Economia Aziendale Online

Business and Management Sciences
International Quarterly Review

Zambia's Economic Puzzle: Decoding the Interplay of Sectoral Contributions, Demographics, Trade, and Resources

Tryson Yangailo

Pavia, March 31, 2025
Volume 16 – N. 1 / 2025

DOI: 10.13132/2038-5498/16.1.13-52

www.ea2000.it
www.economiaaziendale.it

PaviaUniversityPress

Electronic ISSN 2038-5498
Reg. Trib. Pavia n. 685/2007 R.S.P.

Zambia's Economic Puzzle: Decoding the Interplay of Sectoral Contributions, Demographics, Trade, and Resources

Tryson Yangailo, PhD
Independent Researcher. Zambia
https://orcid.org/0000-0002-0690-9747

Corresponding Author:
Tryson Yangailo
ytryson@yahoo.com

Cite as:
Yangailo, T. (2025). Zambia's Economic Puzzle: Decoding the Interplay of Sectoral Contributions, Demographics, Trade, and Resources. *Economia Aziendale Online*, *16*(1), 13-52.

Section:
Refereed Paper

Received: October 2024
Published: 31/03/2025

ABSTRACT

This study provides a comprehensive analysis of Zambia's economic development by examining sectoral contributions, demographic changes, trade activities, and access to resources. Using descriptive statistics, correlation analysis and regression models on data from the World Bank database analyzed using Jamovi software, the study examines how these factors interact and influence Zambia's GDP and overall economic growth. The results reveal that while agriculture and manufacturing have historically contributed significantly to GDP, their relative importance has declined over time as GDP has increased, reflecting a clear structural shift in the economy. Conversely, the contribution of the services sector to GDP has increased substantially, underscoring its growing role in Zambia's economic framework. The study also shows a strong negative correlation between sectoral contributions (excluding services) and GDP, suggesting underlying inefficiencies or structural challenges within these sectors. Demographic trends, including fertility rates and population size, have a minimal impact on GDP growth, suggesting that other factors play a more important role in driving economic development. Trade activity shows that exports have a positive impact on GDP, while imports, although substantial in volume, have a weaker and statistically less significant impact on growth. This underscores the critical role of export performance in Zambia's economic progress. In addition, the study finds a strong positive relationship between increased access to electricity and life expectancy, suggesting that infrastructure improvements are key to improving the quality of life. Although GDP growth has a minimal direct effect on life expectancy or access to electricity, improved infrastructure is strongly associated with better health outcomes. Overall, the study highlights the need for policies that address sectoral imbalances, promote export growth, support the expanding services sector, and improve infrastructure to foster sustainable economic development. These findings provide valuable insights for policymakers and stakeholders as Zambia continues its economic transformation.

Questo studio fornisce un'analisi completa dello sviluppo economico dello Zambia esaminando i contributi settoriali, i cambiamenti demografici, le attività commerciali e l'accesso alle risorse. Utilizzando statistiche descrittive, analisi di correlazione e modelli di regressione sui dati del database della Banca Mondiale, analizzati utilizzando il software Jamovi, lo studio esamina come questi fattori interagiscono e influenzano il PIL dello Zambia e la crescita economica complessiva. I risultati rivelano che, sebbene l'agricoltura e l'industria manifatturiera abbiano storicamente contribuito in modo significativo al PIL, la loro importanza relativa è diminuita nel tempo con l'aumento del PIL, riflettendo un chiaro cambiamento strutturale nell'economia. Al contrario, il contributo del settore dei servizi al PIL è aumentato in modo sostanziale, sotto-

lineando il suo ruolo crescente nel quadro economico dello Zambia. Lo studio mostra anche una forte correlazione negativa tra i contributi settoriali (esclusi i servizi) e il PIL, suggerendo inefficienze di fondo o sfide strutturali all'interno di questi settori. Le tendenze demografiche, compresi i tassi di fertilità e le dimensioni della popolazione, hanno un impatto minimo sulla crescita del PIL, suggerendo che altri fattori svolgono un ruolo più importante nel guidare lo sviluppo economico. L'attività commerciale mostra che le esportazioni hanno un impatto positivo sul PIL, mentre le importazioni, sebbene consistenti in volume, hanno un impatto più debole e statisticamente meno significativo sulla crescita. Ciò sottolinea il ruolo critico delle esportazioni nel progresso economico dello Zambia. Inoltre, lo studio rileva una forte relazione positiva tra un maggiore accesso all'elettricità e l'aspettativa di vita, suggerendo che i miglioramenti delle infrastrutture sono fondamentali per migliorare la qualità della vita. Sebbene la crescita del PIL abbia un effetto diretto minimo sull'aspettativa di vita o sull'accesso all'elettricità, il miglioramento delle infrastrutture è fortemente associato a migliori risultati sanitari. Nel complesso, lo studio evidenzia la necessità di politiche che affrontino gli squilibri settoriali, promuovano la crescita delle esportazioni, sostengano il settore dei servizi in espansione e migliorino le infrastrutture per favorire uno sviluppo economico sostenibile. Questi risultati forniscono preziose informazioni per i responsabili politici e le parti interessate mentre lo Zambia continua la sua trasformazione economica.

Keywords: Economic Development; Sectoral Contributions; Demographic Trends; Trade Activities; Resource Access

1 – Introduction

Zambia's economic trajectory is shaped by a variety of factors that collectively influence its gross domestic product (GDP) and overall development. The interplay of key sectors-agriculture, manufacturing, and services-plays a central role in shaping the country's economic landscape (Farahane & Heshmati, 2020; Carrasco & Tovar-García, 2021). Over time, the evolution of these sectoral contributions provides valuable insights into Zambia's changing economic dynamics. Demographic trends, including population growth, urbanization, and age distribution, have significant implications for labor markets and economic opportunities (Moyo, 2024; Shishkina *et al*., 2021). In addition, trade activities-both exports and imports-are critical to Zambia's integration into the global economy (Farahane & Heshmati, 2020; Okyere & Jilu, 2020). Access to essential resources, especially electricity, affects industrial productivity and quality of life, which in turn affects economic growth (Haanyika, 2008; Bayliss & Pollen, 2021).

Understanding the complex interactions among these factors is essential for designing effective policies and strategies to promote sustainable growth. This study aims to provide a comprehensive analysis of Zambia's economic development by examining the interplay between sectoral contributions, demographic trends, trade activities, and access to key resources. By integrating findings from existing research, this study seeks to elucidate the combined impact of these factors on Zambia's economic trajectory.

Despite various efforts to stimulate economic growth in Zambia, there remains a limited understanding of how sectoral contributions, demographic changes, trade activities, and access to resources collectively shape the country's economic development. This lack of comprehensive understanding hinders the development of policies that address the multifaceted nature of economic growth. This study is significant because it addresses gaps in the existing literature by integrating multiple dimensions of economic development into a unified analytical framework. Previous research often isolates factors such as sectoral contributions or trade without considering their interrelated effects (Raghutla, 2020; Chishimba, 2024). By examining

the interactions between sectoral contributions, demographic changes, trade activities, and access to resources, this research provides a more holistic view of Zambia's economic development. Such an integrated approach is critical for understanding the complex dynamics that influence economic growth and for informing more effective policymaking.

Existing research often focuses on individual aspects-such as the role of agriculture or trade dynamics-without integrating these elements into a broader analysis (Tivatyi *et al*., 2022; Aggarwal, 2019). This study aims to fill this gap by providing a holistic analysis of how these factors collectively affect Zambia's economic development.

2 – Research Objectives

General Objective

The primary objective of this study is to analyze the combined impact of sectoral contributions, demographic trends, trade activities, and access to resources on Zambia's economic development from 1994 to 2023.

Specific Objectives

1. Assess the contributions of key sectors (Service, Agriculture, Manufacturing) to Zambia's GDP from.
2. Examine the impact of demographic changes on economic opportunities and social policies in Zambia.
3. Assess the impact of trade activities (imports and exports) on Zambia's economic performance.
4. Examine how access to electricity and other basic resources affects economic development and social outcomes, including health and quality of life.

3 – Significance Scope and limitations of the study

This study adds to the existing body of knowledge by providing a comprehensive analysis of how sectoral contributions, demographic trends, trade activities, and access to resources interact to influence Zambia's economic development. It provides practical insights for policymakers, economists, and development planners. By highlighting the interconnectedness of these factors, the study aims to inform more targeted and effective economic policies that take into account the complex interactions between different sectors and resources.

The study covers the period from 1994 to 2023 and focuses on specific indicators such as GDP, trade activities, population growth, and access to electricity. Limitations include potential data availability issues and reliance on secondary data sources only. In addition, the study's focus on Zambia may limit the applicability of its conclusions to other contexts.

4 – Literature Review

4.1 – *Sectoral Contributions*

4.1.1 – Theoretical Background

The role of different economic sectors such as agriculture, manufacturing, and services in contributing to a nation's GDP is fundamental to understanding economic development and

growth. Classical economic theories, including the theory of structural transformation, explain the transition from agrarian to industrial and service-oriented economies. This transition is critical to development because it reflects the movement of resources and labor across sectors.

Zambia's economy has historically been driven by the mining sector, particularly copper, which has played a dominant role in terms of contribution to GDP and foreign exchange earnings. However, diversification into agriculture, manufacturing, and services has been a key policy objective.

Mella (2012) provides a relevant framework for understanding Zambia's economic structure through the "theory of combinatorial systems".This theory explains how globalization can lead to both the expansion of production and the strengthening of local economies through clusters of firms.

In Zambia, mining-related clusters have emerged as specialized and vertically integrated structures, while agriculture and small-scale manufacturing have developed their own accumulation and diffusion systems. Understanding these interdependencies provides a clearer view of Zambia's sectoral transformation.

4.1.2 – Agriculture: The Foundation of Early Economies

Agriculture has been central to human civilization since its inception, marking a significant shift from hunter-gatherer societies to sedentary agricultural communities (Andrade, 2007). The sector typically plays a dominant role in the early stages of an economy, providing food, raw materials, and employment and laying the foundation for further economic development. Despite its smaller share of the global economy today, agriculture remains essential to the livelihoods of many people (Alston & Pardey, 2014).

Johnson (1997) emphasizes that advances in agriculture, such as increased labor productivity and food production, have been critical to economic growth and the development of societies. These advances, including those brought about by the Industrial Revolution, allowed for the transfer of labor from agriculture to other sectors, which facilitated urban growth and industrialization. In the context of Zambia, Katongo *et al*. (2024) highlight the country's diverse economic activities, ranging from traditional practices such as agriculture to modern sectors. Despite challenges to economic diversification rooted in the colonial focus on mineral exploitation, agriculture remains an important part of the Zambian economy.

4.1.3 – Manufacturing: The Engine of Growth

Manufacturing has historically been an important driver of economic growth, especially since the industrial revolution (Szirmai, 2013). The shift of resources from agriculture to manufacturing has been associated with economic development and structural transformation. While advanced economies have become predominantly service-oriented, manufacturing remains an important sector in developing countries (Haraguchi, 2017).

Szirmai (2013) argues that despite the growing importance of the service sector, manufacturing remains critical for developing economies. The role of manufacturing in driving growth and productivity is well documented, especially in middle-income countries (Marconi *et al*., 2016).

Haraguchi (2017) notes that although the share of manufacturing in developing countries has declined, it remains essential for industrialization and economic development.

4.1.4 – Service Sector

Zambia's service sector has been a major contributor to economic growth, providing essential services and playing a crucial role in the country's GDP. Key sectors include tourism, financial services, telecommunications, transport, education, healthcare, and retail/wholesale trade. While tourism benefits from Zambia's diverse wildlife and cultural heritage, the financial and telecommunications sectors have expanded rapidly, offering a wide range of products and services.

Despite these advances, the services sector faces challenges such as inadequate infrastructure, skills shortages, and regulatory hurdles.

However, opportunities for growth through regional integration, diversification, and foreign direct investment can help Zambia further enhance its economic development and improve the quality of life for its citizens.

4.1.5 – Empirical Review

Using a system GMM model, Moyo and Jeke (2019) find a positive relationship between manufacturing value and economic growth in Africa. This suggests that strengthening the manufacturing sector can boost economic growth and reduce unemployment, especially through reindustrialization efforts.

According to Ndulo and Chanda (2016), the Zambian economy has experienced steady growth, largely driven by the domestic services sector, which has expanded at a rate similar to the overall economy.

