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Original Article

The Contribution of Green Transition to Increase in South-South Trade and Economic Growth of Commodity-Rich Developing Countries

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Abstract: *The green transition means restructuring of national economies according to the new ecological principles. It is associated with specific changes in global demand for certain commodities and merchandise. International trade, which is the chief means for the effective delivery of commodities and merchandise, undergoes well-pronounced alternations in its geographical and product structure. The established supply chains undergo respective diversions in the aspect of length and chief participants. Green transition contributes to the effective integration in the global economy of some developing countries – chief suppliers of crucial resources. As some of them are one of the least developed countries it could be stated that green transition turns into an instrument for achieving also one of the UN goals for sustainable development, namely – reduced inequalities, economic growth, zero hunger and no poverty. (UN, 2023)*

Keywords: *Green Transition, Global Demand, Crucial Commodities, Integration In The Global Economy, Developing Countries, Economic Growth, Sustainable Development Goals.*

I. INTRODUCTION

The Paris Agreement signed by 196 countries in 2015 triggered economic and social transformation, leading to reduced greenhouse gas emissions. The major aspects of the green transition are the switch to renewable energy resources instead of fossil fuels and the decrease in the level of carbon emissions. The share of wind energy and solar energy surged during the past 10 years, but it is still to rise, according to the International Energy Agency (IEA, 2023). The agency predicts a great growth in renewable energy driven by solar PV technology advances and wind turbines. Reduction of carbon emissions can be achieved by replacement of the fuels that generate them as well as by cutting down the distances that the vehicles pass. The switch from traditional cars powered by oil to electric vehicles is a great step, but it has certain limitations. Developing and usage of bioenergy for the ships is still far from mass practice. Shortening the global supply chains via trade concentration and nearshoring (Unctad, 2023) is another way to decrease carbon emissions.

The main goal of this article is to reveal the changes in the geographical structure of international trade due to the specifications in the production process, assurance of crucial minerals and key players in major green transition supply chain products. It will study how the increased demand for crucial elements for green transition can contribute to the intensified integration of some developing countries in the global economy and contribute to their economic growth. First, the essential products for the green transition, as well as the crucial elements for their production, will be identified. These products and their building elements present the changes in the product structure of international trade. The way of crucial resources from the main suppliers to the main producers and the eventual consumers marks the geographical trends in international trade. The research will prove that this way strengthens the South-South trade flows. The study will analyze the changes in the economic indicators of key suppliers of crucial elements (certain developing countries) such as export values, terms of trade, trade openness and gross domestic products in order to prove the positive impact of green transition for the economic development and global integration of these countries.

II. LITERATURE REVIEW& METHODOLOGY

The study's primary methodologies are the most widely used scientific methodologies: analysis, synthesis, induction, and deduction. The empirical confirmation of a hypothesis uses the induction and deduction methods. Data comparisons and scientific explanations underpin the analytical process. Data are obtained from the official statistics of international organizations and institutions. The main sources of information concerning the green transition are the IEA and IMF. Information concerning the trade values, volumes and indicators is obtained mainly from the statistics of UNCTAD, WTO and WB. Certain calculations obtain some secondary data. Certain tendencies in data series are observed and respective conclusions are drawn on their basis. Mathematical methods such as extrapolation are also applied in attempts for certain future predictions.

The analysis corresponds with the basic theories for the benefits of international trade – the classical theory of David Ricardo (1817), the neoclassical theory of E. Heksher (1919) and B. Olin (1933). The theorem of Rybczynski (1995) for the increased production based on factor endowment finds confirmation in the increased developing of the mining sector in the studied countries. The expectations for increased economic growth in these countries are in accordance with the modern theory of The Competitive Advantage of Nations by Michael E. Porter (1990) and the technological theory of R. Vernon (1966). Krugman's (1992) theory for the increased international trade between developed countries is read in a new light. Arguments for increased South-South trade are searched and adapted. Prebisch-Singer's (1940) hypothesis is discussed on the example of the trends in terms of trade of studied countries in the period 2010-2023, and the specific features of analyzed countries and commodities for the period are marked.

