An Overview of NATO Air Operations in Libya

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Abstract

This paper seeks to achieve three main objectives: (1) to determine the sum of air sorties and air strike sorties conducted by NATO alliance in Libya over the period April to October. (2) To discover the nature and the number of targets destroyed. (3) To find out which parts of Libya have the largest number of destroyed targets over this period.

In terms of research methodology, data were collected from NATO main website. The analysed data presents a seven months period of air operation undertaken by NATO.

In this study, descriptive statistical analysis was used. The main variables considered are: date of operation, total sorties, total strike sorties, vicinity, number of targets destroyed and type of targets. One-way analysis of variance (ANOVA) or Kruskal-Wallis (KW) tests were used to examine the research hypotheses.

The key findings are: (1) approximately 36.4 % from the total sorties are total strike sorties. (2) Significant difference among the seven months was noticed. (3) High efficiency and effectiveness were detected throughout the seven months of air operations as air operations decreased and targets destroyed increased. (4) The main focus of NATO activities was to destroy storages, resupplying facilities and heavy weapons.

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The value of this paper can be seen from the following points: (1) the study is pioneering as none has conducted such research. (2) The study might be seen as an objective indicator to assess NATO operations effectiveness and efficiency in performing its mission. (3) The results emerged might be compared with other studies conducted elsewhere in the world to extract some key inferenceز

Finally, the paper concludes by acknowledging some research limitations and suggesting a number of advanced areas of research.

Key Words: Air Operations, NATO, Libya

1. Introduction

North **A**tlantic **T**reaty **O**rganization (NATO) was established in Washington in 1949. A total of 28 countries are now members of NATO, other countries who are not members of NATO also can be cooperated with the treaty's political and military guidelines. A part from peace keeping between countries and deterring war, NATO also acts in the area of crisis management and has guidelines help preventing conflict between countries and resolve any crisis.

On 31 March 2011, NATO allies decided to take on military operations in Libya under United Nations Security Council Resolution 1970 and 1973. The objective of this operation was to protect civilians and civilian-populated areas under threat of Gaddafi troops. The mission consists of three elements: an arms embargo, no-fly zone and action to protect Libyan civilians from attack or the threat of attack (Vandewalle, 2012).

Geographically, Libya is a North African country that lies on the south coast of the Mediterranean Sea with a coastline of about 1,900

kilometers. Apart from the Mediterranean Sea coast, Libya has frontiers with six Arabic and African countries.

The country has a small population of around 6 million residents occupying, relatively, a very large area of about 1,760,000 square kilometers. The vast majority of the population live in the coastal regions due to the fact that most of the land is desert, which forces about 90% of the people to live in just 10% of the land (Douglas, 1973 and Anderson, 1987).

On April 1963, the political system of Libya was transformed from federal to unitary. All government departments were put under the direct control of the central government. The official name of the country was also changed to the Kingdom of Libya (Farley, 1971).

On September 1969, the monarchy was abolished by Colonel Ghaddafi, proclaiming the country as the Libyan Arab Republic. The first several years of the new government were consumed with efforts to eradicate corruption and symbols of Western imperialism (Wright, 1981).

Different sanctions were imposed on Libya by the US and UN. The US forbade the imports of Libyan crude oil in 1981 and extended it later to include direct trade, commercial contracts, and travel activities. The UN embargo began in 1992 after the accusation of two Libyan citizens of involvement in the crash of an American aeroplane in Scotland in 1988. The UN embargo was eased in 1999 and completely ended in 2003 after the country accepted responsibility for the crash, while the US embargo was ended by the closing stages of the same year (Vandewalle, 2012).

After the year 2003, more progress in the Libyan foreign relationships was made by a major step taken by the Libyan government as the Mass

Destruction weapons have been left. This step improved significantly the image of Libya and the country has opened more to foreign world. More embassies and political representations opened in Libya and great number of international businesses has started acting in Libya in different area of business.

Despite these improvements at foreign political level, the Libyan local community was suffering and no real improvements have been made to satisfy their needs. This situation have been aggravated and resulted in the 17th of February 2011 Revolution. This resulted in the intervention of the United Nations and NATO alliance to protect the Libyan civilians from Gaddafi troop's attacks. Consequently, this study comes to give an overview of NATO Air Operations in Libya throughout the liberty war.

The content of this study has been structured into six main sections. Section one presents research objectives. Research hypotheses and contributions were discussed in sections two and three respectively. Research methodology and findings were explained in sections four and five. Finally, research conclusion and implication were discussed in section six.

2. Research Objectives

This paper seeks to give descriptive analysis to NATO air Operations on Libya over a period of seven months from April to October 2011. The main objectives are:

1. To determine the sum of air sorties and air strike sorties conducted by NATO alliance in Libya over the mentioned period.
2. To discover the nature and the number of targets destroyed by NATO alliance in Libya over this period.

3. To find out which parts of Libya (cities or vicinity) have the largest number of destroyed targets over this period.
4. To introduce some thoughts and implications.

3. Research Hypotheses

For the purposes of this research, the following hypotheses have been formulated:

1. There is no difference among the seven months of NATO air operations in Libya in terms of number of air sorties.
2. There is no difference among the seven months of NATO air operations in Libya in terms of number of air strikes.
3. There is no difference among the seven months of NATO air operations in Libya in terms of number of targets destroyed.

4. Research contribution

The scientific value of this paper can be clearly identified through the review of the following points:

1. To the best of the researchers' knowledge, the study can be considered pioneering as none has conducted such research using NATO data. This, in turn, makes its results valid and reliable for NATO decision makers and the Libyan National Transition Council (NTC) as well.
2. This paper explains in more detail the most targeted regions in Libya and the most destroyed weapons as well.
3. The study might be seen as an objective external indicator to assess the effectiveness and efficiency of NATO operations in Libya.

