures) is a must at this stage of the war. The purpose of this paper is to provide one such tool.

The tool is a simple statistical procedure known as *clustering analysis*. It can be used to identify certain specialization patterns among the basic military units of the FARC, the major irregular group fighting the Colombian armed forces. Indeed, when applied to a FARC terrorist act database, this statistical procedure finds a natural grouping of the different FARC units according to the different types of terrorist acts they commit. This information reveals patterns that are useful to determine a better priorization and geographical allocation of scarce military resources.

The paper is organized as follows. The next section explains the clustering analysis methodology. Section three describes the data set. Section four presents the results and the last section concludes.

2. CLUSTERING ANALYSIS

This technique organizes in different groups (*clusters*) any collection of mathematically characterizable objects. Indeed, if it possible to characterize every object in a collection with a vector, then the technique is able to segregate into different groups (*clusters*) all the objects of the collection by minimizing the mathematical distance between the resulting groups. Even though there are many definitions of mathematical distance, the Euclidean distance is used in this paper due to its simplicity and common use in clustering techniques.

The following algorithm describes the methodology:

1. Let N be the number of vector/objects in the collection.

2. Calculate the Euclidean distance between every possible pair of the N vectors that describe the N objects of the collection.

3. Let Δ be an $N \times N$ matrix registering the distance between object i and object j $[d(i,j)]$ in row i and column j. Note that Δ is symmetric with zero's on the diagonal.

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[1]There are also right-winged paramilitary groups but they are not the purpose of this paper.

4. Search for the shortest distance in Δ. Let x and y be the two objects with the shortest distance in between:

$$d(x, y) = Min \quad [d(i, j)] \quad \veebar i, j = 1...N$$

5. Let x and y conform the cluster xy.

6. Eliminate the 2 rows and 2 columns corresponding to object x and object y from Δ. With the distance between cluster xy and the remaining $N - 2$ objects, add a new row and column to Δ. The distance between cluster xy and any other object of the remaining collection is the largest of the distances between x and the other object and y and the other object:

$$d(xy, z) = Max\{d(x, z), d(y, z)\}$$

7. Let $N = N - 1$ and go back to step 4.

It is up to the researcher to decide at which iteration to stop, according to the number of clusters he/she aims to obtain.

Consider the following example. There are four objects $(A, B, C, D) \in R^2$ characterizable by the following vectors:

$$A = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad B = \begin{pmatrix} 5 \\ 4 \end{pmatrix} \quad C = \begin{pmatrix} 6 \\ 5 \end{pmatrix} \quad D = \begin{pmatrix} 10 \\ 9 \end{pmatrix}$$

Let:

$$\Delta = \begin{bmatrix} d(A, A) & d(A, B) & d(A, C) & d(A, D) \\ d(B, A) & d(B, B) & d(B, C) & d(B, D) \\ d(C, A) & d(C, B) & d(C, C) & d(C, D) \\ d(D, A) & d(D, B) & d(D, C) & d(D, D) \end{bmatrix}$$

Note:

$$d(A, B) = d(B, A) = \sqrt{(3 - 5)^2 + (2 - 4)^2} = 2.8$$

$$d(A, C) = d(C, A) = \sqrt{(3 - 6)^2 + (2 - 5)^2} = 4.2$$

$$d(A, D) = d(D, A) = \sqrt{(3 - 10)^2 + (2 - 9)^2} = 9.9$$

$$d(B, C) = d(C, B) = \sqrt{(5 - 6)^2 + (4 - 5)^2} = 1.4$$

$$d(B, D) = d(D, B) = \sqrt{(5 - 10)^2 + (4 - 9)^2} = 7.1$$

$$d(C, D) = d(D, C) = \sqrt{(6 - 10)^2 + (5 - 9)^2} = 5.7$$

Thus:

$$\Delta = \begin{bmatrix} 0 & 2.8 & 4.2 & 9.9 \\ 2.8 & 0 & 1.4 & 7.1 \\ 4.2 & 1.4 & 0 & 5.7 \\ 9.9 & 7.1 & 5.7 & 0 \end{bmatrix}$$

The shortest distance in Δ is given by $d(B,C) = d(C,B) = 1.4$. Hence, BC is a cluster and there are now only three objects in the collection: $(A, BC, D) \in R^2$, characterizable by the following vectors:

$$A = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad BC = \left\{ \begin{pmatrix} 5 \\ 4 \end{pmatrix} \begin{pmatrix} 6 \\ 5 \end{pmatrix} \right\} \quad D = \begin{pmatrix} 10 \\ 9 \end{pmatrix}$$