III. DISCUSSION AND RESULTS

A) Identifying the products behind the green transition

The products that are the driving force of the green transition are solar panels, wind turbines, and electrical vehicles. Their share in the international trade has grown considerably in the past five years. As road transport accounts for 1/6 of global emissions, the decarbonization of the sector is essential. The total sales of electric cars in numbers have increased 11.7 times for the period 2019-2023. (Table 1). The growth rate of electric cars is considerably bigger than the growth rate of international trade with commodities in the recent years 2022-23. Global sales of fully electric and plug-in hybrid vehicles (PHEVs) rose 60 % in 2022 and 31% in 2023, according to UNCTAD (2024).

Table 1: Electric car sales in millions

Seller Country	2019	2020	2021	2022	2023
China	1.1	1.1	3.3	6	8
Europe	0.6	1.4	2.3	2.7	3.4
USA	0.3	0.3	0.6	1	1.6
The rest of the world	0.2	0.2	0.3	0.6	0.9

Source: *International Energy Agency*

The trade value of Solar Panel equipment has increased more than 2 times for the period 2019-2022 (Table 2). It could be stated that there is an apparent tendency for increasing share in the international trade of the products associated with the green transition in recent years.

Table 2: Trade value of Solar Panel parts – 2019-2022 in billions of USD

Part/Year	2019	2020	2021	2022
Modules	18.3	19	32.5	39.3
cells	2.1	2.2	2.2	3.1
wafers	1.7	1.7	3.4	2.9
Polysilicon	1.2	0.9	2.6	3.2
Total:	23.3	23.8	40.7	48.5

Source: *International Energy Agency*

B) Crucial minerals for the manufacturing of green transition products.

The production of solar panels requires considerable quantities of copper, silicon, silver and zinc. The metals most needed for the production of wind turbines are iron ore, copper and aluminium. Electrical vehicles differ from vehicles with internal combustion engines by the batteries they carry. The typical battery pack needs 8 kg of lithium, 35 kg of nickel, 20 kg of manganese and 14 kg of cobalt. A substantial amount of copper is used for the production of charging stations. Copper's high conductivity is essential for electricity generation.

The global demand for these minerals is expected to grow considerably over the next few decades. The demand for vital minerals, like lithium and graphite, is projected to increase 42-fold and 25-fold by 2040 (OEC, 2023). The increased demand for these minerals, according to market logic, leads to higher prices. Figure 1 presents the price tendency of lithium, copper and nickel for the period 2010-2023. Lithium prices were relatively stable from 2010-2015, ranging between 5,000 and 7000 USD/MT. A notable increase was observed in 2016, reaching 15,000 USD/MT in 2017. After steep rises in prices for lithium in 2017 and 2018, prices fell back sharply in 2019, and in 2020, they slipped by 40%. In 2022, lithium prices have reached a new peak of over 35,000 USD/MT as a result of an upsurge in electric vehicle sales. The price of lithium carbonate in China reached around 75,000 USD/MT in March. The huge price increase in lithium prices after 2020 is attributed to an imbalance in global supply and demand. The rise continued in 2023, reaching over 40,000 USD/MT. Lithium prices are forecasted to increase in coming years as demand for the material outpaces available supply.

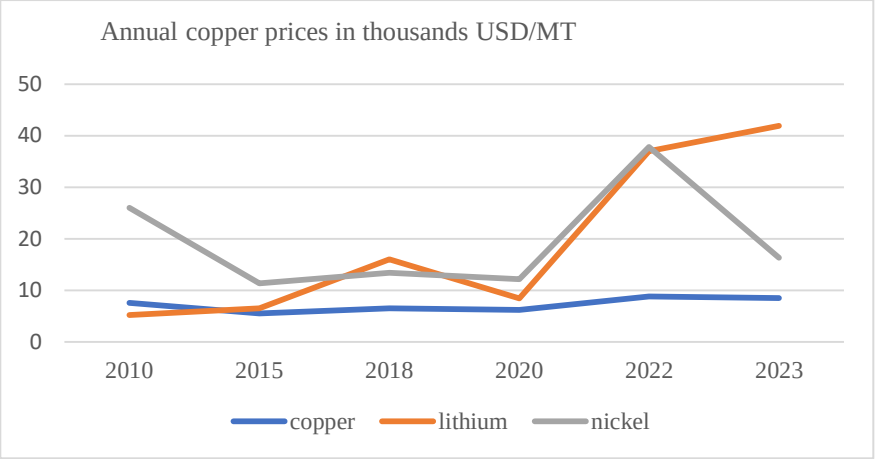

Fig. 1 Copper, lithium and nickel prices in thousand USD/MT (2010-2023)

Source: *US. Geological Survey*

Nickel prices follow a similar tendency of growth, with the sharpest rise in the period 2020-2022. After 2022, a slump is observed, which can be explained by the slowing down of global economic growth provoked by anti-inflation measures and geopolitical tensions. The trend of copper prices from 2015 until the present day is steady and positive.

