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## The Influence of AI and the Pandemic on BRICS Nations: South Africa's Economic Performance During Crisis

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### Abstract

The fourth industrial revolution (4IR) and the COVID-19 pandemic have profoundly influenced global trade dynamics and e-commerce activities. This study examines the impact of the restrictions imposed by COVID-19 alongside the opportunities created by artificial intelligence (AI) technologies under 4IR in the economies of the BRICS nations, with a specific focus on South Africa (SA). A performance assessment is conducted using non-positivist multi-criteria decision-making methods. South Africa's performance is compared with data from the public and private sectors in BRICS countries, considering factors such as rising unemployment and the growth of e-commerce, through a purposeful criterion selection framework. The integration of AI has not only maintained commercial flow but also enhanced sustainability and competitiveness during the pandemic. As economic activity slowed due to COVID-19, the pandemic simultaneously accelerated the adoption of e-commerce platforms as countries moved towards digital solutions. The South African analysis emphasizes the importance of science, technology, engineering, and mathematics (STEM), as well as trade relations in the context of the 4IR. South African businesses are advised to invest in developing effective e-commerce strategies. The study also highlights issues such as inadequate infrastructure and limited access to digital resources, which have hindered the e-commerce sector during the pandemic.

**Keywords:** COVID-19, International trade, Industry 4.0, BRICS, South Africa

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### Introduction

The COVID-19 pandemic has presented a significant challenge to businesses, especially those that were unable to quickly adapt to Industry 4.0 technologies. Those who failed to embrace these technological advancements risked failure because of the restrictions imposed during the pandemic. Industry 4.0, by introducing new technological frameworks, has reshaped traditional business models, demanding new skill sets and approaches. The changes required to meet this new paradigm have affected both societal norms and economic operations.

However, the impact of COVID-19 has expedited this transition. Artificial intelligence (AI) applications, as part of the Industry 4.0 revolution, had already begun being implemented before the virus spread to South Africa in early 2020. The pandemic further accelerated this technological shift.

Businesses and governments are now focused on how the post-pandemic world will operate, with strategies being developed for the "new normal." The research conducted in this study evaluates various criteria within the BRICS countries, specifically South Africa. These findings aim to help national governments make more accurate projections regarding the current and future economic conditions in these nations, which are recognized as rising global powers.



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### *Background for the problem and purpose of the study*

The BRICS group, which emerged as a prominent alliance of emerging economic powers, has brought new perspectives to the global economy, especially after the decline in dominance of developed nations and the USA. This group includes significant Asian economies that have become global production hubs, as well as developing nations that weathered the 2009 financial crisis with comparatively less damage than their developed counterparts.

The COVID-19 restrictions have caused economic disruptions across regions and sectors, with noticeable disparities in the way these impacts have been felt. This study aims to analyze these differences and provide insights into how businesses, particularly in BRICS countries like South Africa, can better prepare for future economic challenges.

### *Literature review*

#### *The fourth industrial revolution (4IR) and developments in skills*

As the integration of AI and robotic technologies into business operations continues under Industry 4.0, the shift towards digitalization has become essential, especially during pandemic-related restrictions. Industry 5.0, which emphasizes research, innovation, and the long-term contribution of technology to humanity on a global scale, presents a distinct focus [1].

Industry 5.0 is characterized by community-driven, unmanned technologies, where robots can quickly learn diverse information and work styles, thereby enhancing productivity and sales. These robots can operate continuously, helping businesses reduce costs and improve efficiency [2]. This marks a transition towards an even more advanced phase of industrial development.

#### *Views on change in member states of BRICS*

BRICS nations play a vital role in global production, constituting a significant share of the world's output and forming one of the largest markets globally [3]. The performance of these countries is heavily influenced by the demands and preferences of other nations [4]. Despite the diversity in the economic and social structures of BRICS countries, they share commonalities in their economic growth, largely driven by increased international trade and foreign direct investment [5].

