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Export and import dynamics of selected commodities in Papua New Guinea: A country-level analysis

Kanakaraj Nataraj
IBSUniversity, Port Moresby, Papua New Guinea
kanakaraj.gounder@ibs.ac.pg

Sabarinathan Kandasamy
Sri Ramakrishna college of arts & science Coimbatore, Tamilnadu, India
sabarinathank@srcas.ac.in

Periyasamy Palani
IBSUniversity, Port Moresby, Papua New Guinea.
periyasamy.palani@ibs.ac.pg

Abstract

In today's economic landscape, the growth of an economy in developing countries depends on the growth in foreign trade. Foreign trade plays a pivotal role in the economic development of developing countries by providing access to larger markets, encouraging industrial growth, and facilitating technology transfer. This study focuses on identifying the challenges and opportunities in trends in exports and imports of major commodities and providing recommendations to key stakeholders. The secondary data were collected from the World Bank reports and academic sources. The study covers the period 2019 to 2023 in selected commodities like oil and gas, gold, coffee, and cocoa beans. For data analysis, the researchers used the simple percentage method, linear growth rate, compound growth rate, and instability index to understand the trade performance in Papua New Guinea. The findings revealed substantial variation in metals and petroleum product exports. Notably, only a few countries, including Papua New Guinea (PNG), maintain consistent export relationships with their trade partners. In the case of imported items such as machinery, metals, minerals, and textiles is dominated that there is a need to compensate for the imports of machinery through the indigenous production of inland fish, marine products, and agricultural commodities exports to Asian and European countries.

Keywords: Foreign trade, industrial growth, technology transfer, exports and imports, indigenous production.

1. Introduction

Foreign trade plays a pivotal role in the economic development of developing countries by providing access to larger markets, encouraging industrial growth, and facilitating technology transfer. By exporting goods and services, these countries can earn valuable foreign currency, which is essential for importing capital goods and raw materials that are not produced domestically. It also enables them to diversify their economies, reduce dependency on a narrow range of commodities, and foster competitive industries. Trade liberalization often brings in foreign direct investment (FDI), which supports infrastructure development, job creation, and skill enhancement. Furthermore, foreign trade helps integrate developing countries into the global economy, promoting institutional reforms and governance improvements. According to Krueger (1997), openness to trade correlates with faster GDP growth in developing nations. Similarly, the World Bank (2020) highlights that trade has helped lift millions out of poverty by enabling developing countries to participate in global value chains. However, the benefits of trade are maximized only when accompanied by sound macroeconomic policies, investment in human capital, and strong institutions (Rodrik, 2001). Therefore, foreign trade is not just a mechanism for economic exchange but a vital tool for structural transformation in developing economies. Therefore, foreign trade is regarded as essential to economic development, offering a significant stimulus to a country's income.

1.1 Background

Papua New Guinea (PNG) is a lower-middle-income country in the Pacific region, with a population of over 9 million and a GDP of approximately USD 33 billion as of 2023 (World Bank, 2024). Its economy is heavily dependent on the extractive sector, with gold, copper, oil, and liquefied natural gas accounting for the majority of export earnings. Despite the availability of rich inland waterways in the form of rivers and a large coastal area, agriculture and allied sector activities are still only in the naïve stage.

The agricultural, forestry, and fishing sector accounts for most of the labour force of PNG. Agriculture currently accounts for 25% of GDP and supports more than 80% of the population. Most agriculture is subsistence, while cash crops are exported. The main crops by value are coffee, oil, cocoa, copra, tea, rubber, and sugar. PNG's economic growth is often volatile, tied closely to commodity prices and large resource projects (ADB, 2023).

Over the past 40 years, PNG has experienced only a low increase in per capita income despite its modest headline economic developments and natural wealth; poverty remains high, with about 40% of the population living below the national poverty line (UNDP, 2022). The informal sector dominates employment, and access to health and education services is limited. Macroeconomic instability, sluggish productivity growth, excessive dependence on natural resources, and unexploited potential of human capital have all hindered the economic headway of the country. Hence, to attain a robust economic growth, the nation must augment economic stability, increase productivity, which requires augmenting the exports and imports of the country. The country has substantial potential for growth through economic diversification, improved connectivity, and expanded trade partnerships.

1.2 Problem statement

With the native stage of its development and highly poverty-stricken, optimum utilization of the available natural resources could make significant contribution to the growth of the country and expansion of foreign trade is the major avenue growth. Hence, there is a need to understand the commodity composition and country composition of exports and imports of the country of

PNG and the present piece of research is devoted towards this objective. Such an analysis would help to identify the areas of improving the trade of the country.

1.3 Objectives of the study

Based on the above logic, the following objectives were framed:

1. To evaluate the trends in the major commodities of exports and imports in PNG.
2. To examine the country wise exports and imports of PNG
3. To propose strategic recommendations for enhancing trade performance and addressing key barriers affecting the current trade environment.

2. Materials and methods

The prime objective of the present research was to examine the trade performance of the country of Papua New Guinea. For this purpose, the secondary data were collected from various published sources using databases such as Scopus, World Bank Reports, Google Scholar, Web of Science, etc. Tell us how many sources were used. Since, the trade performance could be measured over the period of time, the present research is based on the time series analysis and the required secondary data have been collected for the latest available five-year period from the published official sources of PNG and the reports of the World Bank, from Papua New Guinea Trade reports and official websites of the country.

2.1 Data analysis

To analyse the trends in the growth, apart from the simple percentage method, the linear growth rate and compound growth rates were used. To understand the volatility or otherwise in the growth of trade variables, the instability index has been used.

The formula for estimating the linear growth rate can be given as below:

$$LGR = \frac{b}{\bar{y}} * 100$$

Where,

b = the slope coefficient of the linear trend equation of the form:

$Y = a + bt$

Y_i = the i^{th} trade variable

t = the time variable

The compound growth rates and instability index were calculated using the following exponential regression function.

$$Y_i = a\ (b_i)^t$$

Transforming this into log form:

$$\text{Log } Y_i = \text{Log } a + t \log (b_i)$$

Where ,

Y_i = the i^{th} trade variable

t = the time variable

Based on the above mentioned formula, the annual compound rate of growth (r) was calculated as:

$$r = (\text{Anti log } (b_i) - 1) \times 100$$

The modified instability index (I) was calculated as follows:

$$II = \sqrt{\frac{\left(\frac{\sum ei^2}{n}\right)}{\bar{x}}} * 100$$

Where,

e_i = value of the residual of the i^{th} observation

n = number of observations, and
k = the number of variables.

To identify the nature of the significance of the compound growth rates calculated, the 't' values were also calculated.

3. Literature review

According to Rani and Kumar (2018), a long-term association exists among exports, imports, gross capital formation, and economic growth, indicating sustained interlinkages over time. Narayan et al. (2007) presented evidence validating the export-led growth hypothesis for Fiji in the long run, whereas for Papua New Guinea, such support was confined to the short-run period.

Awokuse (2007), in his analysis of Bulgaria, the Czech Republic, and Poland, concluded that expanding both exports and imports acts as a stimulant for economic growth in transition economies. Lawrence & Weinstein (1999) and Mazumdar (2001) argue that imports can act as a channel through which developing countries gain access to growth-enhancing foreign R&D knowledge originating from developed nations.