The commercial banking sector has improved, but challenges remain in the energy services and telecommunications sectors. To enhance growth and achieve sustainable development goals, Ndulo and Chanda recommend institutional and regulatory reforms in these sectors to promote competition and increase output of both goods and services.

Yangailo and Chambani (2023) examined the impact of industrialization on Zambia's GDP and found a significant positive effect. The study suggests that promoting industrial activities can significantly contribute to Zambia's economic development.

Grabowski and Self (2021) analyzed structural changes in sub-Saharan Africa, including the decline of agriculture and stagnation in manufacturing. They argued that agricultural productivity growth is critical for supporting manufacturing development by reducing the cost of agricultural goods, which in turn supports industrial expansion. This perspective is particularly relevant to understanding Zambia's economic dynamics.

4.1.6 – Sectoral Shifts in Zambia

The historical and contemporary roles of agriculture, forestry, fisheries, and manufacturing in Zambia's economy have been influenced by various events and policies. Agricultural reforms, industrial policies, and trade agreements have shaped the contribution of these sectors to GDP. Thus, policies aimed at diversifying the economy and improving industrial capacity have been central to Zambia's development strategy.

However, there is a notable gap in the literature regarding the interaction between these sectors and their collective impact on GDP. While the contributions of individual sectors are well documented, less attention has been paid to how these sectors interact and affect overall economic performance. This study aims to address this gap by providing a comprehensive analysis of sectoral contributions and their collective impact on Zambia's economic growth.

4.2 – *Demographic Changes*

4.2.1 – Theoretical Background

The Demographic Transition Model (DTM) is central to understanding how demographic changes affect economic outcomes. The model describes a four-stage process: initially high birth and death rates lead to slow population growth; as living standards improve, death rates fall, leading to rapid population growth; eventually birth rates fall, slowing growth; and finally both birth and death rates stabilize, leading to a stable or declining population (Weir, 1991).

Agupusi (2022) discusses how Africa's demographic transition presents both opportunities and challenges. The continent's young population could potentially provide a demographic dividend characterized by increased economic growth if supported by effective policies in education, health, and economic development. Conversely, failure to address issues such as poverty and unemployment could lead to negative outcomes.

The Easterlin paradox suggests that while happiness is correlated with income in the short run, long-term economic growth does not significantly increase happiness. This paradox emphasizes that relative income differences, rather than absolute income, play a crucial role in determining happiness (Easterlin & O'Connor, 2022).

Malthus's theory of population, although criticized for its pessimistic outlook, remains influential. Malthus predicted that population growth would outstrip resource availability, but his theory also anticipated the impact of technological change on living standards, influencing economic debates and policy decisions (Weir, 1991).

Unified growth theory and the concept of the demographic dividend emphasize that human capital, particularly education, is a more important driver of economic growth than changes in the age structure alone. Lutz *et al*. (2019) argue that the true demographic dividend is derived from a human capital dividend, where education and skills development are critical for sustainable economic growth.

4.2.2 – Empirical Review

Mberu and Ezeh (2017) analyzed the relationship between population trends and economic development in sub-Saharan Africa, focusing on Zambia and Botswana. Their study found that Botswana's better economic performance compared to Zambia is partly due to differences in demographic indicators, such as fertility rates. The study highlights the role of investments in family planning and education in achieving development goals and reducing poverty.

Karra *et al*. (2017) document the ongoing demographic transition in sub-Saharan Africa, highlighting that fertility decline can create a demographic dividend and provide a window of opportunity for economic growth. Their findings suggest that managing fertility decline is critical to realizing this potential.

Peter and Bakari (2018) examined the impact of population growth and fertility on economic growth in African countries. Their panel data analysis from 1980 to 2015 shows that population growth has a positive impact on economic growth, while high fertility rates have a negative impact. They recommend policies to increase population productivity in order to reap the demographic dividend.

Ekane (2013) examined high fertility rates in sub-Saharan Africa, looking at contributing factors such as social organization and cultural norms. This study highlights the variation in

fertility rates across the region and the importance of understanding these dynamics for effective population planning.

Nyoni *et al*. (2021) used artificial neural networks to predict fertility rates in Zambia from 1960 to 2030 and found that fertility rates are likely to remain high. They suggest that addressing reproductive health challenges and investing in women's empowerment are critical to managing future population growth. Sanchez *et al* (1997) found that soil fertility decline limits per capita food production in Africa, which could affect economic development, particularly in agriculture-dependent economies.

4.2.3 – Demographic Trends in Zambia

Zambia's demographic trends, including high fertility rates and population growth, are influenced by factors such as health interventions, education, and urbanization. Understanding these trends is critical for effective development planning and social services.

The literature on Zambia's demographic trends highlights the need for more integrated studies that link demographic changes to economic performance indicators such as GDP growth. Closing this gap can provide a more comprehensive understanding of how demographic shifts affect economic outcomes and inform better policy decisions.

4.3 – *Trade Activities*

4.3.1 – Theoretical Background

Trade plays a central role in economic development, and several key theories help explain this relationship. The theory of comparative advantage, originally attributed to David Ricardo, suggests that countries should specialize in producing goods for which they have a relative efficiency advantage and trade in other goods. However, Morales Meoqui (2021) challenges this notion by arguing that Ricardo's example, often cited as proof of comparative advantage, was not the origin of the concept. Morales Meoqui (2023) further contends that Ricardo's numerical example was intended to illustrate that the relative value of goods is affected by the difficulty of moving capital rather than solely by labor input, thus challenging traditional interpretations of comparative advantage.

Export-led growth theory suggests that countries can achieve economic growth by expanding exports. This theory has been used to justify trade policies that focus on increasing a country's export volumes to stimulate economic growth. Farahane and Heshmati (2020) examine the relationship between trade and growth in the Southern African Development Community (SADC) and find that while export expansion has a positive impact on growth, increased trade openness can have negative effects. The study suggests that the growth benefits of SADC have been limited due to incomplete implementation of key instruments, emphasizing the need to promote export expansion and effectively manage trade-related shocks.

4.3.2 – Empirical Review

Trade liberalization has been a key driver of Zambia's economic strategy to expand export markets and attract foreign direct investment (FDI). The country's dependence on copper exports has made it vulnerable to price fluctuations, prompting discussions on trade diversification. Sepashvili (2020) adds another dimension to this discussion by highlighting the role of digital transformation in global trade. The study argues that e-commerce, e-banking, and

e-signatures are interdependent and essential to strengthening a country's global competitiveness. Zambia's trade sector could benefit from government-supported policies that enhance digital infrastructure and ensure smooth integration into global e-commerce networks.

Numerous studies have examined the impact of trade on economic growth, particularly in developing countries and sub-Saharan Africa. Farahane and Heshmati (2020) found that export expansion has a positive impact on economic growth, while increased trade openness has a negative impact. They recommend focusing on export growth and managing trade shocks to promote economic development within SADC.

Carrasco and Tovar-García (2021) highlight that in developing countries, export composition and diversification do not significantly affect growth, while domestic content of exports and imports of high-tech and capital goods are positively associated with economic growth. Their findings suggest that developing countries should focus on importing high-tech and capital goods to stimulate growth and consider industrial policies to boost domestic production. Raghutla (2020) reports a long-term positive relationship between trade openness and economic growth among emerging market economies from 1993 to 2016. The study also finds bidirectional causality between economic growth and inflation, with unidirectional causality from growth to trade openness and financial development. These findings underscore the importance of trade openness in promoting economic growth and development.

Omoke *et al*. (2021) find a long-run positive relationship between export trade and economic growth in Nigeria, although import trade has a negative impact. However, the negative impact of imports diminishes as the quality of institutions improves, suggesting that governance and institutional improvements are critical to harnessing trade for sustainable growth.

Tivatyi *et al*. (2022) analyzed the relationship between exports, imports, and economic growth in four Southern African countries. The study found evidence of bidirectional causality between exports and growth in Botswana, Namibia, and Zimbabwe, while the export-led growth hypothesis is supported only in the short run in South Africa. The study suggests that improving export competitiveness can increase employment and economic benefits.

Okyere and Jilu (2020) examined the impact of exports and imports on economic growth in Ghana from 1998 to 2018. They found a significant causal relationship between exports and GDP growth, especially for cocoa, but no significant relationship between imports and GDP growth.

Jambo and Sundjo (2021) examined the benefits of COMESA membership for Zambia and found that while COMESA membership had a positive impact on investment, it did not significantly affect long-term GDP growth or trade. They recommended avoiding non-tariff and technical barriers to trade to fully realize the benefits of regional integration.

Byiers *et al*. (2023) examined Mozambique's experience with the SADC Protocol on Trade in Goods and found limited success in increasing exports due to administrative and logistical challenges. The study highlights the potential of the AfCFTA for Mozambique to increase job-creating exports through a problem-solving approach.

Moyo (2024) assessed the impact of the SADC Free Trade Area (FTA) on intra-regional trade and found that full implementation has not significantly affected export performance. The study suggests that the effectiveness of the SADC FTA in regional trade integration has been limited.

4.3.3 – Trade in Zambia

Zambia's trade history has been significantly influenced by its copper reserves, which have been a major export since independence in 1964. Copper has consistently contributed to the country's

GDP and foreign exchange earnings, although fluctuations in global copper prices have led to economic instability. Initially pursuing import substitution to reduce dependence on imports and promote local industries, Zambia later adopted a more open trade policy and joined SADC in 1992 to promote regional trade and investment.

Despite its reliance on copper, Zambia has diversified its exports to include commodities such as tobacco, maize, and gemstones. However, these efforts have not fully mitigated the country's vulnerability to global price shocks. Zambia's imports are dominated by manufactured goods, machinery, and food, and reducing dependence on essential imports remains a challenge.

Trade policies, including tariff reductions and quota adjustments, have been an integral part of Zambia's economic development. While trade liberalization has facilitated global integration, it has also increased competition and exposed the country to economic challenges such as high debt levels and currency crises. Nevertheless, Zambia's natural resources and strategic location offer opportunities for future economic growth.

4.3.4 – Gaps in the Literature

Current research on Zambia's trade activities could benefit from a more comprehensive analysis of the long-term impact of trade on different sectors of the economy and the broader implications for economic development. Further studies could examine how trade dynamics affect sectoral growth and the effectiveness of trade policies in achieving sustainable economic outcomes.

4.4 – *Access to Resources*

4.4.1 – Theoretical Background

Access to essential resources, such as electricity, plays a critical role in driving economic development. Electricity is vital to various sectors, including industry, agriculture and services. It supports the efficient operation of machinery, communications, transportation, and essential services such as lighting and refrigeration.

Shishkina *et al*. (2021) discussed the role of electricity availability in sustainable development, emphasizing that while it is not directly correlated with economic indicators, it serves as an indicator of social sustainability and quality of life. Zhang *et al*. (2019) find that access to finance, education, economic development, infrastructure, and industrialization are key drivers of long-term electricity access, emphasizing the need for integrated development strategies. Matthew *et al*. (2018) show that while human capital development is insignificantly related to economic growth, electricity consumption is significantly related to growth, suggesting that expanding electricity access is critical to increasing productivity.

The growth pole theory, as discussed by Thomas (1975), explains that economic growth is often concentrated in certain industries or firms, which can drive broader economic development. Musibau *et al*. (2019) and Ogunjobi *et al*. (2021) highlight that electricity availability, human capital development, and institutional quality positively affect economic growth in sub-Saharan Africa and Nigeria, respectively. Musibau *et al*. (2019) suggest that a regulated energy sector may be more beneficial than a deregulated one due to the level of corruption.

Kannan *et al*. (2024) examined the impact of access to electricity on women's empowerment in Zambia, finding that it expands economic opportunities and increases self-reliance. Haanyika (2008) highlights the challenges Zambia faces in meeting the growing demand for electricity due to increased mining activities and industrial development, but notes the potential benefits for rural electrification. Chishimba (2024) reviewed various studies on household energy access in Zambia, found that access to electricity improves livelihoods, and suggested a mix of grid and off-grid solutions for optimal results. Bayliss and Pollen (2021) argued that the current policy paradigm, which focuses on private sector participation and cost-recovery pricing, has not effectively addressed Zambia's electricity challenges and calls for a more nuanced approach.

