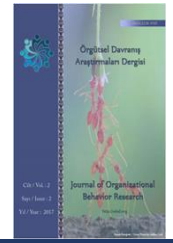




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## THE IMPACTS OF ARTIFICIAL INTELLIGENCE AND COVID-19 ON BRICS AND PERFORMANCE ANALYSIS OF SOUTH-AFRICAN REPUBLIC

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### ABSTRACT

*Fourth Industrial Revolution (4IR) and Coronavirus Pandemic (COVID-19) have affected the international trade environment and e-commerce activities in the world. This article describes the effect of the restrictions caused by COVID-19 and facilities provided by the Artificial Intelligence (AI) applications within the scope of 4<sup>th</sup> Industrial Revolution (4IR) in the economy of BRICS member countries and South Africa (SA). A performance evaluation was performed with the non-positivist multi-criteria decision-making techniques. SA performance is analyzed by comparing the data announced by the public and private authorities of BRICS member countries due to the unemployment and e-commerce increase monitored in the global perspective by using a purposeful criterion selection design. The importance of AI and its online use provided not only the stream of the commercial activities but also promoted the sustainability in the operations and contributed to increase the competitive power due to the restrictions increased by the pandemic. While the restriction of the economic activities was increasing its speed due to COVID-19, it accelerated the growth of the e-commerce platforms in the phase of transition to the digital. As the result of the South Africa analysis; since the science, technology, engineering and mathematics, national and international trade relations are an integral part of the modules related with 4IR, South African businesses should pay attention to develop an e-commerce model. Problems like infrastructure insufficiency in access to electronic devices, data and internet brought the difficulties experienced in e-commerce applications into the forefront in the process of COVID-19 restrictions.*

**Keywords:** International trade, COVID-19, Industry 4.0, BRICS, SA Republic.

### INTRODUCTION

Businesses have faced the threat of failure to provide adequate service due to the restrictions applied with the effect of COVID-19 if they could not adapt to Industry 4.0 both in the country and in the global trade environment during the pandemic process that is currently experienced. Industry 4.0 has already initiated a new work environment containing the use of technology for abandoning the traditional applications by rendering new work models which utilize different obligatory skill sets. Necessary alterations have been made to equip in such a way that will cover the demands in the process of leading to great changes in the society and economic activities.

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However, the effect of COVID-19 accelerated this process. Likewise, the use of artificial intelligence applications has started within the scope of the new technologies together with Industry 4.0 before the spreading of the Coronavirus epidemic to South Africa in the early months of 2020 and this process has gained speed under the pandemic conditions.

The national governments and businesses are taking into consideration how the business environment will continue in a post-pandemic world and planning their future strategies according to the process called “new normal”. The findings obtained as a result of the research intended to the evaluation of various criteria applied within the scope of this study will contribute to the national government in the establishment of the most accurate forecasts about today and future of the selected economic criteria in the countries of BRICS group recognized as a new rising power and particularly in the Republic of South Africa.

#### *Background for the Problem and Purpose of the Study*

BRICS cooperation group that is standing out among the new rising economic powers after the recession of the hegemony of the developed countries and USA in the economic field of the world has started to bring new approaches to the world economy. In this regard, both Asian countries which became important production centers of the world and the developing countries which overcame the last 2009 financial crisis with fewer losses compared with the developed countries have played a role. While COVID-19 restrictions are bringing the activities to a standstill, differences are observed from the aspect of the regions and sectors.

#### *Literature Research*

#### *The Fourth Industrial Revolution and Developments in Skills*

As the use of artificial intelligence and robotic technologies has been moved to the business fields with Industry 4.0, the running of the work has started to increase compulsorily particularly in the process of pandemic restrictions and focused on digitalization and artificial-intelligence-aided technologies. Industry 5.0 provides a different focus and emphasizes the importance of research and innovation for supporting the industry in the long-term service of humanity on a global scale (European Commission, 2021).