The demand for cobalt has been gradually increasing since 2000. The primary engine of expansion was the high demand for rechargeable batteries, which were first employed in electronic equipment. From 34,000 tonnes in 2000 to over 126,000 tonnes in 2016, cobalt mining production climbed by almost 270% (WMD, 2018). The cobalt price trend is displayed in Figure 2. In the period 2012-2018, cobalt prices are relatively stable and low 21 600 USD/MT. They nearly doubled by 2017, reaching 58,500 USD/MT in February 2018. (S&P Global Market Intelligence, 2018). The surge in 2017 is mainly due to the increased need for the production of rechargeable batteries in the answer to the call for the low carbon economy of the Paris Agreement (2015). The price volatility of the discussed commodity is also associated with political and economic instability in DCR as well as inclination to stockpile and sales from the stocks. The pick in 2022 is definitely due to the soaring production of electric vehicles and increased global economic activity.

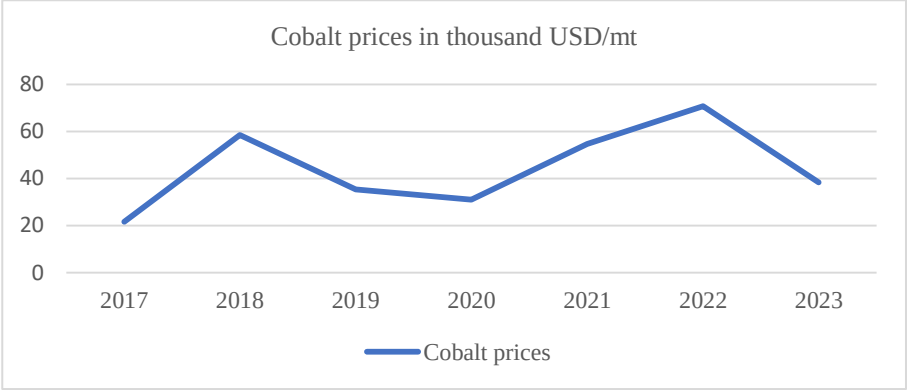

Fig. 2 Cobalt prices in thousand USD/MT(2017-2023)

Source: *S&P Global Market Intelligence*

The global cobalt demand is expected to grow at a rate of between 7 % and 13 % from 2017 to 2030 (Alves Dias P., Blagoeva D., Pavel C., Arvanitidis N, 2018). Annual global cobalt consumption is expected to reach about 220 000 tonnes in 2025, increasing to 390 000 tonnes in 2030 unless alternative battery chemistry is developed. The additional amounts are expected to come from existing producers led by DCR. Co.

C) Identifying major participants in the green transition products supply chain

By identifying the sourcing countries for the crucial elements as well as the chief participants in processing and manufacturing of the end products such as electric cars and renewable energy equipment - the direction of trade flows will be traced. Table 3 shows the major producers of minerals crucial for green transition. China, South Africa, Kongo DR and

neighbouring countries such as Zambia and some countries from South America – Peru and Chile stand out as major suppliers of these elements.

Table 3: Biggest suppliers of crucial elements for the green energy transition

Element	Supplier countries with the biggest share	Other countries with a considerable share
Copper	Chile 28%	Peru 9%, China, Congo, D.R, Indonesia, Australia, Zambia
Nickel	Indonesia 30%	Philippines 15%, Russia 10%
Cobalt	Congo, D.R. 70%	Russia 8%, Australia 7%
Lithium	Australia 78%	Chile 9%, China, Argentina, Brazilia
Manganese	South Africa 28%	Australia 18%, Gabon 15%
Aluminium	China 55%	India 6%, Russia, Australia, Brazil, Guinea
Chromium	South Africa 40%	Kazakhstan 16%, Turkey 15%

Source: *IMF*

The Democratic Republic of Congo, for example, accounts for about 70 % of cobalt output and half of the reserves. (IMF, 2021). Chile is the world's leading producer of copper, followed by Peru, China and DR Congo. The country also possesses the largest lithium reserves globally. As a leading supplier of nickel, Indonesia is responsible for 15% of its processing volume.

