Committee: Economic & Social Council (ECOSOC)

Issue: Innovations in infrastructure development and promoting sustainable industrialization

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INTRODUCTION

In today's world, infrastructure is critical to achieving long-term development and economic progress. To accomplish the aforementioned, resilient transportation, irrigation, energy, and information technology are essential. However, several countries lack essential infrastructure, which not only stifles a nation's economic growth, but also forces a substantial portion of the people to struggle on a daily basis in order to meet their basic needs. Lack of infrastructure, particularly in Less Economically Developed Countries (LEDCs), is an issue of major concern for many people. Nonetheless, decaying and sometimes non-existent infrastructure haunts nations that have even undergone both economic and social development, resulting in catastrophic consequences for both individuals and the economy.

In addition to this, industrialization has been a fundamental approach taken by numerous industrializing nations to accomplish economic development and expansion through the formation of businesses, manufacturing output, job creation, and government income to fulfill the economic needs of a society. However, if rigorous environmental rules and control systems are not effectively implemented and enforced, industrialization frequently has a detrimental effect on the environment.

Goal 9 (Industry and Infrastructure) of the Sustainable Development Goals (SDGs) that the United Nations introduced in 2012 emphasizes the urgent need to create high-quality, dependable, long-lasting, and resilient infrastructure with the assistance of innovation so as to promote economic growth and human well-being. The United Nations SDGs also focus on promoting inclusive and sustainable industrialization so as to increase an industry's contribution to employment and GDP (Gross Domestic Product) in accordance with national conditions.

Figure 1: *The 17 Sustainable Development Goals*[1]

DEFINITION OF KEY TERMS

Sustainable Industrialization

Sustainable industrialization is a long-term transformative process that results in an industry-fueled economy which contributes to the generation of wealth, societal progress, and environmental protection.[2]

Sustainable Infrastructure

The International Institute for Sustainable Development defines Sustainable infrastructure as developing roads, buildings, energy, and water infrastructure with due consideration to economic, social, and environmental implications.[3]

[1]"Sustainable Development Goals and the 2030 Agenda. How IED Supports SDGs!" *Institute of Entrepreneurship Development*, 25 Sept. 2019, ied.eu/blog/sustainable-development-goals-and-the-2030-agenda-how-ied-supports-sdgs/.

[2]Farha Sharmin Assistant Director at D.Net Follow. "Industrialization & Sustainability(L4)." *SlideShare*, www.slideshare.net/farha451288/industrialization-sustainabilityl4.

[3]"What Is Sustainable Infrastructure?" *Sustainable Asset Valuation SAVi*, www.iisd.org/savi/faq/what-is-sustainable-infrastructure-2/.

Sustainability

Sustainability is focused on meeting society's current demands without endangering future generations' capacity to satisfy their own needs. The concept of sustainability is based on three key components: economic, environmental, and social.[4]

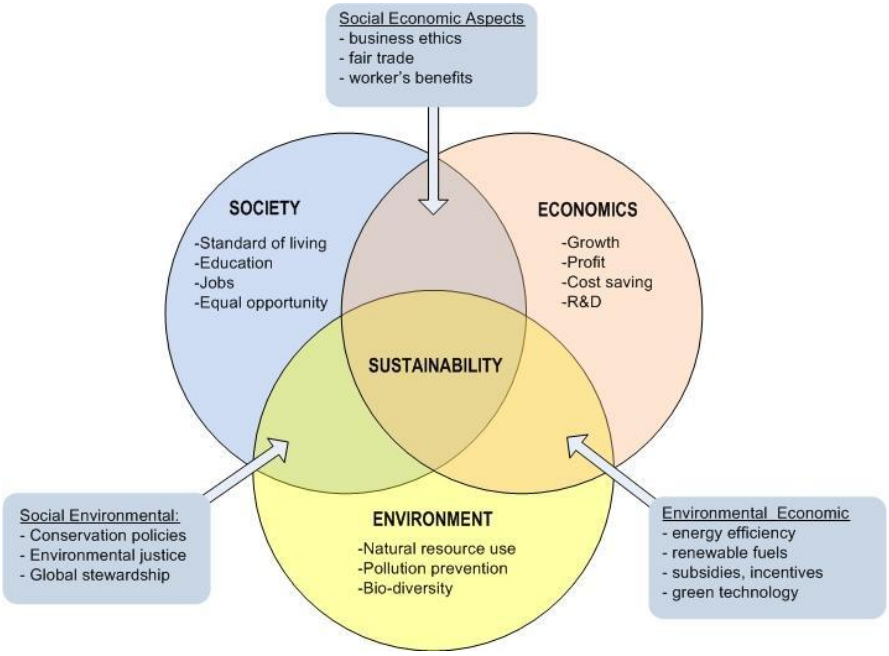

Figure 2:*The three key components of sustainability analyzed.*[5]

Emerging Economies

An emerging economy can be described as an economy that is increasingly becoming integrated with global markets while it develops. More specifically, emerging economies are ones that have some, but not all, the features of a developed economy. As an emerging economy develops, it becomes increasingly connected with the global economy, as seen by growing liquidity in local debt and stock markets.[6]

[4]Grant, Mitchell. "Sustainability." *Investopedia*, Investopedia, 6 July 2021, www.investopedia.com/terms/s/sustainability.asp.

[5]"1.1 Sustainability Definitions." 1.1 Sustainability Definitions | EME 807: Technologies for Sustainability Systems, www.e-education.psu.edu/eme807/node/575.

[6]Team, The Investopedia. "Emerging Market Economy Definition." *Investopedia*, Investopedia, 9 June 2021, www.investopedia.com/terms/e/emergingmarketeconomy.asp.