4.4.2 – Empirical Review

Research has consistently shown that access to electricity and critical infrastructure has a positive impact on economic outcomes. Kunze (2014) finds a nonlinear relationship between life expectancy and economic growth that varies with intergenerational transfers. Cervellati and Sunde (2011) suggest that improvements in life expectancy affect population growth and human capital accumulation differently before and after the demographic transition. Ngangue and Manfred (2015) find that life expectancy positively affects economic growth in developing countries, although this effect is less significant in middle-income countries. He and Li (2020) show a positive long-run relationship between life expectancy and GDP per capita, with different effects depending on the level of aging. Shahbaz *et al*. (2019) suggest that globalization, financial development, and economic growth positively affect life expectancy in sub-Saharan Africa. Biyase and Malesa (2019) find a robust positive impact of economic growth on life expectancy in Southern Africa. Alwago (2023) finds that health spending and life expectancy are key drivers of GDP growth in Kenya.

4.4.3 – Resource Access in Zambia

Zambia has made significant progress in expanding access to electricity through various government initiatives and rural electrification programs. The Zambia Electricity Supply Corporation (ZESCO) has worked to expand the national grid and improve power generation and distribution. The government has launched rural electrification projects, such as the World Bank-funded Zambia Rural Electrification Project, and promoted solar home systems for remote areas. Expanding access to electricity has led to increased productivity, improved education and healthcare, and reduced poverty. However, challenges remain, including the high cost of electricity, limited access in remote areas, and the need for infrastructure maintenance. Continued investment and support are essential to overcome these challenges and continue Zambia's progress in bringing electricity to its people.

5 – Methodology

5.1 – *Research Design*

This study uses a quantitative research design to provide a comprehensive analysis of Zambia's economic development by examining the linkages between sectoral contributions, demographic trends, trade activities, and access to key resources. The research aims to quantify the relationships between these factors and their impact on Zambia's economic growth.

5.2 – *Data Collection and Data Analysis*

The primary data source for this study is the World Bank Data Statistics database, which provides a comprehensive set of economic indicators for Zambia from 1994 to 2023. Specific indicators used include GDP, sectoral contributions (agriculture and manufacturing), trade activity (imports and exports), demographic data (population growth, fertility rate), and access to basic resources (electricity). Data were extracted from the World Bank Data Statistics database to ensure that the most recent and relevant data points were included in the analysis. The dataset was checked for completeness and consistency to ensure accurate analysis. Data analysis was performed using Jamovi software, which provides advanced statistical analysis and visualization. Jamovi was selected for its user-friendly interface and robust analysis capabilities.

5.3 – *Analytical Techniques:*

5.3.1 – Descriptive Statistics

Descriptive statistics were used to summarize and describe key characteristics of the data. These included measures of central tendency (mean, median) and dispersion (standard deviation, range) for each economic indicator.

5.3.2 – Correlation Analysis

Correlation analysis was used to examine the strength and direction of relationships between different variables. This analysis helped to identify how sectoral contributions, demographic trends, trade activities and access to resources are interrelated.

5.3.3 – Regression analysis

Multiple regression analysis was used to examine the impact of sectoral contributions, demographic trends, trade activities, and resource access on Zambia's GDP growth. This method allowed for an assessment of the relative importance of each factor and how they collectively influence economic development.

5.4 – *Data Triangulation*

Triangulation was used to ensure the reliability and validity of the findings. This involved the use of multiple data sources, including different economic indicators from the World Bank Data Statistics database, and the application of different analytical methods (correlation, descriptive statistics, and regression analysis) to cross-check the results. Triangulation enhances the robustness of the study by mitigating potential biases and confirming the consistency of findings across different analytical approaches.

5.5 – *Research Ethics*

All data used in this study are secondary and publicly available from the World Bank Data Statistics database, ensuring compliance with ethical guidelines for research. The study adhered to principles of transparency and accuracy in data handling and analysis.

5.6 – *Reliance on secondary data and Methodological Limitations*

Potential limitations include the reliance on secondary data from the World Bank Data Statistics database, which may have inherent limitations in terms of data granularity and completeness.

In addition, the focus of the study on Zambia may limit the generalizability of the findings to other contexts.

While triangulation enhances the validity of the findings, the use of statistical methods alone cannot fully capture the qualitative aspects of economic development. Future research may benefit from incorporating qualitative approaches to provide a more comprehensive understanding of Zambia's economic dynamics.

6 – Results

This section presents the findings from the analysis of each of the sub-themes (sectoral contributions to GDP, demographic changes, trade activities, and access to resources) and how these findings relate to Zambia's economic development.

6.1 – *Sectoral Contributions to GDP*

6.1.1 – Descriptive Statistics

The descriptive statistics for Zambia's GDP and its major sectors - Agriculture, Forestry and Fishing; Manufacturing; and Services in Table 1 provide a detailed overview of the country's economic structure and the variability within these sectors.

Table 1 – Descriptive Statistics on GDP, Services, Manufacturing and Agriculture, Forestry, and Fishing

	GDP (current US$, Million)	Agriculture, forestry, and fishing, value added (% of GDP)	Manufacturing, value added (% of GDP)	Services, value added (% of GDP)
Mean	15112	10.2	8.63	49.8
Median	16620	11.5	8.67	50.1
Standard deviation	9682	5.02	1.33	4.75
Skewness	-0.0160	-0.257	0.00828	-0.971
Std. error skewness	0.427	0.427	0.427	0.427
Kurtosis	-1.70	-1.39	-0.854	0.409
Std. error kurtosis	0.833	0.833	0.833	0.833

The GDP (current US$, million) has a mean of 15,112 million and a median of 16,620 million, indicating that the distribution is slightly skewed to the left, as reflected by the negative skewness of -0.0160. The standard deviation is 9.682 million, indicating a considerable variability in GDP over the period analyzed. For the Agriculture, Forestry and Fishing sector, the mean value added as a percentage of GDP is 10.2%, with a median of 11.5%, indicating that

on average this sector contributes a significant share to the economy. The standard deviation of y5.02% indicates some variability in the contribution of this sector over time.

The manufacturing sector has an average contribution to GDP of 8.63%, with a median of 8.67%. The standard deviation is relatively low at 1.33%, indicating that the manufacturing sector's contribution to GDP has been fairly consistent. Finally, the services sector has the highest average contribution to GDP at 49.8%, with a median of 50.1%. This sector also has a moderate standard deviation of 4.75%, indicating some variability in its contribution over time. The skewness of -0.971 suggests a left skew, meaning that lower values are slightly more common than higher ones. The kurtosis of 0.409 indicates a distribution that is slightly more peaked than normal, suggesting a more consistent central tendency with fewer extreme values.

Overall, these statistics reflect the dominant role of services in Zambia's economy, the moderate variability of agriculture, and the relative stability of manufacturing. The skewness and kurtosis values across sectors highlight the unique distributional characteristics of each sector and provide insights into the economic structure and sectoral performance of Zambia over the period analyzed.

6.1.2 – Correlation Matrix of GDP and Sectoral Contributors

The correlation matrix in Table 2 provides insights into the relationships between GDP and the sectoral contributions of manufacturing, agriculture, forestry and fishing, and services in Zambia.

The value added of the manufacturing sector as a percentage of GDP shows a strong positive correlation with the agriculture, forestry and fishing sector, with a Pearson's correlation coefficient ® of 0.750 and Spearman's rho of 0.786, both significant at the $p < 0.001$ level.

This suggests that as the contribution of agriculture increases, manufacturing tends to contribute more to GDP, indicating a potential interdependence between these two sectors in the Zambian economy. In contrast, the correlation between GDP (current US$, million) and both the manufacturing and agriculture sectors is strongly negative, with Pearson's r values of -0.868 and -0.874, respectively, both significant at $p < 0.001$.

The negative correlations suggest that as the absolute size of GDP increases, the relative contributions of these two sectors to GDP tend to decrease. This could mean that as Zambia's economy grows, these traditional sectors may become a smaller percentage of total economic output, possibly due to the expansion of other sectors such as services.

The services sector's value added as a percentage of GDP is positively correlated with total GDP ($r = 0.785$, $p < 0.001$), suggesting that as Zambia's GDP grows, the services sector expands and becomes a more dominant part of the economy.

Conversely, the services sector has a strong negative correlation with both manufacturing ($r = -0.711$, $p < 0.001$) and agriculture ($r = -0.667$, $p < 0.001$).

These negative correlations imply that as the service sector grows, it may absorb resources or focus away from these traditional sectors, leading to a relative decline in their contributions to GDP.

Overall, these correlations highlight significant structural shifts within Zambia's economy, where the service sector appears to be growing in importance as the economy grows, while traditional sectors such as manufacturing and agriculture, while interrelated, are contributing less in relative terms to overall economic output. This shift suggests a move towards a more service-oriented economy, which is common in many developing countries as they grow and diversify their economic activities.

Table 2 – Correlation Matrix of GDP and other Sectoral Contributors

		Manufacturing, value added (% of GDP)	Agriculture, forestry, and fishing, value added (% of GDP)	GDP (current US$, Million)	Services, value added (% of GDP)
Manufacturing, value added (% of GDP)	Pearson's r	—			
	df	—			
	p-value	—			
	Spearman's rho	—			
	df	—			
	p-value	—			
Agriculture, forestry, and fishing, value added (% of GDP)	Pearson's r	0.750***	—		
	df	28	—		
	p-value	< .001	—		
	Spearman's rho	0.786***	—		
	df	28	—		
	p-value	< .001	—		
GDP (current US$, Million)	Pearson's r	-0.868***	-0.874***	—	
	df	28	28	—	
	p-value	< .001	< .001	—	
	Spearman's rho	-0.845***	-0.854***	—	
	df	28	28	—	
	p-value	< .001	< .001	—	
Services, value added (% of GDP)	Pearson's r	-0.711***	-0.667***	0.785***	—
	df	28	28	28	—
	p-value	< .001	< .001	< .001	—
	Spearman's rho	-0.786***	-0.779***	0.831***	—
	df	28	28	28	—
	p-value	< .001	< .001	< .001	—

Note. * p < .05, ** p < .01, *** p < .001

6.1.3 – Regression Analysis on Sectoral Contributions to GDP

The model fit measures in Tables 3 and subsequent analyses provide a comprehensive understanding of the relationship between Zambia's GDP and its sectoral contributors-agriculture, forestry, and fishing; manufacturing; and services.

The overall model test indicates a strong fit, with a high R value of 0.943, indicating that the model explains a significant portion of the variance in GDP. The R^2 value of 0.889 indicates that approximately 88.9% of the variability in GDP is explained by the independent variables (agriculture, manufacturing, and services). The adjusted R^2, which adjusts for the number of predictors in the model, is slightly lower at 0.877, but still suggests a very robust model. The F-statistic of 69.7, with 3 and 26 degrees of freedom, is highly significant ($p < .001$), indicating that the model is a good fit to the data and that the predictors collectively have a significant impact on GDP. The omnibus ANOVA test (Table 4) further supports these findings. The test results show that the Agriculture, Forestry, and Fishing sector has a highly significant F-value of 18.54 ($p < .001$), indicating that this sector contributes significantly to the model.

The manufacturing sector also shows a strong contribution, with an F-value of 12.18 ($p = 0.002$), indicating that changes in the manufacturing sector have a significant impact on GDP. The services sector, while still significant, has F-value of 5.11 ($p = 0.032$), indicating that its impact on GDP, while important, is less pronounced compared to the other sectors.

Table 3 – Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.943	0.889	0.877	69.7	3	26	< .001

Table 4 – Omnibus ANOVA Test

Sectors	Sum of Squares	df	Mean Square	F	p
Agriculture, forestry, and fishing, value added (% of GDP)	2.14e+8	1	2.14e+8	18.54	< .001
Manufacturing, value added (% of GDP)	1.41e+8	1	1.41e+8	12.18	0.002
Services, value added (% of GDP)	5.91e+7	1	5.91e+7	5.11	0.032
Residuals	3.00e+8	26	1.16e+7		

Note. Type 3 sum of squares

The Table 5 of model coefficients provides further insight into the specific impact of each sector on GDP. The intercept of 25,619, while not statistically significant ($p = 0.084$), represents the estimated GDP when the contributions of all sectors are zero. The agriculture, forestry and fishing sector has a negative coefficient of -854, which is highly significant ($p < .001$). This suggests that as the percentage contribution of agriculture to GDP increases, total GDP decreases, possibly indicating a shift away from traditional sectors as the economy grows. Similarly, the manufacturing sector has a negative coefficient of -2.781 ($p = 0.002$), reinforcing the idea that higher 27ontributeons from manufacturing are associated with lower overall GDP in this context.

Conversely, the services sector has a positive coefficient of 446, which is statistically significant ($p = 0.032$). This suggests that as the contribution of the services sector to GDP

increases, overall GDP tends to increase, reflecting the growing importance of services in the Zambian economy.