Table 4: Share of processing volume by China of certain elements in 2019

Metal	Copper	Lithium	Nickel	Cobalt	Rare earth elements
Share of volume	40%	58%	37%	65%	86%

Source: *IEA*

According to the share of processing volume, China also takes a leading position (Table 4). The country accounts for more than 80% of production in all the manufacturing stages of solar panels according to the IEA (2022). After a massive national campaign, 173 minerals were totally, 59 of which metals were discovered in China. The country hosts 85% of processing operations of the rare earth elements by applying a complicated technology that is not yet mastered by other countries hosting a major share of resources as Australia e.g... The top 10 world suppliers of solar PV manufacturing equipment are also Chinese. The reduction of costs due to the economy of scale brought about Chinese leadership in the production of solar panels. The country started by importing advanced technologies from Northern countries and successfully applied this technology in the manufacturing of finished products. The technological theory for the lifecycle of a product (Vernon R., 1966) can easily be traced in China's case. So, it can be stated that China represents a concentration of the green transition products supply chain. It is both the greatest producer of the equipment and also hosts the processing stages of the raw materials.

D) The Growth in South-South Trade

Given the main sourcing countries and the leading participants in the processing phase, it can be concluded that a considerable share of the supply chain of products for the green transition consists of trade between the developing countries, known as South-South trade. So, it can be assumed that the green transition contributes to the increase of the South-South trade. According to Unctad (2023) trade between developing countries has increased by an average annual rate of 9.8% since 2000 until 2021 compared to the slower rate of 5.5 % of the world trade for the same period. The intensification observed in the trade between China and Africa and China and South America, as well as the increased investment on the side of China in these countries, embodies the integration process of less developed countries in the global economy. As per data from Chinese customs authorities (2023), the international trade value between China and Africa has increased by 14.8% in 2022 compared to its value in 2021. In the first half of 2023 there is 7.4% growth compared to the same period of the previous year. South Africa is the biggest trade partner of China among the African countries. The trade value between the two countries has increased by 8.6% in 2022. In 2023, the annual growth reached 10.5%. The growth in trade openness, calculated as the ratio of trade over GDP, in 2021 is 16.6 % for Africa, 11.0% for Africa and Oceania, 10.4 % for both North and South America and 8.4% for Europe (UNCTAD, 2023).

At the end of the 20th century, Krugman (1991) provides an explanation for the increasing trade between the developed countries, justifying it with the effect of the economy of scale. He points at the transportation costs and tariff measures as reasons for the growth in regional trade (2001). Nowadays, his arguments can also be used to explain the growth in South-South trade. Improving the infrastructure and increasing economic integration between developing countries, e.g. BRICS, SADC (Southern Africa Development Community), COMESA (Common Market for Eastern and Southern Africa), etc., accounts for the rise in international trade. Within the regional blocks the economic relations deepen also through foreign direct investments. China has been the biggest foreign investor in Africa in recent years, the major investments being in strategic

sectors such as energy distribution, communications, mining, and construction of transport infrastructure - roads, railways, and ports. Chinese FDI annual flows to Africa, according to an official Chinese report, have been increasing steadily since 2003 (Figure 3).