Inclusive Growth

Inclusive growth is a concept that promotes equitable distribution of opportunities to every member of society during economic growth.[7]

Economic Growth

When one period of time is compared to the next, economic growth is defined as a rise in the production of economic products and services. Although other metrics are sometimes employed, aggregate economic growth is traditionally quantified in terms of gross national product (GNP) or gross domestic product (GDP).[8]

Supply Chain

A supply chain is a network that connects a business and its suppliers to manufacture and deliver a certain product to the customer. Different activities, people, entities, information, and resources are all part of this network. The supply chain also refers to the stages required to get a product or service from its initial condition to the buyer.[9]

Product Transfer

A product transfer occurs when changing an existing mortgage to a new one with the same lender, typically at the completion of a fixed term.[10]

Gross Domestic Product

Gross domestic product (GDP) is the total monetary or market worth of all finished goods and services produced within the borders of a nation in a given time period.[11]

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[7] "Inclusive Growth - Economic Growth That Is Distributed Fairly across Society." *OECD*, www.oecd.org/inclusive-growth/.

[8] Team, The Investopedia. "Economic Growth ." *Investopedia*, Investopedia, 9 June 2021, www.investopedia.com/terms/e/economicgrowth.asp.

[9] Kenton, Will. "How Supply Chains Work." *Investopedia*, Investopedia, 19 May 2021, www.investopedia.com/terms/s/supplychain.asp.

[10] Alexander, Neil. "What Is a Product Transfer?" *Clever Mortgages*, 15 May 2020, www.clever-mortgages.co.uk/mortgage-guides-and-advice/what-is-a-product-transfer/.

[11] Fernando, Jason. "Gross Domestic Product (GDP)." *Investopedia*, Investopedia, 16 July 2021, www.investopedia.com/terms/g/gdp.asp.

Stagflation

Stagflation is characterized by sluggish economic growth and relatively high unemployment along with rising prices (inflation). Stagflation is also defined as a time of inflation followed by a fall in gross domestic product (GDP).[12]

Irrigation

Irrigation is the artificial application of water to land to aid in agricultural production.[13]

BACKGROUND INFORMATION

Industrial Revolution and sustainable industrialization

The Industrial Revolution took place in the 18th century, and it resulted in significant economic and social changes. As far as the economy is concerned, the Industrial Revolution transformed agricultural and handicraft economies into economies based on large-scale industries and automated production. Some of the positive implications were that goods were more affordable and accessible to everyone, with existing industries managing to become more productive and efficient as a direct result of new equipment, new power sources, and new ways of arranging labor. Thus, the field of medicine was subject to massive change with more jobs becoming available. Despite the benefits that came with industrialization, there also were some disastrous consequences, mostly in the social and environmental sectors. From a social standpoint, people, particularly women and children, were working in inadequate and dangerous circumstances, which frequently resulted in injuries, serious illnesses, and fatalities. Moreover, the ecosystem was severely harmed as the worldwide issues of widespread water and air pollution, biodiversity loss, wildlife habitat destruction, and even global warming, started to leave their mark on the planet.

Today, in some of the world's Less Economically Developed Countries (LEDCs), industrialization is starting to spread rapidly. Presently, industrialization, like in the past, has a wide range of environmental consequences, which emphasize the need for the promotion

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[12] Team, The Investopedia. "Stagflation Definition." Investopedia, Investopedia, 7 July 2021, www.investopedia.com/terms/s/stagflation.asp.

[13] "Irrigation." Dictionary.com, Dictionary.com, www.dictionary.com/browse/irrigation.

and the implementation of sustainable industrialization. Sustainable Industrialization can be the major source of revenue production, allowing for quick and sustained improvements in living conditions for all people, and providing further innovative solutions in order to achieve environmentally friendly industrialization. More analytically, within an environmentally sustainable framework, broader economic and social growth is encouraged; hence, nations and their economies can reach a greater level of industrialization, and thus profit from the globalization of markets for industrial goods and services. In fact, according to the United Nations for Industrial Development Organization (UNIDO), the enforcement of sustainable industrialization can accomplish three things: the promotion of a successful and competitive economy, as it will encourage businesses to produce for both the export and domestic markets (economic effects), the generation of productive employment with industry generating long-term employment and increasing affluence (social effects), and lastly, the safeguarding of the environment by ensuring that each industry uses non-renewable resources effectively, conserves renewable resources and stays within ecosystem functioning limitations (environmental effects).[14]

The importance of infrastructure

Infrastructure, such as roads and bridges, is a requirement for a country, region, or organization to function economically. Infrastructure plays a leading role in determining economic growth by providing services (transportation, communication services and provision of clean water and electricity), which improve people's quality of life, since they facilitate commerce, powers businesses, connects employees to employment, offer chances for underserved populations, and protect the country from an increasingly unstable natural environment. Furthermore, workers are supported by construction and maintenance industries, which provide millions of jobs each year. In fact, infrastructure occupations employ approximately 11% of a nation's workforce, have minimal entry hurdles, and are expected to increase over the next decade.[15] Additionally, it is also necessary for achieving important national objectives. To connect supply chains and effectively transfer goods and services across borders, an economy needs reliable infrastructure. Infrastructure links

[14]"Inclusive and Sustainable Industrial Development." *UNIDO*, www.unido.org/inclusive-and-sustainable-industrial-development.

[15]Puentes, Robert. "Why Infrastructure Matters: Rotten Roads, Bum Economy." *Brookings*, Brookings, 28 July 2016, www.brookings.edu/opinions/why-infrastructure-matters-rotten-roads-bum-economy/.

households throughout urban regions to higher-quality jobs, healthcare, and education options. Greenhouse gas emissions can be reduced by the usage of renewable energy and public transportation. Moreover, natural catastrophes with a high profile, such as hurricanes or earthquakes, have brought attention to issues with water infrastructure. Overburdened wastewater systems, washed-out highways, shorted electrical circuits, and flooded railway stations show an economy's reliance on these networks, as well as their precarious position. Even though some countries lack infrastructure or they have weak and inadequate infrastructure, another challenge arises that make the construction of infrastructure even more crucial. The tremendous growth of the population will be a great challenge for all the countries as it will put extra pressure on an already overburdened infrastructure. Metropolitan regions must be prepared to adapt not just to service millions of additional consumers, but also to assist poorer people, many of whom are unemployed, in finding jobs.