While the BRICS nations differ in their economic structures, with each country's economy predominantly relying on different sectors, they generally depend on the primary sectors and foreign investments [6]. The economies of these nations are primarily export-driven. For instance, Russia's and Brazil's exports are dominated by petroleum and natural gas, benefiting from rising prices in recent years, which have supported their economic growth. South Africa also shares similar growth patterns. Conversely, China, with its large population, focuses on the manufacturing sector, while India focuses on services, leveraging low-cost labor to increase their market share [7, 8].

BRICS countries engage in international trade based on the resources they possess, whether labor-intensive or natural resource-based. Countries with similar per capita income levels often have similar needs and preferences, making trade among them more likely [9]. It is projected that China will dominate the global manufacturing sector, India will lead in services, and Russia and Brazil will continue to be key players in natural gas, energy, and raw materials [10].

In terms of South Africa, the country's exports significantly dropped by over 50% between March and April 2020, but by the end of May, exports reached the levels seen in March, though still 8% below May 2019 levels. The country primarily exports semi-finished gold, iron, coal, and other ores, with a substantial decline in these exports as a result of the pandemic's spread [11].

Looking toward the future, BRICS member countries are expected to become increasingly influential in the global economy, with their collective strength projected to grow significantly by 2050 [12].

#### *Views on change in South Africa*

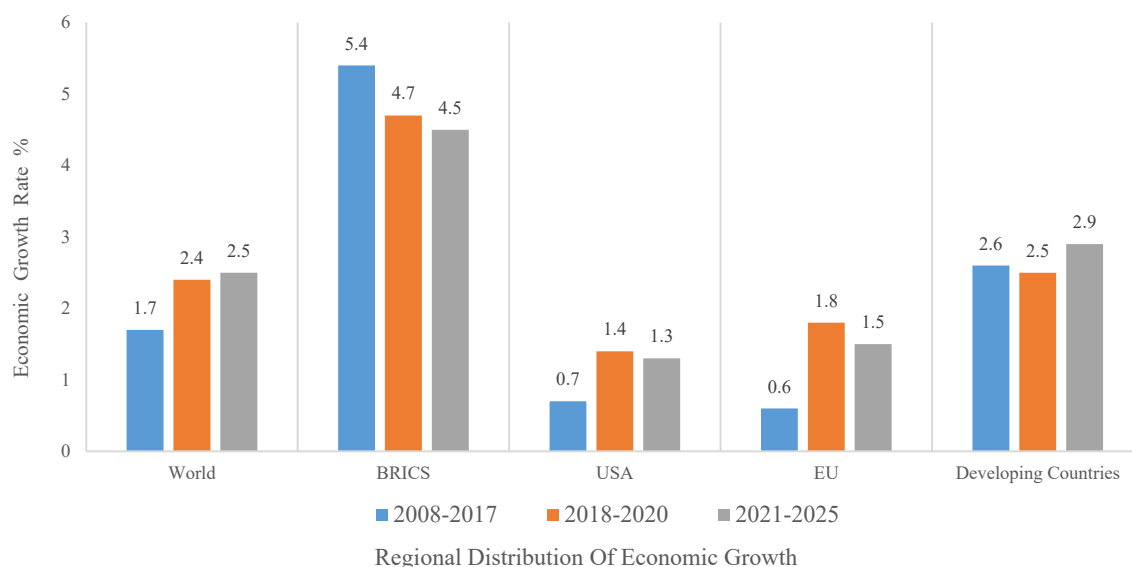
BRICS, initially an economic alliance of Brazil, Russia, India, and China, was later expanded to include South Africa in 2010, forming the acronym BRICS [13]. The Republic of South Africa's increasing reliance on the "New Development Bank" (NDB), established under the BRICS cooperation framework, highlights its growing significance in the global economic governance system, especially through equal voting rights within the bank [14]. South Africa has historically not been one of the pioneers of the industrial revolutions but has gradually integrated into the global industrial processes, particularly during the 4IR. While rural areas still reflect traditional lifestyles, urban areas have seen a growing number of universities, and technology research centers, specializing in technological advancement, and an increase in contributions to international technological organizations [15].