Al-Yousif (1997), using a bound testing approach on data from 44 countries, identified a strong and statistically significant positive relationship between export activity and economic growth. As a primary advocate of the imports-led growth hypothesis, Hanson (1982) emphasized that bringing in capital goods and enhancing infrastructure play a pivotal role in promoting economic growth. Tyler (1981) asserted that the expansion of manufacturing exports enhances technological advancement and absorptive capacity, both of which contribute significantly to economic development. In the case of Nigeria, Fajana (1979) recognized exports as a critical driver and engine for the country's economic growth.

By analyzing data from 11 developing nations, Balassa (1978) found additional confirmation of the Export-Led Growth hypothesis, reinforcing the positive connection between exports and growth. Consequently, this study incorporates exports, imports, and

capital formation into its empirical framework to assess how trade influences Nepal's economic growth.

4. Synthesis and discussion

4.1 Trend in the major commodity composition of exports

As provided in Table 1, an examination of five-year exports of commodities from Papua New Guinea in the year 2019, the product of petroleum gas stood out as the highest exported commodity. The export value of this commodity stood at 4,330 million kina. This product consistently remained among the top in all the subsequent years, with an average export value of 5,286 million kina, the highest among all commodities studied. This indicates the critical role of petroleum gas in the country's export economy. The next major contributor in 2019 was gold, with exports worth 2,580 million kina. Although it ranked second in 2019, its performance showed a consistent decline in subsequent years, culminating in a reduced export average of 2,090 million kina. Platinum cad metals shared the same export value as gold in 2019, at 2,580 million kina. However, exports of this commodity sharply declined, reaching zero by 2022 and 2023 and leading to a moderate average of 1,254 million kina. Copper Ore ranked fourth in 2019 with 989 million kina. Despite a minor dip in the intermediate years, the export value remained relatively stable, with an average of 867.2 million kina. Palm Oil contributed to 530 million kina of exports in 2019. It recorded an increase over the years, reaching a high of 1,110 million kina in 2022 and averaging 811.2 million kina, reflecting consistent demand. Crude Petroleum followed with 731 million kina, maintaining its role in the energy export sector. Though it saw some fluctuations, the average stood at 773.2 million kina. Nickel Mattes and Rough Wood had lower starting values of 494 and 428 million kina, respectively. Both commodities showed steady export performance, with average values of 587.6 and 440.8 million kina. Their upward movement suggests a growing international interest or increased production. Refined petroleum recorded 339 million kina in 2019. The value peaked in 2021 and then declined to 216 million kina in 2023, resulting in an average of 360.2 million kina. Other mid-level contributors included Precious Metal Ore (401 million kina), Processed Fish (237 million kina), Non-fillet Frozen Fish (258 million kina), and Coffee (143 million kina). Notably, Coffee showed a rising trend, finishing 2023 at 232 million kina, up from 143 million kina in 2019, leading to an average of 178.8 million kina. At the lower end were commodities like Non-fillet Fresh Fish, Cocoa Beans, Coal Tar Oil, and Sawn Wood. Particularly, Sawn Wood had no exports in four out of the five years, yielding an average of just 12.72 million kina.

Table 1: Trends in the major commodities of exports of Papua New Guinea: 2019 -2023(in PGK million)

Sl.No	Products	2019	2020	2021	2022	2023	Mean	LGR	CGR	instability
1	Petroleum Gas	4330	3290	4590	8630	5590	5286	14.87	15.90	1991.20
2	Gold	2580	2320	1960	1740	1850	2090	-9.76	-9.09	265.82
3	Platinum Clad Metals	2580	2240	1450	0	0	1254	-59.01	-90.39	835.73
4	Copper Ore	989	919	633	891	904	867.2	-2.28	-2.08	402.85
5	Palm Oil	530	587	986	1110	843	811.2	14.16	16.94	539.76
6	Crude Petroleum	731	613	930	1060	532	773.2	0.63	-0.87	705.13

7	Nickel Mattes	494	424	674	768	578	587.6	8.71	9.51	410.10
8	Rough Wood	428	348	270	638	520	440.8	10.75	10.47	524.54
9	Refined Petroleum	339	325	480	441	216	360.2	-3.61	-5.79	481.03
10	Precious Metal Ore	401	440	354	208	246	329.8	-16.43	-15.86	249.69
11	Processed Fish	237	269	255	274	244	255.8	0.74	0.77	86.76
12	Coffee	143	124	168	227	232	178.8	15.72	17.03	136.21
13	Non-fillet Frozen Fish	258	156	136	153	155	171.6	-12.18	-9.86	246.87
14	Non-fillet Fresh Fish	105	152	262	0	0	103.8	-34.87		830.49
15	Cocoa Beans	63.6	90.2	0	89.5	117	72.06	14.72		434.15
16	Coal Tar Oil	184	167	0	0	0	70.2	-76.21		491.59
17	Sawn Wood	0	63.6	0	0	0	12.72			

Source: Literature survey

In terms of growth rates registered by commodities, as seen ibn the table, the highest linear growth rate (LGR) was observed for Coffee, which recorded an impressive 15.72% annual increase. The compound growth rate (CGR) for coffee was similarly high at 17.03%, confirming the sustained growth momentum of this commodity over the five years. Following closely was Palm Oil, which registered a linear growth rate of 14.16% and an even higher compound growth rate of 16.94%. This indicates a strong and accelerating demand for this product. Petroleum Gas showed a robust performance with a linear growth rate of 14.87% and a compound rate of 15.90%, further solidifying its position as the backbone of Papua New Guinea's export economy. Cocoa Beans had a high LGR of 14.72%, although its compound growth rate was not reported, likely due to zero exports in 2021. The other commodities in the declining order of growth can be given as : Rough Wood and Nickel Mattes (with LGRs of 10.75% and 8.71%, and compound growth rates of 10.47% and 9.51%, respectively), Processed Fish had a low but positive linear and compound growth (LGR: 0.74%, CGR: 0.77%), indicating marginal yet consistent improvement and Crude Petroleum (LGR: 0.63%, CGR: -0.87%). Products like, Gold, (LGR of -9.76% and CGR of -9.09%), Platinum Clad Metals (LGR at -59.01% and CGR at -90.39%) and Coal Tar Oil (LGR -76.21%) and Non-fillet Fresh Fish (-34.87%) have recorded the negative growth rate in exports of the country.

Export instability, measured through the instability index, reveals the degree of variation in annual exports. As it is provided in the table, almost all the commodities have shown either moderate or high instability in the exports with a minimum (but even then a higher) instability (86.76 per cent) was registered by Processed Fish. The other commodities like, Coffee (136.21 per cent), Precious Metal Ore (249.69 per cent), Non-fillet Frozen Fish (246.87 per cent), and Gold (265.82 per cent) have shown a moderate variation. While the commodities like, Refined Petroleum and Rough Wood (481.03 per cent), and 524.54, respectively. Commodities such as Cocoa Beans (434.15), Nickel Mattes (410.10), and Copper Ore (402.85) exhibited medium instability. The commodities like, Crude Petroleum (705.13 per cent), Platinum Clad Metals (835.73 per cent), and Non-fillet Fresh Fish (830.49 per cent) have all show a very high volatility or extreme instability. These exports were marked by sharp fluctuations and, in some cases, complete withdrawal from international markets. Among all, Petroleum Gas exports had shown the highest volatility with an instability index of 1991.20 per cent. Although it dominated in value and growth, the export pattern was highly erratic, pointing to strong market sensitivities and external shocks.