Asia's explosive growth

Economic growth is strongly reliant on infrastructural investments, technological advancements, and sustainable industrialization, especially in nations with emerging economies. A good example of the aforementioned statement is Asia. Emerging economies in Asia are experiencing explosive growth, which is heavily linked to industrialization and manufacturing. Since 1960, Asia has witnessed a huge increase in its wealth, which can be noticed not only in the average incomes, but also in the fact that nations like Singapore have evolved into huge technological hubs for western businesses.

However, this development has not occurred at the same rate across the continent. The western half of Asia developed at almost the same rate as the rest of the globe, whereas the eastern half (China, Hong Kong, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan Province of China, and Thailand) outperformed the rest. In the past, the majority of Asian countries struggled with sluggish economic growth, rising population, poverty, and corruption whilst attempting to establish a powerful system of self-governance. Several causes have affected and contributed to the rapid growth of Asian countries in various regions, each with its own set of difficulties.

The four Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan) were the first to develop rapidly. During the years 1960-1990, these nations sustained a growth rate of more than 7%. Aside from overarching government programs which assisted growth, the causes for the Tigers' rapid development were several. Singapore and Hong Kong

significantly benefited from their strategically important geographical location, which serves as handy ports linking diverse areas of the world. Direct foreign investment in Taiwan, which took advantage of low prices, and trade incentives in South Korea severely boosted their economies. Each of these economies also established improved education systems, resulting in high-quality workforces.

Even though the crisis-affected these nations to a substantial extent, they still managed to maintain their economic power. Moreover, regarding the rest of the nations in Asia, from 1960 until the present day, Japan, the world's third-largest economy, has developed steadily and at an astonishing rate. Nevertheless, since the 1980s stock market and real estate collapse, the country has been in a prolonged era of stagflation. China also began swiftly growing in the 1980s, when it opened its doors to international firms and eventually became the world's factory, owing to their cost advantage. Lastly, India's growth began with the fast liberalization policies implemented in the 1990s, as well as the emergence of the Technological Revolution. As previously stated, there are several causes behind Asia's rapid development. However, the underlying reason that has led to the economic growth of these nations over the last 50 years is liberalization, urbanization, and industrialization.

To further analyze liberalization, most Asian nations have established a flexible International Direct Investment Policy, which has attracted foreign goods and service providers, allowing foreign investors to enter Asian markets to benefit from the low-cost resources. Simultaneously, these investments have provided employment options for citizens, improving their quality of life. Furthermore, in Asia, urbanization signified that rural populations were drastically impacted by the new concepts of infrastructure (transportation and communication advances) and the value of education. Additionally, rapid industrialization has also aided the area's poverty alleviation and socioeconomic evolution.

To conclude, the accomplishments of East Asia have been truly spectacular, and those of South Asian countries have been far less outstanding. The major distinction is explained by the East Asian nations' industry-oriented structural transition, as opposed to the South Asian countries' services-oriented development. These divergent routes to economic change explain not just the East Asian nations' considerably greater rates of economic development and growing proportion of global exports, but also their capacity to generate good employment and reduce poverty. Asia has risen as a power to be reckoned with in only 50-60 years, holding the highest Gross Domestic Product in the World in terms

of Purchasing Power Parity. A further deduction that can be made, considering the above-mentioned statement, is that the construction of resilient and sustainable infrastructure along with the rapid industrialization as well as other factors led Asia to grow socioeconomically.

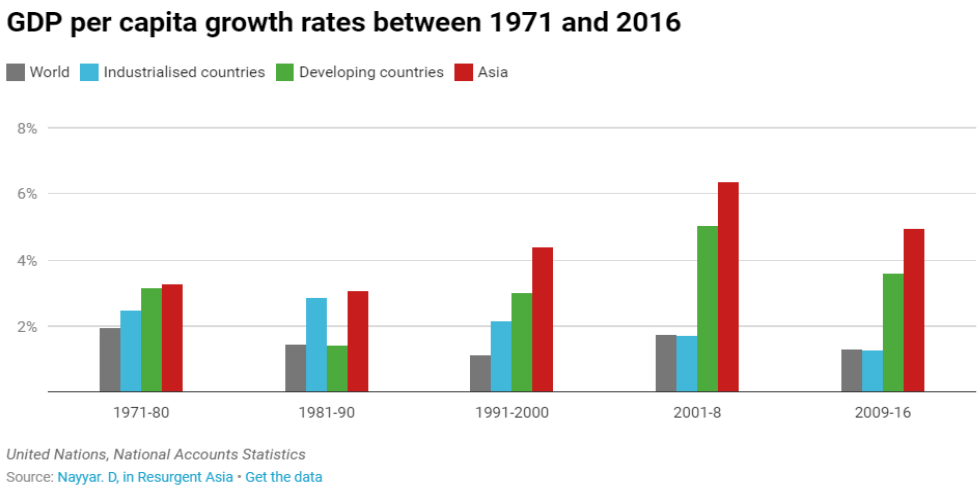

Figure 2: Graph showing Gross Domestic Product growth rates in Asia in comparison to industrialized nations, developing nations and the world between 1971 and 2016.[16]

Australia's Infrastructure

Australia's transportation and communications infrastructure has grown significantly in tandem with the growth of the country's primary industries. In Australia, the development of transportation infrastructure has been almost completely focused on transferring goods for sale in cities or getting access to seaports. To further analyze the infrastructure of this country, Australia's road infrastructure is excellent. Throughout the country, both urban and inter-city roadways are highly developed. However, congestion, particularly that induced by rivalry between freight and passenger road users, is becoming an issue in major cities (Adelaide, Melbourne, Sydney, and Brisbane are the most impacted cities of this problem). Despite the country's relatively flat topography and long distances, rail infrastructure in Australia has never garnered significant government backing. As a

[16] www.facebook.com/IndusDictum. "How Asia Transformed from The Poorest Continent In The World Into A Global Economic Powerhouse." *Indus Dictum*, 24 Oct. 2019, indusdictum.com/2019/10/24/how-asia-transformed-from-poorest-continent-world-into-global-economic-powerhouse/.

result, a few high-demand corridors have emerged, supplied by rather inadequate infrastructure. Nevertheless, while current rail infrastructure has sufficient capacity to deal with demand, major investments, totaling at least US$2 billion, have been identified as being necessary to deal with the expected increase in demand for transport over the next 20 years.