Hence:

$$\Delta = \begin{bmatrix} d(A,A) & d(A,BC) & d(A,D) \\ d(BC,A) & d(BC,BC) & d(BC,D) \\ d(D,A) & d(D,BC) & d(D,D) \end{bmatrix}$$

Given that:

$$d(A,BC) = d(BC,A) = \max\{d(A,B), d(A,C)\} = \max\{2.8, 4.2\} = 4.2$$

$$d(A,D) = d(D,A) = 9.9$$

$$d(BC,D) = d(D,BC) = \max\{d(B,D), d(C,D)\} = \max\{7.1, 5.7\} = 7.1$$

It follows that:

$$\Delta = \begin{bmatrix} 0 & 4.2 & 9.9 \\ 4.2 & 0 & 7.1 \\ 9.9 & 7.1 & 0 \end{bmatrix}$$

The shortest distance in Δ is given by $d(A,BC) = d(BC,A) = 4.2$. Hence, ABC is a cluster and there are now only two objects in the collection: $(ABC, D) \in R^2$. By construction, during the next iteration the two remaining objects will be grouped into one big cluster containing all the objects of the original collection: $(ABCD)$. Note then that the methodology reveals 4 possible groupings:

1. Four clusters:

   - Cluster 1: A
   - Cluster 2: B
   - Cluster 3: C
   - Cluster 4: D

2. Three clusters:

- Cluster 1: A
- Cluster 2: BC
- Cluster 3: D

3. Two clusters:

  - Cluster 1: ABC
  - Cluster 2: D

4. One cluster:

  - Cluster 1: $ABCD$

Again, the researcher decides at which grouping level to stop. Given that the first and last levels are irrelevant, the researcher has to choose between two or three clusters [i.e. between (A, BC, D) or (ABC, D)].

3. DATA

The database employed in this paper was obtained from the Ministry of Defense and the Ministry of Interior and Justice of Colombia. It includes all officially reported terrorist acts committed by the FARC between January 2/1999 and February 9/2003. The database contains 5819 acts which can be divided into 117 different types (ex: kidnappings, massacres, blowings of oil ducts, blowings of energy towers, attacks against military infrastructure, etc.). The database is described by the following simple statistics across the different types of acts:

- Minimum frequency = 1 act[2]

- Maximum frequency = 610 acts[3]

- Median = 5 acts.

- Mean = 49.5 acts

For the purposes of this paper it is necessary that every act in the database contains the following information[4]:

- Type of act

- Location (city/town and state)

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[2]Corresponding to Armed Strike.

[3]Corresponding to Combats with Colombian Armed Force.

[4]Of course, additional information for each act is also available from the database (ex: date, army brigade with jurisdiction in the location where the act was committed, etc).

- FARC unit committing the act

  Those acts with missing information were eliminated from the database. This reduced the total number of acts in the database to 3896. Given that several FARC units operate in the same area and systematically use a hit and run strategy (due to the guerrilla-warfare nature of the conflict), sometimes it is very difficult for the Ministry of Defense to identify accurately the unit responsible for some of the terrorist acts committed by the FARC. Thus, the information from the Ministry of Defense was double checked for consistency with that from the Ministry of Interior and Justice (which comes from alternative sources).

4. RESULTS

Note that the database allows the vector-characterization of every FARC unit according to the number of terrorist acts they committed per every different type of act in the database, between January 2/1999 and February 9/2003. In consequence, the clustering technique described above was used to obtain a natural clustering of the different FARC units according to the different types of terrorist acts they perpetrated between January 2/1999 and February 9/2003.

The procedure reveals nine different clusters of FARC units (see Table 1).

Table 1

Cluster	# of units	% of acts	Average acts per cluster member
1	66	81.55%	48.14
2	8	1.36%	6.63
3	14	6.21%	17.29
4	10	6.55%	25.50
5	7	1.87%	10.43
6	7	0.33%	1.86
7	9	1.05%	4.56
8	9	0.54%	2.33
9	9	0.54%	2.33
Total	139	100%	

Interestingly, more than 80% of all the terrorist acts committed by the FARC during the period of analysis is concentrated in cluster number 1, with 66 units (or 47% of the FARC units). The average number of terrorist acts committed by the units in cluster number 1 is 48.14, almost twice as much as the second highest average. Now, clusters number 3 and 4 (with 14 and 10 units, respectively) concentrate jointly almost 13% of the attacks and, after cluster number 1, are the only two other clusters with a significant percentage of the acts. Indeed, the average number of acts committed by the members of clusters 3 and 4 is 17.29 and 25.50, respectively, much higher than the average for the other clusters (except that of cluster 1).