Taken together, the results highlight the complex dynamics between Zambia's GDP and its sectoral contributors. While traditional sectors such as agriculture and manufacturing appear to be negatively associated with GDP growth, the services sector shows a positive relationship, underscoring its critical role in driving economic expansion.

Table 5 – Model Coefficients – GDP (current US$, Million)

Predictor	Estimate	SE	t	p	Standard Estimate
Intercept	25619	14238	1.80	0.084	
Agriculture, forestry, and fishing, value added (% of GDP)	-854	198	-4.31	< .001	-0.443
Manufacturing, value added (% of GDP)	-2781	797	-3.49	0.002	-0.381
Services, value added (% of GDP)	446	197	2.26	0.032	0.219

6.2 – *Demographic Changes. Descriptive Statistics*

The descriptive statistics (Table 6) for the dataset provide a detailed overview of three key indicators: Population, Fertility Rate, total (births per woman); and GDP Growth (annual %). These statistics show the central tendency, variability, and shape of the distribution for each indicator over 30 observations.

Table 6 – Descriptive Statistics on Population, Fertility Rate and GDP Growth

	Population, total	Fertility rate, total (births per woman)	GDP growth (annual %)
N	30	30	30
Mean	1.36e+7	5.19	4.67
Median	1.31e+7	5.49	5.15
Standard deviation	3.79e+6	1.17	3.71
Skewness	0.336	-3.16	-1.80
Std. error skewness	0.427	0.427	0.427
Kurtosis	-1.18	13.5	5.02
Std. error kurtosis	0.833	0.833	0.833

6.3 – *Population*

The mean population across the 30 observations is about 13.6 million people. The median population is slightly lower at 13.1 million people, indicating a modest difference between the

mean and the median. This suggests a fairly symmetric distribution with a slight positive skewness of 0.336. This skewness value means that the distribution has a slightly longer tail on the right side, but the effect is minimal. The standard deviation of 3.79 million people indicates that there is some variability in population size across the observations, but it is not excessive. The kurtosis value of -1.18 suggests that the population distribution is flatter than a normal distribution, which means fewer outliers and a more even distribution of values. The standard errors for skewness and kurtosis are 0.427 and 0.833, respectively, indicating the precision of these estimates.

6.4 – *Fertility Rate (Births per Woman)*

The mean fertility rate in this dataset is 5.19 births per woman, with a median of 5.49 births per woman. The fact that the median is slightly higher than the mean suggests that the distribution is skewed towards lower values. Indeed, the skewness of -3.16 confirms a strong negative skew, indicating that the distribution has a long left tail, with most observations concentrated at the upper end of the fertility rate. This skewness suggests that while the majority of observations have high fertility rates, a few have much lower rates, pulling the mean down. The standard deviation of 1.17 reflects moderate variability in fertility rates, indicating that while most countries have similar fertility rates, there is still some diversity. The extremely high kurtosis of 13.5 indicates a highly skewed distribution, with more extreme values (outliers) than would be expected from a normal distribution. This suggests that the fertility data are highly concentrated around the central value, with a few extreme cases causing the distribution to peak sharply. The standard errors for skewness and kurtosis are 0.427 and 0.833, respectively, indicating the reliability of these estimates.

6.5 – *GDP Growth*

6.5.1 – Mean GDP growth

The mean GDP growth rate for the 30 observations is 4.67%, indicating moderate economic growth on average. The median GDP growth rate is slightly higher at 5.15%, indicating that half of the observations have a growth rate above this level. The negative skewness of -1.80 indicates that the distribution of GDP growth rates is skewed to the left, with a longer tail on the left side.

This means that while most observations have moderate to high GDP growth rates, there are a few years with significantly lower growth, pulling the mean down. The standard deviation of 3.71% suggests a considerable variability in GDP growth rates across the observations, indicating that the economic growth rate has fluctuated significantly over the period. The kurtosis value of 5.02 indicates a distribution that is more peaked and has more outliers than a normal distribution, suggesting that while most observations cluster around the mean, there are a few extreme values that deviate significantly from it.

The standard errors for skewness and kurtosis are 0.427 and 0.833, respectively, underscoring the precision of these measures.

In summary, the population data show a slightly positive skewness with a relatively flat distribution, indicating a fairly even distribution of population sizes across the observations. In contrast, the fertility rate and GDP growth distributions have strong negative skews, with higher kurtosis values indicating peaked distributions and the presence of outliers. These patterns reflect the diversity and concentration of fertility rates and economic growth across the

dataset, with notable deviations from normality in these distributions. These findings are critical to understanding the underlying trends and variability of demographic and economic indicators within the sample.

6.5.2 – Correlation Matrix of Population, GDP Growth and Fertility Rate

The correlation matrix in Table 7 shows the relationships between population, GDP growth (annual %) and fertility rate (total births per woman) using both Pearson's r and Spearman's rho coefficients.

Table 7 – Correlation Matrix of Population, GDP Growth and Fertility Rate

		Population, total	GDP growth (annual %)	Fertility rate, total (births per woman)
Population, total	Pearson's r	—		
	df	—		
	p-value	—		
	Spearman's rho	—		
	df	—		
	p-value	—		
GDP growth (annual %)	Pearson's r	0.056	—	
	df	28	—	
	p-value	0.770	—	
	Spearman's rho	0.047	—	
	df	28	—	
	p-value	0.803	—	
Fertility rate, total (births per woman)	Pearson's r	-0.798 ***	-0.059	—
	df	28	28	—
	p-value	< .001	0.757	—
	Spearman's rho	-1.000 ***	-0.047	—
	df	28	28	—
	p-value	< .001	0.803	—

Note. * p < .05, ** p < .01, *** p < .001

Starting with the relationship between population and GDP growth (annual %), the Pearson's r value is 0.056, indicating a very weak positive correlation. However, this correlation is not statistically significant, as the p-value is 0.770, which is well above the generally accepted threshold of 0.05. The Spearman's rho for this relationship is also weak at 0.047, with a p-value

of 0.803, further suggesting that there is no significant rank-based correlation between these variables.

Next, the relationship between population, total and fertility rate, total (births per woman) shows a strong negative correlation, with a Pearson's r value of -0.798, which is highly significant ($p < 0.001$).

This suggests that as the population grows, the fertility rate tends to decrease significantly. The Spearman's rho for this relationship is -1.000, indicating a perfect negative rank correlation, with a p-value of less than 0.001, further confirming the strong inverse relationship between population and fertility rate.

Finally, the correlation between GDP growth (annual %) and total fertility rate (births per woman) is also analyzed. The Pearson's r value is -0.059, indicating a very weak negative correlation, with a p-value of 0.757, indicating no statistical significance.

The Spearman's rho value is also weak at -0.047, with a non-significant p-value of 0.803, suggesting that there is no significant relationship between GDP growth and fertility rate when looking at ranked data.

In summary, the correlation matrix indicates a significant inverse relationship between population and fertility rate, while the relationships between GDP growth and the other two variables (population and fertility rate) are weak and statistically insignificant.

6.5.3 – Regression Analysis on Demographic Changes

The results of the regression analysis below, which examines the impact of demographic changes on GDP growth, reveal several important insights. The fit measures of the model indicate that the predictors included in the analysis - fertility rate and total population - do not explain much of the variation in GDP growth. With an R^2 value of 0.0606, the model accounts for only about 6.06% of the variance in GDP growth, suggesting that the predictors have limited explanatory power. Furthermore, the adjusted R^2 value of 0.00368, which is negative, underscores the model's ineffectiveness in explaining GDP growth beyond a simple mean-based prediction (Table 8).

Table 8 – Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.0606	0.00368	-0.0701	0.0498	2	27	0.951

The results of the omnibus ANOVA test (Table 9) provide further evidence that none of the predictors contribute significantly to the model. The sum of squares for the fertility rate (total births per woman) is 0.2313, with an F-value of 0.01574 and a p-value of 0.901.

This indicates that the fertility rate does not have a significant impact on GDP growth, as evidenced by the high p-value. Similarly, for the total population, the sum of squares is 0.0813, with an F-value of 0.00553 and a p-value of 0.941, confirming that population size does not significantly affect GDP growth.

Table 9 – Omnibus ANOVA Test

	Sum of Squares	df	Mean Square	F	p
Fertility rate, total (births per woman)	0.2313	1	0.2313	0.01574	0.901
Population, total	0.0813	1	0.0813	0.00553	0.941
Residuals	396.8303	27	14.6974		

Note. Type 3 sum of squares

Looking at the model coefficients (Table 10) , the intercept of 5.017, with a standard error of 9.04 and a p-value of 0.584, suggests that the average GDP growth predicted by the model without taking the predictors into account is not significantly different from zero. For the fertility rate, the coefficient estimate is -0.127 with a standard error of 1.01, giving a t-value of -0.1255 and a p-value of 0.901. This indicates that the fertility rate has a negligible and statistically insignificant effect on GDP growth.

Table 10 – Model Coefficients - GDP growth (annual %)

Predictor	Estimate	SE	t	p	Standard Estimate
Intercept	5.017	9.04	0.5548	0.584	
Fertility rate, total (births per woman)	-0.127	1.01	-0.1255	0.901	-0.0400
Population, total	2.32e-8	3.12e-7	0.0744	0.941	0.0237

In summary, the regression analysis suggests that both the fertility rate and the total population do not significantly affect GDP growth in this model. The low R^2 and adjusted R^2 values, combined with the high p-values for both predictors, suggest that other factors may be influencing GDP growth or that the relationship between these demographic variables and GDP growth is minimal. Further research with additional predictors or alternative model specifications may be necessary to gain a clearer understanding of the drivers of GDP growth.

6.6 – *Trade Activities*

6.6.1 – Descriptive Statistics

The descriptive statistics for Zambia's imports of goods and services, exports of goods and services, and GDP provide important insights into the country's economic dynamics, as shown in Table 11.

Table 11 – Descriptive Statistics on Import, Export and GDP

	Imports of goods and services (% of GDP)	Exports of goods and services (% of GDP)	GDP (current US$, Million)
N	30	30	30
Mean	34.8	34.0	15112
Median	35.5	33.6	16620
Standard deviation	4.04	6.86	9682
Minimum	25.3	23.9	3404
Maximum	42.7	52.2	29164

6.6.2 – Imports of Goods and Services

The average share of imports in GDP is 34.8%, highlighting Zambia's considerable dependence on external goods and services. This suggests that a significant part of the economy is dependent on imports. The median of 35.5% is slightly higher than the mean, indicating that most data points are clustered around this value. The standard deviation of 4.04 reflects a moderate level of variability in import dependence, suggesting some fluctuations in the import-to-GDP ratio over time. The range, from a minimum of 25.3% to a maximum of 42.7%, underscores significant differences in import intensity, with the maximum value indicating periods of particularly high import dependence.

6.6.3 – Exports of Goods and Services

The mean export-to-GDP ratio is 34.0%, which is quite close to the import ratio, suggesting a balanced trade relationship relative to the size of the economy. The median is slightly lower at 33.6%, indicating that most values are close to this central point. The standard deviation of 6.86 indicates greater variability in export levels compared to imports, reflecting greater fluctuations in the export-to-GDP ratio. The export values range from a minimum of 23.9% to a maximum of 52.2%, showing considerable variability and highlighting periods of both strong and weak export performance.

6.6.4 – GDP

The average GDP is $15,112 million, providing a general measure of the size of Zambia's economy. The median GDP of $16,620 million is higher than the mean, indicating that the central data points are skewed toward higher values. The standard deviation of $9,682 million indicates a large variability in the size of Zambia's economy, reflecting significant economic fluctuations.

The GDP values range from a low of $3,404 million to a high of $29,164 million, showing a wide range of economic conditions from periods of low economic output to periods of substantial growth. In summary, Zambia's economic data show a high level of import and export activity relative to GDP, with notable fluctuations in both areas.

The GDP data also reflect considerable variability, suggesting a dynamic and evolving economic landscape. These findings are essential to understanding Zambia's trade dynamics and overall economic health.

6.6.5 – Correlation Matrix of Import, GDP and Export

Table 12 presents an analysis of the relationships between imports of goods and services as a percentage of GDP, exports of goods and services as a percentage of GDP, and GDP in current U.S. dollars. This analysis uses both Pearson's correlation coefficient and Spearman's rank correlation coefficient to evaluate these relationships.