In general, Australia maintains a relatively resilient infrastructure and there are several reasons for this. Firstly, the Australian Government has recognized infrastructure development as a priority as a basis for economic growth and it plays a vital role in constructing the country's assets, such as road and rail networks. The Government has paved the way for several opportunities for investors to finance, build, own, and manage Australia's transportation, utility, and social infrastructure. Another reason is the establishment of the organization “Infrastructure Australia.” Infrastructure Australia is an independent organization that provides impartial research and recommendations on projects and changes pertaining to infrastructure investment in Australia at all levels of government and business. It promotes changes in areas such as infrastructure finance and operation, as well as how to better design and utilize Australia's infrastructure networks. Moreover, the Infrastructure Priority List is also maintained by Infrastructure Australia. This is a prioritization method designed to ensure that all nationally significant infrastructure projects are evaluated and prioritized through a single pipeline.

Australia is a global leader in infrastructure development for the aforementioned reasons. In fact, in terms of successful coordination between the public and private sectors to supply transportation, energy, and social infrastructure, the country is among the most advanced economies in the world.

Africa’s weak infrastructure

Despite the crucial importance of infrastructure, many countries, mostly LEDCs, overlook its magnitude due to the sheer cost of developing it. An example of a continent which is lacking infrastructure is Africa. Road access is just 34% in Africa, compared to 50% in the rest of the developing world. This highlights the fact that transportation will be more difficult for people living in Africa, but also more expensive as the cost of transportation will be higher. Moreover, over 620 million people do not have access to electricity and the internet penetration rate is about 6%. Irrigation is used in only 5% of agriculture, while

infrastructure deficiencies are expected to cost Africa's GDP growth by 2%.[17] These statistics point to the conclusion that the sole lack of infrastructure not only impedes the economic growth of Africa, but it also forces the people of Africa to live in terrible conditions. Therefore, Africa will not reach the projected or needed levels of growth without resilient infrastructure.

If Africa's enormous economic and developmental potential is to be realized, infrastructure planning and investment are consequently crucial. The meticulous building of a sustainable infrastructure that can aid in turning the situation around is critical in helping the continent realize its economic potential. What leads to weak infrastructure and is sometimes non-existent in African countries is the lack of resources. Funding is still a major issue. African governments have traditionally financed a significant portion of the continent's infrastructure development on the balance sheet, limiting infrastructure deployment due to financial constraints. Furthermore, local banks are frequently unable to provide the long-term financing required for infrastructure construction. Nevertheless, Public-Private Partnerships (PPPs) are increasingly being used by governments and public bodies to offer efficient and cost-effective infrastructure and services. PPPs may assist public sector entities in reducing delivery times, sharing risks, achieving greater value for money, and increasing innovation in infrastructure deployment and service delivery. They also will allow the private sector organizations to contribute their expertise and knowledge to infrastructure construction and operation, as well as raise funds for long-term infrastructure expenditures, through such collaborations. PPPs, despite their potential, are extremely complicated policy tools that must be well understood and properly implemented and managed if they are to fulfill their promise. Above all, political resolve to make choices swiftly and publicly is essential for maximizing the benefits of this process. Lastly, the infrastructure gap — the number of funds needed to satisfy fundamental infrastructure requirements – is widening. To maintain and build vital public infrastructure, developing nations must spend an average of 5% of their GDP on infrastructure capital expenditures

[17]"Innovations for Infrastructure Development and Sustainable Industrialization." *United Nations*, United Nations, www.un.org/en/desa/innovations-infrastructure-development-and-sustainable-industrialization.

each year.[18] This ongoing challenge necessitates creative and innovative methods and realistic solutions, such as public-private partnerships (PPPs).

The economic advantages and disadvantages that result from sustainable infrastructure.

Sustainable infrastructure is a key factor in determining economic growth. The reason behind this is that with the implementation of sustainable infrastructure, the economy prospers in numerous ways. To be more specific, in the economic sector, sustainable infrastructure creates green employment, meaning that jobs producing or supplying products and services help the environment by protecting natural resources. In addition to this, according to studies on urban commercial districts and strip malls, consumers are interested in spending more on products, visiting such places more frequently, or travelling further to make purchases in locations with attractive landscaping, good tree cover, or green roadways, thus leading to an increase in retail sales. In fact, customers are keen to spend 8 to 12 percent extra in regions with a mature tree cover.[19] The cost of construction will also be reduced. A prime example of the aforementioned is that permeable pavement parking lots may have higher initial capital expenditures, but they have substantially reduced maintenance expenses compared to asphalt, resulting in overall lower life-cycle costs. Furthermore, property values will increase as well, since landscaping and trees raise the value of a home by 2 to 5%.[20] Moreover, sustainable infrastructure facilitates commerce and power enterprises. Furthermore, as structures are all-natural, they provide a higher return on investments, leading to properties in such buildings selling for higher prices.

On the other hand, many disadvantages come with this transition. First and foremost, the transition to sustainable infrastructure requires time and continual monitoring efforts. Secondly, building sustainable infrastructure requires greater funding, being

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[18] *Addressing Africa's Infrastructure Challenges - Deloitte*. www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/dttl-er-power-addressing-africas-infrastructure-challenges.pdf.

[19] EPA, Environmental Protection Agency, www.epa.gov/G3/green-jobs-your-community#Benefits-Businesses.

