



EMPIRICAL COMPARISON OF REFINING OF CRUDE OIL AND OIL DEMAND OF NON-OPEC OIL INDUSTRY WITH OPEC OIL INDUSTRY, 2012-2021

Bailey Saleh, PhD¹, Abbas Bailey Saleh²

¹Department of Political Science, University of Maiduguri, PMB 1069, Maiduguri, Borno State, Nigeria.
Postcode - 600004

ORCID-ID 0000-0002-5401-4382

²Department of Mathematics & Computer Science, Karl-Kumm University, Vom Jos South, Nigeria.

ABSTRACT

The extraction and sale of crude petroleum brought enormous prosperity for OPEC members and of economic growth and general development of their countries. However, after the Arab-Israeli (Yom Kippur) war of October 6, 1973, Non-OPEC countries step-up actions in crude petroleum oil production, refining throughputs and processing of petroleum products, and strategic crude/refined oil reserves. This made them to outperformed the OPEC cartel in virtually all sectors of the global oil industry. The study is a qualitative one. Document studies were adopted and utilized in generating data from secondary sources such as books, journals, bulletins, policy papers, newspapers and internet materials. The data was analyzed through discourse and explanatory methods; where numerical data were analyzed through descriptive method. The study has established that Non-OPEC outperformed OPEC by 549% in the refining sector. The study also established that Non-OPEC outperformed OPEC by 591% in the oil demand sector. The implication of this sub-optimal performance by OPEC in the vital sectors of refining and oil demand portend great danger for their economies in no distant time. The inability of OPEC members to embark on exclusive refining and of more oil demand for their industries forms the main motivation for the study.

KEYWORDS: Empirical, Comparison, Oil Demand, Non-OPEC, OPEC, Petroleum, Refining.

JEL Codes: F5, F59, G13, P5, R1.

1. INTRODUCTION

It is not in doubt that the organization of the petroleum exporting countries (OPEC) as a cartel has been dominant in giving the global oil industry direction in the past six decades. However, the Non-OPEC oil producing countries of the world and particularly those of the Northern hemisphere, were forced to brace up and re-strategize towards boosting the exploration, production, refining and maintaining huge reserves of their refined petroleum oil and even crude petroleum oil. The West in particular had to do this because of the bitter experience of the October 6-25, 1973 Fourth-Arab-Israeli war where OPEC as a cartel used the petroleum oil instrument to humiliate them (pro-Zionist). Even the non-Western Non-OPEC major oil producing countries of Russia and China learnt from it and became wiser in harnessing and maintaining huge strategic reserves of both crude and refined petroleum oil as safety valves and deterrence against such unfavorable consequences (NNPC-AR, 2017/18).

Apart from the frontal attacks of stepping up the production, refining, processing and strategic reserves of fossil fuel, Non-OPEC oil producing countries of the world have equally launched out in sourcing for and developing more alternative clean energy sources to compliments their increasingly growing oil industries and manufacturing outfits. This will subsequently serve as a sucking economic vortex for third world oil producing countries of Africa, Middle East, Latin America and part of Asia & Pacific who are still oblivious of this naked reality of the increasing supremacy of Non-OPEC countries in the global oil industry. The affluent OPEC members that are increasingly becoming more complacent, are equally becoming more decadent; because they have largely failed in domesticating the refining and processing of all their crude petroleum oil. They have equally failed to direct their enormous oil wealth towards domesticating indigenous manufacturing and industrialization with the associated value chain. This would have brought to an end, the problem of unemployment in their countries; as well as economically empowering their citizens; with the long-term benefits of economic growth and general development in their various domestic economies. The attainment of this would have brought them out of the doldrums of economic dependency on the G7 and the West who forms bulk of Non-OPEC countries (Saleh, 2019; Fareed, et-al, 2019).



2. LITERATURE REVIEW

The comparative advantage theory has been adopted and utilized as a framework for the study as treated below:

2.1 Comparative Advantage Theory

The second theory adopted as framework for the study is the Comparative Advantage Theory. Comparative advantage relates to how much productive and cost-efficient a country is over another country in the harnessing of vital resources in the production of finished goods and services. Furthermore, the theory of comparative advantage which is generally known as Heckster-Ohlin theory, is a classical country-based theory which states that countries will gain comparative advantage if they produce and export goods that requires resources or factors that they have in great supply; and cheaper production factors. The differences in factor abundance and the factor intensity of goods must be in favour of the country that possessed them. The CAT states that countries can benefit from international trade by specializing in producing goods where they have a lower opportunity cost compared to other countries. In another word, it is the ability of a country to produce a particular good or some goods or services at lower opportunity cost than its trading partners. Furthermore, comparative advantage also describes the economic reality of the gains from trade for individuals, firms, or nations; which arise from differences in their endowments or technological progress. The theory emphasizes that countries with advantage in the differences in factor abundance and the factor intensity of goods, often attains absolute advantage where they become more productive, and cost-efficient than other countries (Alting, 1978; Szirmai & Verspagen, 2015; Watson, 2017; Liu, et-al, 2020; Murdock, 2020; Wolde, 2022; Diodato, et-al, 2022; Krusse, et-al, 2023).