Industry 5.0 is shortly summarized as community-oriented unmanned technologies in terms of the future. The use of robots which can learn all kinds of information and style of working, apply what they learned quickly, increase the production and sales capacities of the companies and focus on lowering the costs and increasing productivity by working uninterruptedly underlies Industry 5.0 (ST Industry, 2021).

#### *Views on Change in Member States of BRICS*

BRICS countries are performing an important fraction of the world’s total production for creating the most important market of the world (Ayar, 2014). Covering the need, requests, and preferences of other countries is influential on the performance of the group members (Sholokhova, 2020). While the social and economic structures of the BRICS-member countries are so different, they show similar characteristics in terms of increase in their economic growth depending on the rising rates of their international trade and direct foreign investments (Piper, 2015). BRICS countries have economic structures based on different sectors; however, their



economies generally rely on primary sectors and foreign investments (Chiu *et al.*, 2014). Whereas the economies of the member countries differ from each other, they are generally based on exportation. Petroleum and natural gas constitute more than half of the exportation of Russia and the increasing prices of these products in the recent ten years contribute into the development of Russia, Brazil and South Africa. On the other hand, among the countries having the highest population, China is striving in the manufacturing sector and India is striving in the service sector for increasing their shares by lowering the costs using the cheap labor facilities (Bal *et al.*, 2014).

BRICS member countries participate in the international trade by engaging in foreign trade with the sources they had, if they engage in labor-weighted production, the exportation consisted of these products; if they engage in a production based on natural sources they had, the exportation is consists of these products (Barbosa, 2020). If it is considered that the character of the countries having similar per capita income levels is directly associated with having similar requests and preferences, if the countries have a per capita income at the same level, it is foreseen that it can be engaged in more international trade between them (Saygili & Manavgat, 2014). It is estimated that China will be a leading global actor in the manufacturing sector, India in service, and Russia and Brazil in the energy, natural gas and raw material sector (Wilson & Purushothaman, 2003). The world exportation of South Africa decreased more than half between March and April 2020, however, the exportation reached the levels of March 2020 at the end of May. Besides, the exportation of May 2020 still realized eight percent lower than the exportation of May 2019. The exportation products of South Africa are generally semi-finished gold, coal, iron and other ores, the exportation of these products decreased more than half with the spreading of COVID-19 in the region (Wiljoen, 2020). It is expected that BRICS member countries will be influential and much stronger countries over the world economy until 2050 (Guney, 2017).

#### *Views on Change in South Africa*

BRIC cooperation that is defined as the rising power in the economic circles and founded by Brazil, Russia, India, and China, of the developing countries, and constituted of initials of these countries is defined by O'Neill (2001) and started to be mentioned as BRICS with the participation of the Republic of South Africa into the group in 2010. The reliance of the Republic of South Africa on “New Participation Bank” founded by BRICS cooperation mechanism recently is quite high and supports the importance of having equal voting right in the system of government (Battal & Akan, 2019). The Republic of South Africa was never ranked among those which experienced each industrial revolution as from its beginning and those which were included later more or less in the process of the first three revolutions. Although the practices reflecting the lifestyle of long previous years in rural sides are still existing, the number of technology research centers, universities pursuing the technology and those working in the innovation field, and those contributing to international bodies technologically are increasing (AFAM, 2020).

Once the contributions of creative industries into the development and the inequalities they reproduced are searched in South Africa, it is emphasized that the economic contribution and employment facilities provided by the creative industries are largely for high-, middle- and upper-income classes and rise above the discriminative socio-economic structures in big cities where whites are heavily living (Erkmen & Arı, 2018). Once the spreading of COVID-19 in