[20] *EPA*, Environmental Protection Agency, www.epa.gov/G3/green-jobs-your-community#Benefits-Businesses.

significantly more expensive than regular infrastructure. This will initially harm the economy; however, it could also contribute to economic growth in the long run, as infrastructure will have been constructed with resilient materials. Switching from regular infrastructure to sustainable infrastructure comes with both positive and negative effects on the economy. A conclusion which can be reached is that promoting and enforcing sustainable infrastructure will be incredibly beneficial as it will ensure the growth of the economy and an increase in a nation's Gross Domestic Product.[21]

Social advantages and disadvantages that result from sustainable infrastructure

From a social standpoint, sustainable infrastructure brings positive change. First, many new jobs will be created, which will reduce unemployment to a significant extent and help eradicate poverty. Secondly, current infrastructure is not equipped enough to meet most of the basic needs some Less Economically Developed Countries have, such as access to water, sanitation, and transportation networks. Nevertheless, this transition allows for most people to have access to clean water, electricity, and transportation. This potential transition will not affect the social sector with negative consequences, but rather with positive implications.

MAJOR COUNTRIES AND ORGANISATIONS INVOLVED

United States of America (USA)

After the civil war, the United States managed to enter an era of prosperity. The amount of industrial production, the number of employees engaged in industry, and the number of manufacturing plants, all more than quadrupled during the next 20 years. In fact, the aggregate yearly value of all produced items grew from roughly $5,400,000,000 in 1879 to maybe $13,000,000,000 in 1899, providing a more precise measure of the magnitude of this economic development.[22] This rise in industrial activity was caused by several causes- more specifically, infrastructural improvements (better transportation, railroad construction), technical advancements and other important inventions (the telephone, the

[21]"The Sustainable Infrastructure Opportunity." NCE 2016, newclimateeconomy.report/2016/the-sustainable-infrastructure-opportunity/.
[22]"Industrialization of the U.S. Economy." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., www.britannica.com/place/United-States/Industrialization-of-the-U-S-economy.

typewriter, linotype, etc.). The industrial revolution shaped the economy of the United States and ever since the US has managed to develop the world's largest economy by nominal GDP and net wealth as well as the second-largest by purchasing power parity (PPP).[23] Nowadays, the economy of the country is supported by vast natural resources, a very well-grounded infrastructure, and high productivity. In addition to that, with the recent election of the new president of the United States, Joe Biden, a new plan has been put in place for the USA to build modern, sustainable infrastructure and an equitable clean energy future.

More analytically, the President is aiming to invest in infrastructure and innovation. Regarding infrastructure, President Biden plans to improve the infrastructure system (from roads and bridges to green spaces and from water systems to electricity grids and universal broadbands), thus generating jobs in order to restore America's aging infrastructure. Regarding investment in innovation, the goal is to reduce the cost in critical clean energy technologies (battery storage, negative emissions technologies, the next generation of building materials, renewable hydrogen, advanced nuclear, and the auto-industry), which will again contribute to creating many jobs in the auto industry, domestic auto supply chains, and auto infrastructure.

Kenya

Kenya, like many other nations in Africa, has not been industrialized. For a country to be industrialized and to implement sustainable development, a satisfactory level of infrastructure is required, which Kenya is currently lacking. Insufficient and underperforming infrastructure is a key obstacle to Kenya's economic development and progress, as well as a significant hindrance to the country's Vision 2030. Despite the lack of fundamental infrastructure, Kenya is one of the fastest-growing economies in Sub-Saharan Africa. Kenya's Gross Domestic Product increased from $18 billion in 2005 to $78 billion in 2017.[24] In addition, China, a country which is acknowledging the potential of Kenya, is one of the main foreign investors in the country. One of the most impacting actions from China is The Mombasa-Nairobi Standard Gauge Railway (SGR). The project cost $3.6 billion and

[23]Silver, Caleb. "The Top 25 Economies in the World." Investopedia, Investopedia, 16 July 2021, www.investopedia.com/insights/worlds-top-economies/.

[24]Alexander, Lynsey. "True Progress for Industrialization in Kenya." The Borgen Project, Lynsey Alexander Https://Borgenproject.org/Wp-Content/Uploads/The_Borgen_Project_Logo_small.Jpg, 16 Jan. 2020, borgenproject.org/industrialization-in-kenya/.

connected Kenya's capital to the country's largest city. Because of the construction of the railway, more than 25,000 Kenyans were employed by the China Road and Bridge Corporation. Furthermore, due to the Kenya Informal Settlements Improvement Project, the World Bank assisted many rural areas. More than 60 miles of road were built as part of the project. By the completion of the project in November 2019, 52 miles of walkways, 66 kilometers of drainage canals, 39 miles of sewer pipes, 68 miles of water pipelines, and 134 security lights had been constructed.[25] In conclusion, the Kenyan government should exclusively focus on infrastructure development, as it will lead to economic growth, technological advancements, and lastly to the improvement of living conditions.

China

Up until the start of economic reforms and trade liberalization over four decades ago, China upheld policies that resulted in a poor, stagnant, centrally managed, substantially inefficient economy, largely isolated from the world market. However, under Deng Xiaoping's leadership, the government opened up to international trade and investment in 1979, as well as instituting free-market reforms, and managed to be one of the world's fastest-growing economies, with real annual GDP growth averaging 9.5% through 2018. Such development has allowed China to increase its GDP every 8 years on average, lifting an estimated 800 million people out of poverty. In addition, since China's economy has evolved and become more mature, real GDP growth has slowed substantially, from 14.2% in 2007 to 6.6% in 2018, with the International Monetary Fund (IMF) predicting that growth will decrease to 5.5% by 2024.[26] Nowadays, the Chinese government has accepted slower economic growth as something normal, recognizing the need for China to adopt a new development plan that heavily depends on private consumption, services, and innovation to stimulate economic growth. In fact, the Chinese government has made innovation the main priority in its economic planning, as evidenced by a number of high-profile initiatives, such as “Made in China 2025” a plan announced in 2015 to advance and modernize China's manufacturing in ten key sectors with the goal of making China a major global competitor in

[25]Alexander, Lynsey. “True Progress for Industrialization in Kenya.” The Borgen Project, Lynsey Alexander Https://Borgenproject.org/Wp-Content/Uploads/The_Borgen_Project_Logo_small.Jpg, 16 Jan. 2020, borgenproject.org/industrialization-in-kenya/.