Overall, the highest average value of exports is registered by Petroleum Gas (5,286 million kina). The Highest growth rate in exports being recorded by Coffee (LGR 15.72%, CGR 17.03%). The volatility is found to be recorded the least by Processed Fish (instability 86.76) while it Petroleum Gas (instability 1991.20) that recorded the highest volatility, inspite of its higher value of exports.

4.2 Trend in the percentage share of major commodities of exports

Given the trends in the value of exports of commodities, based on the export data discussed in local currency values, in the present paragraph it is attempted to examine the share in exports of each commodity to total merchandise exports of Papua New Guinea from 2019 to 2023, covering 17 commodities. As provided in Table 2, in the year 2019, Petroleum Gas was the dominant export commodity of Papua New Guinea, accounting for 30.08 percent of total export earnings. This made it the most significant contributor to the country's foreign exchange in that year. It continued to hold its leading position in 2020 with a slightly reduced share of 26.26 percent. However, in 2021 and 2022, the commodity saw a significant surge, rising to 34.91 percent and 53.17 percent, respectively. Though slightly lower in 2023 at 46.48 percent, it remained by far the leading export. These figures indicate that Petroleum Gas is not only consistently the largest export product but also exhibits increasing importance over the years, especially post-2020, suggesting enhanced production or increased global demand during the period. Following Petroleum Gas in 2019 were Gold and Platinum Clad Metals, each contributing 17.93 percent. Gold showed a slight increase to 18.52 percent in 2020, but a decline to 15.38 percent in 2023. This trend suggests some instability in gold exports, possibly due to fluctuations in gold prices or changes in production levels. Platinum Clad Metals, though starting equally with Gold in 2019 at 17.93 percent, exhibited a sharp decline to reach to 11.03 percent in 2021, and was completely absent in 2022 and 2023 in the export list. This abrupt fall to zero suggests either depletion of reserves, a halt in production, or complete withdrawal from the international market. Copper Ore was the fourth most important export in 2019, contributing 6.87 percent to the total. This share ultimately increased moderately to 7.52 percent in 2023, which is the highest for this product during the period indicating a stable export performer. Palm Oil exports which stood at 3.68 percent in 2019 showed gradual improvement to reach to 7.01 percent in 2023 with fluctuations in share. The stable and increasing trend implies rising demand and greater production capacity. Crude Petroleum exports declining from 5.08 percent in 2019 to 4.42 percent in 2023. Nickel Mattes accounted for 3.43 percent in 2019 and slightly increased by maintaining consistency to reach above 4 percent from 2021. Rough Wood and Refined Petroleum followed with initial shares of 2.97 percent and 2.36 percent, respectively, in 2019. While Rough Wood showed increase in share (to reach 4.32 percent in 2023), Refined Petroleum experienced a peak in 2021 with 3.65 percent but declined sharply to 1.80 percent in 2023. This contrast highlights the volatility of refined petroleum exports and the steady demand for raw wood products.

Table 2: Trend in the percentage share of major commodities of exports:2019 -2023 (in Percentage)

Sl. No	Commodity	2019	2020	2021	2022	2023
1	Petroleum Gas	30.08	26.26	34.91	53.17	46.48
2	Gold	17.93	18.52	14.91	10.72	15.38
3	Platinum Clad Metals	17.93	17.88	11.03	0.00	0.00
4	Copper Ore	6.87	7.34	4.81	5.49	7.52
5	Palm Oil	3.68	4.69	7.50	6.84	7.01
6	Crude Petroleum	5.08	4.89	7.07	6.53	4.42

7	Nickel Mattes	3.43	3.38	5.13	4.73	4.81
8	Rough Wood	2.97	2.78	2.05	3.93	4.32
9	Refined Petroleum	2.36	2.59	3.65	2.72	1.80
10	Precious Metal Ore	2.79	3.51	2.69	1.28	2.05
11	Processed Fish	1.65	2.15	1.94	1.69	2.03
12	Coffee	0.99	0.99	1.28	1.40	1.93
13	Non-fillet Frozen Fish	1.79	1.25	1.03	0.94	1.29
14	Non-fillet Fresh Fish	0.73	1.21	1.99	0.00	0.00
15	Cocoa Beans	0.44	0.72	0.00	0.55	0.97
16	Coal Tar Oil	1.28	1.33	0.00	0.00	0.00
17	Sawn Wood	0.00	0.51	0.00	0.00	0.00

Source: Literature survey

Precious Metal Ore, starting at 2.79 percent in 2019 and reached a level of 2.05 percent in 2023 with moderate instability. Processed Fish (rose from 1.65 percent in 2019 to 2.03 percent in 2023), Coffee (an increase from 0.99 percent to 1.93 percent between 2019 and 2023) have shown a moderate increase suggesting for expanding market access or productivity of this produce. Non-fillet Frozen Fish, in contrast, declined slightly from 1.79 percent to 1.29 percent, indicating a small but consistent reduction in share. The Non-fillet Fresh Fish had a negligible presence in 2019 at 0.73 percent, rose to 1.99 percent in 2021, but fell to zero in 2022 and 2023. This points to either supply disruptions or removal from the export stream. It is noteworthy that the exports of marine food in the country is either negligible or negative though the country has the immense scope for increasing marine output, which may contribute considerable share in exports. The export of Cocoa Beans recorded an increase in share from 0.44 percent in 2019 to 0.97 percent in 2023. Coal Tar Oil, which contributed 1.28 percent in 2019, but like Platinum Clad Metals, saw complete cessation of exports in 2021 and subsequent years. The export of Sawn Wood registered a small presence only in 2020 (0.51 percent), and then again declined to zero. It remains the least significant commodity in the export basket.

When considering the overall trends and total contribution to exports during the five-year period, Petroleum Gas clearly occupies the top position in terms of both consistency and magnitude. Gold, while remaining important, shows decline and fluctuation. Platinum Clad Metals, despite a strong start, is entirely absent by the end of the period, indicating a structural change. Copper Ore, Palm Oil, Crude Petroleum, and Nickel Mattes form the middle tier of stable, medium-contribution exports. At the lower end are commodities like Cocoa Beans, Non-fillet Fish (both fresh and frozen), and Coal Tar Oil. Sawn Wood remains the least contributing export commodity across all five years.

To conclude, Petroleum Gas is the undisputed leader in Papua New Guinea's export economy, both in percentage share and in performance over time. In stark contrast, Sawn Wood holds the least export share, appearing marginally in only one year out of five and absent otherwise. These findings highlight the structural dependence of Papua New Guinea on a few key mineral and hydrocarbon exports, while underlining the need for diversification to stabilize and broaden the export base.