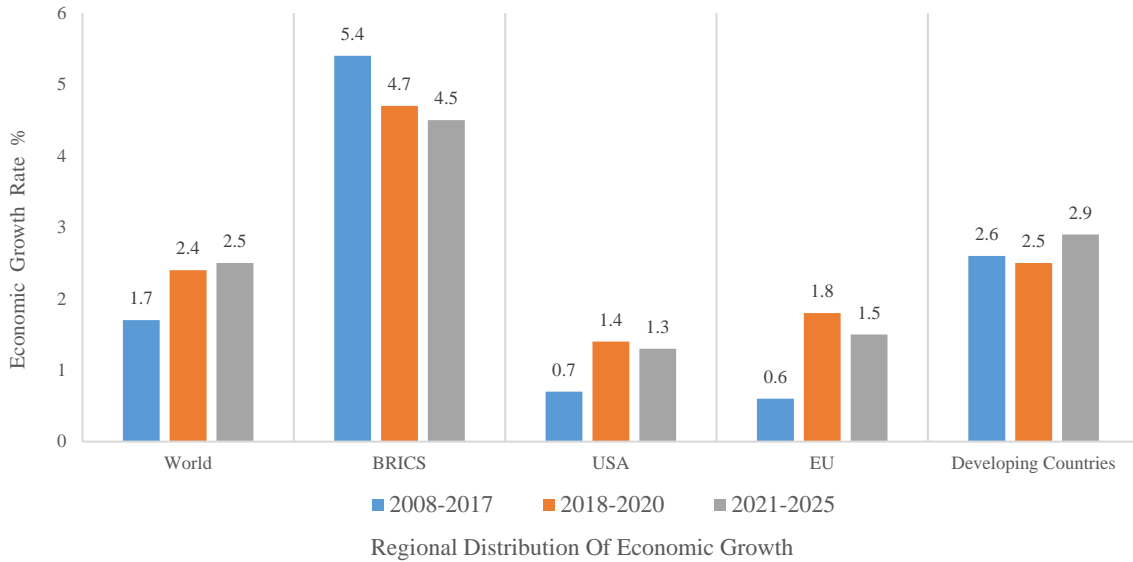


Africa is searched and risk factors are evaluated, it is seen that the continental countries are negatively affected from the economic aspect and cooperation support is needed in such a pandemic process when even high-income countries have problems in the supply chain and medical equipment stocks (Dedeler *et al.*, 2020).

#### Indicator of Economic Development of BRICS Member States

Compared with the previous years, the BRICS formation that is more outstanding in the world economy has become an authority operating in many fields in this process. The BRICS formation is a strong alternative in the world economy both shows itself more prone to cooperation compared with other countries and is standing out with its economic growth rates (Chang, 2018). Once BRICS and other regions are compared in the world, it is seen that the economic growth rates are higher.