In sum, clusters 1, 3 and 4, with 65% of the total number of FARC units, carried out 94% of all the acts perpetrated by this terrorist group. The units in cluster 1 alone participated with more than 80% of the terrorist acts. Those FARC units belonging to all other clusters

(and representing 35% of all FARC units) participated with less than 6% of all the terrorist acts.

These results reveal an interesting specialization pattern among the FARC. Apparently, the units belonging to cluster 1 are military in nature. In other words, they are in charge of using all types of terrorist acts to attack civilian society, destroy its infrastructure and combat the legitimate armed forces of Colombia. The units belonging to clusters 3 and 4 are also military oriented but not as much as those in cluster 1. They are probably specialized only in certain sorts of military activities. In contrast, the units belonging to the other clusters are probably dedicated to non-military activities (political, logistic support, financial support, etc.).

To identify this specialization pattern more clearly each cluster should be studied separately. Appendix 1 exhibits the complete statistical output for each of the FARC unit clusters. Note that those FARC units belonging to cluster 1 are responsible (in the sample of the database) for 82.80% of all masacres, 86.63% of all civilian murders, 79.53% of all kidnappings and 79.01% of all attacks against towns and villages. Moreover, they are responsible for 89.02% of all vehicle theft/retention, 76.34% of all explosions, 76.96% of all bridge and road blowings, 82.49% of all oil duct attacks and 64.09% of all attacks against the electric infrastructure. Additionally, they concentrate 87.54% of all combats with the Colombian armed forces. It is important to highlight that this type of terrorist act represents almost 17% of the activities of cluster 1 units. As expected above, the units in cluster 1 make up the military hard core of the FARC. They are devoted to inflict terrorism upon civilian society, destroy its economic infrastructure and combat the armed forces of the State.

Note, however, that the FARC units belonging to cluster 3 are responsible for 26.36% of all attacks against the electric infrastructure, 10.99% of all attacks against oil ducts and 9.60% of all bridge and road blowings. On the other hand, those FARC units belonging to cluster 4 are responsible for 18.96% of all explosions. Moreover, this type of terrorist act concentrates 44.31% of the activities of cluster 4 units. As envisaged above, the FARC units in clusters 3 and 4 are also military oriented though not as much as those in cluster 1. They only specialize in some sort of specific military activity. Specifically, those units belonging to cluster 3 specialize in reinforcing the attacks of cluster 1 against the economic infrastructure of the country while those in cluster 4 devote their acts to the use of explosive materials.

A detailed analysis of the other clusters is left to the reader.

5. CONCLUSIONS

Clustering analysis is a simple statistical tool that divides into different groups (*clusters*) any collection of mathematically characterizable objects. This paper applies such tool to the Colombian armed conflict. Indeed, when applied to a FARC terrorist act database, this statistical procedure finds a natural clustering of the different FARC units according to the different types of terrorist acts they commit. The facts revealed in this paper should be useful not only for future military strategies, but also to determine a better priorization and geographical allocation of the scarce military resources.

For instance, the paper identifies a cluster of FARC units devoted to inflicting terrorism upon civilian society, to destroying the economic infrastructure of the country and to combating the legitimate armed forces of Colombia. Surprisingly, this cluster or military hard core of the

FARC only represents 44% of all FARC units. The paper also identifies two other clusters whose units specialize in certain sorts of military operations (attacks against infrastructure and use of explosive material). Again, these two clusters only represent 15% of all the FARC units. All other clusters seem to specialize in non-military activities (political, logistic, financial, etc).

From a military strategy and resource allocation point of view, devoting military personnel, equipment and resources to pursue, disarticulate and eliminate the FARC units belonging to these three clusters (but especially to the first one) is the most efficient policy (and a priority). Indeed, aiming and concentrating scarce military resources on the FARC military hard core, the one that has been identified in this paper, seems to be a wise choice. Immediate military confrontation of the FARC units belonging to all the other clusters is not efficient. Instead, operations intensive in financial and urban intelligence should be used to close in on these non-military oriented units in order to disarticulate them.