4.3 Trends in the major countries of exports

Having discussed the major commodities of exports of Papua New Guinea, in the present paragraph it is attempted to discuss the major countries of exports from PNG. As provided in Table 3, in the year 2019, Papua New Guinea’s largest export destination was Australia, receiving PGK 5,420 million worth of exports. However, the export value to Australia declined steadily over the years, falling to PGK 4,500 million in 2020 and further declining in subsequent years, reaching PGK 2,070 million in 2023. Over the five-year period, the average

annual export value to Australia stood at PGK 3,376 million, the highest among all trading partners. Despite its top position in average exports, the linear growth rate was sharply negative at -28.02 percent, indicating a consistent annual decline in exports. The compound growth rate similarly reflected this trend at -24.99 percent. The instability index, calculated at 740.40, indicates moderate fluctuations in export flows, suggesting that the fall in exports was neither smooth nor uniformly distributed. Japan emerged as the second-largest export destination in 2019, with exports from PNG valued at PGK 2,650 million. The exports declined in 2020 but witnessed a strong recovery, peaking at PGK 4,580 million in 2022 before falling again to PGK 3,190 million in 2023. The average exports to Japan over the period were PGK 3,034 million. Importantly, Japan displayed a positive trend in both linear and compound growth rates, registering at 11.90 percent and 12.47 percent respectively. These figures indicate that PNG's exports to Japan grew significantly over time. However, the high instability index of 1241.59 suggests considerable year-to-year volatility in the flow of exports. China followed closely with exports valued at PGK 2,590 million in 2019. Though this dropped slightly in 2020, exports to China picked up substantially thereafter, reaching PGK 3,550 million in 2023. The average annual exports over the five years stood at PGK 2,886 million, and both growth indicators were strong—13.24 percent linear growth and 14.01 percent compound growth. These positive trends mark China as one of PNG's most consistently growing markets. Still, the instability index of 845.47 points to notable variations, albeit with an overall upward movement. Chinese Taipei was also a notable export destination, receiving PGK 813 million in 2019. The export values remained relatively stable and peaked at PGK 1,460 million in 2022. With an average of PGK 964.2 million, the country showed promising and steady trade relations. Linear and compound growth rates of 11.56 percent and 11.89 percent respectively confirmed an expanding export relationship. The volatility, captured by an instability index of 681.87, was lower than that of China or Japan, indicating more consistent trade.

Table 3: Trend in the major countries of exports: 2019 -2023 (PGK in million)

Sl. No	Country	2019	2020	2021	2022	2023	Mean	LGR	CGR	instability
1	Australia	5420	4500	3150	1740	2070	3376	-28.02	-24.99	740.40
2	Japan	2650	2050	2700	4580	3190	3034	11.90	12.47	1241.59
3	China	2590	1950	2490	3850	3550	2886	13.24	14.01	845.47
4	Chinese Taipei	813	717	832	1460	999	964.2	11.56	11.89	681.87
5	South Korea	383	535	690	1680	0	657.6	5.76	0.00	2174.60
6	Netherlands	363	399	489	492	394	427.4	3.63	3.80	233.33
7	India	128	149	329	619	483	341.6	34.54	50.38	487.45
8	Singapore	221	396	558	203	217	319	-6.30	-6.80	761.43
9	North Korea	416	384	385	0	0	237	-51.31	0.00	581.18
10	Philippines	437	390	282	0	0	221.8	-56.99	0.00	389.76
11	Germany	170	190	238	241	264	220.6	10.83	11.83	59.24
12	Malaysia	151	208	167	314	176	203.2	7.68	7.45	379.61
13	United Kingdom	139	110	119	232	253	170.6	20.52	21.46	257.21
14	Italy	140	222	230	153	96.4	168.28	-9.28	-10.58	352.51
15	Thailand	217	69	0	204	0	98	-30.51	-28.49	863.14
16	Switzerland	78	110	129	0	0	63.4	-41.96	-28.49	491.30
17	Hong Kong	0	0	256	0	0	51.2	0.00	0.00	1431.08
18	Bulgaria	0	130	80.6	0	0	42.12	-30.86	0.00	780.70
19	United States	77.3	87.3	0	0	0	32.92	-73.48	0.00	375.95
20	Spain	0	0	90.1	0	0	18.02	0.00	0.00	849.00

Source: Literature survey

South Korea received PGK 383 million in exports in 2019, in 2023 it dropped to zero. Among European partners, the Netherlands consistently imported exports from PNG, starting at PGK 363 million in 2019 and maintaining a steady trend through the study period. The average value stood at PGK 427.4 million. Linear and compound growth rates of 3.63 and 3.80 percent respectively indicate a marginal but consistent growth in exports. The moderate instability index of 233.33 points to stable and predictable trade, making the Netherlands a reliable export destination for PNG. India represented a rapidly emerging export market of PNG, with a modest PGK export of 128 million in 2019. The export value rose sharply to 619 million PGK in 2022, before settling at PGK 483 million in 2023. This trajectory produced a five-year average of PGK 341.6 million. Significantly, exports to India recorded the highest linear and compound growth rates among all countries, at 34.54 percent and 50.38 percent respectively. These statistics strongly suggest a rapidly expanding export relationship between the two countries. The instability index of 487.45, though not the lowest, reflects moderate variability in the data that may be expected during periods of rapid expansion. Singapore received PNG exports worth PGK 221 million in 2019, which increased to PGK 558 million in 2021 and declined. As a result of declining value of exports, the country experienced the negative linear and compound growth rates of 6.30 per cent and 6.80 percent respectively. The instability index of 761.43 confirms the inconsistency in trade volumes during the study period. Exports to North Korea were recorded at PGK 416 million in 2019 but dropped to zero by 2022. The average export value was PGK 237 million. The linear growth rate was negative with 51.31 percent. The instability index of 581.18 suggests a high degree of fluctuation. The exports to Philippines which stood at PGK 437 million in 2019 declined steadily to zero by 2022. Exports to Germany experienced a slow and steady increase from PGK 170 million in 2019 to PGK 264 million in 2023. The average value was PGK 220.6 million. Both growth rates were positive (10.83 percent linear and 11.83 percent compound) with also the lowest instability index with 59.24 per cent recorded among all countries. This combination of steady growth and low volatility marks Germany as PNG's most stable and dependable export market during the study period. Malaysia also saw a positive trend, with exports rising from PGK 151 million in 2019 to PGK 314 million in 2022, although dipping slightly to PGK 176 million in 2023. The average stood at PGK 203.2 million. Linear and compound growth were both positive, at 7.68 and 7.45 percent, respectively, with an instability index of 379.61, suggesting moderate but tolerable fluctuations. The United Kingdom received PGK 139 million in 2019, and exports increased consistently to PGK 253 million in 2023. With an average export value of PGK 170.6 million, the UK posted strong linear (20.52 percent) and compound (21.46 percent) growth rates. The instability index, at 257.21, was relatively low, confirming a reliably growing trade link. Italy experienced varied export values, averaging PGK 168.28 million, and a declining trend with a linear growth rate of -9.28 percent and compound rate of -10.58 percent. The instability index of 352.51 shows notable fluctuations but not to the extent of more volatile destinations. Among less significant exporting countries, Thailand, Switzerland, Bulgaria, the United States, and Spain showed minimal and inconsistent trade activity. Exports to all the countries recorded high instability.

In conclusion, Australia remained PNG's largest export destination in average terms, though it showed a steep decline over the years. India and China emerged as dynamic and growing markets, with India showing the fastest rate of growth. Germany, despite a smaller trade volume, demonstrated the highest level of stability and consistent growth. The findings underline the importance of nurturing both high-value and high-stability markets, while cautioning against over-dependence on volatile or declining destinations. Policymakers and trade strategists may use this evidence to re-align export promotion efforts towards expanding and stabilizing PNG's trade portfolio.