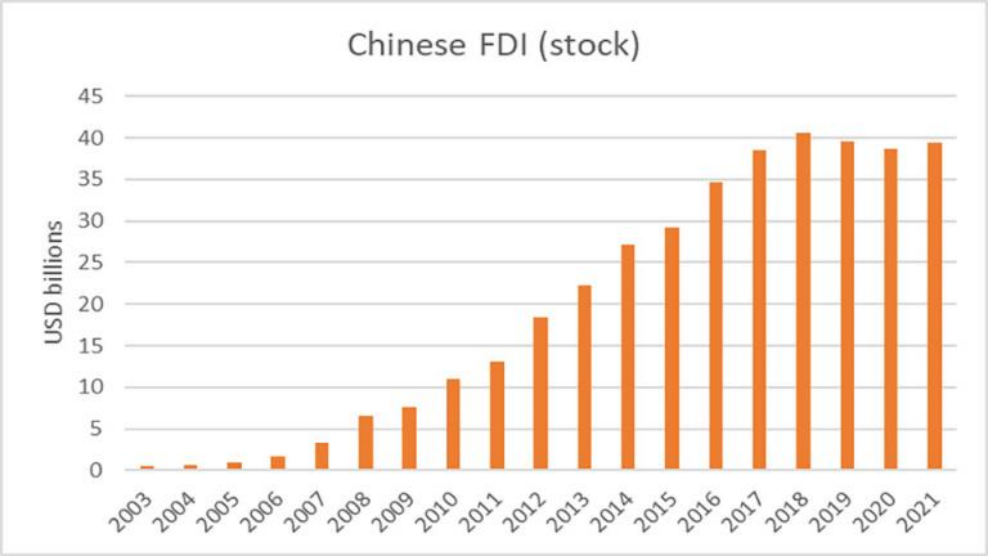

Fig. 3 Chinese FDI in Africa in billions USD (2003-2021)

Source: *http://www.sais-cari.org/chinese-investment-in-africa*

Flows surged from $75 million in 2003 to $5 billion in 2021, then dropped to $1.8 billion in 2022. The top five African destinations for Chinese FDI in 2022 were South Africa, Niger, the Democratic Republic of Congo, Egypt, and Cote d'Ivoire. A similar consistent strategy in investing on behalf of China is also observed in Latin America – namely Chile and Peru. The transfer of technologies for clean energy supply from China to these countries is a chance for their technological advancement.

All of the above contributes to the statement that the green transition is a prerequisite for increased South-South trade and further deepening the economic relationships between the developing countries. In order to pursue the positive effect of the active participation of developing countries in global trade, a closer look will be taken at some representative developing countries.

E) Consequences of the increased South-South trade for chosen developing countries – major suppliers.

The benefit from participation in international trade is highlighted by various theories, starting with the classical ones of Adam Smith (1776) and David Ricardo (1817), by the neoclassical theory of E. Heksher (1919) and B. Olin (1933) and confirmed by the modern ones. The earlier theories concentrate on the specialization in production and trade on account of comparative advantages as the basis for achieving a higher level of satisfaction for the national consumers. These theories can explain the chance of developing countries, rich in crucial green transition minerals, for economic growth through intensified participation in international trade. Given the endowment with precious commodities according to Rybczynski's (1955) theorem, it is expected that these countries will develop the mining industries, and the extruded minerals will have a considerable share in GDP and export lists. The study below will prove this statement empirically.

The impact of the increased demand for certain commodities will be studied through indicators for participation in international trade. For the purposes of this study only some less developed countries among the key exporters of crucial minerals will be singled out and analyzed - in aspect of the export values of certain commodities, net barter terms of trade and rate of growth of GDP. The increased demand for these commodities leads to higher world prices as well as to growth in the exports of the minerals from the main suppliers. Both the higher prices and the increase in the volume of exports have a cumulative effect on improved terms of trade of the exporting countries. The trend in terms of trade is a main indicator of the success of a country in its participation in global trade. The rate of growth of gross domestic product for recent years will be analyzed in order to prove the connection between trade openness and economic growth.

The Democratic Republic of Congo (DRC), about the size of Western Europe, is the largest country in Sub-Saharan Africa (SSA). DRC is endowed with exceptional natural resources, including minerals such as cobalt and copper. The unexploited resources of minerals and metals are calculated to account for about 24 trillion USD. The country hosts 50% of coltan deposits and 60% of cobalt deposits in the world. It is also rich in copper, gold, silver, zinc, tin, etc. DRC is one of the

world's five poorest countries. In 2023, 74.6% of Congolese citizens were expected to be living on less than $2.15 a day. In SSA, the DRC is home to around one in six persons who live in extreme poverty. (World Bank, 2024). Endowed with crucial minerals and being one of the poorest nations in the world, the country is a perfect example to illustrate the positive changes for the national economy brought about by the green transition. The positive influence consists in the chance it reveals to Congo for increased participation in global trade. Participation in global trade will be observed via the value of exports of certain groups of commodities and the terms of trade. The economic development of the country will be evaluated by observation of GDP from 2003 until now.

Table 5 presents information about the value of exports of certain product groups. The value of exports of ores and metal increased 150% for the period 2017-2022.