It must be emphasized that the paper employs the simplest definition of mathematical distance (Euclidean) and also the easiest clustering analysis procedure. This is not a problem given that the object of this paper is simply to illustrate the advantages for military strategy and resource allocation of the clustering analysis tool. More sophisticated clustering analysis algorithms are welcome to improve upon the results.

Finally, the usefulness of the results revealed by any statistical tool is a function of the quality of the data. Of course, data from any armed conflict is not of the best quality. Even though a big effort was done to clean and check for consistency with alternative sources the data employed in the paper, the authors are not responsible for the quality of the original sources.

6. BIBLIOGRAPHY

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7. APPENDIX 1: CLUSTERING BY FARC UNITS

7.1. Cluster 1

Cluster members*: (1), (2),(3), (5), (6), (7), (8), (10), (13), (14), (15), (17), (18), (19), (21), (22), (23), (24), (25) (26), (28), (29), (30), (31), (33), (34), (35), (36), (37), (38),(40), (41), (42), (45),(47), (48), (49), (50), (51), (54), (55), (56), (58), (59), (60), (61), (16, 39, 43, 44), (3, 15), (38, 52), (39, 43, 44), (45, Alfonso Castellanos), (5, 34), (6, Col. M. Jacobo Arenas), (61, 13, 32, 49), (8, Col. M. Jacobo Arenas),(8, 60), (Abelardo Romero), (Armando Ríos), (Aurelio Rodríguez), (Col. M. Daniel Aldana), (Col. M. Teófilo Forero), (CP. Abelardo Romero), (CP. Policarpa Salavarrieta), (CP. Victor Saavedra), (Jacinto Matallana)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Combats with Colombian Armed Forces	534	16, 81	87, 54
Vehicle theft/retention	462	14, 54	89, 02
Use of explosive element	455	14, 32	76, 34
Massacres	207	6, 52	82, 80
Bridges and roads blown	146	4, 85	76, 96
Oil ducts blown	147	4, 85	82, 49
Town and village harassment	149	4, 69	79, 68
Civilian murders	149	4, 69	86, 63
Electric infrastructure attacks	141	4, 44	64, 09
Kidnappees liberated	140	4, 41	86, 96
Kidnappings	136	4, 28	79, 53
Attacks to public force	135	4, 25	82, 32
Gas cylinder recovery/theft	100	3, 15	89, 29
Town and village attacks	64	2, 01	79, 01
Combats between insurgent groups	53	1, 67	68, 83
Attacks to public force installations	49	1, 54	69, 01
Vehicle burn	33	1, 04	82, 50
Assault on tolls and banks	31	0, 98	88, 57
Attacks to civilian installations	25	0, 79	65, 79
Electoral material theft/burn	14	0, 44	82, 35
Fugue	6	0, 19	100, 00
Armed strike	1	0, 03	100, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.2. Cluster 2

Cluster members*: (11), (12), (20), (46), (13, 63), (2, 3), (41, 59), (Argelino Godoy)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Massacres	16	30, 19	6, 40
Combats with Colombian Armed Forces	9	16, 98	1, 48
Electric infrastructure attacks	7	13, 21	3, 18
Oil ducts blown	7	13, 21	3, 66
Kidnappees liberated	3	5, 66	1, 86
Attacks to public force	2	3, 77	1, 22
Attacks to civilian installations	2	3, 77	5, 26
Vehicle theft/retention	2	3, 77	0, 39
Attacks to public force installations	1	1, 89	1, 41
Town and village attacks	1	1, 89	1, 23
Use of explosive element	1	1, 89	0, 17
Kidnappings	1	1, 89	0, 58
Bridges and roads blown	1	1, 89	0, 56
Assault on tolls and banks	0	0, 00	0, 00
Civilian murders	0	0, 00	0, 00
Combats between insurgent groups	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Town and village harassment	0	0, 00	0, 00
Electoral material theft/burn	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00
Vehicle burn	0	0, 00	0, 00
Gas cylinder recovery/theft	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.3. Cluster 3