4.4 Trends in the share of major countries of exports

Having discussed the country wise value of exports, in the present paragraph it is attempted to examine the share in exports to major countries. As it is seen in Table 4, during the study period, there are 20 major countries to which Papua New Guinea (PNG) exported its commodities. A perusal of the data given in the table would indicate that in the year 2019, Australia emerged as the dominant destination for PNG's exports, accounting for 37.66% of the total share. This high proportion indicated a strong bilateral trade relationship in that year. However, this lead was not sustained, as the share declined sharply to 35.72% in 2020, then to 23.84% in 2021, and then further to 11.04% in 2022 though it recovered moderately to 17.70 per cent in 2023 suggesting a reduction in PNG's dependence on the Australian market, The second highest share in 2019 was held by Japan, with 18.41% of PNG's exports. The exports with Japan was maintained during the study period though the share slightly declined in 2020 to 16.27% and which regained in 2021 (20.43%) and in 2023 (27.28%). Share in exports to China was 17.99% in 2019 which is the largest export destination for PNG that year. The trend indicated that the export share rose steadily to reach a peak level of 30.36% in 2023. And for PNG, in 2023, China was the largest export destination. The share of Chinese Taipei (Taiwan) was 5.65% and the share increased over the years to reach 8.54% in 2023. South Korea held a modest share of 2.66% in 2019 and which increased to 10.65% in 2022. But there were no exports to this country in 2023. Exports to Netherlands accounted for 2.52% in 2019 and there was a minor rise in exports to 3.37% in 2023. India, though beginning with a small share of 0.89% in 2019, showed a consistent and encouraging upward trajectory, reaching 4.13% in 2023. This progression over five years suggests a growing trade link that may evolve further in the future. Exports to Singapore stood at 1.54% in 2019but with a moderate fluctuation reached a level of 1.86% in 2023 indicating some volatility in the trade relationship. While the share in exports to North Korea and Philippine decreased gradually and completely disappeared by 2022 and 2023. The exports to Germany, Malaysia and United Kingdom showed slow but steady growth during the study period.

Table 4: Trends in the share of major countries of exports (in %age share)

Sl. No	Products	2019	2020	2021	2022	2023
1	Australia	37.66	35.72	23.84	11.04	17.70
2	Japan	18.41	16.27	20.43	29.05	27.28
3	China	17.99	15.48	18.84	24.42	30.36
4	Chinese Taipei	5.65	5.69	6.30	9.26	8.54
5	South Korea	2.66	4.25	5.22	10.65	0.00
6	Netherlands	2.52	3.17	3.70	3.12	3.37
7	India	0.89	1.18	2.49	3.93	4.13
8	Singapore	1.54	3.14	4.22	1.29	1.86
9	North Korea	2.89	3.05	2.91	0.00	0.00
10	Philippines	3.04	3.10	2.13	0.00	0.00
11	Germany	1.18	1.51	1.80	1.53	2.26
12	Malaysia	1.05	1.65	1.26	1.99	1.51
13	United Kingdom	0.97	0.87	0.90	1.47	2.16
14	Italy	0.97	1.76	1.74	0.97	0.82
15	Thailand	1.51	0.55	0.00	1.29	0.00
16	Switzerland	0.54	0.87	0.98	0.00	0.00
17	Hong Kong	0.00	0.00	1.94	0.00	0.00
18	Bulgaria	0.00	1.03	0.61	0.00	0.00

19	United States	0.54	0.69	0.00	0.00	0.00
20	Spain	0.00	0.00	0.68	0.00	0.00

Source: Literature Survey

Other European countries like Italy, Switzerland, Bulgaria, and Spain had marginal and inconsistent shares. Exports to Italy showed no real momentum. Exports to Switzerland, Bulgaria, Hong Kong and Thailand do not show any continuous trade engagements and exports to United States showed a declining trend.

To summarize, over the five-year period, China rose to become the leading export destination for PNG by 2023, followed closely by Japan, while Australia, once the dominant partner, saw a significant decline in its share. On the other hand, countries like Spain, Bulgaria, Switzerland, and the United States represented the lowest shares with either a very marginal presence or complete withdrawal from PNG's export destinations in the later years. The overall trend reflects PNG's shifting trade alliances, increasingly oriented towards East Asian economies, especially China, Japan, and Taiwan, while traditional partners like Australia and the United States saw relative declines.

4.5 Trends in the major commodities of imports

Having examined the trends in value and share in exports of PGK, in the present paragraph, it is attempted to examine the commodity-wise imports of PNG. As seen in Table 5, in the year 2019, the single largest import of the country was Machines. The value of imports was 1191.25 million PGK. This was followed by Mineral Products at 941.96 million PGK and Metals at 526.78 million PGK. Transportation imports stood at 439.21 million PGK, while Chemical Products (463.45 million PGK) and Foodstuffs (398.26 million PGK) also ranked among the top six import categories. At the bottom of the list in 2019 were Weapons (1.58 million PGK) and Arts and Antiques, with a negligible value of 0.04 million PGK. By 2020, the top three remained largely consistent, with Machines (1163.08 million PGK), Mineral Products (679.80 million PGK), and Metals (554.45 million PGK) dominating the chart. Other major imports included Chemical Products and Transportation. On the other end, Weapons, Precious Metals, and Arts and Antiques continued to form the smallest shares. In 2021, Machines again led the imports at 1207.78 million PGK. Although the import of Mineral Products fell sharply to 495.35 million PGK, it still held its place in the top three, along with Metals and Transportation. Lower-end import categories included Animal Hides, Weapons, and Arts and Antiques. The trend intensified in 2022, when the import value of Machines spiked to 1415.04 million PGK—the highest for any year. Mineral Products recovered to 777.84 million PGK, followed by Metals at 566.51 million PGK. Transportation and Chemical Products held their place. Meanwhile, Weapons, Precious Metals, and Arts and Antiques continued to have very small values. In 2023, the highest imports were again in Machines at 1269.14 million PGK, followed by Mineral Products (972.14 million PGK) and Transportation (565.38 million PGK). Interestingly, the import of Metals declined to 447.54 million PGK, yet it remained among the top five. Arts and Antiques and Weapons retained the lowest values.

An examination of the growth trends of the commodities in terms of the worked out Linear Growth Rate (LGR), the product category Arts and Antiques showed the highest linear growth rate of 4.64%, despite its low volume. This was followed by Wood Products (3.79%) and Transportation (6.04%), showing a steady increase in value over the years. Machines also registered a healthy growth rate of 3.26%, reinforcing its dominance. On the other hand, Animal and Vegetable Bi-Products recorded the steepest negative growth rate at -27.27%, suggesting a sharp fall in imports. Precious Metals (-12.43%) and Weapons (-10.86%) also registered significant declines in imports over the five years. Other categories with consistent

negative growth included Chemical Products, Foodstuffs, and Textiles. A perusal of the data on the instability index (I) indicates that the product category with the least volatility was Vegetable Products with an index of 40.17 per cent indicating a stable imports during the study period. The imports of Arts and Antiques stood with next lowest instability index of 45.68 per cent, despite its small size. The third least volatility in imports could be found in the case of Weapons with 57.61 per cent, suggesting that though the absolute values were low, their year-to-year fluctuations were limited. On the other and, in the case of the commodities like, Animal Hides (1054.79 per cent), Mineral Products (625.89 per cent), Transport products (290.91 per cent), Machines (195.06 per cent), and Wood Products (184.68 per cent), high volatility or fluctuation.