In examining South Africa's creative industries, it is evident that these sectors primarily benefit the high- and middle-income groups in urban areas, especially in cities with significant white populations. This has led to criticisms regarding the socio-economic inequalities perpetuated by these industries [16, 17]. The outbreak of COVID-19 in Africa revealed the deep economic challenges faced by the continent. Even high-income countries struggled with supply chain disruptions and

shortages of medical equipment, underscoring the need for greater cooperation among African nations to navigate such global crises [18].

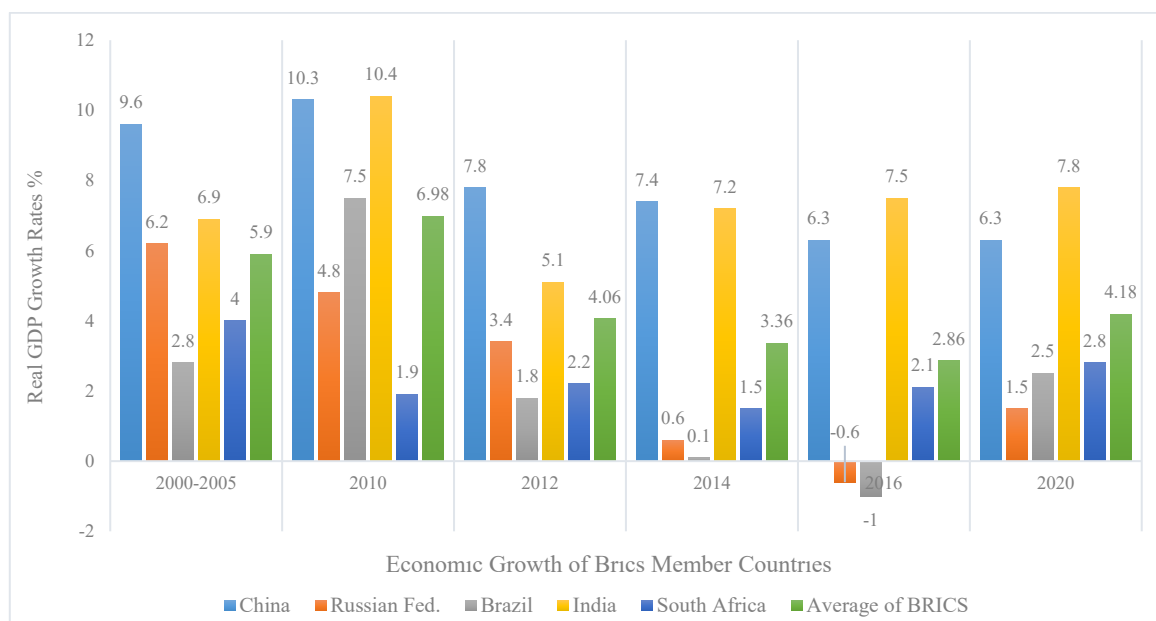
### Indicators of economic development of BRICS member states

The BRICS coalition has emerged as a significant economic force in the global arena, showing notable progress in various sectors. In comparison to other global economic blocs, BRICS has demonstrated a greater inclination for cooperation, supported by impressive economic growth rates [19]. BRICS countries collectively outperformed other regions in economic growth, registering a 5.4% growth rate from 2008 to 2017, a stark contrast to the 0.7% growth rate in the USA and 0.6% in the EU. This trend has continued during the COVID-19 pandemic, with BRICS nations maintaining robust growth despite global challenges. Forecasts suggest that BRICS will continue to perform at or above the global average from 2021 to 2025 (**Figure 1**). During past global crises, such as the 2009 and 2020 economic downturns, the BRICS group proved to be resilient, showcasing the best economic performance among global regions [20].



**Figure 1.** Comparison of economic growth (%) [20]

Evaluations conducted by various countries indicate a positive trend in economic growth over the years, driven by factors such as capital, production, employment, and income growth [21]. According to IMF analyses focusing on BRICS nations, the impacts of the COVID-19 crisis have varied significantly across member countries. In China, which has been known for its high GDP growth since the 2000s, there was a noticeable decline in 2020, with the COVID-19 outbreak in Wuhan playing a key role in this downturn. India also experienced a decline in growth due to the pandemic, yet it managed to achieve a higher real GDP growth rate compared to the other BRICS countries. Russia and Brazil showed positive growth trends, while South Africa demonstrated continuous growth, emerging as the second-best performer after India, with a growth rate of 2.8% in 2020 (**Figure 2**).