[26]“China's Economic Rise: HISTORY, Trends, Challenges, and Implications for the United States.” *EveryCRSReport.com*, Congressional Research Service, 25 June 2019, www.everycrsreport.com/reports/RL33534.html.

these areas.[27] Furthermore, China's investments in infrastructure, as well as the dependence of the government of China on innovation, show the commitment of China in the fulfillment of Sustainable Goal 9 and the transformation of China towards sustainability.

Japan

Japan has one of the world's largest and most advanced economies. It boasts a well-educated, hardworking workforce, and its huge, affluent population makes it one of the world's most important consumer markets. From 1968 to 2010, Japan's economy was the world's second-largest (behind the United States), until it was surpassed by China. Japan managed to develop because of investments in productive plants and equipment, the use of efficient industrial processes, and a high level of education. In addition to the above, good working relationships between labor and management, access to innovative technology and considerable investment in R&D (research and development), a more open global trade framework, and a huge domestic market of selective customers, gave Japanese firms a competitive advantage in terms of size of operations. However, despite the aforementioned, the key driver of economic growth was manufacturing. As far as the Sustainable Development Goals are concerned, Japan was already adopting steps to achieve a sustainable society prior to the formation of the 2030 Agenda via environmental, economic, and social means. Today, Japan not only seeks the completion of all SDGs, but it also aspires to be a global leader in the implementation of SDG-related measures and will make efforts in Japan and in collaboration with other countries, to achieve global sustainable societies where nobody is left out.

Brazil

Brazil has the largest economy in Latin America and it was one of the world's fastest-growing major economies from 2000 to 2012, with an average annual GDP growth rate of above 5%.[28] Nevertheless, Brazil's economy slowed in 2013, and the country entered a recession in 2014. In 2017, the economy began to recover and, after a brief period of

[27] "Made in China 2025 Explained." *Made In China 2025 Explained*, projects.iq.harvard.edu/innovation/made-china-2025-explained.

[28] Bajpai, Prableen. "Emerging Markets: Analyzing Brazil's GDP." *Investopedia*, Investopedia, 17 May 2021, www.investopedia.com/articles/investing/102615/emerging-markets-analyzing-brazils-gdp.asp.

stagnation, officially emerged from the recession. Even though Brazil is the largest economy in South America, the country faces unemployment resulting in poverty. Additionally, in relation to SDG 9, Brazil has set out plans to boost innovation and has a resilient infrastructure. However, the infrastructural and also the industrial sectors are not sustainable, and as a result they both harm the environment. In fact, Brazil is the world's 13th greatest greenhouse gas emitter and because of its responsibilities towards the Amazon Rainforest, it is in a unique position when it comes to the climate issue. Brazil's rainforests are rapidly becoming a source of emissions rather than a carbon sink. However, due to its enormous livestock output, it is also one of the most powerful generators of methane emissions. Finally, this emphasizes the need to promote and implement sustainable industrialization, to limit climate change.

African Union

In recent years, some countries of Africa have experienced noteworthy growth in both their economic and social sectors. However, despite their need to foster and boost economic progress, the lack of infrastructure blocks or slows down this process. African Nations need to build resilient infrastructure and industrialize, so as to develop even more, accelerate economically and socially in order to resolve pressing issues such as poverty and climate change. In fact, actions have been taken regarding this issue, as African leaders attended a high-level session on the “Operationalization of the 2030 Agenda for Africa's Industrialization,” and urged the world community to increase financial support in accordance with Goal 9 of the 2030 Agenda for Sustainable Development and to support industrial and infrastructure initiatives that underlie this development, particularly those stated in Aspiration 1 of Africa's Agenda 2063, which call for an affluent and successful Africa based on equitable growth and sustainable development. The African leaders specifically encouraged the private sector to acknowledge Africa's export and domestic market potential, and they also asked for international investors to significantly boost their commitments to the continent. Moreover, they urged international organizations to offer industrial policy guidance and technical assistance programs to help African nations achieve their objectives and strengthen regional and inter-regional collaboration. They highlighted the importance of structural reform, technological progress, and innovation in all nations.[29]

[29]“Africa and SDG 9.” *UNIDO*, www.unido.org/who-we-are/unido-and-sdgs/africa-and-sdg-9.

European Union

The industrial sector in the EU (European Union) involves around 35 million people and contributes to more than 20% of the European economy.[30] Simultaneously, it is a source of several environmental stresses, such as material consumption and the production of greenhouse gases and other air pollutants. These issues result in early deaths, poor life quality, and damaged ecosystems. Considering these problems, one of the European Green Deal's main goals, which is intended to assist and expedite the EU's industrial transition to a more sustainable form of inclusive growth, is to mobilize the industry for a greener economy. In addition to the aforementioned, in the context of sustainable infrastructure, the European Green Deal aspires to make the EU a more affluent society with a modernized, resource-efficient, and competitive economy. To accomplish this goal, the European Union must confront the dual challenges of green and digital transformation. Within this framework, the Green Deal demands hastening the transition to sustainable and smart mobility, as well as investments in digitalization to aid the ecological transformation. As a result, multimodal freight transport, as well as automated and linked multimodal mobility will play an increasingly vital role, as will smart traffic control systems enabled by digitalization.