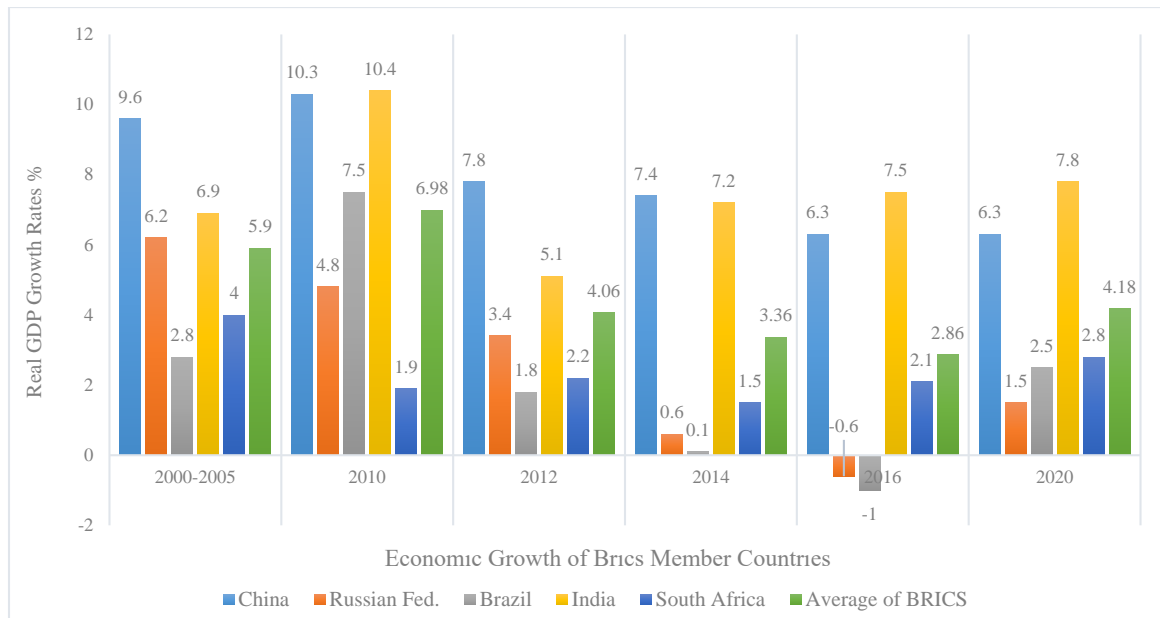
While BRICS realized the highest economic growth with a rate of 5.4% because the effects of the crisis lasted long in the 2008-2017 period, a growth was seen in the USA at a rate of 0.7% and EU at 0.6%. The same trend is continuing in the process of COVID-19. It is announced in the future forecasts that the BRICS group is expected to maintain the same performance in the world average in the 2021-2025 period (**Figure 1**). In the global crisis periods (2009 and 2020 global crises), the BRICS cooperation group showed the best performance (SETAV, 2020).



**Figure 1.** Comparison of Economic Growth - % (SETAV, 2020)

In the evaluations performed by countries, an increasing trend is seen in the economic growth over the years depending on the employment, capital, production and income growth in the countries (UN, 2020). It is shown by IMF in the analyses performed based on BRICS countries that the reflections of the COVID-19 crisis are different. In China which is known to have a high GDP rate as from 2000's in the world, a decrease has been experienced in 2020, and the outbreak of the Coronavirus epidemic in Wuhan city of China has played a role in this decrease. A decreasing trend has started in India with COVID-19; however, it is seen that a higher real

GDP increase realized compared with the other member countries. A growth trend is shown in Russia and Brazil. The continuous growth is continuing in South Africa and it is the country in which the best performance is shown following India with a growth of 2.8% in 2020 (Figure 2).



**Figure 2.** Real GDP Growth in BRICS (IMF, 2021)

Development of the infrastructures of artificial intelligence and robotic technologies by the countries and businesses has gained importance under the pandemic circumstances which exercise influence over the whole world in parallel with 4IR development and where borders have been closed, practices of remote-training, remote-working have been initiated, the physical working facilities have decreased and the use of e-commerce model is compulsory in covering the basic needs. Creating a difference in the offering of the existing product and services to the consumer as well as widening of these products and services in terms of the businesses has become the most important point in terms of the competition. It is foreseen to prioritize the growth of labor to increase the use of new technology under and after the pandemic conditions for covering the expectations of the BRICS-member countries and businesses within and beyond the national borders. It is acknowledged that the presence of a country in BRICS group having a high trade volume and being influential over the world economy like China will positively contribute to the other national economies in terms of representing the developing countries.

## MATERIALS AND METHODS

In the study, a sampling design and more specifically purposeful sampling were used. “Multi-criteria Decision-making Method” is applied. The sampling framework consists of data obtained from the public and private authorities of South Africa and other BRICS member countries and explaining the economic level based on COVID-19 effects.

The inclusive criteria used for the selection in BRICS: Unemployment Rate in BRICS member countries in the period of 2010-2020; E-commerce sales in BRICS countries in the period of 2017-2023 and GDP growth rate of BRICS member countries in the period of 2010-2021.