Table 12 – Correlation of Import, GDP and Export

		Imports of goods and services (% of GDP)	Exports of goods and services (% of GDP)	GDP (current US$, Million)
Imports of goods and services (% of GDP)	Pearson's r	—		
	df	—		
	p-value	—		
	Spearman's rho	—		
	df	—		
	p-value	—		
Exports of goods and services (% of GDP)	Pearson's r	0.121	—	
	df	28	—	
	p-value	0.526	—	
	Spearman's rho	0.197	—	
	df	28	—	
	p-value	0.295	—	
GDP (current US$, Million)	Pearson's r	0.140	0.761 ***	—
	df	28	28	—
	p-value	0.459	< .001	—
	Spearman's rho	0.218	0.849 ***	—
	df	28	28	—
	p-value	0.247	< .001	—

Note. * p < .05, ** p < .01, *** p < .001

The correlation between imports of goods and services as a percentage of GDP and exports of goods and services is very weak, with a Pearson's r value of 0.121 and a p-value of 0.526. This indicates that there is no significant linear relationship between these two variables. Similarly, the Spearman's rho of 0.197 with a p-value of 0.295 supports the notion that the rank-based relationship is also weak and statistically insignificant.

Looking at the correlation between imports of goods and services and GDP, both Pearson's r (0.140, p-value 0.459) and Spearman's rho (0.218, p-value 0.247) suggest a weak and statistically insignificant positive relationship. These results suggest that imports do not have a significant impact on GDP in this data set.

In contrast, the relationship between exports of goods and services and GDP is particularly strong. The Pearson's r value of 0.761 with a p-value of less than 0.001 indicates a significant and robust positive linear relationship.

This suggests that higher exports are strongly associated with higher GDP. Similarly, the Spearman's rho value of 0.849 with a p-value of less than 0.001 confirms a very strong and statistically significant positive relationship between exports and GDP, underscoring the crucial role of exports in economic performance.

Overall, the analysis shows that while exports have a significant positive correlation with GDP, imports do not have a similar impact. This highlights the significant impact of exports on economic growth, in contrast to the minimal impact of imports in this context.

6.6.6 – Regression Analysis on Trade Activities

The linear regression analysis was conducted to examine the relationship between trade activities-specifically, imports and exports of goods and services as a percentage of GDP-and GDP (current US$, million), as shown below.
The purpose of the analysis was to understand how these trade activities contribute to Zambia's economic development.

The regression model (Table 13) shows an overall good fit, with an R value of 0.763, indicating a substantial correlation between the predictors and GDP. The R^2 value of 0.582 suggests that approximately 58.2% of the variability in GDP can be explained by the model, while the adjusted R^2 of 0.551 accounts for the number of predictors in the model and provides a slightly more conservative estimate of the explanatory power. The overall model test yielded an F statistic of 18.8 with degrees of freedom df1=2, df2=27, and a p-value of less than 0.001. This indicates that the model is statistically significant and that the predictors together have a meaningful impact on GDP.

Table 13 – Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.763	0.582	0.551	18.8	2	27	< .001

The regression coefficients (Tables 14 and 15) provide insight into the relationship between each predictor and GDP. The intercept of the model is -25,197 with a standard error of 11,482, yielding a t-value of -2,194 and a p-value of 0.037, indicating that the intercept is significantly

different from zero. For imports of goods and services (% of GDP), the coefficient estimate is 118 with a standard error of 301, giving a t-value of 0.393 and a p-value of 0.697. This indicates that while the coefficient is positive, imports of goods and services do not have a statistically significant impact on GDP.

Conversely, the coefficient for exports of goods and services (% of GDP) is 1.066, with a standard error of 177, a t-value of 6.023 and a p-value of less than 0.001. This result indicates a strong and statistically significant positive effect of exports on GDP.

Table 14 – Omnibus ANOVA Test

	Sum of Squares	df	Mean Square	F	p
Imports of goods and services (% of GDP)	6.50e+6	1	6.50e+6	0.154	0.697
Exports of goods and services (% of GDP)	1.53e+9	1	1.53e+9	36.278	< .001
Residuals	1.14e+9	27	4.21e+7		

Note. Type 3 sum of squares

Table 15 – Model Coefficients - GDP (current US$, Million)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept	-25197	11482	-2.194	0.037	
Imports of goods and services (% of GDP)	118	301	0.393	0.697	0.0493
Exports of goods and services (% of GDP)	1066	177	6.023	< .001	0.7552

In summary, the regression analysis shows that while exports of goods and services have a significant and positive effect on GDP, imports of goods and services do not have a statistically significant effect in this model. This suggests that export activities play a more critical role in the context of Zambia's economic development compared to import activities.

6.7 – *Access to Resources*

6.7.1 – Descriptive Statistics:

Table 16, which presents the descriptive statistics for the data on access to electricity, life expectancy, and GDP growth, reveals some interesting insights into Zambia's economic and social landscape.

Table 16 – Descriptive Statistics on Access to Electricity, GDP Growth and Life Expectancy

	Access to electricity (% of population)	Life expectancy at birth, total (years)	GDP growth (annual %)
N	30	30	30
Missing	0	0	0
Mean	26.0	52.0	4.67
Median	23.7	53.3	5.15
Standard deviation	11.2	12.0	3.71
Minimum	0.00	0.00	-8.63
Maximum	47.8	62.8	10.3

For access to electricity, the average percentage of the population with access is 26.0%, indicating that about a quarter of the population has reliable access to this essential service. The median is slightly lower at 23.7%, indicating that half of the data points fall below this level, which may indicate regional disparities in access.

The standard deviation of 11.2% reflects a moderate degree of variability around the mean, indicating that while some regions may have very high access, others may have much lower access. The range goes from a minimum of 0.00% to a maximum of 47.8%, indicating significant differences in access between regions.

In terms of life expectancy at birth, the average is 52.0 years and the median is 53.3 years. This median is slightly higher than the mean, suggesting that a few lower values could pull the mean down.

The standard deviation of 12.0 years indicates considerable variation in life expectancy across the population, which could be influenced by factors such as quality of health care and living conditions. The minimum life expectancy is 0.00 years, which could reflect data entry anomalies or specific cases of extreme mortality rates, while the maximum is 62.8 years, indicating a significant gap in longevity. The GDP growth rate has a mean of 4.67% and a median of 5.15%.

This suggests that the growth rate is generally positive, but can fluctuate significantly. The standard deviation of 3.71% illustrates the extent of this variation, with some years experiencing substantial growth and others experiencing slower or even negative growth. The range of GDP growth rates, from a minimum of -8.63% to a maximum of 10.3%, underscores the volatility of the economy and the different levels of performance in different periods.

Overall, these descriptive statistics provide a snapshot of Zambia's economic and social conditions, highlighting both the progress made and the disparities that remain.

6.7.2 – Correlation Matrix of Access to Electricity, GDP Growth and Life Expectancy

The correlation matrix in Table 17 shows the relationships between three key variables: GDP growth (annual %), life expectancy at birth (total years), and access to electricity (% of population). The analysis uses both Pearson's correlation coefficient and Spearman's rank correlation coefficient to provide a comprehensive view of these relationships.

Table 17 – Correlation Matrix of Access to Electricity, GDP Growth and Life Expectancy

		GDP growth (annual %)	Life expectancy at birth, total (years)	Access to electricity (% of population)
GDP growth (annual %)	Pearson's r	—		
	df	—		
	p-value	—		
	Spearman's rho	—		
	df	—		
	p-value	—		
Life expectancy at birth, total (years)	Pearson's r	-0.005	—	
	df	28	—	
	p-value	0.977	—	
	Spearman's rho	-0.070	—	
	df	28	—	
	p-value	0.714	—	
Access to electricity (% of population)	Pearson's r	-0.084	0.816 ***	—
	df	28	28	—
	p-value	0.660	< .001	—
	Spearman's rho	-0.042	0.922 ***	—
	df	28	28	—
	p-value	0.825	< .001	—

Note. * p < .05, ** p < .01, *** p < .001

6.7.3 – GDP Growth and Life Expectancy

The correlation between GDP growth and life expectancy at birth is extremely weak and statistically insignificant. Pearson's correlation coefficient is -0.005 with a p-value of 0.977, indicating that there is no discernible linear relationship between these two variables. Similarly, Spearman's rho is -0.070 with a p-value of 0.714, reinforcing the lack of a monotonic relationship. This suggests that variations in GDP growth do not have a meaningful impact on life expectancy within this dataset.

6.7.4 – GDP Growth and Access to Electricity

The correlation between GDP growth and access to electricity is also weak, but more nuanced. The Pearson correlation coefficient is -0.084 with a p-value of 0.660, indicating no significant linear relationship.

Spearman's rho is -0.042 with a p-value of 0.825, further supporting the lack of a monotonic relationship. This result suggests that changes in GDP growth are not strongly related to changes in access to electricity.

6.7.5 – Life Expectancy and Access to Electricity

In contrast, the relationship between life expectancy and access to electricity is markedly different. The Pearson correlation coefficient is 0.816 with a p-value of less than 0.001, indicating a strong positive linear relationship between these variables. Spearman's rho is 0.922 with a p-value of less than 0.001, confirming a strong positive monotonic relationship. This suggests that increased access to electricity is strongly associated with increased life expectancy, highlighting the significant impact of improved infrastructure on health outcomes.

Overall, the data suggest that while GDP growth does not significantly affect life expectancy or access to electricity, access to electricity is strongly associated with improved life expectancy. This underscores the importance of infrastructure development in improving health outcomes.

6.7.6 – Regression Analysis on Access to Resources

The linear regression analysis (Table 18) conducted to assess the relationship between access to resources and life expectancy at birth provides some insight into how these variables are related. The model shows a strong overall fit with an R^2 of 0.671, indicating that approximately 67.1% of the variance in life expectancy at birth can be explained by the predictors included in the model. The adjusted R^2 of 0.646 further refines this measure, taking into account the number of predictors and increasing the explanatory power of the model.

Table 18 – Model Fit Measures

				Overall Model Test			
Model	R	R^2	Adjusted R^2	F	df1	df2	p
1	0.763	0.582	0.551	18.8	2	27	< .001

The omnibus ANOVA test (Table 19) highlights significant contributions from the predictor variables. In particular, access to electricity, which has a substantial F value of 54.963 ($p < 0.001$), shows a robust and statistically significant relationship with life expectancy.

This suggests that greater access to electricity has a pronounced positive impact on life expectancy, reflecting its importance as a resource for improving overall health outcomes and quality of life. In contrast, GDP growth has an F of 0.327 ($p = 0.572$), indicating that its effect on life expectancy is not statistically significant in this model. This suggests that while GDP growth is a relevant economic indicator, its direct impact on life expectancy is less pronounced compared to access to electricity, at least in this analysis.

Table 19 – Omnibus ANOVA Test

	Sum of Squares	df	Mean Square	F	p
Access to electricity (% of population)	2794.1	1	2794.1	54.963	< .001
GDP growth (annual %)	16.6	1	16.6	0.327	0.572
Residuals	1372.5	27	50.8		

Note. Type 3 sum of squares

The model coefficients (Table 20) shed further light on these relationships. The intercept of 28.160 indicates the baseline life expectancy when both predictors are zero. The coefficient on access to electricity is 0.881, with a standard error of 0.119, yielding a t-value of 7.414 ($p < 0.001$). This high t-value and significant p-value underscore the strong, positive impact of access to electricity on life expectancy. Conversely, the coefficient on GDP growth is 0.205 with a standard error of 0.359 and a t-value of 0.572 ($p = 0.572$), indicating that GDP growth does not contribute significantly to variations in life expectancy in this model.

Table 20 – Model Coefficients - Life expectancy at birth, total (years)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept	28.160	3.863	7.289	< .001	
Access to electricity (% of population)	0.881	0.119	7.414	< .001	0.8218
GDP growth (annual %)	0.205	0.359	0.572	0.572	0.0634

Overall, these results suggest that improving access to electricity may be a more effective lever for improving life expectancy than focusing solely on GDP growth. This finding has important policy implications, as it highlights the value of infrastructure improvements in improving health and longevity outcomes.

7 – Discussion

7.1 – *Sectoral Contributions to GDP*

The study provides several key insights into the relationship between sectoral contributions and Zambia's GDP.

The services sector emerges as the most dominant contributor to Zambia's GDP, as evidenced by its highest average value of 49.8 percent and a significant positive relationship

with overall GDP growth. The positive coefficient of the services sector in the regression model further underscores its critical role in driving economic expansion. This finding is in line with global trends, where economies, especially those transitioning from low-income to middle-income status, often experience a shift towards a more service-oriented economic structure. The growth of the services sector likely reflects increased urbanization, rising demand for financial services, retail trade, and telecommunications, as well as government efforts to diversify the economy.