4. The results emerged might be compared with other studies conducted elsewhere to evaluate the degree of similarities and divergence among all those studies.

5. Research Methodology

For the sake of this paper, data were collected from NATO daily reports available from the alliance main webpage[1]. The analysed data presents a seven months period of air operation undertaken by NATO from April to October 2011. The rationale behind comparing the seven months of air operations was to extract some inferences within the seven months of the NATO air operations in Libya.

Several relevant variables were examined in the paper. Date of operation, total sorties, total strike sorties, city or vicinity of city, number of targets destroyed and type of targets are all factors considered in the analysis process.

In terms of the analysis process, descriptive statistical analysis was used. One-way analysis of variance (ANOVA) and Kruskal-Wallis (KW) were used to test the statistical significance among the seven months.

6. Research results

As mentioned previously, the data set of this research obtained from the NATO's main website over a period of seven months. The data analysis plays a vital role in data sets to understand summaries and find the more useful information structure (Michael, 2005).

6.1 Air Operations and Number of Targets

[1] All reports can be obtained from NATO website: (www.nato.int/cps/en/natolive/news_71994.htm).

To investigate the activities of NATO air operations in Libya over seven-month from April to October 2011, Table 6.1 provides a summary statistics of air sorties during this period. The first column shows the total air sorties for each month, with total air sorties over the whole period are of about (26230). The second column shows the mean of air sorties. This helps us to obtain a general idea of the average about the air sorties for each month and over the whole period (127.3). The remaining column shows the standard derivation which gives information about the variability of air sorties during this period. Having looked at this table, we observed that the air sorties starting are high (4647) in the first two-month and then decreasing at the end of this period of about (1845). This may be due to the fact that NATO performance control all-fly zone to protect civilians from threat of attack.

Table 6.1 shows air operations of NATO based on air sorties over seven months

Air operations	Month	Descriptive statistics		
		Sum	Mean	Std
Air sorties	April	4647	149.9	15.4
	May	4471	149.0	10.3
	June	4141	138.0	13.9
	July	4005	129.2	11.2
	Aug	3738	120.6	8.9
	Sep	3383	112.8	11.5
	Oct	1845	80.2	10.7
	Total	26230	127.3	24.9

Figure 6.1 Shows trend air operations of total air sorties

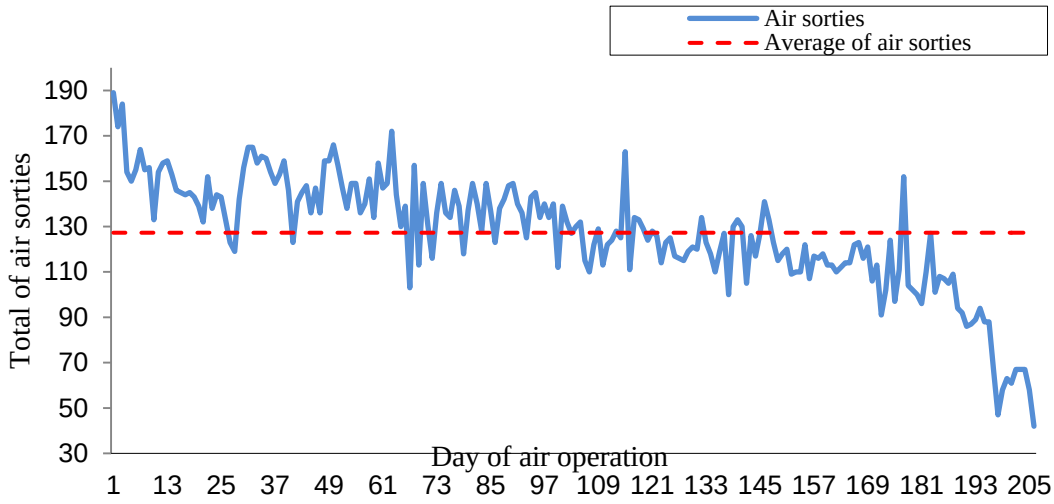


Figure 6.1 presents daily air sorties over the whole period. The solid curve shows the air sorties, whereas the dashed line shows the average during this period. The fluctuations in air sorties were possibly caused by countries who are members of this mission contributed strongly or slightly.

Table 6.2 shows descriptive statistics of the strike sorties for each month and overall period. From this table, we can observe that there are differences between the first month and the other months, and there are significant differences in May, June and July. This however coincides with a sharper decrease in strike sorties at the end of the mission.

Table 6.2 shows air operations of NATO based on strike sorties

Air operations	Month	Descriptive statistics		
		Sum	Mean	Std
Air strikes	April	1828	58.9	8.4
	May	1567	52.2	6.0
	June	1516	50.5	7.4
	July	1534	49.5	6.6
	Aug	1369	44.2	7.8
	Sep	1206	40.2	5.5
	Oct	532	23.1	11.3
	Total	9552	46.4	12.5

Figure 6.2 shows daily strike sorties over the whole period. The solid curve shows the strike sorties, while the dashed line shows the average during this period. From this graph we conclude that the activities of NATO strike sorties have been fluctuating over the seven-month period of the air operations, starting high and then are up-down the average (dashed line), which is similar pattern to the air sorties (see Figure 6.1).