Table 5: Trends in major commodities of imports: 2019 -2023 (in million)

Sl. No	Products	2019	2020	2021	2022	2023	Average	LGR	CGR	instability
1	Machines	1191.248	1163.078	1207.779	1415.04	1269.136	1249.26	3.26	3.28	195.06
2	Mineral Products	941.9573	679.805	495.3518	777.8405	972.1404	773.42	2.05	2.00	625.89
3	Metals	526.7772	554.4528	481.3692	566.5093	447.537	515.33	-2.84	-3.00	174.95
4	Transportation	439.2081	425.4384	340.3372	440.2082	565.3808	442.11	6.04	5.54	290.91
5	Chemical Products	463.4499	387.8375	346.9172	405.8021	306.9755	382.20	-7.72	-7.49	167.98
6	Foodstuffs	398.2627	334.6066	320.3638	357.5882	340.331	350.23	-2.65	-2.45	124.92
7	Vegetable Products	304.2198	303.4805	305.7464	281.9693	295.5498	298.19	-1.30	-1.30	40.17
8	Plastics and Rubbers	285.3283	260.582	244.5446	258.0409	263.0899	262.32	-1.79	-1.71	70.19
9	Animal Products	226.0175	209.7654	198.3729	198.2941	239.8115	214.45	0.75	0.62	109.79
10	Textiles	165.7408	149.1122	128.9185	135.0342	152.6984	146.30	-2.75	-2.60	97.44
11	Miscellaneous	124.3806	98.61476	80.67377	84.33776	120.787	101.76	-2.11	-2.13	176.54
12	Paper Goods	92.99454	88.73413	79.53385	109.1139	75.00751	89.08	-1.75	-2.21	123.71
13	Instruments	65.6006	72.88967	75.14435	79.81922	64.14731	71.52	0.56	0.46	69.29
14	Stone And Glass	75.97569	59.51977	53.70346	46.43422	68.64533	60.86	-4.56	-4.41	124.71
15	Animal and Vegetable Bi-Products	91.06712	69.63366	32.53612	37.88835	34.49288	53.12	-27.27	-22.51	152.28
16	Footwear and Headwear	54.68932	31.15659	28.75259	30.68271	51.31212	39.32	-1.84	-1.42	178.69
17	Animal Hides	20.74584	11.67842	9.592533	10.48912	20.27891	14.56	-1.46	-1.52	1054.79
18	Wood Products	7.247176	6.32229	6.724399	6.334612	8.574357	7.04	3.79	3.44	184.68
19	Precious Metals	4.32003	5.124756	0.86876	2.949018	3.344422	3.32	-12.43	-10.10	72.38
20	Weapons	1.581872	0.297088	0.316801	1.371774	0.592695	0.83	-10.86	-4.24	57.61
21	Arts and Antiques	0.039898	0.116424	0.571433	0.093733	0.093706	0.18	4.64	16.08	45.68

Source: Literature survey

To conclude, machines not only dominated the import structure of PNG in terms of value but also showed consistent growth. Mineral Products had high value but also high volatility. The trade in smaller commodities like Arts and Antiques remained steady but insignificant in scale. The diversity in growth patterns and instability across product categories

highlights the shifting priorities and dependencies in PNG's import profile during the study period.

4.6 Trends in the share of major commodities of imports

Having discussed the value of imports by commodities, in the present paragraph, it is attempted to study the share in imports of such commodities. As provided in Table 6, in the year 2019, Machines represented the highest share of imports, accounting for 21.73 percent of the total. This indicates that machinery and mechanical appliances constituted the primary import requirement of the country in that year. The second-largest import category was Mineral Products, which made up 17.19 percent of total imports. This was followed by Metals, which contributed 9.61 percent. Other significant categories included Transportation equipment at 8.01 percent, Chemical Products at 8.46 percent, and Foodstuffs at 7.27 percent. These six product categories alone accounted for more than 72 percent of total imports, signifying a strong concentration in core infrastructure and consumption-related goods. On the other hand, the lowest share in 2019 was recorded under Arts and Antiques, which registered a negligible import value. Weapons contributed just 0.03 percent, and Precious Metals stood at 0.08 percent, indicating minimal external procurement in these segments. In 2020, Machines continued to dominate PNG's imports, increasing to 23.68 percent. Although the overall trend was similar to 2019, Mineral Products dropped to 13.84 percent, while Metals increased to 11.29 percent, becoming the second-largest import category. Transportation, Chemical Products, and Foodstuffs retained their mid-level importance, with respective shares of 8.66, 7.90, and 6.81 percent. Notably, Vegetable Products increased their share from 5.55 percent in 2019 to 6.18 percent in 2020, reflecting rising food security or agricultural inputs demand. At the lower end, Weapons further declined to 0.01 percent, Animal Hides fell to 0.24 percent, and Arts and Antiques maintained zero share, confirming the consistent unimportance of these categories. The import composition in 2021 followed similar lines. In 2022, the composition showed a slightly different trend. Although Machines held the top position at 26.97 percent, Mineral Products saw a rebound to 14.83 percent, moving back into the second position. Metals, transportation, and chemical products remained steady shares at around 10.80, 8.39, and 7.74 percent, respectively. Foodstuffs also remained stable at 6.82 percent. By 2023, Machines retained the highest import share at 23.95 percent. Interestingly, Mineral Products increased significantly to 18.34 percent, the highest level across the five years. This rise could be linked to industrial, energy-related, or processing sector needs. Transportation equipment saw an increase as well, reaching 10.67 percent, becoming the third-largest import group, ahead of Metals, which declined to 8.44 percent. Other mid-tier import shares were held by Foodstuffs, Chemical Products, and Vegetable Products, ranging between 5.58 and 6.42 percent. At the tail end, Arts and Antiques continued to report zero share, while Weapons and Precious Metals recorded less than 0.06 percent.

Table 6: Trends in the percentage share in imports of PNG:2019 -2023 (in Percentage)

Sl. No	Products	2019	2020	2021	2022	2023
1	Machines	21.73473	23.67711	27.21377	26.97451	23.94629
2	Mineral Products	17.18633	13.83898	11.1613	14.82776	18.34253
3	Metals	9.611228	11.28715	10.84624	10.79921	8.444212
4	Transportation	8.013499	8.660772	7.668501	8.391566	10.66771
5	Chemical Products	8.4558	7.895319	7.816762	7.735692	5.792072
6	Foodstuffs	7.266438	6.811682	7.21846	6.816603	6.421429
7	Vegetable Products	5.550593	6.178041	6.889099	5.375102	5.576489
8	Plastics and Rubbers	5.205911	5.304743	5.510096	4.918961	4.96403
9	Animal Products	4.123765	4.270255	4.469751	3.780024	4.524808

10	Textiles	3.023996	3.035521	2.9048	2.574118	2.881142
11	Miscellaneous	2.269366	2.007529	1.817747	1.607707	2.279031
12	Paper Goods	1.696717	1.806386	1.792062	2.080008	1.415256
13	Instruments	1.196905	1.483836	1.693158	1.521571	1.210343
14	Stone And Glass	1.386202	1.211661	1.21005	0.885163	1.295213
15	Animal and Vegetable Bi-Products	1.66155	1.417552	0.733106	0.722255	0.650818
16	Footwear and Headwear	0.997825	0.634264	0.647855	0.584896	0.968167
17	Animal Hides	0.378515	0.237741	0.21614	0.199951	0.382626
18	Wood Products	0.132227	0.128705	0.151515	0.120755	0.161783
19	Precious Metals	0.07882	0.104326	0.019575	0.056216	0.063103
20	Weapons	0.028862	0.006048	0.007138	0.02615	0.011183
21	Arts and Antiques	0.000728	0.00237	0.012876	0.001787	0.001768

Source: Literature survey

To sum up, the product categories imported by Papua New Guinea over the five-year period from 2019 to 2023 indicated that the import of Machines, consistently held the highest share each year and clearly dominated PNG's import basket. The dominance of Machines, Mineral Products, Metals, and Transportation equipment confirms that the country's external trade is heavily skewed toward infrastructure and economic development needs. On the other hand, products such as Weapons, Arts and Antiques, and Precious Metals occupy the fringe, both in terms of volume and importance, reflecting either low demand or strict import regulations.