The strong positive correlation between the services sector and GDP suggests that as Zambia's economy grows, the services sector will not only expand but also become a more integral part of the economic landscape. This shift may indicate the country's transition to a more modern economy, where traditional sectors such as agriculture and manufacturing play a less central role in favor of services that cater to both domestic and international markets. The slight negative skewness observed in the distribution of the services sector further supports the idea of steady growth with occasional dips, possibly due to economic fluctuations or policy changes.

Contrary to the services sector, agriculture, forestry and fishing, as well as manufacturing, have a negative relationship with overall GDP growth. The descriptive statistics show that agriculture has a significant, though declining, contribution to GDP with an average of 10.2%. The negative coefficient for agriculture in the regression analysis suggests that as the sector's share of GDP increases, overall GDP tends to decrease. This could be indicative of the structural transformation of the economy, where reliance on traditional agricultural practices is decreasing as the country modernizes and diversifies its economic base.

Similarly, the manufacturing sector, with an average contribution of 8.63% to GDP, also shows a negative relationship with GDP growth. The negative coefficient for manufacturing, along with its significant impact in the ANOVA test, suggests that higher manufacturing contributions are associated with lower GDP. This may seem counterintuitive, but it could reflect the challenges facing Zambia's manufacturing sector, such as limited industrial capacity, dependence on imports for raw materials, and competition from more developed economies. The relatively low standard deviation of manufacturing's contribution to GDP suggests a consistent but limited role in the economy, possibly due to structural issues such as inadequate infrastructure, energy shortages, or policy bottlenecks.

The strong positive correlation between agriculture and manufacturing underscores the interdependence between these two traditional sectors. As agricultural production increases, there is likely to be a corresponding increase in manufacturing activity, particularly in agro-processing and related industries. However, despite this interdependence, both sectors are negatively correlated with overall GDP, suggesting that their growth may not be sufficient to drive significant economic expansion in the context of Zambia's evolving economy.

The negative correlations between services and both agriculture and manufacturing further illustrate the structural shift within the economy. The observed negative correlations and inverse relationship may indicate inefficiencies or structural challenges, supporting the findings of Grabowski and Self (2021) on structural shifts in developing economies. This inverse relationship reflects the economic challenges associated with sectoral changes, echoing the observations of Johnson (1997) on the evolution of sectoral contributions over time. As the service sector grows, it appears to be absorbing resources or attention that might otherwise go to these traditional sectors. This shift may be indicative of Zambia's broader economic transition

toward sectors that offer higher value-added activities and greater potential for long-term growth.

The results of this study have important implications for Zambia's economic policy and development strategy. The growing importance of the services sector suggests that policies aimed at enhancing the competitiveness and efficiency of services, particularly in areas such as finance, telecommunications, and retail trade, could yield significant economic benefits. In addition, the declining relative contributions of agriculture and manufacturing may require a rethinking of strategies for these sectors. Boosting productivity through technological innovation, improving supply chain infrastructure and promoting value-added could help revitalize these traditional sectors and better integrate them into the broader economy.

In addition, the negative relationship between agriculture and GDP highlights the challenges of over-reliance on traditional agricultural practices. Policies that promote agricultural modernization, crop diversification, and integration with industrial activities could help mitigate this problem. For manufacturing, addressing structural constraints, promoting industrialization, and encouraging foreign direct investment could be key to reversing its declining contribution to GDP.

In sum, Zambia's economic landscape is characterized by a growing services sector that is increasingly driving GDP growth, while traditional sectors such as agriculture and manufacturing face challenges that limit their contributions. The interdependence between agriculture and manufacturing suggests that coordinated policies could help strengthen their roles, but the overall shift toward services points to a broader transformation of the economy. Understanding these dynamics is critical for policymakers seeking to promote sustainable and inclusive economic growth in Zambia. By leveraging the strengths of the services sector while addressing challenges in agriculture and manufacturing, Zambia can create a more balanced and resilient economic structure that supports long-term development goals.

7.2 – *Demographic Changes*

Descriptive statistics for the dataset reveal notable patterns in key demographic and economic indicators: Population, Fertility Rate, and GDP Growth. The mean population is approximately 13.6 million, with a median of 13.1 million, suggesting a fairly symmetric distribution with slight positive skewness. The fertility rate has a mean of 5.19 births per woman and a median of 5.49, reflecting a distribution skewed toward higher fertility rates. The high negative skewness and kurtosis values for the fertility rate indicate a concentration of higher values and a significant presence of outliers. The GDP growth rate, with a mean of 4.67% and a median of 5.15%, shows negative skewness and high kurtosis, indicating variability in economic growth rates and the presence of extreme values.

Correlation analysis reveals important relationships between population, GDP growth and fertility rate. There is a strong negative correlation between population and fertility rate, with a Pearson's r value of -0.798, indicating that as the population grows, the fertility rate tends to decrease significantly. Conversely, the correlation between GDP growth and both population and fertility rates is weak and statistically insignificant. This suggests that GDP growth is not significantly related to changes in either population size or fertility rate, pointing to other potential factors influencing economic growth.

The regression analysis assessing the impact of demographic changes on GDP growth shows limited explanatory power of the model. With an R^2 value of 0.0606 and an adjusted R^2 value of

-0.0701, the model explains only a small fraction of the variance in GDP growth, indicating that fertility rate and total population are not significant predictors of GDP growth. The omnibus ANOVA test further confirms the lack of significance, with high p-values for both predictors. The coefficients for fertility rate and population are statistically insignificant, reinforcing the finding that these demographic factors have minimal impact on GDP growth. These results suggest that other variables or more complex models may be needed to better understand the drivers of GDP growth.

This finding resonates with Mberu and Ezeh's (2017) study on the demographic dividend and the need for targeted policies to harness the potential of Zambia's population dynamics. However, the findings of this study contrast with Nyoni *et al*.'s (2021) assertion that fertility rates and population growth have a significant impact on economic development, suggesting that additional factors may be influencing GDP growth in Zambia.

7.3 – *Trade Activities*

The descriptive statistics for Zambia's imports, exports, and GDP reveal several key aspects of the country's economic activities. Imports of goods and services as a percentage of GDP have a mean of 34.8 percent and a median of 35.5 percent, indicating significant dependence on external goods and services. The data show a standard deviation of 4.04, reflecting moderate variability in import dependence. The range is from a minimum of 25.3% to a maximum of 42.7%, highlighting fluctuations in import intensity over time.

Exports of goods and services are close to imports, with a mean of 34.0% and a median of 33.6%, suggesting a relatively balanced trade relationship. However, the higher standard deviation of 6.86 indicates greater variability in export performance compared to imports. The range of export values, from 23.9% to 52.2%, underscores the significant fluctuations in export levels.

The correlation analysis between imports, exports and GDP shows a clear relationship. The correlation between imports of goods and services and exports is very weak, with Pear-son's r at 0.121 and Spearman's rho at 0.197, indicating no significant linear or ranked relationship. Similarly, imports have a weak and statistically insignificant positive relationship with GDP, with Pearson's r of 0.140 and Spearman's rho of 0.218.

In contrast, exports show a strong and significant positive correlation with GDP. The Pearson's r of 0.761 and Spearman's rho of 0.849 suggest a robust linear and rank-based relationship, respectively. This indicates that higher export levels are closely associated with higher GDP, underscoring the critical role of exports in driving economic growth. This finding supports Farahane and Heshmati's (2020) conclusions on export-led growth and Raghutla's (2020) observations on the long-term benefits of trade openness for economic development.

The regression analysis further elucidates the impact of trade activities on Zambia's GDP. The model, with an R^2 value of 0.582 and an adjusted R^2 value of 0.551, explains a substantial portion of the variability in GDP. The overall model is statistically significant with an F-statistic of 18.8 and a p-value of less than 0.001. The omnibus ANOVA test shows that while imports of goods and services have no significant effect on GDP (p-value of 0.697), exports have a significant positive effect (p-value less than 0.001). The regression coefficients show that the impact of imports on GDP is not statistically significant (coefficient of 118, p-value of 0.697), while exports have a strong positive effect (coefficient of 1.066, p-value less than 0.001).

In summary, the analysis shows that Zambia's economic development is more influenced by export activities than by imports. Exports have a significant and positive impact on GDP, reflecting their critical role in Zambia's economic growth, while imports do not have a significant impact in this context. This finding is consistent with Jambo and Sundjo's (2021) observations on trade dynamics within regional economic frameworks.

7.4 – *Access to Resources*

The descriptive statistics for access to electricity, life expectancy, and GDP growth in Zambia provide a snapshot of the country's socioeconomic landscape. Access to electricity averages 26.0% of the population, with a median of 23.7% and a standard deviation of 11.2%, indicating moderate regional variability. The range of access varies widely, from 0% to 47.8%, reflecting disparities in infrastructure across areas. Life expectancy at birth averages 52.0 years, with a slightly higher median of 53.3 years and a standard deviation of 12.0 years, suggesting variability in health outcomes influenced by factors such as the quality of health care. The GDP growth rate shows an average of 4.67% with a median of 5.15%, indicating positive but fluctuating economic performance. The standard deviation of 3.71% and the range of -8.63% to 10.3% highlight the volatility of economic growth.

The correlation analysis reveals different patterns in the relationships between GDP growth, life expectancy and access to electricity. There is no significant correlation between GDP growth and life expectancy, as evidenced by a Pearson's correlation coefficient of -0.005 and a Spearman's rho of -0.070, neither of which indicates a meaningful linear or monotonic relationship. Similarly, GDP growth is weakly correlated with access to electricity, with a Pearson's r of -0.084 and a Spearman's rho of -0.042, indicating that changes in GDP growth do not significantly affect access to electricity.

In contrast, access to electricity and life expectancy are strongly positively correlated, with Pearson's r of 0.816 and Spearman's rho of 0.922, both statistically significant. This strong relationship suggests that improved access to electricity is closely associated with increased life expectancy. This finding is consistent with Haanyika's (2008) concerns about infrastructure challenges and Shishkina *et al.*'s (2021) observations about the critical role of electricity in improving quality of life. The regression analysis underscores the importance of access to electricity in influencing life expectancy. The model shows a good fit with an R^2 of 0.671, indicating that approximately 67.1% of the variance in life expectancy can be explained by the included predictors. The adjusted R^2 of 0.646 refines this estimate by taking into account the number of predictors. The omnibus ANOVA test shows that access to electricity has a significant impact on life expectancy, with a p-value of less than 0.001, indicating a substantial and positive effect of improved access to electricity on life expectancy.

7.5 – *Integrated Discussion*

Sectoral contributions to GDP show that agriculture and manufacturing, despite their historical importance, have diminishing returns in terms of GDP growth. Both sectors have a negative correlation with GDP, suggesting that as their relative contributions increase, overall GDP tends to decline. This may reflect a structural shift in the Zambian economy towards sectors with different growth dynamics.

The regression analysis further supports this, showing that increases in the contributions of agriculture and manufacturing are significantly associated with decreases in overall GDP. In

contrast, the services sector has a positive relationship with GDP growth. The regression analysis confirms that as the contribution of the services sector increases, so does GDP, indicating its growing importance in the economy. This suggests that the services sector is becoming increasingly important for economic performance. The negative impact of agriculture and manufacturing combined with the positive contribution of services highlights the need for policies that support the expansion of the services sector to drive economic growth (see Figure 1). Demographic change has a weak relationship with GDP growth. The strong negative correlation between population growth and the fertility rate suggests that as the population grows, fertility rates tend to fall. However, the correlation between GDP growth and demographic factors such as population and fertility rates is weak and statistically insignificant. This suggests that demographic factors alone do not significantly drive GDP growth. Instead, other variables may play a more important role in influencing economic performance. The results suggest that while demographic dynamics are important, they may not be the primary drivers of economic growth, pointing to the need for more targeted policies to harness demographic potential.