Figure 6.2 Shows trend air operations of daily strike sorties

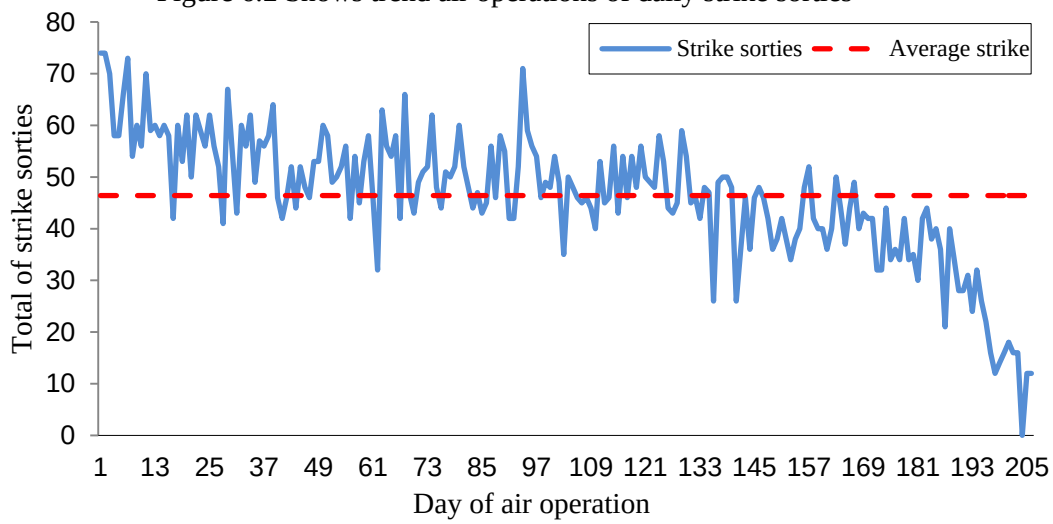


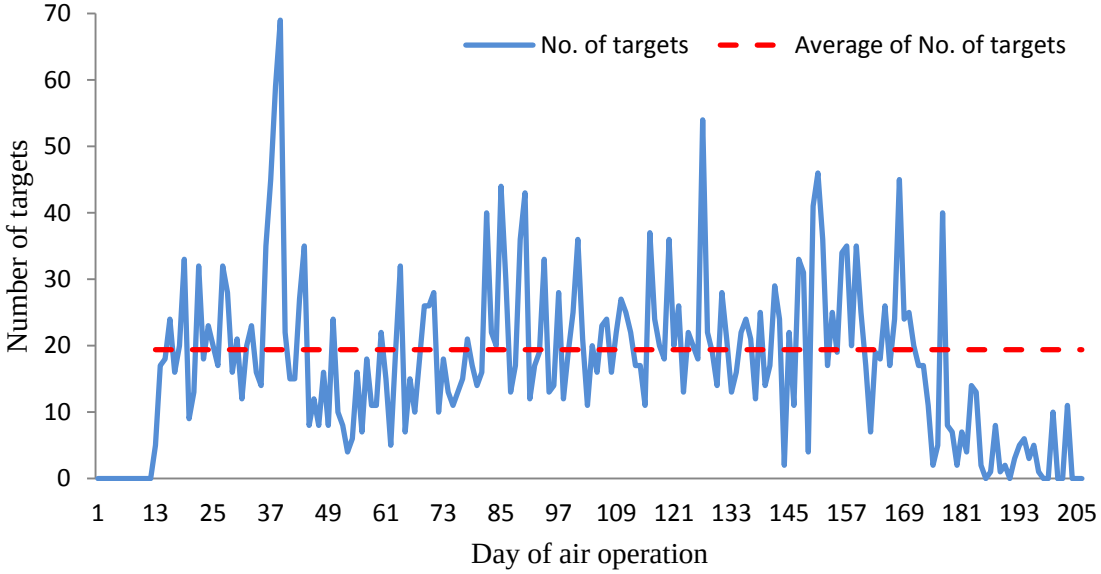
Table 6.3 demonstrates descriptive statistics of the number of targets among the seven months of the NATO air operations. It can therefore be concluded that the efficiency of strike sorties was substantial higher average number of targets in the first months and rapidly decreased in October (due to the end of mission).

Table 6.3 shows air operations of NATO based on number of targets

Air operations	Month	Descriptive statistics		
		Sum	Mean	Std
No. of targets	April	374	19.7	7.7
	May	599	19.9	15.3
	June	611	20.4	10.4
	July	669	21.6	7.1
	Aug	691	22.3	11.3
	Sep	569	18.9	11.3
	Oct	71	5.1	4.0
	Total	3584	19.4	11.3

Figure 6.2 summarizes the total number of targets during the seven months of air operations. The aim of this plot is to explore the activities of NATO air operations on a daily basis. This figure demonstrates that there are no clear targets in the first 12 days of the NATO mission. This might be interpreted as a sort of evaluation to the whole situation before taking any military action.

Figure 6.3 Shows trend targets in days of air operations



The behavior of the number of targets represented by the trend line (solid line) is fluctuated up-down the average (dashed line) with high variability. Thus, it might also be useful to say that the number of targets is above the average in some days, especially on the 8th of May which reached about (69) targets as shown in the above figure. The natural question arises "why is the number of targets fluctuated with high variability?" One possible answer is because members of NATO or countries that involved in the military operations do not have equal input in achieving the task.

6.2 Type of Targets

Regarding the nature of targets destroyed by NATO air operations over the whole period, a frequency and percentage have been used as presented in Table 6.4.