In addition, the inclusive criteria used for the selection are data about GDP rates of South Africa by years and quarters, unemployment rates, labor force participation in the period of 2010 Q1 – 2020 Q4, number of foreign travelers of South Africa in the period of 2018-2021; E-commerce use of South Africa in the period of 2019-2020. The sectors in which e-commerce activities changed in South Africa were examined in 2019 and 2020.

The purpose of the analysis is to determine the effects of COVID-19 in BRICS countries. As well as in South Africa compared to other countries and to determine the impact of COVID-19.

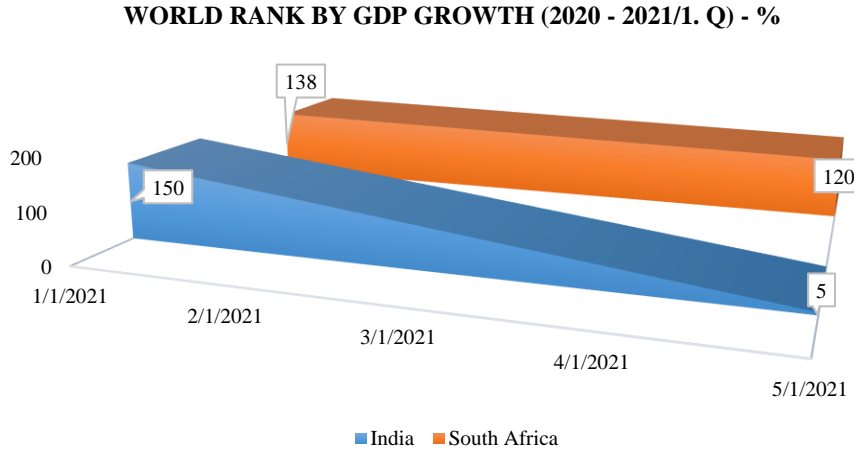
On this basis, the trend of the economic developments changing with the effects of COVID-19 in the Republic of South Africa and other BRICS countries is evaluated. In the process when obligatory changes are experienced with the effect of COVID-19, it is focused on the level of data in terms of countries. The content related to the subjects associated with COVID-19 is defined. It has been determined that the most effective criteria are GDP and e-commerce data.

#### *Determined the Result of the Analysis*

World ranking of GDP in 2020; China > Russia > Brazil > South-Africa > India

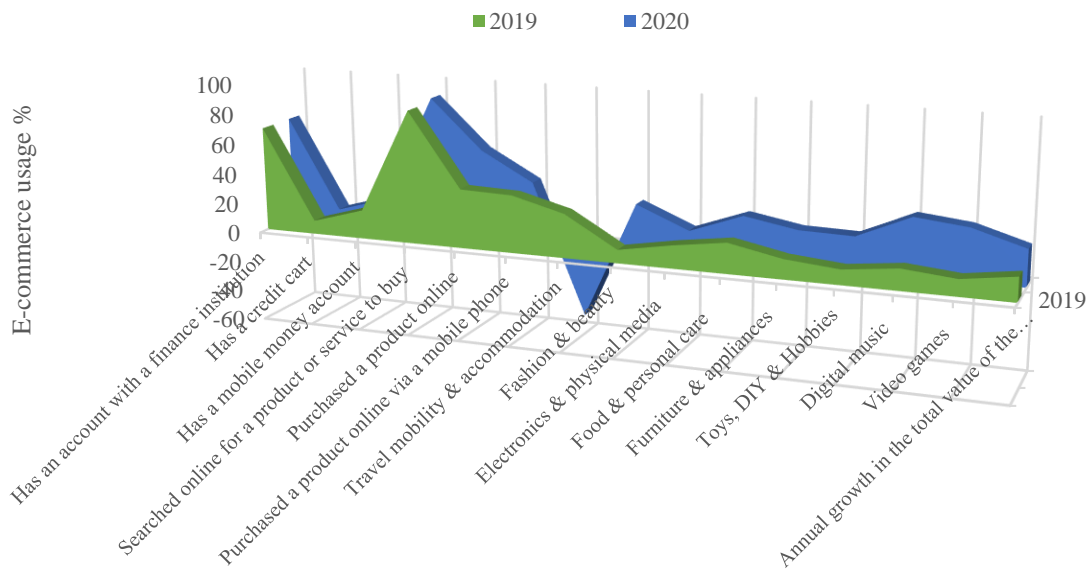
World ranking of GDP in 2021-Q1; India > China > Russia > Brazil > South-Africa