Table 5: Congo D.R. export in current prices in thousands of USD

Year/product group	2017	2018	2019	2020	2021	2022
Primary commodities	8 924 465	13 422 985	10 562 415	11797 691	19 548 716	21 310 439
Ores and metals	8068 625	12 490 398	9 631 520	11 092 088	18 700 178	20 206 261
Non-ferrous metals	5 963 146	9 609 284	8 126 829	9 821 386	16 821 386	17 880 497
Other ores and metals	2 105 479	2 881 114	1 504 691	1 270 702	1 758 266	2 325 764

Source: *UNCTAD*

Given the increase in export value of certain product groups and the increased world prices of the commodities needed for the green transition, it can be expected that the net barter terms of trade of Congo D.R. to improve. Table 6 displays the positive tendency in net barter terms of trade from 2003 to 2021.

Table 6: Net Barter Terms of Trade Congo D.R. index (2015-100)

2003	2004	2005	2006	2009	2010	2017	2018	2020	2021
95.8	98.8	105.8	116.8	106.3	122	113.1	116	106	132.8

Source**:** *World Bank*

The average value of NBTT for the Republic of Congo during the period 1980 to 2021 was 72.89 %, with a minimum of 22.44 % in 1998 and a maximum of 132.8 % in 2021(World Bank, 2022). For comparison, the world average in 2021 based on 189 countries is 109.62%.

Table 7: Gross Domestic Product of Congo D.R. in Billion USD

2003	2004	2005	2006	2009	2010	2017	2018	2020	2021	2022
8.93	10.28	11.96	14.45.8	18.65.3	21.57	38.02	47.57	51.78	55.33	64.72

Source: *World Bank*

GDP increased more than 7 times in the period 2003-2022. Real GDP growth in the DRC was 7.8% in 2023, after reaching a peak of 8.9% in 2022. This growth was largely driven by the mining industry, which expanded by 15.4% in 2023 and accounted for over 70% of overall growth. Driven by the mining industry, GDP growth is predicted to slow to 6% in 2024 and to stabilize at 5.8% throughout 2025–2026. (World Bank, 2024).

Chile is another developing country famous for its endowment with copper. Mining accounts for 15.2 % of GDP. Thanks to a large amount of copper resources and the right governmental strategy for developing the mining sector, Chile has become one of the main copper producers, with almost 30% of the global annual copper output (IMF 2020). Chile also has the biggest reserves in the world (Table 8). In 2019, Chile ranked sixth in the world for silver production and second in terms of lithium and molybdenum production, in addition to copper.

Table 8: Copper mine production and reserves 2019-2020

Country	Mine Production of Copper 2019	Mine production 2020	Reserves
USA	1260	1200	48000
Australia	934	870	88 000
Canada	573	570	9000
Chile	5 790	5700	200 000
China	1680	1700	26 000

Source: *USGS*

This endowment can be traced in the export profile by product groups (Table 9). Being the largest producer of copper in the world, Chile has a considerable share of the mining sector in its export profile - 53 % in 2020.

The growth in export of primary commodities for the period 2017-2022 is more than 2 times. China is a major destination of exports from Chile, especially for copper and other commodities, which is coming to confirm the thesis for growth in South-South trade. Other important trade destinations for Chile among the developing countries are Argentina, Brazil, and South Korea (IMF 2022).

Table 9: Chile exports in current prices in thousands of USD

Year/product group	2017	2018	2019	2020	2021	2022
Primary commodities	15 536 990	19 192 380	18 160 631	15 339 859	23 007 123	32 922 315
Ores and metals	713 478	784 757	707 633	815 229	1 198 378	1 052 317
Non-ferrous metals	336 521	364 750	333 160	316 370	452 985	459 205
Other ores and metals	376 957	420 007	374 473	498 858	745 392	593 112

Source: *UNCTAD*

Table 10: Net Barter Terms of Trade Chile. index (2015-100)

2003	2004	2005	2006	2009	2010	2017	2018	2020	2021
56.9	69.5	79.5	103.8	94.8	115	114.3	111.3	121.8	136.1

Source: *World Bank*

The tendency for improved terms of trade can be easily noticed (Table 10). Only in the year of the big financial crisis, 2009, did the value drop significantly, which is a natural consequence of an open economy. For the period 2003 – 2021, the value of the index increased 2.4 times. This contributes to growth in GDP, which increased 4 times for the period 2003-2022, reaching the highest value in 2021 and dropping considerably in 2020 due to the economic consequences of Covid-pandemic (Table 11).