4.7 Trends in the major countries of imports

Having discussed the commodity wise imports, in the present paragraph it is attempted to discuss the major countries from which Papua New Guinea (PNG) imports. As seen in Table 7, the data on the country-wise import pattern of Papua New Guinea (PNG) from 2019 to 2023 reveals significant variations across trading partners in terms of import value, growth trends, and stability. The analysis based solely on the provided dataset—without any external references—helps to understand PNG's evolving international trade dependencies and the volatility associated with them.

In the year 2019, the highest import value was recorded from Australia, with a total of PGK 1628.19 million. This figure confirms Australia's dominant position as PNG's leading import source during the beginning of the study period. In the same year, China followed as the second-largest supplier with PGK 865.51 million, only slightly ahead of Singapore, which accounted for PGK 864.37 million. These three countries formed the core of PNG's external trade portfolio in 2019. Malaysia stood at a distant fourth with PGK 323.57 million, while Indonesia and Japan followed, registering import values of PGK 175.20 million and PGK 171.87 million respectively. Other countries such as Thailand (PGK 168.06 million), New Zealand (PGK 161.25 million), and the United States (PGK 141.26 million) also contributed substantially, although their volumes were comparatively lower.

Countries such as Chinese Taipei, India, and Hong Kong contributed modestly, with Chinese Taipei registering PGK 22.62 million, India at PGK 76.82 million, and Hong Kong at PGK 71.28 million. Imports from the Philippines, Italy, Germany, and other smaller European nations were low, while minimal values were recorded from Canada, Fiji, the United Kingdom, and the United Arab Emirates. The residual group comprising 163 countries collectively recorded PGK 324.21 million in 2019, indicating the significance of global diversification even outside the primary trading partners.

When considering the five-year average import values, Australia remained the top import partner with an average of PGK 1442.53 million, emphasizing its continued economic linkages and bilateral trade agreements with PNG. China ranked second, averaging PGK

1076.52 million, and Singapore followed with an average import value of PGK 760.22 million. Malaysia and Indonesia maintained their middle-order positions, averaging PGK 390.22 million and PGK 199.98 million respectively. Japan also maintained a steady role with an average import value of PGK 187.93 million. Among the lower-volume trading partners, Chinese Taipei displayed a rising trend with an average of PGK 78.66 million, while countries like the United Kingdom, United Arab Emirates, and Germany remained at the bottom in terms of average import contribution.

Table 7: Trends in the major countries of imports (in Million)

Sl.No.	Products	2019	2020	2021	2022	2023	AVERAGE	LGR	CGR	instability
1	Australia	1628.19	1360.12	1513.77	1273.09	1437.46	1442.53	-3.25	-3.10	271.39
2	China	865.51	870.85	932.07	1425.76	1288.43	1076.52	13.01	13.75	381.54
3	Singapore	864.37	605.91	687.20	856.54	787.07	760.22	1.26	1.60	359.28
4	Malaysia	323.57	283.50	343.38	508.07	492.59	390.22	14.42	15.30	234.62
5	Indonesia	175.20	163.55	219.75	244.55	196.84	199.98	6.21	6.56	166.86
6	Japan	171.87	157.33	198.89	196.18	215.38	187.93	6.70	6.95	76.63
7	Thailand	168.06	143.38	172.08	185.20	177.98	169.34	3.64	3.78	86.19
8	New Zealand	161.25	128.23	141.54	132.02	125.98	137.81	-4.84	-4.54	74.58
9	United States	141.26	74.30	59.66	97.10	109.84	96.43	-4.15	-2.33	283.39
10	Chinese Taipei	22.62	38.05	53.21	112.11	167.30	78.66	46.20	66.24	175.12
11	India	76.82	62.25	72.55	85.28	70.46	73.47	1.40	1.43	86.68
12	Hong Kong	71.28	52.11	74.55	34.51	33.64	53.22	-17.45	-17.42	156.70
13	Philippines	43.18	40.36	26.75	20.49	18.73	29.90	-23.00	-20.93	49.18
14	Italy	49.17	31.70	23.52	11.41	20.56	27.27	-28.42	-24.16	123.80
15	Germany	46.00	27.77	20.19	7.94	17.18	23.82	-32.53	-27.54	134.93
16	Netherlands	24.20	16.72	23.30	17.42	22.50	20.83	-1.30	-1.04	67.88
17	United Arab Emirates	25.71	10.74	18.05	17.00	9.73	16.25	-15.83	-13.80	111.01
18	United Kingdom	25.51	11.72	19.18	11.37	9.85	15.53	-20.40	-17.58	99.36
19	Canada	22.83	25.82	6.80	5.73	15.07	15.25	-23.34	-20.82	163.73
20	Fiji	15.03	17.33	15.77	15.56	11.24	14.99	-6.23	-6.65	39.61
21	All other 163 Countries	324.21	316.22	290.02	223.51	72.09	245.21	-24.34	-28.49	257.00

Source: Literature survey

In terms of growth in imports, a distinct picture emerges when we examine the linear growth rate (LGR) and compound growth rate (CGR). Chinese Taipei recorded the highest LGR of 46.20 percent and a CGR of 66.24 percent, suggesting a rapidly growing trade relationship with PNG. This significant rise indicates either a strategic shift in trade patterns, or the growing importance of specific commodities imported from Chinese Taipei. Malaysia and China also demonstrated robust growth, with LGR values of 14.42 and 13.01 percent, and corresponding CGRs of 15.30 and 13.75 percent respectively, further strengthening their positions as dynamic trade partners. Japan and Indonesia showed moderate growth rates (LGRs of 6.70 and 6.21 percent), indicating consistent but controlled increases in import volumes. Countries such as Thailand and India also recorded positive LGRs of 3.64 and 1.40 percent, though their volumes remained modest. On the other hand, a sharp decline was visible in several countries. Germany showed the steepest fall in imports, with a LGR of -32.53 percent and a CGR of -27.54 percent. Italy (-28.42 percent LGR), the group of "All other countries" (-24.34 percent), and the Philippines (-23.00 percent) also faced major declines in PNG's import share. The negative growth extended to Hong Kong, the United Kingdom, and Canada as well, highlighting either reduced trade flows or a shift in sourcing policies by PNG.

The instability index, a measure of volatility in imports, provides the inference that the lowest volatility was observed in the Philippines, with an instability index of 49.18. This

implies that imports from the Philippines were relatively stable and showed less year-on-year fluctuation, even though the overall volume was low. Following the Philippines, countries like Fiji (39.61), New Zealand (74.58), and Japan (76.63) recorded relatively low instability values, indicating steadier import behaviour. In contrast, imports from China were the most volatile, with an instability index of 381.54, suggesting wide fluctuations in trade volumes year to year. This could be due to external price shocks, changing demand patterns, or disruptions in logistics. Other countries like Singapore (359.28), the United States (283.39), and the group of "All other countries" (257.00) also recorded high instability, implying less predictability in trade patterns. Despite their significance, imports from Australia and Malaysia also displayed considerable volatility, with instability indexes of 271.39 and 234.62, respectively.