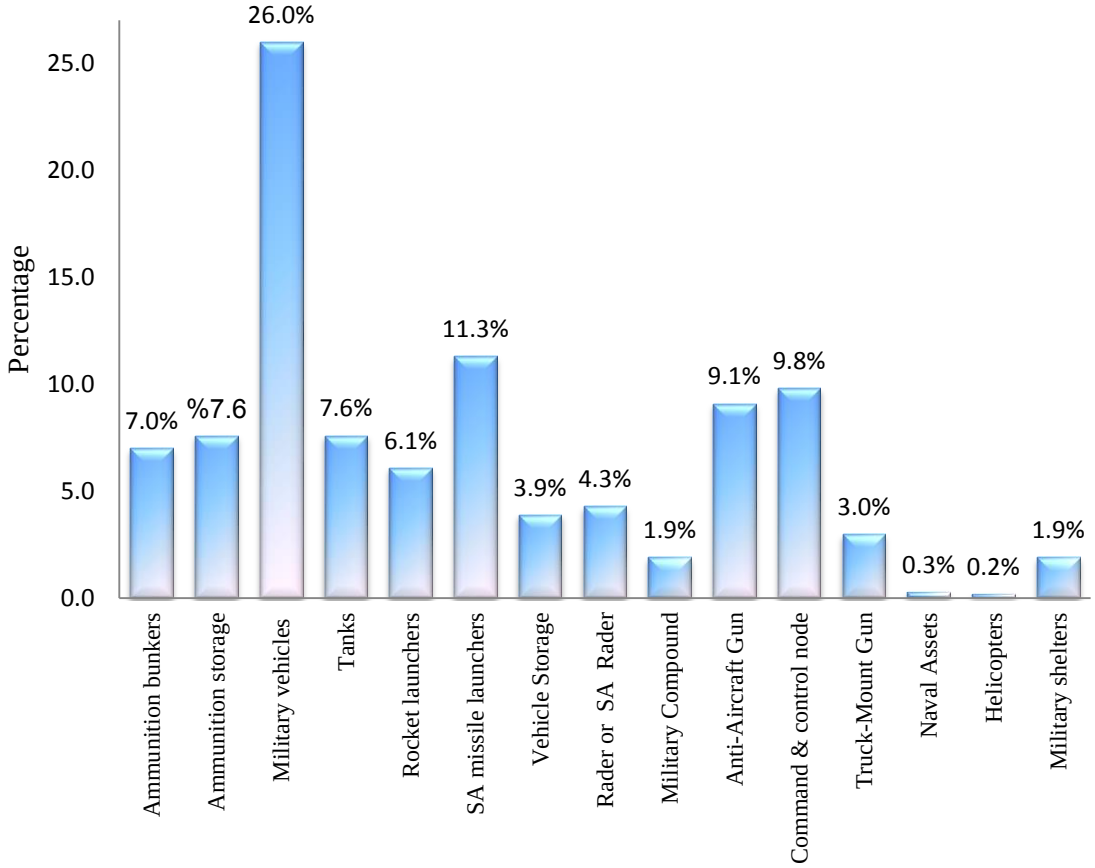
Table 6.4 Distribution the type of targets over the whole period (April to October)

Type of targets / Month		April	May	June	July	Aug.	Sept.	Oct.	Total
Ammunition storage bunkers or facility	Freq.	108	20	17	-	62	41	4	252
	%	28.9	3.3	2.8	-	9.0	7.2	5.6	7.0
Ammunition storage sites	Freq.	50	174	3	16	31	-	-	274
	%	13.4	29.0	0.5	2.4	4.5	-	-	7.6
Military vehicles or logistic Trucks	Freq.	55	61	145	249	226	152	44	932
	%	14.7	10.2	23.7	37.2	32.7	26.7	62.0	26.0
Tanks	Freq.	64	43	58	43	37	25	2	272
	%	17.1	7.2	9.5	6.4	5.4	4.4	2.8	7.6
Multiple rocket launchers	Freq.	29	37	22	42	53	31	3	217
	%	7.8	6.2	3.6	6.3	7.7	5.4	4.2	6.1
Surface to air missile launchers or canisters	Freq.	18	41	53	46	123	123	-	404
	%	4.8	6.8	8.7	6.9	17.8	21.6	-	11.3
Vehicle Storage or facility	Freq.	14	86	28	1	1	6	2	138
	%	3.7	14.4	4.6	0.1	0.1	1.1	2.8	3.9
Rader	Freq.	11	10	25	37	38	34	-	155
	%	2.9	1.7	4.1	5.5	5.5	6.0	-	4.3
Military Compound	Freq.	8	15	35	1	7	3	-	69
	%	2.1	2.5	5.7	0.1	1.0	0.5	-	1.9
Anti-Aircraft Gun or Self Propelled Artillery piece	Freq.	8	21	74	74	57	91	1	326
	%	2.1	3.5	12.1	11.1	8.2	16.0	1.4	9.1
Command and control node or facility	Freq.	7	49	51	158	45	32	9	351
	%	1.9	8.2	8.3	23.6	6.5	5.6	12.7	9.8
Truck-Mount Gun or Mortar	Freq.	-	25	65	1	-	18	-	109
	%	-	4.2	10.6	0.1	-	3.2	-	3.0
Naval Assets	Freq.	-	9	-	-	2	-	-	11
	%	-	1.5	-	-	0.3	-	-	0.3
Helicopter or maintenance area	Freq.	2	5	-	-	-	-	-	7
	%	0.5	0.8		-	-	-	-	0.2
Military shelters or firing position	Freq.	-	3	35	1	9	13	6	67
	%	-	0.5	5.7	0.1	1.3	2.3	8.5	1.9
Total	Freq.	374	599	611	669	691	569	71	3584
	%	10.4	16.7	17.0	18.7	19.3	15.9	2.0	100

From the table above it can be clearly seen that the main type of targets destroyed in April is Ammunition storage bunkers followed by Tanks, Military vehicles and Ammunition storage sites are about of (74.1%). The most types of destroyed targets in May are Ammunition storage and Vehicle storage and facility followed by Military vehicles of Command and control nodes are about (62.0%). In June, Military vehicles are the most types of targets destroyed and Anti-Aircraft Gun or Artillery Pieces, followed by Truck-Mount and Tanks are of about (56.1%). In July, the

most types of targets are Military vehicles and Command control nodes, followed by Anti-Aircraft Gun or Artillery Pieces are about (71.9%). In August, Military vehicles are the most types of targets destroyed and Surface to air missile launchers are about (51.0%). In September, Military vehicles are the most types of targets destroyed, followed by Surface to air missile launchers and Anti-Aircraft Gun or Artillery Pieces are about (64.3%). Finally, Military vehicles are the most types of targets destroyed and Command control nodes are about (74.7%).