**Figure 2.** Real GDP growth in BRICS [22]

The development of AI and robotic technology infrastructure by countries and businesses has become increasingly important in the context of the pandemic, which has impacted the entire world. This shift aligns with the progress of the 4IR, during a period when borders were closed, remote training and working practices were implemented, physical workspaces decreased, and e-commerce became essential to meet basic needs. For businesses, distinguishing their products and services from competitors and expanding their offerings has become a key competitive strategy. It is expected that, under and after the pandemic conditions, there will be a focus on growing the labor force to enhance the adoption of new technologies, to meet the demands of BRICS countries and businesses both domestically and internationally. The presence of a large trade volume and global economic influence from a BRICS member country like China is anticipated to positively affect the economies of other developing countries within the group.

## Materials and Methods

The study utilized purposeful sampling, specifically focusing on data obtained from public and private sectors in South Africa and the other BRICS nations, to evaluate the economic impact of COVID-19. The analysis applied a “Multi-Criteria Decision-Making Method” to assess the key indicators in these countries.

The following criteria were considered for BRICS nations:

- Unemployment rates in the period between 2010 and 2020,
- E-commerce sales trends from 2017 to 2023,
- GDP growth trajectories from 2010 to 2021.

For South Africa, additional specific data was incorporated:

- Quarterly and annual GDP growth rates from Q1 2010 to Q4 2020,
- Unemployment trends and labor force participation from Q1 2010 to Q4 2020,
- The volume of foreign travelers visiting South Africa from 2018 to 2021,
- The development of e-commerce usage in South Africa during 2019 and 2020. Also examined were the shifts in sectors impacted by e-commerce during the pandemic.

The primary aim was to assess the varying effects of the COVID-19 pandemic on the BRICS nations, with a particular focus on South Africa. A comparison of how the pandemic influenced these countries economically was conducted.

This analysis emphasizes the trends observed in economic factors, specifically GDP and e-commerce data, across the BRICS countries, highlighting significant changes induced by the COVID-19 crisis.

## Results and Discussion

### *Findings from the analysis*

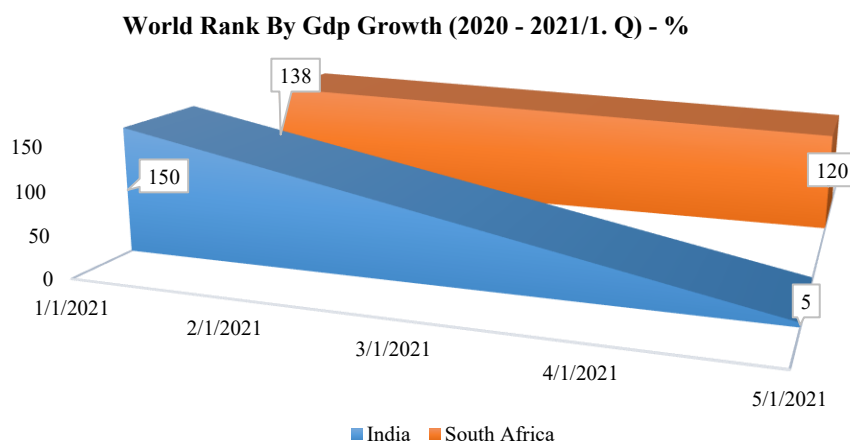
For the global GDP rankings in 2020:

- China > Russia > Brazil > South Africa > India

However, the first quarter of 2021 saw a notable shift:

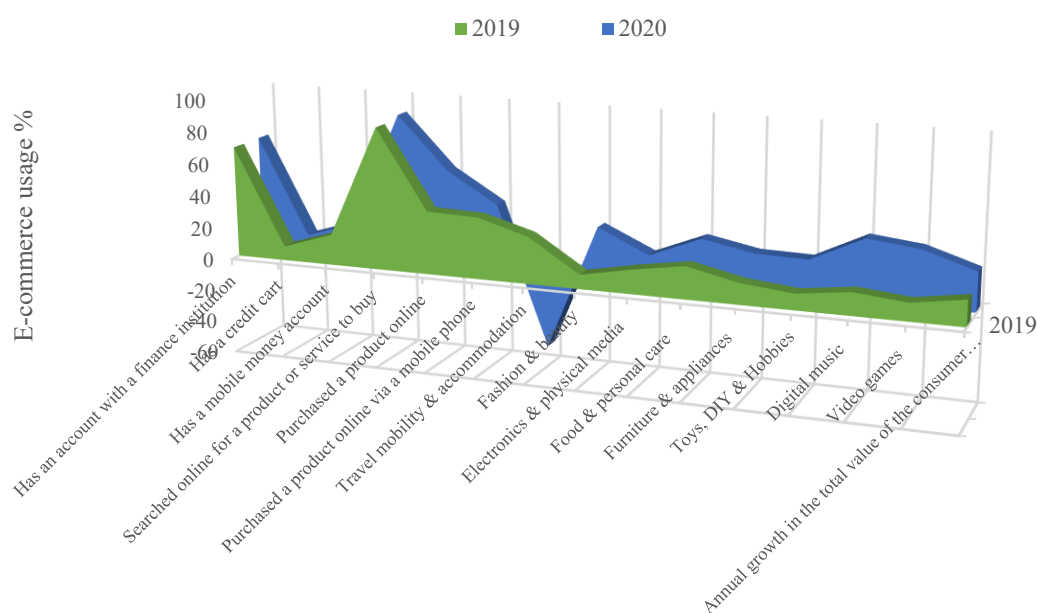
- India > China > Russia > Brazil > South Africa

India exhibited the most substantial improvement, rising from 150th place in 2020 to 5th place in Q1 2021. South Africa also showed a positive trend, improving from 138th place in 2020 to 120th place in Q1 2021 amid the pandemic (**Figure 3**).



**Figure 3.** GDP growth of India and South Africa – 2020-2021/ 1. Q

The examination of e-commerce trends in South Africa during 2019 and 2020 reveals noticeable shifts in consumer behavior, despite the overall continued reliance on digital platforms. Although there was no dramatic change in the general adoption of e-commerce, certain sectors experienced significant fluctuations. In particular, demand decreased for sectors such as travel, electronics, physical media, and non-essential hobbies. Conversely, there was a sharp increase in the demand for essential items, especially food, as well as entertainment products, such as video games and music, which became key forms of leisure during the quarantine period. The changes in e-commerce usage between 2019 and 2020 in South Africa are visually represented in **Figure 4**.



**Figure 4.** E-commerce use of South Africa (2019-2020)

#### *Changes experienced by the Republic of South Africa*

- **GDP trends:** South Africa's GDP growth in 2020 showed an unprecedented decline, dropping from a modest 1% in 2019 to a drastic -17.1%, marking the steepest decrease in recent history, surpassing even the effects of the 2009 global financial crisis.

- *Unemployment rates:* The country faced an alarming rise in unemployment during the pandemic. While unemployment was already high in previous years, it escalated sharply from 23.3% in Q2 2020 to 30.8% in Q3 and reached 32.5% by Q4 due to the COVID-19 crisis.
- *Foreign trade:* South Africa's foreign trade saw an increase in 2020, though its recovery from the pandemic lagged behind countries like China, the USA, and those in the EU, which experienced earlier impacts from the global outbreak.
- *Inflation rates:* South Africa's inflation rate, which had been stable at 2% in 2019, began to rise in early 2020. By mid-year, the inflation rate reached 3%, and by the last quarter, it surged to 4.4%, reflecting the economic pressures of the pandemic.
- *Tourism decline:* Tourism was hit particularly hard, with an 87.5% decline in activities during 2020, continuing into the first quarter of 2021, as border closures and pandemic restrictions were enforced, mirroring trends seen globally.
- *E-commerce shifts:* Despite the overall digital adoption remaining steady, e-commerce usage saw notable shifts. While demand for travel, electronics, and physical media decreased, there was a sharp rise in the need for essential items like food and entertainment products such as music and video games during the lockdown period.
- *Unemployment comparison with BRICS countries:* A comparison of unemployment trends in South Africa and other BRICS nations indicates that all countries within the group faced increased unemployment due to the pandemic. Future differences in recovery will likely depend on the policy measures taken by individual national governments to mitigate the pandemic's effects.