To conclude, the analysis of PNG's country-wise import data from 2019 to 2023 reveals that Australia has remained the largest trading partner, both in terms of annual and average import values, followed by China and Singapore. Chinese Taipei has emerged as the fastest-growing import source with the highest growth rates, while Germany, Italy, and the Philippines have seen significant declines. From the perspective of stability, the Philippines, Fiji, and New Zealand showed the most consistent trade relations, whereas imports from China and Singapore have been highly volatile.

4.8 Trends in the share of major countries' imports

Following the value in imports, an examination of the share in imports of PNG by countries would indicate that, as seen in Table 8, there is a clear pattern in the country's reliance on particular international trade partners. As it is provided in Table 8, in 2019, the largest share of PNG's imports came from Australia, which constituted 31.04 percent of total imports. This dominant position reflects Australia's historical and geographical closeness, long-standing trade relations, and possibly the diversity of goods supplied. China ranked second with a share of 16.50 percent, reflecting China's growing role in the Asia-Pacific trade sphere. Following closely was Singapore, which contributed 16.48 percent, just marginally lower than China. The presence of Singapore, a prominent re-export and trading hub, in the third position underscores its importance in PNG's supply chain, particularly for processed goods and oil products. The fourth highest share was recorded by Malaysia, with 6.17 percent of PNG's imports. Indonesia, another neighbouring ASEAN country, contributed 3.34 percent, followed closely by Japan at 3.28 percent. Thailand, New Zealand, and the United States held moderate shares at 3.20 percent, 3.07 percent, and 2.69 percent respectively. These countries appear to play an important role in PNG's industrial and technological import requirements. Beyond the top ten import sources, Chinese Taipei (Taiwan) had a minor share of 0.43 percent in 2019. Other Asian trading partners like India and Hong Kong held 1.46 percent and 1.36 percent respectively, which though modest, reflect strategic linkages in specific sectors such as pharmaceuticals and electronics. The Philippines accounted for 0.82 percent, while European nations such as Italy, Germany, and the Netherlands contributed 0.94 percent, 0.88 percent, and 0.46 percent respectively. These shares may be linked to imports of machinery, medical equipment, or specialty products. The United Arab Emirates and the United Kingdom each contributed 0.49 percent, and Canada and Fiji recorded even smaller shares at 0.44 percent and 0.29 percent respectively. The group comprising all other 163 countries collectively contributed 6.18 percent of PNG's imports in 2019, suggesting that while the majority of imports were from major partners, PNG's import base was also globally diversified.

During the five-year period, significant changes occurred in the import pattern. For example, China's share increased steadily, peaking at 26.01 percent in 2022 before slightly declining to 24.31 percent in 2023. This reflects the rising influence of China in PNG's trade and possibly growing reliance on Chinese goods. Australia, though starting at the top,

experienced a decline in 2022 to 23.23 percent but rebounded to 27.12 percent in 2023, indicating resilience in trade ties. Singapore, on the other hand, saw a dip from 16.48 percent in 2019 to 13.65 percent in 2020 and remained within the 13 to 16 percent range for the rest of the years. Malaysia's share steadily rose, especially from 2021 onward, reaching above 9 percent by 2022 and 2023, reflecting enhanced trade engagements.

By 2023, Australia remained the top import source, holding the highest share of 27.12 percent, followed by China with 24.31 percent. Singapore maintained its third position with 14.85 percent. Malaysia became the fourth-largest source, surpassing Indonesia and Japan. Despite being relatively small in 2019, Chinese Taipei emerged as a strong contender, overtaking traditional partners like India, Hong Kong, and the Philippines by 2023. Counties like Fiji, Canada, and the United Kingdom consistently registered very low import shares. While these countries are likely to supply niche goods or specialty products, their role in PNG's broader import profile appears minimal.

To sum up, the five-year data reflect a clear pattern of dominance by Australia, China, and Singapore, followed by rising contributions from Malaysia and Chinese Taipei. Countries such as the United States, Indonesia, and Japan maintained a stable middle-order position. Meanwhile, several European and smaller Pacific nations saw a decline in their trade relevance. The analysis shows that PNG's import structure is becoming more concentrated among fewer countries, especially in the Asia-Pacific region, with Australia and China competing for the top position. Therefore, as per the latest year of 2023, PNG's highest import share is from Australia, while the least share is from Fiji, excluding the aggregated category of other countries.

Table 8: Trends in the share of major countries of imports (in Percentage)

Sl. No	Products	2019	2020	2021	2022	2023
1	Australia	31.04	30.65	30.82	23.23	27.12
2	China	16.50	19.62	18.97	26.01	24.31
3	Singapore	16.48	13.65	13.99	15.63	14.85
4	Malaysia	6.17	6.39	6.99	9.27	9.29
5	Indonesia	3.34	3.69	4.47	4.46	3.71
6	Japan	3.28	3.55	4.05	3.58	4.06
7	Thailand	3.20	3.23	3.50	3.38	3.36
8	New Zealand	3.07	2.89	2.88	2.41	2.38
9	United States	2.69	1.67	1.21	1.77	2.07
10	Chinese Taipei	0.43	0.86	1.08	2.05	3.16
11	India	1.46	1.40	1.48	1.56	1.33
12	Hong Kong	1.36	1.17	1.52	0.63	0.63
13	Philippines	0.82	0.91	0.54	0.37	0.35
14	Italy	0.94	0.71	0.48	0.21	0.39
15	Germany	0.88	0.63	0.41	0.14	0.32
16	Netherlands	0.46	0.38	0.47	0.32	0.42
17	United Arab Emirates	0.49	0.24	0.37	0.31	0.18
18	United Kingdom	0.49	0.26	0.39	0.21	0.19
19	Canada	0.44	0.58	0.14	0.10	0.28
20	Fiji	0.29	0.39	0.32	0.28	0.21
21	All other 163 Countries	6.18	7.13	5.90	4.08	1.36

Source: Literature survey

5. Conclusion and suggestions

The above discussion vindicates that the country exports metals and petroleum products. But it could also be seen that, except for a few countries, PNG does have minimal regular export partners. Also, in the case of imports, the country imports mostly machinery and minerals.

Based on the above discussion, the following suggestions for trade improvements can be given:

- Though the data on the earlier periods could show a positive balance of payments for the country, the latest year 2023 indicated a decrease in trade balance, which is mostly due to the higher imports of machinery and minerals. Hence, there is a need to reduce the imports machinery through indigenous production.
- Too much reliance on only a few countries may impede the future exports prospects. Hence, PNG can try to expand its trade partners.
- With the immense scope for expanding the output of inland fish and marine products and agricultural commodities, the country can expand its trade on these items with Asian and European partners.
- The government ought to promote value-added exports, such as processed oil, refined metals, or agri-foods, to growing markets in Africa or Southeast Asia, where competition is less intense and market entrance is more accessible.
- It is recommended that PNG engage in import substitution industries, particularly in basic manufacturing, agro-processing, fertilizers, and medicinal products. Promoting local industries via tax incentives, infrastructure development, and loan assistance can mitigate the trade deficit and create employment opportunities.
- Numerous nations, such as Singapore and Malaysia, exhibit substantial import proportions while demonstrating low or variable export proportions. For example, exports to Singapore decreased to merely 1.86% in 2023, although imports remained elevated. Hence, PNG can deepen bilateral trade agreements with these nations to promote reciprocal market access, especially for specialized PNG products such as fisheries, spices, or specialty minerals.

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