Figure 6.4 shows the total number of targets destroyed in seven months



The total targets destroyed in the whole period will be clearer from Figure 6.4. From this chart, it can be clearly understood that the military vehicles are the most targets

destroyed about (26%), followed by Surface to air missile launchers(11.3), command and control nodes of (9.8%) and Anti-Aircraft

Gun or Artillery Pieces of about (9.1%), which is more than half of the total number of targets destroyed.

6.3 Targeted Regions

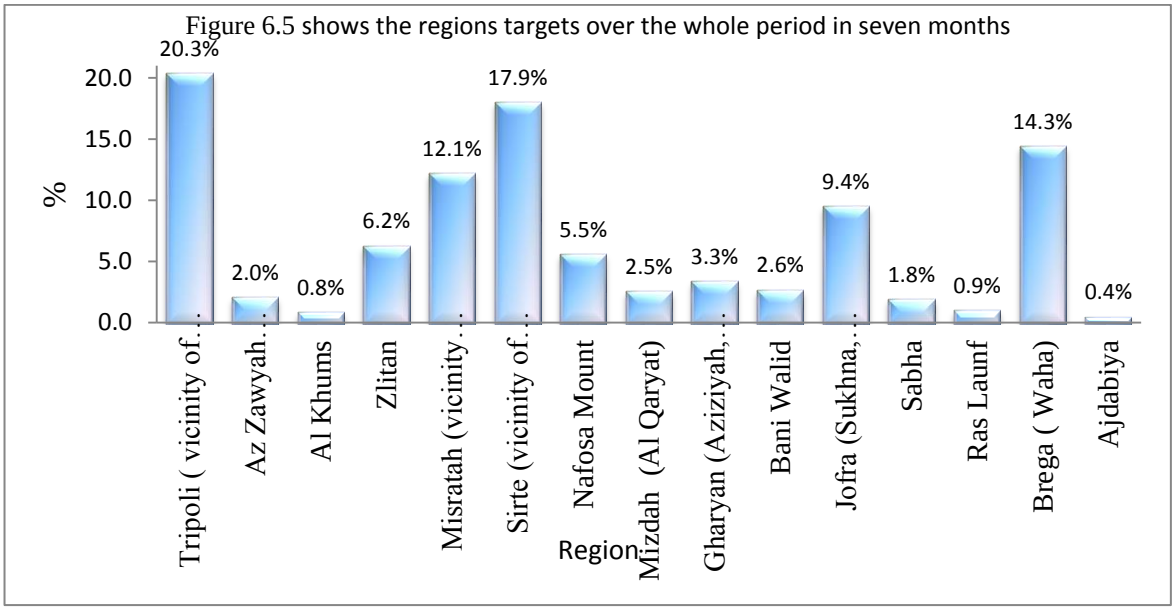
In terms of the region of air operations, a descriptive analysis has been used to explain which regions are more targeted as shown in the table below.

Table 6.5 Distribution of regions targets over the whole period (April to October)

City (or the vicinity) / Month		April	May	June	July	Aug.	Sept.	Oct.	Total
Tripoli (or vicinity)	Freq.	98	122	181	147	178	-	-	726
	%	26.2	20.4	29.6	22.0	25.8	-	-	20.3
Az Zawyah (or Surman or Zuwara)	Freq.	-	19	5	14	34	-	-	72
	%	-	3.2	0.8	2.1	4.9	-	-	2.0
Al Khums	Freq.	10	11	-	3	4	-	-	28
	%	2.7	1.8	-	0.4	0.6	-	-	0.8
Zlitan	Freq.	-	-	46	115	61	-	-	222
	%	-	-	7.5	17.2	8.8	-	-	6.2
Misratah (or vicinity) or Tawurgha	Freq.	92	117	103	97	23	-	-	432
	%	24.6	19.5	16.9	14.5	3.3	-	-	12.1
Sirte (or vicinity) or Buwayrat	Freq.	75	60	6	12	150	313	27	643
	%	20.1	10.0	1.0	1.8	21.7	55.0	38.0	17.9
Nafosa Mountain	Freq.	46	62	57	27	4	-	-	196
	%	12.3	10.4	9.3	4.0	0.6	-	-	5.5
Mizdah (or Al Qaryat)	Freq.	28	55	8	-	-	-	-	91
	%	7.5	9.2	1.3	-	-	-	-	2.5
Gharyan (or Aziziyah or Birl Ghanam or Okba or Tiji)	Freq.	-	2	15	38	65	-	-	120
	%	-	0.3	2.5	5.7	9.4	-	-	3.3
Bani Walid	Freq.	-	-	-	-	15	34	44	93
	%	-	-	-	-	2.2	6.0	62.0	2.6
Jufra (Sukhna or Hun or Waddan or Zillah)	Freq.	1	90	15	31	36	165	-	338
	%	0.3	15.0	2.5	4.6	5.2	29.0	-	9.4
Sabha	Freq.	-	4	1	-	4	57	-	66
	%	-	0.7	0.2	-	0.6	10.0	-	1.8
Ras Launf	Freq.	2	7	8	1	16	-	-	34
	%	0.5	1.2	1.3	0.1	2.3			0.9
Brega (or Waha)	Freq.	13	46	166	184	101	-	-	510
	%	3.5	7.7	27.2	27.5	14.6	-	-	14.3
Ajdabiya	Freq.	9	4	-	-	-	-	-	13
	%	2.4	0.7	-	-	-	-	-	0.4
Total	Freq.	374	599	611	669	691	569	71	3584
	%	10.4	16.7	17.0	18.7	19.3	15.9	2.0	100.0