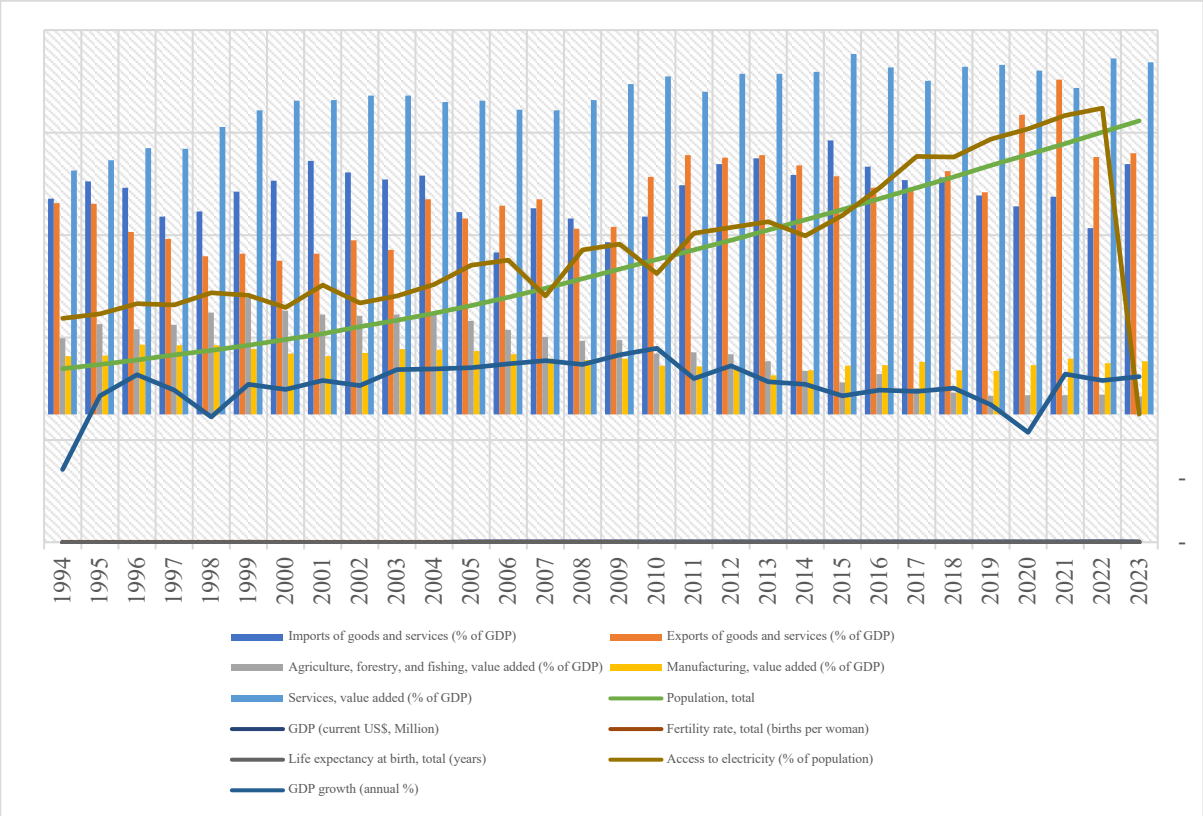

Figure 1 – Interlinkages Between Sectoral Contributions, Demographic Trends, Trade, and Resource Access in Zambia

(Source: Compiled using data from World Bank (2024) Database Statistics)

Trade activity underscores the critical role of exports in Zambia's economic development. The strong positive correlation between exports and GDP, coupled with the significant positive impact of exports on GDP in the regression analysis, underscores the importance of trade in driving economic growth. In contrast, imports have a weak and statistically insignificant impact on GDP, suggesting that import policies may not have a significant impact on economic

performance. The results suggest that enhancing export activities should be a strategic focus for boosting GDP, while import strategies may not need as much emphasis.

7.6 – *Policy Implications*

The findings from this study underscore several key policy implications for Zambia:

7.6.1 – Diversification of Economic Sectors

The study reveals a significant decline in the contributions of agriculture and manufacturing to GDP, indicating a structural shift in Zambia's economy.

To address this, policymakers should prioritize the diversification of Zambia's economic base. Strategic investments in emerging sectors such as technology and services can reduce the economy's dependence on traditional industries and mitigate the risks associated with these shifts.

This strategy will foster a more resilient and balanced economic structure, better equipped to adapt to changing global and domestic conditions.

7.6.2 – Export-Oriented Strategies

The significant positive impact of exports on GDP underscores the importance of developing policies to improve export performance. Policymakers should prioritize policies that facilitate trade, improve trade agreements, and support export-oriented industries. By boosting export activities, Zambia can promote economic growth and stability and use its trade relations to strengthen its economy.

7.6.3 – Infrastructure Development

The study shows a strong correlation between access to electricity and life expectancy, indicating that infrastructure investment is critical. Prioritizing infrastructure development, particularly improving access to electricity, is critical to improving quality of life and supporting economic growth.

Investment in infrastructure can lead to better health outcomes and create a more conducive environment for economic activity.

7.6.4 – Addressing Demographic Challenges

Although demographic changes such as high fertility rates have a limited impact on GDP growth, addressing these issues through targeted education and family planning programs can contribute to long-term economic stability. By influencing population growth and labor force participation, such programs can help create a more sustainable economic environment and support future economic development.

7.7 – *Significance of the Study*

This study provides valuable insights into the linkages between sectoral contributions, trade activities, demographic changes and access to resources in Zambia. It highlights the changing structure of the economy, the critical role of exports in economic growth, and the importance of

infrastructure in improving health outcomes. By providing a comprehensive analysis of these factors, the study contributes to a deeper understanding of Zambia's economic dynamics and offers evidence-based recommendations for policy development. It fills a gap in the literature by integrating multiple dimensions of economic development and providing practical insights for policymakers.

7.8 – *Summary*

The study is summarized in Table 21.

Table 21 – Summary of the Study

Subtopic	Key Metrics	Findings	Recommendations
Sectoral Contributions	Agriculture, Manufacturing, Services	Agriculture and manufacturing show a negative correlation with GDP, with regression analysis indicating significant negative associations, reflecting a structural shift in the economy. The services sector shows a strong positive association with GDP growth, confirmed by regression analysis, highlighting its growing importance for economic performance.	Focus on expanding and supporting the services sector to drive economic growth. Implement strategies to modernize and adapt agriculture and manufacturing sectors, ensuring they contribute positively to GDP while aligning with evolving economic priorities
Demographic Changes	Population, Fertility Rate	Demographic factors (population and fertility rate) show weak and statistically insignificant correlations with GDP growth, suggesting they are not primary drivers of economic performance.	Implement targeted policies to leverage demographic potential, such as improving education and employment opportunities, while recognizing that demographic factors alone may not drive GDP growth.
Trade Activities	Imports, Exports	Exports have a strong positive impact on GDP, indicating their crucial role in economic growth. Imports show a minimal and statistically insignificant impact on GDP.	Enhance export activities through trade agreements and support for export-oriented industries. Re-evaluate import policies to ensure they do not negatively impact the domestic economy.
Access to Resources	Electricity Access, Life Expectancy	There is a strong positive correlation between access to electricity and life expectancy. Improvements in electricity access significantly enhance life expectancy, whereas GDP growth has a minimal impact on these factors.	Invest in infrastructure development, particularly in expanding access to electricity, to improve quality of life and health outcomes. Ensure that improvements in infrastructure are aligned with overall economic development goals.

8 – Conclusion and Limitations

This study provides a comprehensive understanding of Zambia's economic development by examining the interplay between sectoral contributions, demographic changes, trade activities, and access to resources. The findings provide valuable insights into how these factors

collectively shape the country's economic trajectory and highlight critical areas for policy intervention.

The study reveals a significant structural shift in Zambia's economy, with the relative contributions of agriculture and manufacturing to GDP declining over time. This shift underscores the need for economic diversification and increased investment in emerging sectors such as technology and services. The growing importance of the services sector reflects its growing role in the economy, suggesting that future policies should prioritize supporting and expanding this sector to ensure a more balanced and resilient economic structure.

The study finds that demographic factors, including fertility rates and population size, have a minimal impact on GDP growth. This suggests that while demographic trends are important, they are not the primary drivers of economic performance. Addressing demographic challenges through targeted education and family planning programs can still contribute to long-term economic stability, but more immediate economic impacts are likely to be driven by other factors. Trade activities, particularly exports, play a crucial role in driving Zambia's economic growth. The strong positive impact of exports on GDP underscores the importance of developing export-oriented strategies and improving trade performance. Policymakers should focus on improving trade agreements, supporting export industries, and leveraging trade relationships to support economic growth. Conversely, the minimal impact of imports on GDP suggests that import policies may have less impact on economic performance. Access to electricity is found to have a significant positive effect on life expectancy, suggesting that infrastructure development is essential for improving quality of life and supporting economic growth. While GDP growth does not directly affect life expectancy or access to electricity, investments in infrastructure, particularly in expanding access to electricity, can lead to better health outcomes and create a more conducive environment for economic activity.

The study highlights the need for comprehensive policies that address sectoral imbalances, promote export growth, support the expanding services sector, and improve infrastructure. A focus on these areas will contribute to sustainable economic development and improve the overall quality of life in Zambia. Policymakers should consider the interactions among these factors to design targeted strategies that address the complex dynamics influencing Zambia's economic growth (see APPENDIX). While this study provides valuable insights, it also highlights areas for further research. Future studies should examine the impact of additional variables such as political stability, governance, and global economic conditions. Examining other economic sectors could provide a deeper understanding of Zambia's economic dynamics. Comparative analysis with other developing countries and qualitative research methods could also provide further insights into effective policy design and implementation.

In conclusion, understanding the interrelated factors affecting Zambia's economic development is critical to designing effective policies and strategies. By addressing the identified challenges and capitalizing on opportunities in key sectors, Zambia can enhance its economic growth and improve the quality of life of its citizens.

9 – References

Aggarwal, A. (2019). *Evaluating Economic Impacts of Electrification in Zambia*. Doctoral dissertation, Duke University Durham, North Carolina

Agupusi, P. (2022). Demographic Transition and Development in Africa. In *The Routledge Handbook of African Demography* (pp. 616-626). Routledge.

Alston, J. M., & Pardey, P. G. (2014). Agriculture in the global economy. *Journal of Economic Perspectives*, *28*(1), 121-146.

Alwago, W. O. (2023). The nexus between health expenditure, life expectancy, and economic growth: ARDL model analysis for Kenya. *Regional Science Policy & Practice*, *15*(5), 1064-1086. https://doi.org/10.1111/rsp3.12588

Andrade, G. (2007). DIAMOND, Jared: Guns, Germs and Steel: The Fates of Human Societies. WW Norton & Company, New York, 2003, 494 pp. *Revista de Filosofía*, *25*(55), 151-156.

Bayliss, K., & Pollen, G. (2021). The power paradigm in practice: A critical review of developments in the Zambian electricity sector. *World Development*, *140*, 105358. https://doi.org/10.1016/j.worlddev.2020.105358

Biyase, M., & Malesa, M. (2019). Life expectancy and economic growth: Evidence from the Southern African development community. *Economia Internazionale/International Economics*, *72*(3), 351-366.

Byiers, B., Karkare, P., & Zita, S. (2023). *Lessons from SADC for the AfCFTA: The case of Mozambique.* The Centre for Africa- Europe Relations. Onze Lieve Vrouweplein 216211 HE Maastricht. The Netherlands Pays Bas

Carrasco, C. A., & Tovar-García, E. D. (2021). Trade and growth in developing countries: the role of export composition, import composition and export diversification. *Economic Change and Restructuring*, *54*(4), 919-941.

Cervellati, M., & Sunde, U. (2011). Life expectancy and economic growth: the role of the demographic transition. *Journal of economic growth*, *16*, 99-133.

Chishimba, S. (2024). ETD: *The impact of household energy access on socio-economic outcomes in Zambia*. Doctoral Dissertation. University of Cape Town

Chitumbo, S. B. (2016). *Causality analysis between electricity consumption and economic growth: Evidence from Zambia* (Master dissertation, University of Zambia).

Easterlin, R. A., & O'Connor, K. J. (2022). The easterlin paradox. In *Handbook of labor, human resources and population economics* (pp. 1-25). Cham: Springer International Publishing.

Ekane, D. (2013). *Fertility trends in sub–Saharan Africa*. Stockholm University, Faculty of Social Sciences, Department of Social Work.