3. METHODOLOGY

The study is a qualitative one, where document studies were adopted and utilized in generating data from mainly secondary sources. The research, which is “Empirical Comparison of Refining of Crude Oil and Oil Demand of Non-OPEC Oil Industry with OPEC Oil Industry, 2012-2021”, is essentially descriptive and explanatory. Documents scrutinized for generating data for the study include: UN-Trade Statistical Data, World Bank Group Open Data, OPEC Statistical Bulletin and BRICS Statistical Data. Other documents scrutinized include published materials such as textbooks, academic journals, scholarly papers, and internet materials.

4. RESULTS AND DISCUSSION

Results of empirical and qualitative data generated mainly from secondary sources are presented in tabular and graphical forms where critical discourse method is utilized in the analysis as given in succeeding paragraphs below:

4.1 Cumulative Crude Oil Refining Throughput of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021

The Non-OPEC countries have outperformed the OPEC cartel in the area of refining throughput for the period of the study (2012-2021). The Non-OPEC countries recorded a cumulative total of 607,811.8b/cyr (85% of world total), as against OPEC’s cumulative total of 110,679.0b/cyr (15% of the world total). The USA as a single country leads the Non-OPEC oil industry with a cumulative total of 156,897.2b/cyr representing 21% of the world total of 718,490.8b/cyr. Apart from USA, other top refiners are - China in the 2nd position with cumulative total refining throughput of 103,996.0b/cyr; Russia 3rd with 56,899.4b/cyr; India is 4th with a cumulative total of 45,460.0b/cyr and Japan 5th with 31,811.0b/cyr. Hence, it is quite interesting to note that three out of the Top five (5) global refiners are from the Asia & Pacific region. The Cumulative Country Average (CCA) for all the 31 Non-OPEC countries for the period of the study stands at 19,609.83b/cyr; their Cumulative Regional Average (CRA) stands at 101,301.96; their World Average (WA) stands at 21,132.0b/cyr and their World Bloc Average stands at 359,245.4b/cyr (Fareed, et-al, 2019; Molla, 2020).

The Asia & Pacific region leads other regions in the refining throughput with a cumulative total of 223,420.4b/cyr (37% of the world total) The North American region is second with cumulative total of 175,393.2b/cyr (24%). The Western European region is third with 84,369.8b/cyr (14%). The Eastern Europe region is 4th with a cumulative total of 73,534.0b/cyr (12%). The Latin American region is 5th with a cumulative total of 41,508.8b/cyr (7%). The region of Africa is 6th with a cumulative total of 9,585.6b/cyr (1%). The Middle East region is 7th and the least on the Refining Throughput Table with Zero (0%) performance. The B3 countries who also belong to the Non-OPEC group recorded cumulative total of 317,792.6b/cyr representing 33% of the world. This shows that the B3 has not only outperformed the OPEC cartel; but also can stifle the oil-induced assertiveness of the OPEC in no distant period (OPEC-ASB, 2017/18; Maynes, 1998; LAOGA, 2021).



This is as presented in Table 1 and Figures 1, 2, and 3 below:

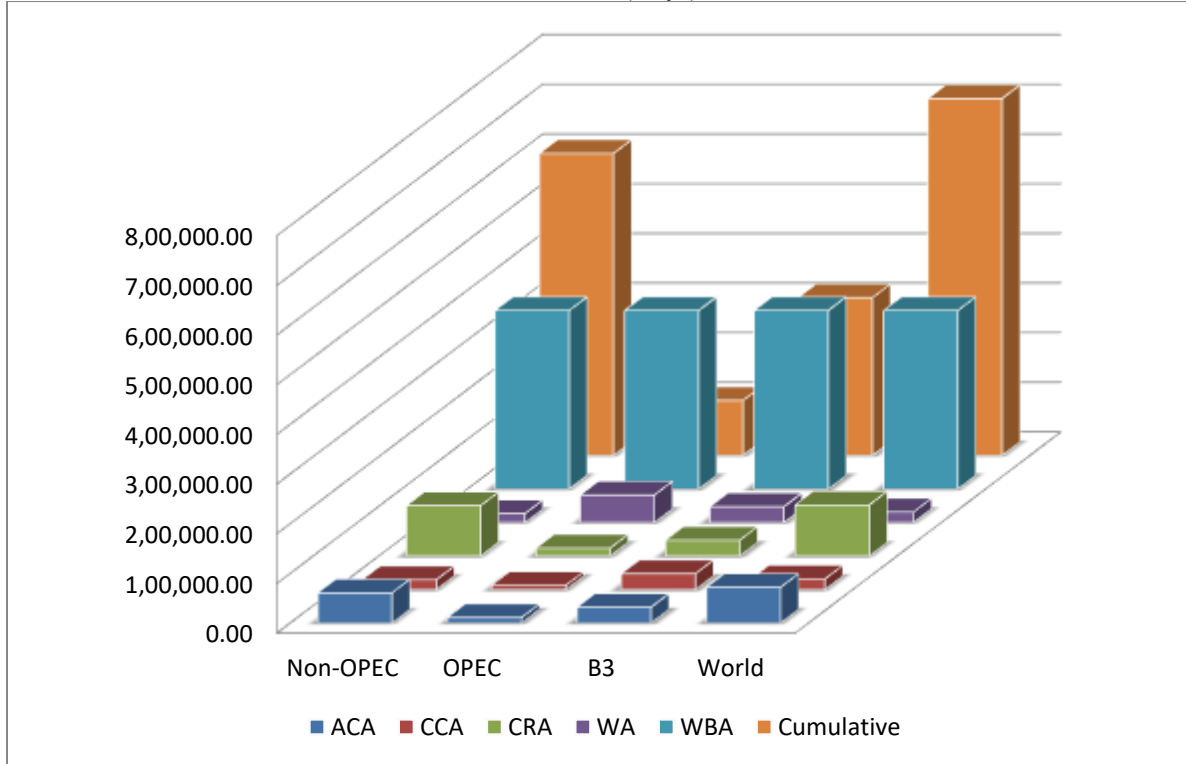
Table 1: Cumulative Refining Throughput of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (b/cyr)