### Solution

The varied responses of national governments to the COVID-19 pandemic's economic fallout will significantly impact the recovery process. However, it is expected that increased cooperation within the BRICS framework will have positive effects on the member countries' economies. South Africa, as a representative of the southern African region, stands to benefit from its position within this coalition, especially with China's economic strength and influence potentially contributing positively to the region's economic recovery, much as it will benefit other BRICS member states.

In terms of unemployment, which is one of the most significant criteria assessed in this study, the onset of the COVID-19 pandemic led to a sharp reduction in the number of workers as national lockdowns were implemented. Most of the workforce that remained active consisted primarily of essential workers [23, 24]. A portion of the workforce shifted to remote work, while others saw their working hours reduced. Interestingly, the proportion of people working from home declined from 10.9% in the third quarter to 8% in the fourth quarter of 2020, with some even dropping to 0% as lockdown restrictions were eased. This shift likely resulted from the gradual relaxation of lockdown measures toward the end of the year. Additionally, while the number of people working fewer than 15 hours per week declined, those working 15 hours or more saw an increase. These trends underscore the dynamic relationship between labor participation and the pandemic's severity. Despite an increase in unemployment, the labor participation rate rose, largely due to the adaptation policies introduced to cope with the pandemic's impact.

In China, which was the epicenter of the Coronavirus outbreak, the unemployment rate in urban areas was around 3.6% in 2019. However, due to COVID-19, this rate rose to 4.2% in 2020. Despite this rise, projections from the International Monetary Fund (IMF) suggest that the unemployment rate will return to below 4% in 2021 as the pandemic's effects diminish. Russia, which had been experiencing a steady decline in its unemployment rate since the 2000s, saw a sharp increase during the 2009 global financial crisis. However, despite the impact of COVID-19, the Russian economy has managed to maintain its trend of decreasing unemployment. Russia's economy, largely focused on services and industry, continues to recover, buoyed by governmental policies aimed at sustaining growth.

In Brazil, the unemployment rate spiked to 11.97% in 2020. However, the country's recent economic growth has contributed to a significant recovery in the unemployment figures, even in the face of the pandemic's challenges.

India, one of the fastest-growing economies in the world and a leading member of the G-20 and BRICS, showed resilience during the COVID-19 crisis. Unlike other developing nations in the BRICS group, India did not experience the same level of negative economic impact as many others did during the 2009 crisis.

South Africa, which joined the BRICS group later than other members, faced more severe consequences from COVID-19. However, the country entered a recovery phase more swiftly than expected, signaling a rapid adaptation to the changing global economic landscape.

### Conclusion

This study was motivated primarily by South Africa's strategic location, its notable economic performance, and its status as a member of the BRICS group. A secondary motivation stemmed from Turkey's expressed interest in joining this influential cooperation mechanism, which was highlighted before the BRICS summit in Johannesburg in 2018.



The criteria selected for this study were critical in creating an objective scale to measure South Africa's economic potential and to compare it with other BRICS countries. A comprehensive framework was established by adding criteria that reflect the developmental capacities of the countries, contributing to the understanding of the global pandemic's impact on economic outcomes.

The study underscores the significance of international cooperation, especially for national governments preparing for the post-pandemic era. It highlights the need to focus on technological advancements anticipated with Industry 5.0 and Industry 6.0. The research successfully contributed to forecasting the potential for increasing South Africa's economic strength in the coming years, underlining the importance of its BRICS membership in this process.

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**Ethics statement:** None

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