Table 6.5 shows that Tripoli followed by Misratah, Sirte and Nafosa Mountain are the most regions targeted in April of about (83.2%). The same in May, Tripoli (or the vicinity of Tripoli), Misratah (or vicinity of Misratah) are of about (40.0%). The other region such as Jofra, Nafosa Mountain and Sirte region have about (15%), (10.4%) and (10%) respectively. In June, the numbers of targets are increased for Tripoli region of (29.6%), followed by Brega of about (27.2%), which represent more than half of the total number of targets. Misratah region and Nafosa Mountain are of about (16.9%)and (9.3%)respectively. In the fourth month July, Brega has a number of targets of about (27.5%), followed by Tripoli region of (22.0%). Zlitan and Misratah region have number of targets about (17.3%) and (14.5%) respectively. In August, Tripoli, Sirte and Brega have number of targets of about (62.1%). In September, the Concentration of targets are in Sirte of about (55.0%), followed by Jofra which has a number of targets of about (29.0%). Finally, Bani Walid has a number of targets of about (62.0%) and Sirte has a number of targets of about (38.0%).

Figure 6.5 gives clear picture about the locations of NATO air operations. The figure



shows that Tripoli region has a high percentage of the number of targets about (20.3%) throughout the seven months, followed by Sirte, Brega and Misratah which have a number of targets about (17.9%), (14.3%) and (12.1%) respectively. The remaining percentages are distributed to the other regions of about (35.4%).

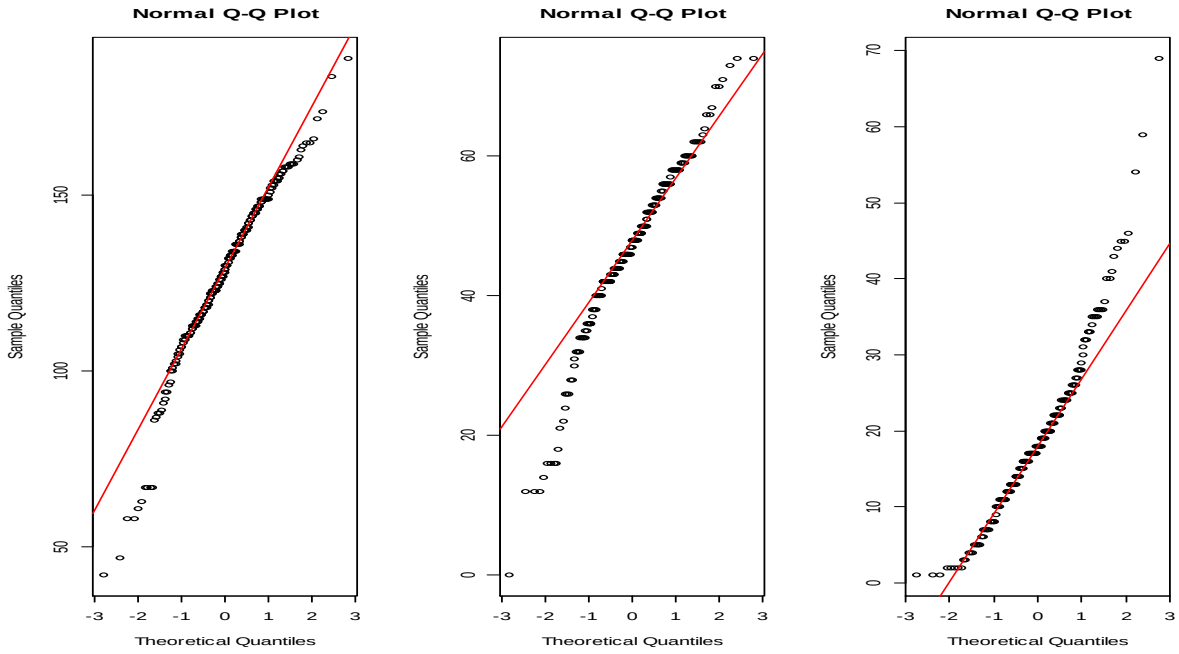
6.4 Test Statistical Significance

Classical statistical analysis can help us to determine whether there is a significant difference among the seven months by using an appropriate statistical test. For instance, we may want to know on the basis of months whether there is a difference in the effectiveness of air sorties, strike sorties and the number of targets. For this sort of situation we perform an ANOVA or Non-parametric ANOVA depending on a test of normality.

6.4.1 Test For Normality

At first, a graphical test for normality of data of each of the above variable is made by having a normal Q-Q plot of data. Figure 6.6 gives the normal Q-Q plot of air sorties on the left panel that the points do not lay on a straight line and thus the air sorties variable cannot be considered as following a normal distribution. Similarly, other variables like strike sorties in the centre panel and the number of targets on the right panel do not follow normal distribution.

Figure 6.6 shows normal Q-Q plot for data of air sorties, strike sorties and number of targets



Another way of looking at the test of normality is using Shapiro-Wilk tests (Patrick Royston,1982). The *p*-value is 0.002, 0.001 and 0.000 for air sorties, strike sorties and number of targets respectively. Hence the null hypothesis that air sorties, strike sorties and number of targets have followed a normal distribution which is strongly rejected at 1% level significant.

6.4.2 Non-parametric ANOVA

Since the variables, air sorties, strike sorties and number of targets are count data (discrete); one-ANOVA is carried out by a non-parametric method suggested by Kruskal and Wallis (1952). Table 6.6 shows the ANOVA results based on air sorties, strike sorties and number of targets.