India showed the most successful performance in the first quarter (1. Q) of 2021 in the world ranking. While in 150<sup>th</sup> place in 2020, India moved up to 5<sup>th</sup> place in the first quarter of 2021. The second-best performer was SA. While in 138<sup>th</sup> place in 2020, SA moved up to 120<sup>th</sup> place in the first quarter of 2021 during the COVID-19 pandemic (**Figure 3**).



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

The sectors in which e-commerce activities changed in South Africa were examined in 2019 and 2020. Although the use of digital does not differ naturally in the comparisons of 2019 and 2020 concerning the use of digital and e-commerce in South Africa, changes are seen in the use of e-commerce. While a decrease is seen in demand for traveling, electronic products, physical media and miscellaneous hobbies in the areas where e-commerce is used, it is seen that there is a maximum increase in demand for basic needs like foods and instruments of spending time under quarantine conditions like music and video games. South Africa e-commerce usage between 2019 and 2020 change ranks (**Figure 4**).



**Figure 4.** E-commerce Use of South Africa – 2019 -2020

Annual growth in the total value of the consumer goods e-commerce market was %50.6

## RESULTS AND DISCUSSION

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

- GDP rates exhibited such a higher decrease than ever before in the previous years and as a result of the 2009 global financial crisis. The annual change rate that was so low at 1% in 2019 realized at the highest decrease rate of -17.1% in 2020.
- Although the unemployment rates were high in the previous years, while it was 23.3% in the second quarter of 2020, it increased at such an unprecedented rate as 30.8% in the third quarter and 32.5% in the fourth quarter with the effect of COVID-19.
- Foreign trade points increased in 2020. The effect of the onset of the COVID-19 pandemic later is noticed compared with China, the USA, and EU countries.
- Whereas an average inflation rate of 2% in 2019, it entered into a rising trend as from the first quarter of 2020. The average inflation rate of 3% in the first half of 2020 increased to 4.4% in the last quarter of the same year.
- Tourism activities also fell at a change rate of -87.5% in 2020 and the first quarter of 2021 in South Africa as a result of the closure of the national borders or implementation of restrictions due to pandemics, as in the other countries of the world.
- Although the use of digital does not differ naturally in the comparisons of 2019 and 2020 concerning the use of digital and e-commerce in South Africa, changes are seen in the use of e-commerce. While a decrease is seen in demand for traveling, electronic products, physical media and miscellaneous hobbies in the areas where e-commerce is used, it is seen that there is a maximum increase in demand for basic needs like foods and instruments of spending time under quarantine conditions like music and video games.



- As a result of the comparison of unemployment rates in South Africa and other BRICS member countries, it is seen that the adverse effects experienced in all countries have also increased, as in the other countries of the world. It is considered that the policies of protection from the pandemic applied by the national governments will account for the difference of being affected in the future process.

### *Solution*

While the precautions applied by the national governments during this process when the effects of COVID-19 pandemic are experienced most heavily vary particularly depending on the economic powers, it is expected that the cooperation policies among the member countries of BRICS group will create positive effects on the national economies. It is anticipated that a country that is one of the strongest economies in the world like China will provide positive contributions to the Republic of South Africa representing the region in the South of Africa, as is in the other BRICS members.