Table 11: Gross Domestic Product of Chile. in Billion USD

2003	2004	2005	2006	2009	2010	2017	2018	2020	2021	2022
76.49	99.08	122.3	153.8	171.8	217.1	276.2	295.9	254.3	316.6	301

Source: *World Bank*

IMF predicts a stable growth for the coming years – 2% for 2024, 2.3% for 2025, 2.4% for 2026 and 2.5% for 2029. Undoubtedly, the projections consider the potential of the mining sector based on the great reserves and expected foreign investments, which the government strongly supports. Laws and regulations to create a favourable investing environment are implemented. Given the large share of the mining sector in its export list, as well as the considerable percentage of copper global output, it can be concluded that the growth in GDP, to a high extent, is due to the output of mineral commodities. All this comes to prove the contribution of green transition to the economic growth of developing countries with considerable mineral reserves.

South Africa is another example of the am thesis. (Tables 12 and 13) show the positive trends in NBTT and GDP of South Africa. The country is famous for its reserves of precious minerals and well-developed mining sector. The mining sector contributes 8% to GDP and represents 60 % of the export value. South Africa accounts for 40% of chromium supply and 28% of manganese supply globally (IMF 2023). The country is also famous for its rich reserves of platinum, gold and silver.

Table 12:Net Barter Terms of Trade South Africa index (2015-100)

2003	2004	2005	2006	2009	2010	2017	2018	2020	2021
77.3	78.7	79.7	84.6.8	97.8.8	101.4	108.8	105.9	123.3	128.8

Source: *World Bank*

Table 13: Gross Domestic Product of South Africa. in Billion USD

2003	2004	2005	2006	2009	2010	2017	2018	2020	2021	2022
197.2	255.81	288.87	303.86	329.75	417.36	381.45	405.26	338.29	420.12	405.27

Source: *World Bank*

There is well-expressed growth in the GDP of South Africa, with an expected slump in 2020 because of the COVID-19 crisis.

Zambia ranks among the countries with the highest level of poverty and inequality globally, reaching 60 % in 2022 in spite of being resource-rich. Copper and cobalt are the main and traditional exporting commodities which account for 64% of export value. Zambia's economic development in 2007 achieved the 6%–7% growth required to alleviate poverty for the first time since 1989 significantly. Since 2004, the construction of new mines and rising copper prices have resulted in a steady

growth in the production of copper. The value of the indicator NBTT shows positive trade (Table 14), with a considerable slump only in 2020 because of the Covid-19 crisis.

Table: 14 Net Barter Terms of Trade Zambia index (2015-100)

2000	2005	2006	2010	2011	2017	2020	2021
60.6	76.7	116.4	118	122	108	101.7	122.5

Source: *World Bank*

It is one of the fastest-growing economies in Africa (IMF, 2023). GDP increased more than two times in the period 2007-2024 (Table 15). However, the GDP per capita is still very low 1305, 00 USD for 2019 because of the high birth-rate. Projections of IMF (2023) for the value of Zambia's GDP for 2025 is 32.41 billion USD for 2027 -38.03 and for 2028 – 41.23. These projections are based on governmental efforts to create favourable conditions for foreign investments. As per the Global Competitive Index, it is ranked the 8th most competitive country in Africa and the 7th best country for doing business, according to Forbes.

Table 15: Gross Domestic product of Zambia. in Billion USD

2007	2008	2010	2011	2013	2017	2020	2021	2022	2023	2024
14.06	17.9	20.27	23.46	28.04	25.87	18.11	22.01	29,16	28.4	29.87