Table 6.6 Comparison of air operations over the whole period (April to October)

Air operations	Sum	Statistical analysis			
		Median	Kruskal-Wallis	df	*p*-value
Air sorties	26230	129.5	146.505	6	0.000
Strike sorties	9552	47.5	119.166	6	0.000
Targets	3584	18.0	35.116	6	0.000

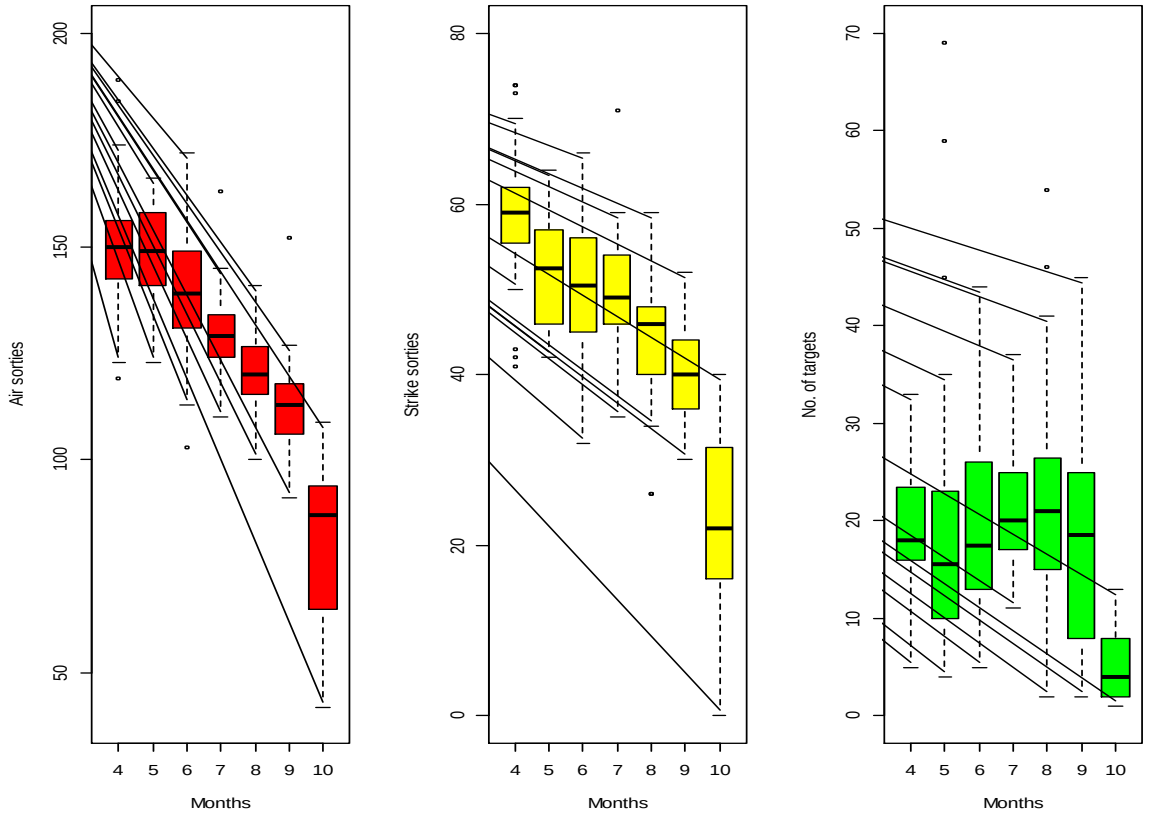
From this table, we can notice that there is a significant probability of (*p*-value=0.000) <0.001 among the seven months of the total sorties, giving a significance probability of (*p*-value=0.000) <0.001 for the total strike sorties and giving a significant probability of (*p*-value=0.000) <0.001 for the total targets. Therefore, the null hypothesis is rejecting at the 0.1% level of significant.

6.4.3 Plots For Interpreting ANOVA

Here we have three variables and seven months, the variables are called air sorties, strike sorties and number of targets.

The boxplot (box and whisker) is used to show the variation within each month and also whether there is skew within each month (Figure 6.7). Outliers are shown above whisker, so the tops (75% quartile) and bottoms (25% quartile) of bars are the maxima and minima within each month. The medians for months are all equal or lower than 50% percentile, except October which is higher than 75% percentile of air sorties on the left panel as well as strike sorties in the centre panel except August which is higher than 75% percentile.

Figure 6.7 shows Box and Whisker plot for data of air sorties, strike sorties and number of targets



The medians for months are all equal or lower than 50% percentile, except September which is higher than 75% percentile of number of targets at right panel. From this figure we suggest that there is a significant difference from the first three months to the last four months of air sorties and strike sorties, while there are significant differences in numbers of targets from one to another (see above for the analysis).

7. Research Conclusions

As is the case for all research, it is vital to come to the stage where results and implications represent the key output of the study conducted. Hence, the next sections will be allocated to discuss the research results and main implications.

7.1 Research Results

After collecting and analysing the data, several key findings have been emerged.

First, approximately (36.4%) of the total sorties are total strike sorties only. Second, the effectiveness and efficiency of NATO operations witnessed reasonable improvements. A decrease in the air sorties and strikes were noticed at a time where the number of destroyed targets increased. Third, NATO operations focused in the first three months on destroying military storage, command control nodes, ammunition storages and heavy weapons. Fourth, NATO operations focused throughout the whole period on the following weapons: military vehicles, command and control nodes, ammunition storages, tanks, anti-air-craft guns and finally, surface to air missile launchers. Fifth, the NATO activities have seen substantial increase in the number of targets from the first month to the third month by more than (40.0%). Then increased by (37.6%) from the fourth month to the fifth month and increased by (3.2%) from the fifth month to the sixth month. However, the number of targets decreased from the sixth month to the last month by (87%). Finally, there is a highly significant difference among the months of air operations in terms of air sorties, strike sorties and the number of targets destroyed.