Cluster members*: (4), (9), (16), (52), (26, 27), (26, 31), (53, 54), (C.P. Joaquín Ballén), (Héroes de Marquetalia)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Electric infrastructure attacks	58	23, 97	26, 36
Combats with Colombian Armed Forces	25	10, 33	4, 10
Vehicle theft/retention	24	9, 92	4, 62
Oil ducts blown	21	8, 68	10, 99
Bridges and roads blown	17	7, 02	9, 60
Use of explosive element	14	5, 79	2, 35
Civilian murders	12	4, 96	6, 42
Massacres	11	4, 55	4, 40
Town and village harassment	9	3, 72	5, 23
Kidnappings	9	3, 72	5, 26
Attacks to public force	8	3, 31	4, 88
Kidnappees liberated	7	2, 89	4, 35
Gas cylinder recovery/theft	7	2, 89	6, 25
Attacks to public force installations	5	2, 07	7, 04
Town and village attacks	4	1, 65	4, 94
Assault on tolls and banks	3	1, 24	8, 57
Attacks to civilian installations	2	0, 83	5, 26
Combats between insurgent groups	2	0, 83	2, 60
Electoral material theft/burn	2	0, 83	11, 76
Vehicle burn	2	0, 83	5, 00
Fugue	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.4. Cluster 4

Cluster members*: (27), (32), (44), (53), (64), (4, 7), (Alirio Torres), (CP. Alonso Cortés), (F.U. Antonio Nariño)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Use of explosive element	113	44, 31	18, 96
Combats with Colombian Armed Forces	20	7, 84	3, 28
Vehicle theft/retention	18	7, 06	3, 47
Civilian murders	12	4, 71	6, 42
Kidnappings	12	4, 71	7, 02
Attacks to public force	11	4, 31	6, 71
Massacres	11	4, 31	4, 40
Electric infrastructure attacks	10	3, 92	4, 55
Town and village harassment	8	3, 14	4, 65
Oil ducts blown	7	2, 75	3, 66
Bridges and roads blown	7	2, 75	3, 95
Town and village attacks	6	2, 35	7, 41
Kidnappees liberated	5	1, 96	3, 11
Gas cylinder recovery/theft	4	1, 57	3, 57
Attacks to public force installations	3	1, 18	4, 23
Combats between insurgent groups	3	1, 18	3, 90
Attacks to civilian installations	2	0, 78	5, 26
Vehicle burn	2	0, 78	5, 00
Electoral material theft/burn	1	0, 39	5, 88
Assault on tolls and banks	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.5. Cluster 5

Cluster members*: (1, 7), (29, 64), (33, 45), (9, 34), (Arturo Medina), (Col. M. Bladimir Stiven), (Col. M. Jacobo Arenas)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Combats between insurgent groups	18	24, 66	23, 38
Use of explosive element	9	12, 33	1, 51
Vehicle theft/retention	9	12, 33	1, 73
Combats with Colombian Armed Forces	8	10, 96	1, 31
Kidnappings	6	8, 22	3, 51
Attacks to civilian installations	4	5, 48	10, 53
Attacks to public force installations	3	4, 11	4, 23
Civilian murders	3	4, 11	1, 60
Attacks to public force	2	2, 74	1, 22
Electric infrastructure attacks	2	2, 74	0, 91
Town and village attacks	2	2, 74	2, 47
Massacres	2	2, 74	0, 80
Bridges and roads blown	2	2, 74	1, 13
Kidnappees liberated	1	1, 37	0, 62
Gas cylinder recovery/theft	1	1, 37	0, 89
Oil ducts blown	1	1, 37	0, 52
Assault on tolls and banks	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Town and village harassment	0	0, 00	0, 00
Electoral material theft/burn	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00
Vehicle burn	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.6. Cluster 6

Cluster members*: (15, 48), (35, 37), (37, 42), (38, 56), (8, 15), (Alfonso Castellanos, 28, 45, 10), (CP. Manuela Beltrán)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Attacks to public force	4	30, 77	2, 44
Combats with Colombian Armed Forces	4	30, 77	0, 66
Town and village harassment	4	30, 77	2, 33
Oil ducts blown	1	7, 69	0, 52
Assault on tolls and banks	0	0, 00	0, 00
Attacks to public force installations	0	0, 00	0, 00
Attacks to civilian installations	0	0, 00	0, 00
Electric infrastructure attacks	0	0, 00	0, 00
Town and village attacks	0	0, 00	0, 00
Civilian murders	0	0, 00	0, 00
Combats between insurgent groups	0	0, 00	0, 00
Use of explosive element	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Electoral material theft/burn	0	0, 00	0, 00
Vehicle theft/retention	0	0, 00	0, 00
Kidnappees liberated	0	0, 00	0, 00
Massacres	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00
Vehicle burn	0	0, 00	0, 00
Gas cylinder recovery/theft	0	0, 00	0, 00
Kidnappings	0	0, 00	0, 00
Bridges and roads blown	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.7. Cluster 7