TIMELINE OF EVENTS

Date	Description of Event
10th June 2008	Kenya Vision 2030
19th July 2014	Thirteenth session of the Open Working Group on Sustainable Development Goals
25th–27th September 2015	United Nations Sustainable Development Summit 2015
4th May 2017	The Multi-Stakeholder Forum on Science, Technology, and Innovation for the SDGs (STI Forum)

[30]"SDG 9 - Industry, Innovation and Infrastructure." SDG 9 - Industry, Innovation and Infrastructure - Statistics Explained, ec.europa.eu/eurostat/statistics-explained/index.php?title=SDG_9_-_Industry%2C_innovation_and_infrastructure#Industry.2C_innovation_and_infrastructure_in_the_EU:_overview_and_key_trends.

17th May 2017	UN General Assembly (UNGA) High-Level SDG Action Event on Innovation and Connectivity
31st May 2017	UN Economic and Social Council's (ECOSOC) Special Meeting on "Innovations in Infrastructure Development and Promoting Sustainable Industrialization"
10th -19th July 2017	High-level Political Forum on Sustainable Development (HLPF)
29th May 2020	Accelerating implementation of the 2030 Agenda through water, sanitation & climate action

UN INVOLVEMENT: RELEVANT RESOLUTIONS, TREATIES AND EVENTS

UN Economic and Social Council's (ECOSOC) Special Meeting 2017

In 2017, the Special Meeting of the Economic and Social Council (ECOSOC) addressed the theme "Innovations in Infrastructure Development and Promoting Sustainable Industrialization'' and emphasized the importance of Sustainable Development Goal 9 (SDG-9). The United Nations fully acknowledges that resilient infrastructure and sustainable industrialization are critical facilitators of poverty alleviation because they encourage inclusion, connection, and equality within society. Nevertheless, the problem is that these particular sectors are difficult to develop, especially for countries that are lacking resources and funds. This meeting accomplished the following: it highlighted the need to build and upgrade resilient infrastructure and promote industrialization, and it shared innovative ways to do that. Furthermore, the resolution on "Transforming our world: the 2030 Agenda for Sustainable Development" was adopted by the General Assembly. On 25th September, 2015 resolution (A/RES/70/1) was adopted. An important statement that was made in the resolution was "we envisage a world in which every country enjoys sustained, inclusive and sustainable economic growth and decent work for all."

PREVIOUS ATTEMPTS TO SOLVE THE ISSUE

Sustainable Development Goals

The United Nations made a global commitment to accomplish the 17 sustainable development goals by 2030. This topic is linked, first and foremost, with SDG number 9 namely (Industry and infrastructure), which focuses on building resilient infrastructure,

promoting, and implementing sustainable industrialization and fostering innovation. Through the 9thSustainable Development Goal, all nations are determined to invest in building better infrastructure, to rely on innovation in order to improve living standards in accordance with many other aspects, such as healthcare. Also, promoting a model of industrialization will certainly have a positive impact on the economy; however, it shall not work at the expense of the environment. Moreover, practical solutions which promote sustainability in infrastructure and industrialization have not been proposed yet.

European Union's initiative to mobilize the industry

The European Union has set in action the European Green Deal. The European Green Deal is a new strategic plan aimed at transforming the EU into a more just and affluent society with a contemporary, resource-efficient, and competitive economy by 2050, with no net greenhouse gas emissions and economic growth decoupled from resource consumption.

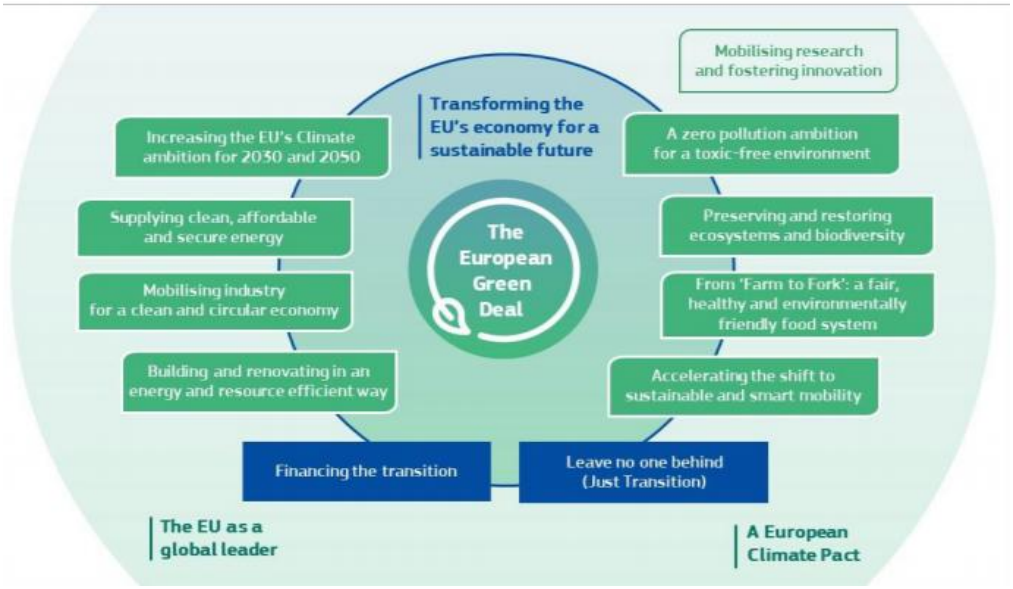

Figure 3: The European Green Deal [31]

Among other goals, the European Green Deal is designed to accomplish a climate-neutral and circular economy, which requires the full mobilisation of the industry. Although the EU's industry has begun to transform, it still accounts for 20% of the EU's greenhouse

[31] "EU Green Deal." *SEGM*, segm.gr/language/en/eu-green-deal-2/.

gas emissions. It remains too reliant on a constant flow of fresh resources being mined, exchanged, processed into commodities, and then discarded as waste or emissions. Only 12% of the materials it utilizes originate from recycled sources. This shift is a chance to increase long-term, job-creating economic activity. Low-emission technology, sustainable goods, and services have a lot of promise in global markets. Similarly, the circular economy has a lot of room for new activities and jobs. Furthermore, a "sustainable goods" strategy will be included in the circular economy action plan to promote the circular design of all products using a standard approach and principles. Prior to recycling, it will prioritize decreasing and reusing resources. It would promote innovative business models and establish minimum standards to avoid the introduction of ecologically hazardous items onto the EU market. The circular economy action plan will also contain incentives for firms to offer reusable, durable, and repairable items, as well as customer choice. It will examine the necessity for a "right to repair" in order to reduce device built-in obsolescence, particularly in the case of electronics. Consumer policy will assist consumers in making informed decisions and in participating actively in the ecological transformation. As long as new business models based on renting and sharing products and services are sustainable and inexpensive, they will play a significant role. Even though the plan of the mobilization of the industry for a clean and circular economy seems incredibly beneficial, it is difficult to be implemented as the transition is occurring at an inordinately sluggish pace.