The result of this research highlights some general and specific implications as follows:

1. If the NATO mission lasted longer that means the whole Mediterranean and North African region will be unstable and then under several threats, which is against the NATO main objectives

established in 1949. Hence, the alliance has to find an end to this campaign.

2. Due to the NATO air operations in Libya, huge number of illegitimate migrants has fled to Mediterranean countries (Italy, Malta…etc). This issue is one of the main challenges facing the European countries during the last few years and this issue aggravated during the campaign on Libya.
3. The outcome of seven months of NATO air operations has ended the capabilities of Gaddafi's military power which means that NATO was successful in implementing 1970 and 1973 resolution concerning the protection of civilians in Libya.

4. The accurate revision of NATO operations in Libya throughout the seven months has explicitly explained the type of military targets destroyed. This, in fact, clearly contradicts the Gaddafi's regime media announcement that NATO operations targeted civilian-populated areas.

5. The inability to build strong structure to the National Transitional Council (NTC) to manage the whole country very well has acted as a deterrent to ending the alliance mission quickly as more support was required to guarantee peace in the region. This, in fact, necessitated seven months of NATO support.
6. The lesson from the Libyan case might be obvious: Even after killing Gaddafi in the Libyan fighting, the many thousands of Libyans who have fought for his regime (especially in Sirt; Sabha and Baniwalid cities) would have to be incorporated (in a way or another) in shaping a new political system in Libya. Indeed, bringing the war to an end and keeping peace in the new Libya is

not a simple task. This requires more negotiations, negotiations and talks especially with some influential Libyan tribes' leaders. Otherwise, stability of the country will be a dream difficult and maybe impossible to achieve.

7.3Future Research

The current research opens the door for a new area of research. This study tried to assess the international alliance performance through using the real data offered by NATO main webpage. However, using this approach alone might not be sufficient. Hence, new area of research might be to focus on investigating Libyans' views on the performance of the alliance on Libya. This requires designing a questionnaire and target different types of respondents such as revolutioners, military forces, academics, local community … etc. the results might be compared later on with the key findings of this research.

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دراسة إحصائية تحليلية لعميات حلف شمال الأطلسي على ليبيا خلال الفترة أبريل إلى أكتوبر 2012

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ملخص الدراسة

تهدف هذه الدراسة الإحصائية التحليلية إلى تحقيق أربعة أهداف رئيسية هي: (1) تحديد عدد الطلعات و الضربات الجوية لحلف شمال الأطلسي (NATO) خلال الفترة من أبريل إلى أكتوبر 2011. (2) تحديد عدد و طبيعة الأهداف التي تم تدميرها خلال الفترة من أبريل إلى أكتوبر 2011. (3) تحديد المناطق التي بها أكثر أهداف تم تدميرها خلال الفترة من أبريل إلى أكتوبر 2011. (4) تقديم بعض النتائج و التوصيات.

فيما يتعلق بمنهجية البحث، تم تجميع بيانات الدراسة من خلال التقارير اليومية للحلف التي يعرضها بشكل يومي على موقعه الإلكتروني. حيث تم تجميع بيانات جميع العمليات خلال الأشهر السبعة أبريل إلى أكتوبر 2011 و تم تحليلها إحصائيا لاستخلاص النتائج.

في هذه الدراسة تم استخدام الإحصاء الوصفي بشكل أساسي مثل المتوسطات و النسب المئوية، ثم استخدام الإحصاء التحليلي المتمثل في تحليل التباين الثنائي و اختبارات الفروق أو ما يسمى (Kruskal-Wallis KW) لاختبار الفرضيات المطروحة بالدراسة. و لقد تم التركيز على عدد من المتغيرات في هذه الدراسة أهمها ما يلي: تاريخ العملية، عدد الطلعات الجوية، عدد الضربات الجوية، المنطقة المستهدفة، عدد الأهداف التي تم تدميرها، و نوع السلاح الذي تم تدميره.

أما فيم يتعلق بأهم النتائج فيمكن تلخيصها على النحو التالي: (1) ما يقرب من 36.4% من الطلعات الجوية للتحالف هي ضربات جوية. (2) هناك فروقات جوهرية بين حجم العمليات المنفذة خلال السبعة أشهر من أبريل إلى أكتوبر 2011. (3) درجة الفعالية في تنفيذ العمليات الجوية للتحالف يمكن وصفها بكونها ذات فعالية عالية نظرا لانخفاض عدد الطلعات الجوية في حين تزايدت كمية الأهداف المدمرة. (4) تركيز التحالف بشكل أساسي على تدمير مجموعة معينة من الأسلحة تتمثل في المخازن، الإمدادات العسكرية و التموينية ثم المعدات و الأسلحة الثقيلة.

فيما يتعلق بالقيمة العلمية للورقة البحثية الحالية فيمكن توضيحها من خلال النقاط التالية: (1) هذه الدراسة تعد الأولى من نوعها نظرا لعدم القيام بها في السابق. (2) هذه الدراسة يمكن الاسترشاد بها كمؤشر يستخدم لتقييم أداء حلف شمال الأطلسي و تبيان مدى قدرته على تنفيذ قرارات الأمم المتحدة. (3) نتائج هذه الدراسة يمكن مقارنتها مع دراسات أخرى أجريت بدول أخرى لاستخلاص بعض الاستنتاجات و المعاني.

أخيرا، تشير الورقة إلى وجود بعض القيود بالدراسة و التي يمكن النظر إليها بمثابة فرص لإجراء المزيد من الأبحاث المستقبلية على البيئة الليبية.

الكلمات المفتاحية: العمليات الجوية، حلف شمال الأطلسي، ليبيا

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