### *Discussion of Findings*

Concerning the unemployment that is one of the criteria determined as the most effective; once the national lockdown started in the process of COVID-19, it is seen that a small number of people were working and these largely consisted of core workers (Alshammari, 2020; Alshammari *et al.*, 2020). Some people started to work at home or physical working hours were reduced for some. The rate of those working at home fell from 10.9% in the third quarter to 8, and 0% in the fourth quarter of 2020. This is probably the result of the loosening of the lockdown restrictions in the fourth quarter. While the number of those working less than 15 hours in a week was decreasing quarterly due to the loosening of the lockdown restrictions, the number of those working for 15 hours and above in a week increased quarterly. In short, changes were experienced in connection with the severity of the pandemic. Although the unemployment increased, the labor participation rate climbed; this is completely related to the policies of adapting to the pandemic conditions.

Whereas the unemployment rate in the urban regions varied at approximately 3.6 percent in 2019 in China that was the outbreak location of the Coronavirus epidemic, the unemployment rate climbed to 4.2 percent in 2020 due to COVID-19; however, it is anticipated that the unemployment rate will return to the below 4 percent in 2021 according to the estimations of IMF with the elimination of the pandemic effects in a short time.

While the unemployment rate in Russia was falling from the 2000's, a higher increase was experienced in the 2009 crisis; however, the effect of COVID-19 could not change the decreasing trend of unemployment. The Russian economy is largely focusing on the services and industry sector and a large majority of labor are working in these two sectors. Following a sharp decline in 2009, the national economy is still maintaining its recovery process with the effect of governmental policies.

The unemployment rate in Brazil in 2020 changed to 11.97% and it is considered that the recent growth in the national economy is the reason for the important recovery in the unemployment rates of the country despite COVID-19.





As a result of the factors such as being is one of the fastest-growing economies of the world, one of the leading economies of G-20 and one of the members of the BRIC group, India did not face negative results in the 2009 crisis in the process of COVID-19, compared with other developing countries in BRICS group.

It is viewed that since South Africa participated in the BRIC group later, it experienced the effects of COVID-19 more adversely; however, it has entered into the recovery process more quickly.

## CONCLUSION

The first motivation source of this study is that South Africa is attractive as of its location, its successful economic performance we noticed and being a member country of the BRICS group. The second motivation source is that Turkey expressed its wish to be a member of this cooperation mechanism before the meeting which the member countries of the BRICS cooperation mechanism held in Johannesburg city of the Republic of South Africa in 2018.

The criteria selected for the study are important ones that were, was provided to create an objective scale measuring the potential performance as well as measuring the existing economic performance of SA and comparison of the countries. A comprehensive scale was created by adding criteria revealing the development capabilities of the countries onto these criteria. It was contributed to acquisition of opinion about the reflections of the global pandemic crisis over the analysis results.

The importance of the cooperation was emphasized once more to the national governments to be prepared for the process following the termination of the health crisis exercising control over the whole world and threatening the human life and for the technology environment expected to develop with Industry 5.0 or Industry 6.0. Through the research conducted, the aim of contributing to the establishment of the forecasts for increasing the economic power of the Republic of South Africa in the next years in terms of the importance of BRICS membership was achieved.

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## References

- AFAM, (2020). African Researchers Association, The Order of the Move in Technology is in Africa, Africa Industry 4.0 Technology, A. Kavas, 21 July 2020. Available from: <https://afam.org.tr/teknolojide-hamle-sirasi-afrikada/>.
- Alshammari, A. M., Aljebreen, A. K., Alenzy, T. M., & Alhamad, M. M. (2020). Reflection on public education and awareness in facing Corona Virus (COVID-19): Experiences from Saudi Arabia. *Journal of Advanced Pharmacy Education and Research*, 10(2), 144-146.



Alshammari, E. (2020). Implementing eOSCE during COVID-19 lockdown. *Journal of Advanced Pharmacy Education & Research*, 10(1), 174-180.

Ayar, S. (2014). "What does it mean BRICS Development Bank?". Available from: <http://www.sde.org.tr/>

Bal, H., Algan, N., Manga, M., & Kandir, E. (2014). The Relationship between Human Capital and Economic Growth: BRICS Countries and Turkey Example ", Alp H. Gencer, International Conference on Eurasian Economies 2014, 1160, Skopje, Macedonia, Beykent University, pp. 795-803.