S/N	Countries	Cumulative	ACA	CCA	CRA	WA	WBA
1.	Canada	18,496.0	1,849.6	19,609.83	101,301.96	21,132.0	359,245.4
2.	USA	156,897.2	15,689.72	19,609.83	101,301.96	21,132.0	359,245.4
3.	Argentina	5,197.2	519.72	19,609.83	101,301.96	21,132.0	359,245.4
4.	Brazil	19,828.0	1,982.8	19,609.83	101,301.96	21,132.0	359,245.4
5.	Colombia	2,560.8	256.08	19,609.83	101,301.96	21,132.0	359,245.4
6.	Mexico	11,150.6	1,115.06	19,609.83	101,301.96	21,132.0	359,245.4
7.	Curacao	1,550.4	155.04	19,609.83	101,301.96	21,132.0	359,245.4
8.	Trinidad & Tobago	1,221.8	122.18	19,609.83	101,301.96	21,132.0	359,245.4
9.	Azerbaijan	1,227.2	122.72	19,609.83	101,301.96	21,132.0	359,245.4
10.	Belarus	4,298.2	429.82	19,609.83	101,301.96	21,132.0	359,245.4
11.	Kazakhstan	3,391.4	339.14	19,609.83	101,301.96	21,132.0	359,245.4
12.	Poland	5,036.8	503.68	19,609.83	101,301.96	21,132.0	359,245.4
13.	Romania	2,088.8	208.88	19,609.83	101,301.96	21,132.0	359,245.4
14.	Russia	56,899.4	5,689.94	19,609.83	101,301.96	21,132.0	359,245.4
15.	Ukraine	592.2	59.22	19,609.83	101,301.96	21,132.0	359,245.4
16.	Belgium	6,247.8	624.78	19,609.83	101,301.96	21,132.0	359,245.4
17.	France	11,449.6	1,144.96	19,609.83	101,301.96	21,132.0	359,245.4
18.	Germany	19,028.0	1,902.80	19,609.83	101,301.96	21,132.0	359,245.4
19.	Italy	13,222.8	1,322.28	19,609.83	101,301.96	21,132.0	359,245.4
20.	Netherlands	10,253.0	1,025.3	19,609.83	101,301.96	21,132.0	359,245.4
21.	Spain	12,218.0	1,221.8	19,609.83	101,301.96	21,132.0	359,245.4
22.	United Kingdom	11,950.6	1,195.06	19,609.83	101,301.96	21,132.0	359,245.4
23.	Egypt	5,152.4	515.24	19,609.83	101,301.96	21,132.0	359,245.4
24.	South Africa	4,433.2	443.32	19,609.83	101,301.96	21,132.0	359,245.4
25.	Australia	5,172.0	517.2	19,609.83	101,301.96	21,132.0	359,245.4
26.	China	103,996.0	10,399.6	19,609.83	101,301.96	21,132.0	359,245.4
27.	India	45,460.0	4,546.0	19,609.83	101,301.96	21,132.0	359,245.4
28.	Indonesia	8,375.8	837.58	19,609.83	101,301.96	21,132.0	359,245.4
29.	Japan	31,811.0	3,181.1	19,609.83	101,301.96	21,132.0	359,245.4
30.	South Korea	26,644.2	2,664.42	19,609.83	101,301.96	21,132.0	359,245.4
31.	Singapore	11,961.4	1,196.14	19,609.83	101,301.96	21,132.0	359,245.4
	Total Non-OPEC	607,811.8	60,781.18	607,811.8	607,811.8	718,490.8	359,245.4
	OPEC Total	110,679.0	11,069.9	8,513.77	15,811.29	55,268.5	359,245.4
	World Total	718,490.8	71,849.0	21,132.0	102,641.54	718,490.8	71,849.08
	B3 Total	317,792.6	31,779.26	31,779.26	31,779.26	31,779.26	359,245.4
	Non-OPEC-North America	175,393.2	17,539.32	87,696.6	119,748.5	21,132.0	359,245.4
	Non-OPEC-Western Europe	84,369.8	8,436.98	12,052.83	119,748.5	21,132.0	359,245.4
	Non-OPEC-Eastern Europe	73,534.0	7,353.40	10,504.86	119,748.5	21,132.0	359,245.4
	Non-OPEC-Latin America	41,508.8	4,150.88	6,918.13	119,748.5	21,132.0	359,245.4
	Non-OPEC-Asia & Pacific	223,420.4	22,342.04	31,917.2	119,748.5	21,132.0	359,245.4
	Non-OPEC-Africa	9,585.6	958.56	4,792.8	119,748.5	21,132.0	359,245.4
	Non-OPEC-Middle East	0	0	0	0	0	0

Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018

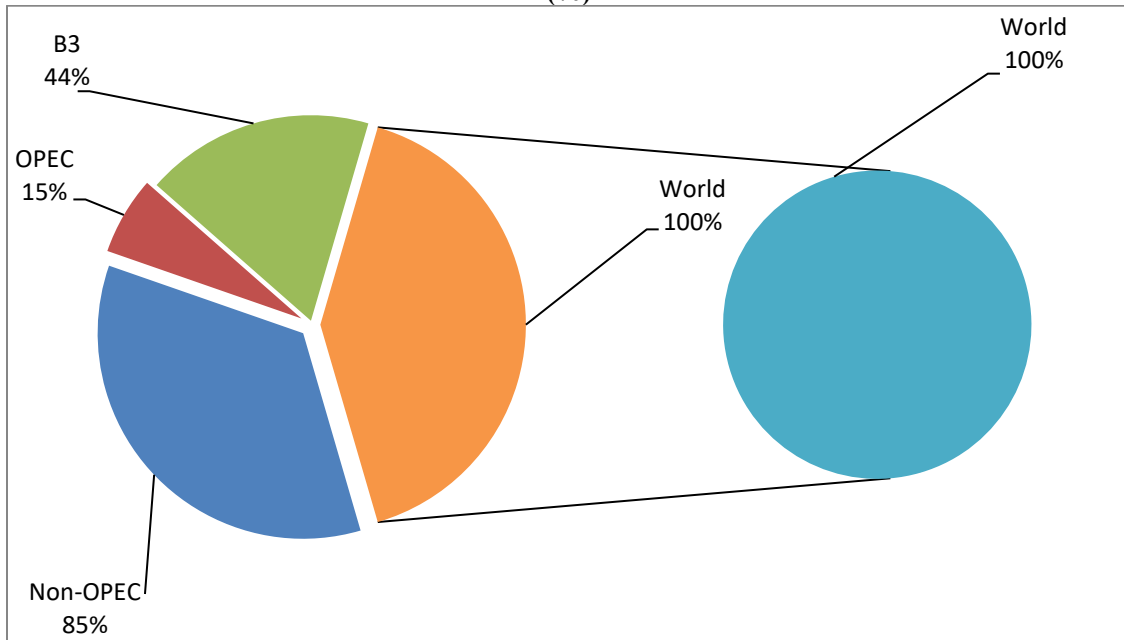


Fig. 1: Cumulative Refining Throughput of Non-OPEC Oil Producing Countries Compared with OPEC & B3, 2012-2021 (b/cyr)



Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018

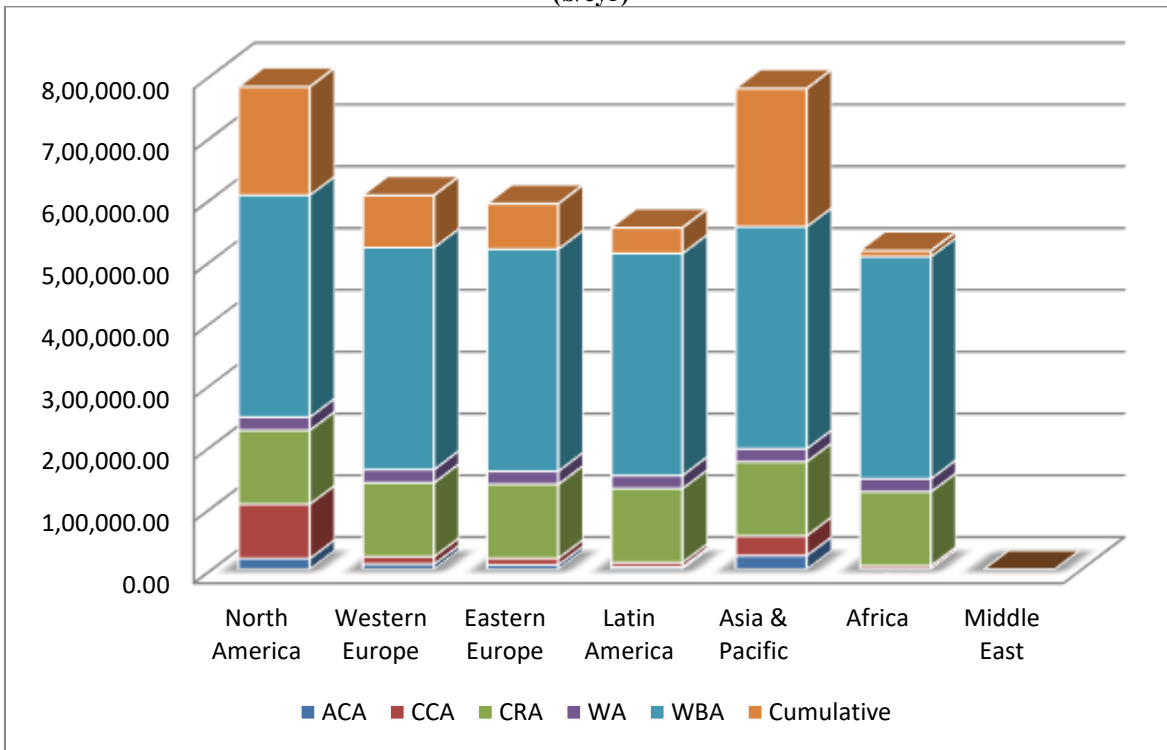
Fig. 2: Cumulative Refining Throughput of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (%)



Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018



Fig. 3:
Cumulative Refining Throughput of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (b/cyr)



Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018

4.2 Oil Demand of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021

The cumulative total oil demand of Non-OPEC countries stand at 692,468.6 (80% of world total); which overwhelms OPEC’s cumulative total oil demand of 117,113.5 (15% of world total) for the period of the study. This shows that Non-OPEC countries have outperformed OPEC by 591% in terms of oil demand. The big three countries of USA, China and Russia (B3) with a cumulative total oil demand of 333,235.8(42% of world total) equally outperformed OPEC by 285%. The Asia & Pacific Non-OPEC region leads other regions with cumulative total of 255,429.4b/cyr representing 32% of the total world oil demand for the period 2012 to 2021 that stands at 786,159.4. It also represents 37% of Non-OPEC countries cumulative total for the same period. It also outperformed OPEC by 218% for the same period. The North American region is second in terms of oil demand for the period of the study with a cumulative total of 216,212.0b/cyr. The region also outperformed the OPEC cartel by 184%. The astronomical rise in oil demands by these Non-OPEC regions is an indication of increasing production activities in the industrial and manufacturing sectors that goes with high volume of employment/job opportunities for their citizens; which also goes with corresponding explosion of wealth generations among the populace. (Denning, 2020; OPEC-ASB, 2017/18; Sayigh, 1984).

The comparison of Non-OPEC countries with OPEC in terms of oil demand is as presented in Table 4 and Figures 4, 5, 6 & 7 below:



Table 2: Cumulative Oil Demand of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (b/cyr & %)