Source: *World Bank*

In all the studied countries can be observed a steady trend for improvement in terms of trade. Since 2000, Africa's terms of trade have increased over those of any other area due to increased demand for some primary commodities from the rapidly emerging Asian countries. Changes in the international pricing of these commodities between 1999 and 2004 improved Africa's terms of trade by almost 30%, while Latin America's improved by 8% and East and South Asia declined by 1% (Unctad, 2005). This fact contributes to the critique of the Prebish – Singer (1940) hypothesis. According to Prebish–Singer (1940) the terms of trade of developing countries tend to deteriorate because of certain characteristics of primary goods which are most abundant in their export lists. The creation of synthetic substitutes of primary goods and the low -income elasticity are such characteristics. What has been observed in the last three decades in terms of trade of the key exporter of crucial minerals can be explained with the following facts. First, elements like copper, cobalt, nickel, lithium, gold and silver cannot have synthetic substitutes or at least such are not developed yet for the production of solar cells, batteries and wind turbines. The low-income elasticity, which has been pointed out as a sound characteristic of primary goods, is more relative to agricultural products not to the minerals crucial for green transition. Another fact in support of the growth in terms of trade is the increased demand of these elements as result of the call for green transition to meet the goals of the Paris Climate Agreement. The increased global demand for certain commodities leads to an increase in their prices. The spot price of cobalt increased from 28517 02 USD/MT in July 2020 to 71 573.3 USD/MT in February 2022, reaching the highest value of 81 790. 38 USD/MT in April 2022. The changes in the price level reflect not only the increased demand due to the green transition but also the changes in global economic activity, which reached a peak in the middle of 2022.

The studied countries from Africa and South America show certain economic growth, which comes to confirm the theory of eminent, well-known scientists - the first of them being the influential classical economists Adam Smith (1776) and David Ricardo (1817) – that free international trade contributes to the country's welfare and economic growth.

The efforts of the governments of these countries to create a favourable business environment and thus achieve growth of FDI and transfer of new technologies is a promise to make economic growth a steady tendency by climbing in the value chain of green transition products. Marit Kitaw**,** Interim Director of the African Minerals Development Centre, a specialized agency of the African Union points out that battery and electric vehicle initiative carries huge opportunity for Africa. It can be done by participation in the processing of the crucial elements, not only mining them.

IV. CONCLUSION

Given the am discussions and analysis, it can be concluded that the green transition triggers a process of economic growth in developing countries, major suppliers of crucial minerals needed for the production of batteries for electric vehicles, wind turbines, solar panels, etc.

This process starts with the increased demand for certain minerals, goes through an increase in their prices, growth in the export of these commodities from supplier countries, leads to improved terms of trade and brings about growth in GDP (Fig 2).

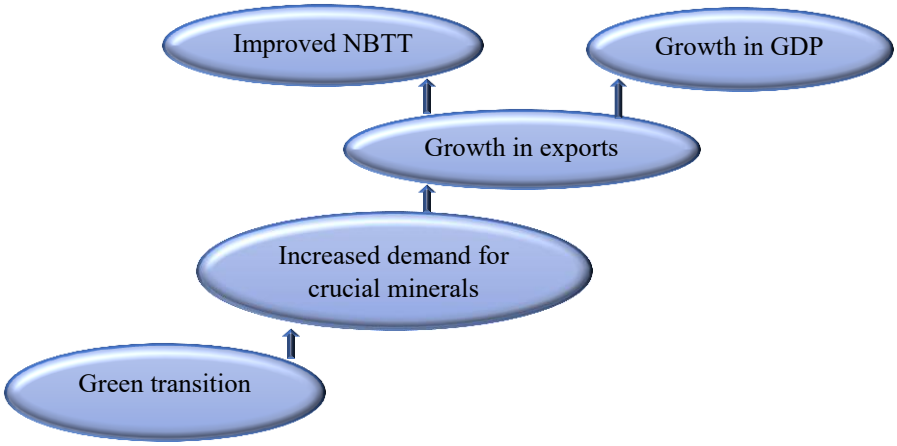

Fig.4 The process of economic growth triggered by the green transition

Source: *Created by the author*

As a result of the discussion several sound arguments that the terms of trade of the studied developing countries will keep improving in coming years are reached. These arguments can be summarised as follows:

1. Given the projections for increased demand for the crucial minerals that the studied developing countries are endowed with, their prices are expected to increase in the next decade.
2. The growth of foreign investments in the mining and energy sector in these countries will contribute to expanding the produced volume of the crucial minerals.
3. The transition of new technology for processing the minerals will definitely contribute to the production and exporting of higher value-added products from these countries.

So, it can be expected that the call for a green transition to bring about also better economic well-being to some of the poorest countries in the world. It carries the chance that one of the basic UN goals for sustainable development (2015) – fighting poverty - is also to be achieved.

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