Barbosa, D. C. (2020). Impact of a BRICS integrated payment system on cross-border e-commerce. *BRICS Journal of Economics*, 1(4), 33-41.

Battal, T., & Akan, E., (2019). Evaluation in the Framework of Performance and Potential Criteria of BRICS Countries and Turkey. *Beykoz Academic Journal*, 7, p. 1.

Chang, M. C., Hu, J. L., & Chang, H. C. (2018). Resource efficiency and productivity changes in the G7 and BRICS nations. *Polish Journal of Environmental Studies*, 27(6), 2463-2474.

Chiu, K., Radulescu, I. G., Panait, M., & Voica, C. (2014). Analysis of the economic development prospects of BRICS countries, Mondaq connecting knowledge and people, South Africa BRICS countries challenge to the world economy new trends. *Procedia Economics and Finance*, 8, 605-661.

Dedeler, M., Ozdilek, Y. İ., Simsek, F. İ., Abdullahoglu, S. D., Eren, T., Çolapkulu, N., Dincer, B., Leblebici, M., Ovali, F., & Alimoglu, O. (2020). COVID-19 and Africa. *Anatolia Clinic, Journal of Medical Sciences*, 25(Special issue:1), 300-311.

Erkmen, K., & Ari, B. (2018). The Contribution of Creative Industries to Development and the Inequalities they reproduce in South Africa. *Hacettepe University, Moment Journal*, 5(2), 255-280.

European Commission, (2021), "Industry 5.0 – Towards a sustainable, human-centric and resilient European industry", R & I Paper Series, Policy Brief, ISBN 978-92-76-25308-2. doi:10.2777/308407 KI-BD-20-021-EN-N Luxembourg: Publications Office of the European Union, 2021.

Guney, T. (2017). The Effect of Economic Freedom on Economic Growth in Turkey and BRICS Countries. *International Review of Economics and Management*, 5(2), 30-47.

IMF, (2021). <https://www.imf.org/>

O'Neill, J. (2001). Building Better Global Economic BRICs, Global Economics Paper No: 66, Goldman Sachs. Available from: <https://www.goldmansachs.com/insights/archive/archive-pdfs/build-better-brics.pdf>, (11.07.2021)

Piper, L. (2015). The BRICS phenomenon: from regional economic leaders to global political players. *Published by: BRICS Initiative for Critical Agrarian Studies (BICAS)*.

Saygili, F., & Manavgat, G. (2014). Linder Hypothesis: "An Empirical Analysis on Turkey's Foreign Trade". *Ege Academic Review*, 14(2), 261-270.



- 
- SETAV, (2018). A New Power Focus in the Global Economy: BRICS, September 2018 Nr. 256, p. 10
- Sholokhova, M. (2020). Investment cooperation in the BRICS countries. *BRICS Journal of Economics*, 1(4), 24-32. doi:10.38050/2712-7508-2020-1-4-3
- ST Industry, (2021), “What is Industry 5.0?” Kumtepe, D., Available from: <https://www.stendustri.com.tr/endustri-40-uygulamalari/endustri-50-nedir-h110456.html> (24.12.2020)
- UN, (2020). United Nations, COVID-19 Response, Coronavirus global health emergency. Available from: <https://www.un.org/en/coronavirus>, (11.08.2021).
- Wiljoen, W. (2020). South Africa’s trade data update the May 2020 reveals the Effect of eased lockdown restrictions. Available from: <https://www.tralac.org/blog/article/14750-south-africa-s-trade-data-update-the-may-2020-data-reveals-the-effect-of-eased-lockdown-restrictions.html>, (14.07.2021).
- Wilson, D., & Purushothaman, R. (2003). Dreaming with BRICs: The path to 2050. *Global Economics Paper*, (99), 1-24.