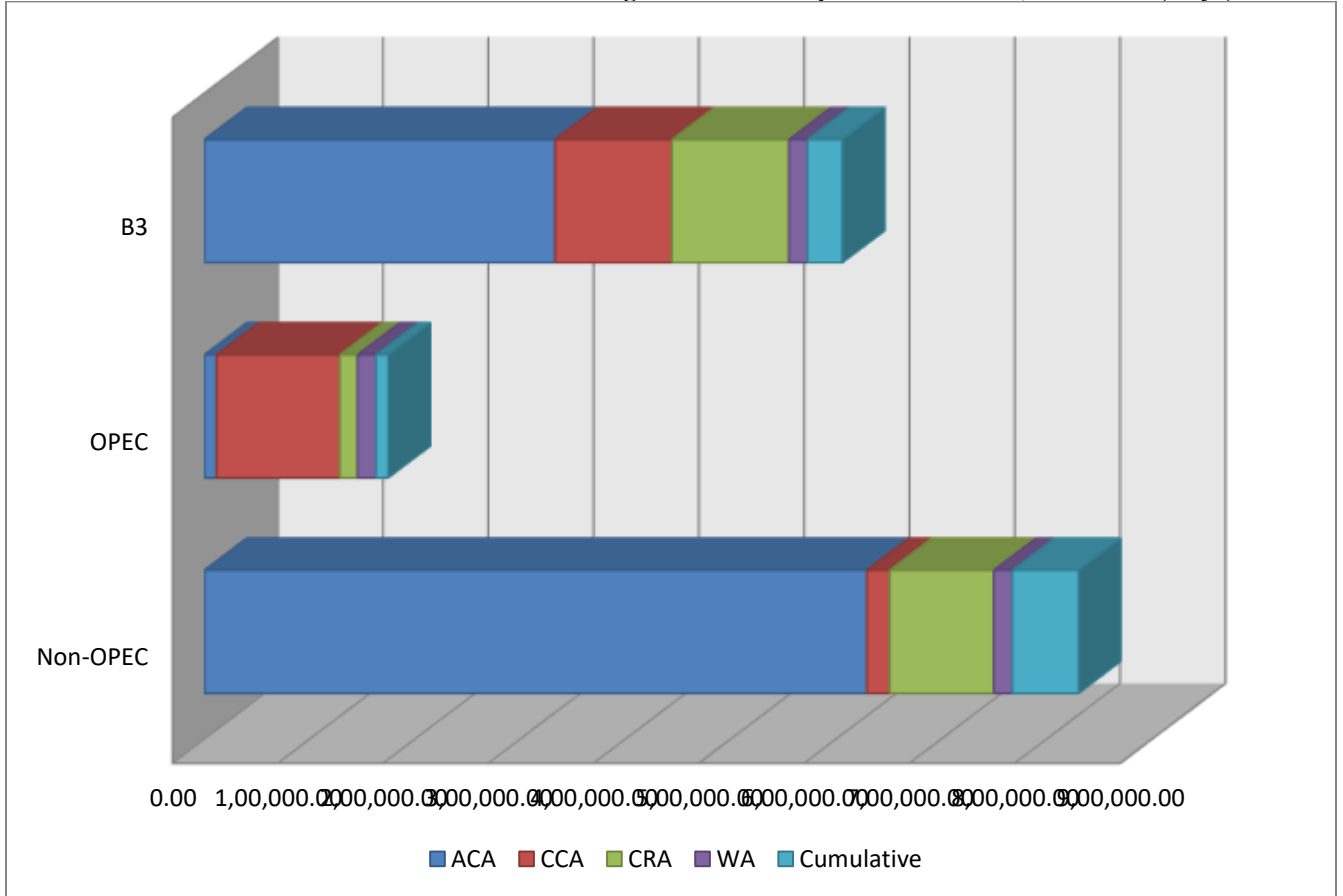
S/N	Countries	Cumulative	ACA	CCA	CRA	WA	Percentage
1.	Canada	24,334.0	2,433.4	21,639.64	98,924.1	14,293.8	N/A
2.	United States of America	191,878.0	19,187.8	21,639.64	98,924.1	14,293.8	N/A
3.	Argentina	7,046.6	704.66	21,639.64	98,924.1	14,293.8	N/A
4.	Brazil	30,787.4	3,078.74	21,639.64	98,924.1	14,293.8	N/A
5.	Colombia	3,092.8	309.28	21,639.64	98,924.1	14,293.8	N/A
6.	Mexico	20,382.0	2,038.2	21,639.64	98,924.1	14,293.8	N/A
7.	Czech Republic	1,890.4	189.04	21,639.64	98,924.1	14,293.8	N/A
8.	Hungary	1,440.2	144.02	21,639.64	98,924.1	14,293.8	N/A
9.	Kazakhstan	2,759.4	275.94	21,639.64	98,924.1	14,293.8	N/A
10.	Poland	5,311.0	531.1	21,639.64	98,924.1	14,293.8	N/A
11.	Romania	1,750.8	175.08	21,639.64	98,924.1	14,293.8	N/A
12.	Russia	34,025.0	3,402.5	21,639.64	98,924.1	14,293.8	N/A
13.	Slovakia	777.2	77.72	21,639.64	98,924.1	14,293.8	N/A
14.	Ukraine	2,710.4	271.04	21,639.64	98,924.1	14,293.8	N/A
15.	France	17,033.4	1,703.34	21,639.64	98,924.1	14,293.8	N/A
16.	Germany	23,967.6	2,396.76	21,639.64	98,924.1	14,293.8	N/A
17.	Italy	12,858.8	1,285.88	21,639.64	98,924.1	14,293.8	N/A
18.	Netherlands	9,837.0	983.7	21,639.64	98,924.1	14,293.8	N/A
19.	Spain	12,505.8	1,250.58	21,639.64	98,924.1	14,293.8	N/A
20.	United Kingdom	15,430.2	1,543.02	21,639.64	98,924.1	14,293.8	N/A
21.	Syria	1,599.2	159.92	21,639.64	98,924.1	14,293.8	N/A
22.	Egypt	8,341.4	834.14	21,639.64	98,924.1	14,293.8	N/A
23.	South Africa	6,377.6	637.76	21,639.64	98,924.1	14,293.8	N/A
24.	Tunisia	903.4	90.34	21,639.64	98,924.1	14,293.8	N/A
25.	Australia	11,160.2	1,116.02	21,639.64	98,924.1	14,293.8	N/A
26.	China	107,332.8	10,733.28	21,639.64	98,924.1	14,293.8	N/A
27.	India	39,044.4	3,904.44	21,639.64	98,924.1	14,293.8	N/A
28.	Indonesia	16,347.0	1,634.7	21,639.64	98,924.1	14,293.8	N/A
29.	Japan	43,028.6	4,302.86	21,639.64	98,924.1	14,293.8	N/A
30.	New Zealand	1,580.8	158.08	21,639.64	98,924.1	14,293.8	N/A
31.	South Korea	23,940.2	2,394.02	21,639.64	98,924.1	14,293.8	N/A
32.	Thailand	13,195.4	1,319.54	21,639.64	98,924.1	14,293.8	N/A
	Total Non-OPEC	692,468.6	62,946.86	21,639.64	98,924.1	17,470.2	80%
	OPEC Total	117,113.5	11,711.35	9,008.70	16,730.5	17,470.2	15%
	World Total	786,159.4	78,615.94	17,470.2	112,308.0	17,470.2	100%
	B3 Total	333,235.8	33,323.58	111,078.6	111,078.6	17,470.2	42%
	Non-OPEC-North America	216,212.0	21,621.20	108,106.0	98,924.1	17,470.2	31%
	Non-OPEC-Western Europe	91,632.4	9,163.24	15,272.07	98,924.1	17,470.2	13%
	Non-OPEC-Eastern Europe	50,664.4	5,066.44	6,333.05	98,924.1	17,470.2	7%
	Non-OPEC-Latin America	61,308.8	6,130.88	15,327.2	98,924.1	17,470.2	9%
	Non-OPEC-Asia & Pacific	255,429.4	25,542.94	31,928.68	98,924.1	17,470.2	37%
	Non-OPEC-Africa	15,622.4	1,562.24	5,207.47	98,924.1	17,470.2	2%
	Non-OPEC-Middle East	1,599.2	159.92	1,599.2	98,924.1	17,470.2	0%

Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018



Fig.4:

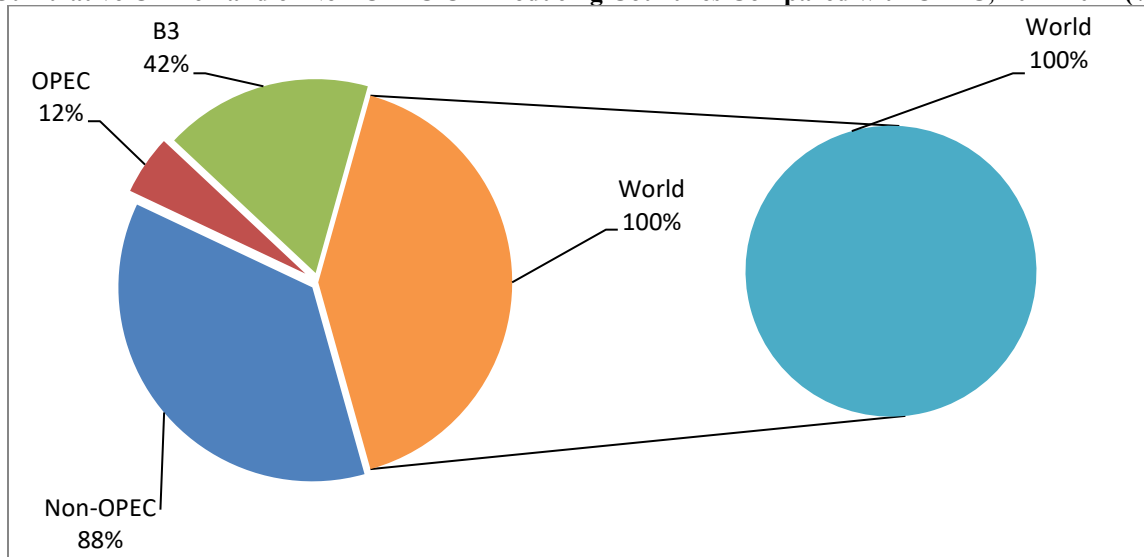
Cumulative Oil Demand of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (b/cyr)



Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018

Fig. 5:

Cumulative Oil Demand of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (%)

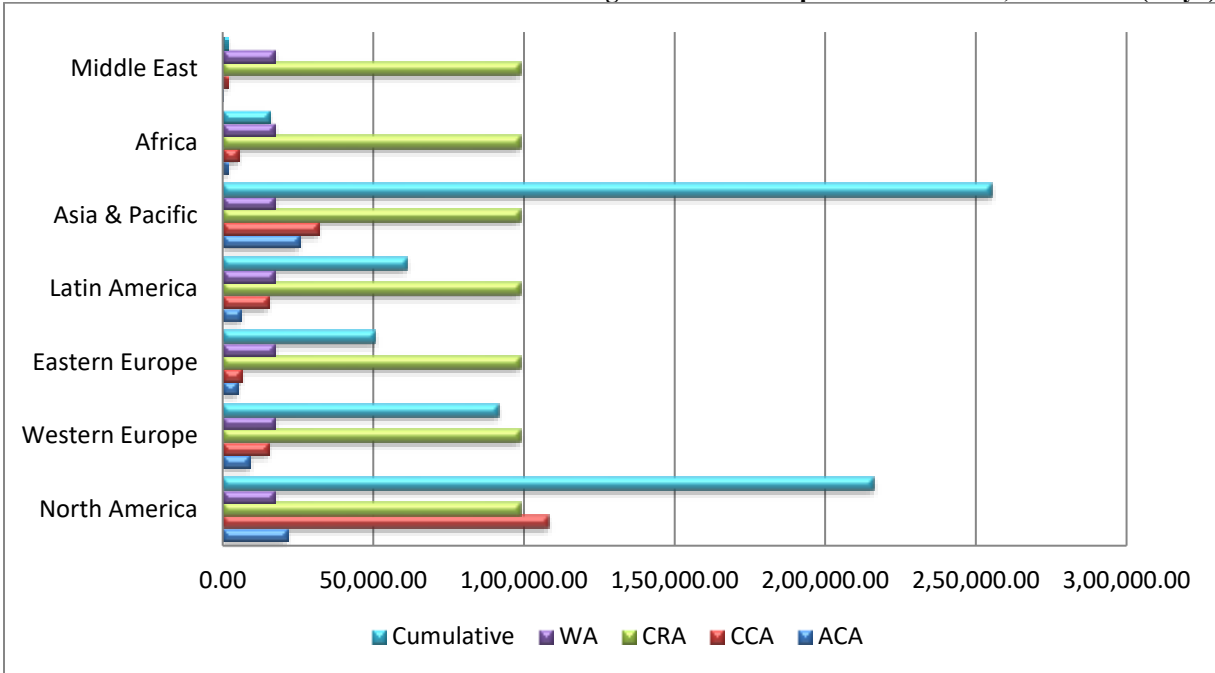


Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018



Fig. 6:

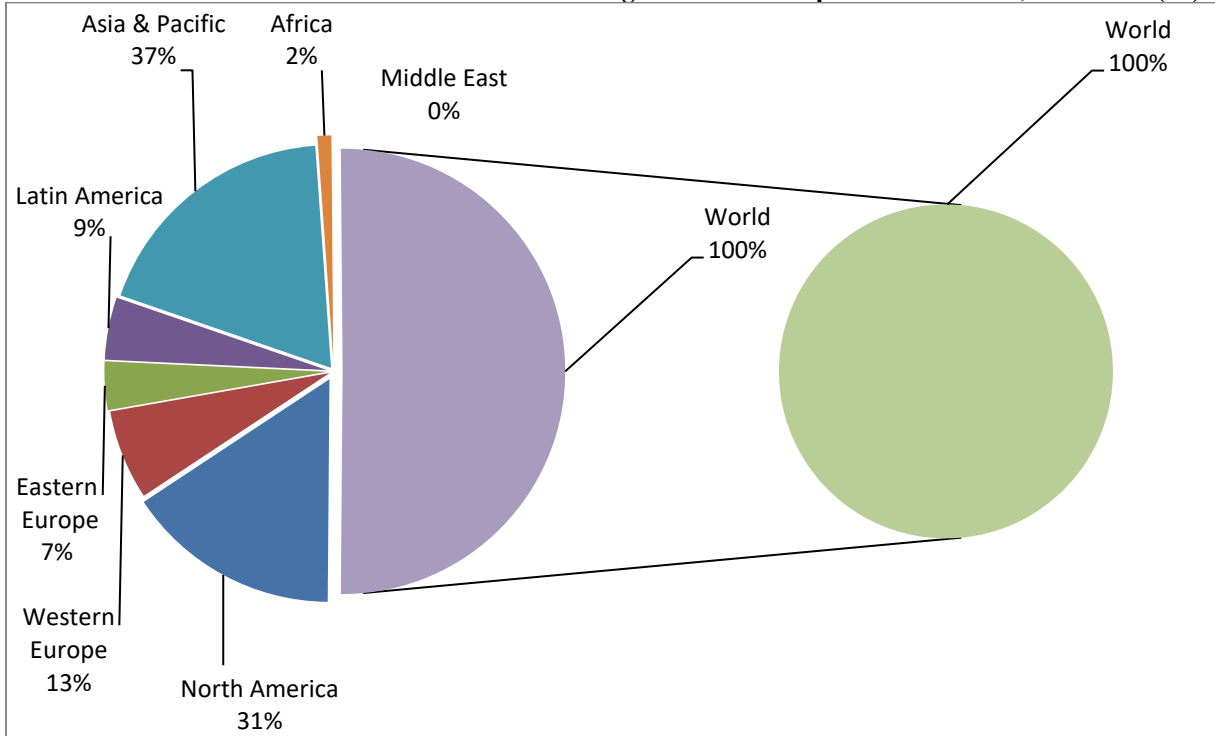
Cumulative Oil Demand of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (b/cyr)



Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018

Fig. 7:

Cumulative Oil Demand of Non-OPEC Oil Producing Countries Compared with OPEC, 2012-2021 (%)



Source: Generated by the Researchers in 2025 as adapted from OPEC Annual Bulletin of 2017/2018



5. CONCLUSION/RECOMMENDATIONS

From the analysis so far, the study has established that Non-OPEC countries with cumulative total of 607,811.8b/cyr representing 85% of world total refining, has overwhelmingly outperformed OPEC by 549% where OPEC's cumulative total stands at 110,679.0b/cyr represents 15% of world total refining throughput. The study has further established that the Non-OPEC countries with 692,468.6b/cyr (88% of world total), have also overwhelmingly outperformed OPEC by 591% in oil demand where OPEC's cumulative total of 117,113.5b/cyr (12% of world total). The implication of these sub-optimal performances of OPEC in the area of refining and oil demand is that, individual members depended entirely on imported refined oil. This self-inflicted and unbalanced relationship portends great dangers for OPEC members since they have no single alternative to oil in the near future.

By way of recommendations, OPEC members should embark on aggressive exclusive refining to meet their domestic consumption needs; as well as export part of it. The proceeds should be plowed-back in the manufacturing and industrial sectors and related value chain. This will generate millions of jobs and create wealth for their citizens.

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