Farahane, M., & Heshmati, A. (2020). Trade and economic growth: Theories and evidence from the Southern African Development Community. IZA Discussion Paper No. 13679, Available at SSRN: https://ssrn.com/abstract=3691392 or http://dx.doi.org/10.2139/ssrn.3691392

Grabowski, R., & Self, S. (2021). Manufacturing in Africa: an example from Zambia. *African Journal of Economic and Sustainable Development*, *8*(1), 18-34. https://doi.org/10.1504/AJESD.2021.112528

Haanyika, C. M. (2008). Rural electrification in Zambia: A policy and institutional analysis. *Energy policy*, *36*(3), 1044-1058.https://doi.org/10.1016/j.enpol.2007.10.031

Haraguchi, N., Cheng, C. F. C., & Smeets, E. (2017). The importance of manufacturing in economic development: has this changed? *World Development*, *93*, 293-315. https://doi.org/10.1016/j.worlddev.2016.12.013

He, L., & Li, N. (2020). The linkages between life expectancy and economic growth: some new evidence. *Empirical Economics*, *58*(5), 2381-2402.

Jambo, H. L., & Sundjo, F. (2021). An empirical investigation into the benefits of regional integration from COMESA for Zambia. *Int J Econ Policy*, *1*(1), 14-41.

Johnson, D. G. (1997). Agriculture and the Wealth of Nations. *The American economic review*, *87*(2), 1-12.

Kannan, S., Bessette, D., & Makai, L. (2024). Electricity access empowers women through expansion of economic, physical, and mental spaces in Zambia. *Energy Research & Social Science*, *116*, 103687.https://doi.org/10.1016/j.erss.2024.103687

Karra, M., Canning, D., & Wilde, J. (2017). The effect of fertility decline on economic growth in Africa: A macrosimulation model. *Population and development review*, *43*, 237-263.

Katongo, C., Phiri, H., & Kefi, A. S. (2024). The Fisheries and Aquaculture Subsector in Zambia. *The Oxford Handbook of the Zambian Economy*, 404.

Kunze, L. (2014). Life expectancy and economic growth. *Journal of Macroeconomics*, *39*, 54-65. https://doi.org/10.1016/j.jmacro.2013.12.004

Lutz, W., Crespo Cuaresma, J., Kebede, E., Prskawetz, A., Sanderson, W. C., & Striessnig, E. (2019). Education rather than age structure brings demographic dividend. *Proceedings of the National Academy of Sciences*, *116*(26), 12798-12803.https://doi.org/10.1073/pnas.1820362116

Marconi, N., de Borja Reis, C. F., & De Araujo, E. C. (2016). Manufacturing and economic development: The actuality of Kaldor's first and second laws. *Structural Change and Economic Dynamics*, *37*, 75-89. https://doi.org/10.1016/j.strueco.2015.12.002

Matthew, O. A., Ede, C. U., Osabohien, R., Ejemeyovwi, J., Fasina, F. F., & Akinpelumi, D. (2018). Electricity consumption and human capital development in Nigeria: Exploring the implications for economic growth. *International Journal of Energy Economics and Policy*, *8*(6), 8-15.

Mberu, B. U., & Ezeh, A. C. (2017). The population factor and economic growth and development in Sub-Saharan African countries. *African Population Studies*, *31*(2). DOI: https://doi.org/10.11564/31-2-1056

Mella, P. (2012). Clustering in the global economy. The Combinatory Systems pproach. *Economia Aziendale Online*, (3), 1-22. DOI: http://dx.doi.org/10.13132/2038-5498/2003.3.1-22

Meoqui, J. M. (2023). The demystification of David Ricardo's famous four numbers. *Journal of the History of Economic Thought*, *45*(3), 447-466.

Morales Meoqui, J. (2021). The Astonishing Conclusion of the Attribution Debate on the Law of Comparative Advantage. *Available at SSRN 3758474*.

Moyo, B. (2024). Impact of SADC Free Trade Area on Southern Africa's Intra-Trade Performance: Implications for the African Continental Free Trade Area. *Foreign Trade Review*, *59*(1), 146-180.DOI: 10.1177/00157325231184669

Moyo, C., & Jeke, L. (2019). Manufacturing sector and economic growth: A panel study of selected African countries. *J. Bus. Econ. Review*, *4*(3), 114-130.

Musibau, H. O., Mahmood, S., Ismail, S., Haruna, M. A., & Khan, M. U. (2019). Electricity availability, human capital investment and sustainable economic growth causality in Sub Sahara Africa: revisited evidences. *International Journal of Energy Economics and Policy*, *9*(6), 222-233.

Ndulo, M., & Chanda, J. (2016). *Services and Sustainable Growth in Zambia*. Southern African Institute for Policy and Research (SAIPAR) Discussion Paper Series, Discussion Paper 2016, 2.

Ngangue, N., & Manfred, K. (2015). The impact of life expectancy on economic growth in developing countries. *Asian Economic and Financial Review*, *5*(4), 653.

Nyoni, S. P., Chihoho, T. A., & Nyoni, T. (2021). Time Series Forecasting of Total Fertility Rate (TFR) in Zambia. *International Research Journal of Innovations in Engineering and Technology*, *5*(8), 437.

Ogunjobi, J. O., Eseyin, O., & Popoola, O. (2021). Human capital and energy infrastructure: Implications for economic growth in Nigeria. *International Journal of Energy Economics and Policy*, *11*(3), 149-154.

Okyere, I., & Jilu, L. (2020). The impact of export and import to economic growth of Ghana. *European Journal of Business and Management*, *12*(21), 130-138.

Omoke, P. C., & Opuala–Charles, S. (2021). Trade openness and economic growth nexus: Exploring the role of institutional quality in Nigeria. *Cogent Economics & Finance*, *9*(1), 1868686.

Peter, A., & Bakari, I. (2018). Impact of population growth on economic growth in Africa: A dynamic panel data approach (1980-2015). *Pakistan Journal of Humanities and Social Science*, *6*(4), 412-427.

Raghutla, C. (2020). The effect of trade openness on economic growth: Some empirical evidence from emerging market economies. *Journal of Public Affairs*, *20*(3), e2081.

Sanchez, P. A., Buresh, R. J., & Leakey, R. R. (1997). Trees, soils, and food security. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, *352*(1356), 949-961.

Sarkodie, S. A., & Adams, S. (2020). Electricity access, human development index, governance and income inequality in Sub-Saharan Africa. *Energy Reports*, *6*, 455-466. https://doi.org/10.1016/j.egyr.2020.02.009

Sepashvili, E. (2020). Digital chain of contemporary global economy: e-commerce through e-banking and e-signature. *Economia Aziendale Online*, *11*(3), 239-249. DOI: http://dx.doi.org/10.13132/2038-5498/11.3.239-249

Shahbaz, M., Shafiullah, M., & Mahalik, M. K. (2019). The dynamics of financial development, globalisation, economic growth and life expectancy in sub-Saharan Africa. *Australian Economic Papers*, *58*(4), 444-479.https://doi.org/10.1111/1467-8454.12163

Shishkina, E. A., Surnina, N. M., & Dyachkov, A. G. (2021). The Study of Accessibility Indicators of Electricity Infrastructure of the Region in the Aspect of Sustainable Development Theory. In *Industry Competitiveness: Digitalization, Management, and Integration: Volume 2* (pp. 716-725). Springer International Publishing.

Szirmai, A. (2013). Manufacturing and economic development. *Pathways to industrialization in the twenty-first century: New challenges and emerging paradigms*, 53-75.

Thomas, M. D. (1975). Growth pole theory, technological change, and regional economic growth. Papers in Regional Science, 34(1), 3-25.

Tivatyi, K. S., Shou, J. M., & N'Souvi, K. (2022). Study on import and export-led economic growth: Cases of Botswana, Namibia, South Africa, and Zimbabwe in Southern Africa. *Open Journal of Business and Management*, *10*(2), 670-700.

Weir, D. R. (1991). Malthus's theory of population. In *The World of Economics* (pp. 401-406). London: Palgrave Macmillan UK.

World Bank (2024). *World Bank Open Data*. Retrieved from https://data.worldbank.org/

Yangailo, T. & Chambani, T. (2023). The Impact of Industrialisation on Zambia's Economic Growth. *JDE (Journal of Developing Economies), 8*(1), 153-161. https://doi.org/10.20473/jde.v8i1.43514

Zhang, T., Shi, X., Zhang, D., & Xiao, J. (2019). Socio-economic development and electricity access in developing economies: A long-run model averaging approach. *Energy Policy*, *132*, 223-231.https://doi.org/10.1016/j.enpol.2019.05.031

APPENDIX

Data on Zambia *(Source: Compiled from World Bank Database)*

Year	Imports of goods and services (% of GDP)	Exports of goods and services (% of GDP)	Agriculture, forestry, and fishing, value added (% of GDP)	Manufacturing, value added (% of GDP)	Population, total	Services, value added (% of GDP)	Access to electricity (% of population)	GDP (current US$, Million)	Fertility rate, total (births per woman)	GDP growth (annual %)	Life expectancy at birth, total (years)
1994	33.70	32.95	11.83	9.09	8,474,216.00	38.05	14.94	3,656.81	6.27	- 8.63	45.85
1995	36.33	32.90	14.09	9.18	8,684,135.00	39.65	15.67	3,806.98	6.24	2.90	45.55
1996	35.34	28.48	13.30	10.92	8,902,019.00	41.54	17.30	3,597.22	6.18	6.22	45.23
1997	30.90	27.37	13.98	10.79	9,133,156.00	41.47	17.11	4,303.29	6.12	3.81	44.95
1998	31.63	24.62	15.87	10.77	9,372,430.00	44.85	19.00	3,537.74	6.05	- 0.39	44.70
1999	34.73	25.04	18.19	10.21	9,621,238.00	47.50	18.54	3,404.28	5.99	4.65	44.66
2000	36.46	23.92	16.15	9.45	9,891,136.00	48.96	16.70	3,600.63	5.93	3.90	45.23
2001	39.56	25.11	15.53	9.08	10,191,964.00	49.10	20.20	4,094.44	5.86	5.32	46.02
2002	37.78	27.13	15.36	9.59	10,508,294.00	49.72	17.40	4,193.85	5.79	4.51	46.98
2003	36.63	25.68	15.62	10.15	10,837,973.00	49.72	18.50	4,901.87	5.73	6.94	48.28
2004	37.27	33.54	15.58	10.07	11,188,040.00	48.81	20.30	6,221.11	5.72	7.03	49.49
2005	31.59	30.61	14.59	9.84	11,564,870.00	48.96	23.30	8,331.87	5.71	7.24	50.66
2006	25.26	32.59	13.21	9.41	11,971,567.00	47.52	24.10	12,756.86	5.69	7.90	51.80
2007	32.18	33.59	12.11	8.68	12,402,073.00	47.45	18.50	14,056.96	5.61	8.35	52.74
2008	30.54	28.92	11.45	8.45	12,852,966.00	49.03	25.70	17,910.86	5.54	7.77	53.95
2009	26.87	29.25	11.55	8.68	13,318,087.00	51.55	26.60	15,328.34	5.45	9.22	55.30
2010	30.87	37.03	9.42	7.58	13,792,086.00	52.81	22.00	20,265.56	5.36	10.30	56.80
2011	35.74	40.47	9.65	7.52	14,265,814.00	50.39	28.30	23,459.52	5.27	5.57	57.77
2012	39.02	40.08	9.32	7.08	14,744,658.00	53.19	29.20	25,503.06	5.15	7.60	58.87
2013	39.97	40.48	8.23	6.02	15,234,976.00	53.14	30.10	28,037.24	5.03	5.06	59.88
2014	37.37	38.82	6.78	6.82	15,737,793.00	53.51	27.90	27,141.02	4.90	4.69	60.70
2015	42.73	37.14	4.98	7.52	16,248,230.00	56.22	31.10	21,251.22	4.79	2.92	61.21
2016	38.63	35.32	6.23	7.69	16,767,761.00	54.18	35.40	20,958.41	4.71	3.76	61.79
2017	36.59	34.99	4.02	8.13	17,298,054.00	52.09	40.30	25,873.60	4.61	3.53	62.12
2018	36.93	37.96	3.34	6.85	17,835,893.00	54.24	40.20	26,311.51	4.54	4.03	62.34
2019	34.16	34.64	2.86	6.79	18,380,477.00	54.60	43.00	23,308.67	4.45	1.44	62.79
2020	32.49	46.72	2.97	7.70	18,927,715.00	53.69	44.60	18,137.76	4.38	- 2.79	62.38
2021	33.99	52.22	3.00	8.67	19,473,125.00	50.94	46.70	22,096.42	4.31	6.23	61.22
2022	29.10	40.19	3.09	8.00	20,017,675.00	55.53	47.80	29,163.78	4.24	5.25	61.80
2023	39.11	40.78	2.79	8.30	20,569,737.00	54.94	-	28,162.63	-	5.83	-