Cluster members*: (43), (13, 32, 49, 61), (14, 15), (2, MIBOL), (13, 14, 15), (38, 46), (9, 47), (52,54), (CP. Enrique Villamizar)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Attacks to public force installations	9	21, 95	12, 68
Vehicle theft/retention	4	9, 76	0, 77
Oil ducts blown	4	9, 76	2, 09
Bridges and roads blown	4	9, 76	2, 26
Combats with Colombian Armed Forces	3	7, 32	0, 49
Explosive element	3	7, 32	0, 50
Vehicle burn	3	7, 32	7, 50
Attacks to public force	2	4, 88	1, 22
Electric infrastructure attacks	2	4, 88	0, 91
Civilian murders	2	4, 88	1, 07
Town and village harassment	2	4, 88	1, 16
Kidnappees liberated	1	2, 44	0, 62
Massacres	1	2, 44	0, 40
Kidnappings	1	2, 44	0, 58
Assault on tolls and banks	0	0, 00	0, 00
Attacks to civilian installations	0	0, 00	0, 00
Town and village attacks	0	0, 00	0, 00
Combats between insurgent groups	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Electoral material theft/burn	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00
Gas cylinder recovery/theft	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.8. Cluster 8

Cluster members*: (39), (65), (10, 45), (24, 57), (4, 5), (13, 49), (Alfonso Castellanos), (CP. Ricardo Franco), (Joselo Lozada)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Civilian murders	8	38, 10	4, 28
Attacks to civilian installations	3	14, 29	7, 89
Combats with Colombian Armed Forces	3	14, 29	0, 49
Oil ducts blown	2	9, 52	1, 05
Assault on tolls and banks	1	4, 76	2, 86
Combats between insurgent groups	1	4, 76	1, 30
Use of explosive element	1	4, 76	0, 17
Kidnappees liberated	1	4, 76	0, 62
Massacres	1	4, 76	0, 40
Attacks to public force	0	0, 00	0, 00
Attacks to public force installations	0	0, 00	0, 00
Electric infrastructure attacks	0	0, 00	0, 00
Town and village attacks	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Town and village harassment	0	0, 00	0, 00
Electoral material theft/burn	0	0, 00	0, 00
Vehicle theft/retention	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00
Vehicle burn	0	0, 00	0, 00
Gas cylinder recovery/theft	0	0, 00	0, 00
Kidnappings	0	0, 00	0, 00
Bridges and roads blown	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.

7.9. Cluster 9

Cluster members*: (66), (16, 10 y 29), (2, 8, Col. M. Jacobo Arenas), (2,17), (2, 16, 39) (32, 48, 49), (51, 53) (Col. M. Arturo Ruiz), (Jacobo Prias)

Type of act	# of acts	%of acts in cluster	% of acts in sample
Kidnappings	6	28, 57	3, 51
Town and village attacks	4	19, 05	4, 94
Combats with Colombian Armed Forces	4	19, 05	0, 66
Kidnappees liberated	3	14, 29	1, 86
Attacks to public force installations	1	4, 76	1, 41
Civilian murders	1	4, 76	0, 53
Massacres	1	4, 76	0, 40
Oil ducts blown	1	4, 76	0, 52
Assault on tolls and banks	0	0, 00	0, 00
Attacks to public forces	0	0, 00	0, 00
Attacks to civilian installations	0	0, 00	0, 00
Electric infrastructure attacks	0	0, 00	0, 00
Combats between insurgent groups	0	0, 00	0, 00
Use of explosive element	0	0, 00	0, 00
Fugue	0	0, 00	0, 00
Town and village harassment	0	0, 00	0, 00
Electoral material theft/burn	0	0, 00	0, 00
Vehicle theft/retention	0	0, 00	0, 00
Armed strike	0	0, 00	0, 00
Vehicle burn	0	0, 00	0, 00
Gas cylinder recovery/theft	0	0, 00	0, 00
Bridges and roads blown	0	0, 00	0, 00

* Each group in parenthesis (x, y, z) was treated as a single unit if x, y and z operate jointly.