African Union’s initiative to implement sustainable industrialization

The United Nations Industrial Development Organization (UNIDO), in collaboration with the African Union Commission (AUC), the Office of the Special Adviser on Africa (OSAA), and the United Nations Economic Commission for Africa (UNECA), hosted a high-level event on the theme of "Operationalizing the 2030 Agenda for Africa's Industrialization" as part of the UN Sustainable Development Goals. Many African politicians, executive directors of various UN bodies, senior officials, and key development actors attended the event to discuss concrete partnerships for the effective implementation of the 2030 Agenda in Africa, with an emphasis on SDG 9 on "resilient infrastructure, inclusive and sustainable industrialization, and innovation." They acknowledged the need of creating an agenda for Africa's industrialization in light of the continent's long-term fall in manufacturing share, indicating a significant potential for the acceleration of the industrial growth in line with that of other emerging areas. Building a strong local manufacturing sector has been hailed as Africa's most significant long-term economic growth engine.

In addition, Africa's major job generator was also identified as inclusive and sustainable industrialization. It was stressed that unless the continent's industrialization process is expedited, it will be unable to provide enough jobs for a growing youthful population, which will account for 60% of the world's young people by 2030. The event also emphasized the need to fairly distributing the advantages of industrialization, enhancing the role of women in production to guarantee inclusivity, and extending the modernization process to Africa's rural areas, essentially leaving no one behind. Furthermore, the main challenge that was extensively discussed was to find and execute models that would allow Africa's industrialization to be effectively operationalized. Technology facilitation and innovation have been identified as solutions. African leaders urged development partners and the business sector to help African nations improve their competitiveness and productivity by enabling technology transfer.

Lastly, participants alluded to the newly approved Addis Ababa Action Agenda when discussing development funding. The Addis Ababa Action Agenda provides comprehensive collection of policy initiatives by Member States, including over 100 concrete steps to fund sustainable development, alter the global economy, and meet the Sustainable Development Goals. Moreover, the agenda sets a new global framework for funding sustainable development that connects all financial flows and policies with economic, social, and environmental goals while ensuring stable and long-term financing. The African leaders also underlined the need for a well-balanced mix of local and international investment flows, as they believe that is the only way to ensure that industrialization is long-term sustainable.

POSSIBLE SOLUTIONS

Building resilient infrastructure

All nations should be willing to dedicate part of their funds to building resilient infrastructure. Investments in transportation, communication systems, and irrigation will play a significant role in determining economic growth. For the LEDCs that do not acquire the resources to accomplish something like that, international organizations such as the United Nations and other Intergovernmental and/or Non-Governmental Organizations should increase their financial aid to these countries in accordance with Sustainable Goal 9. The same organizations will also be responsible for overseeing the sustainable

industrialization projects that each LEDC undertakes to determine that the financial aid is not misused or used for other purposes, other than the intended ones.

Implementing sustainable industrialization

Implementing sustainable industrialization means that all industries should create more eco-friendly machinery that pollutes less and produces less waste. Moreover, modern technology should be incorporated into the manufacturing processes to decrease waste from long-run production and prototyping, utilize a circular economy approach to enhance end-of-lifecycle reuse and recycling, minimize, reuse, and recycle water, nonrenewable minerals, byproducts, and waste, and use materials for renewable resources. Strengthening suppliers' resilience in emerging economies is also extremely important to decrease their exposure to environmentally severe events as well as other economic, social, and environmental crises and catastrophes.

To enforce these solutions, both individuals and nations must rely on innovation. Building resilient infrastructure and promoting sustainable industrialization is possible, but in order not to further harm the environment, nations should use innovative solutions. If the aforementioned solutions are enforced, economic and social development will be accomplished.

Promoting industrialization in LEDCs

It is essential to acknowledge the importance of industrialization in LEDCs, as well as the reasons that lie behind the lack of sustainable and resilient infrastructure. Not only will industrialization contribute to economic and social growth, but it will also pave the way for the achievement of SDG 9, which is directly connected to the subject. Acknowledging the lack of basic resources, international organizations should financially aid the LEDCs, with the prospect of setting up a framework to build, develop, and sustain an infrastructure system. The financial aid will help LEDCs build industries and invest in them and it will lead to the transformation of the economy.

Establishing monitoring bodies to regulate the development of sustainable and resilient infrastructure

The term "institution building" can be used to refer to a wide range of objectives that have always been at the heart of overcoming underdevelopment. In all countries, institution-building should be created, like an organization, and have among other goals, one to supervise and monitor sustainable infrastructure and industrialization. In addition, this organization should assist countries in the following: it should encourage investors to invest in the infrastructure, it should be responsible for the proper management of the financial aid that the LEDCs will receive to build sustainable infrastructure, it should also be responsible for monitoring the materials that the infrastructure will be built from (only sustainable materials should be allowed). Furthermore, after the construction of infrastructure, institution building should monitor the evolution of it and do the following: since sustainable infrastructure enables job creation and economic development, it should contribute to the fair distribution of jobs among all the citizens, and also supervise the economic growth of the country, in order to ensure that the resources will be dedicated to transforming industries into sustainable industries and also to resolve other issues like poverty and climate change.

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