Innovations

National Innovation Investments and the Growth of SMEs: A Case Study of BRICS Economies

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Abstract: *National innovation investments have been identified as a key driver for the growth of SMEs. Reducing bottlenecks in investment, especially for SMEs drives the overall national economy. This study investigated the drivers of national innovation investment in BRICS countries. Data was obtained from the Global Innovation Index and World Bank from 2013 to 2022. Econometric tools such as inferential statistics, Random effect models, and post estimation test was used. The result shows that there is a significant difference in national innovation between countries. Factors such as investment in research and development, inflation rate, and ease of getting credit influenced national investment among BRICS countries. The study recommends strategies that would prevent the misallocation of resources that can stifle innovation and growth.*

Keywords: Innovation investment, SME growth, BRICS, ICT, National Innovation, R&D

1.0. Introduction

The growth and development of Small and Medium-sized Enterprises (SMEs) are critical to the economic prosperity of any nation. This is particularly true in the context of the BRICS nations - Brazil, Russia, India, China, and South Africa - given their emerging economies and the significant role SMEs play in their economic landscapes (Alnafrah, 2021). National innovation investments have been identified as a key driver for the growth of SMEs. These investments, which can take the form of research and development funding, tax incentives for innovation, or direct support to start-ups and SMEs, have the potential to stimulate business growth,

promote competitiveness, and drive economic development. However, the factors that influence (strengthen or hamper) national innovation investmentsfor SME growth are complex and multifaceted.

Developing the right policy to foster innovation in the economy is very important as innovation has been recognized as a driver of economic growth and a rising standard of living, as marked by the success of currently developed nations (Fagaet al., 2016). Developing nations or countries that are still at the lower stage of economic development also realize the importance of innovation to their economic development, therefore they need to have the right innovation policy as guidance to be applied along their development process later. The government has an important role in promoting innovation as it can act as a coordination for all the elements in the nation to achieve the national innovation objective (Leo, 2022; Patanakul and Pinto, 2014). Public and private sector interaction in technology product development is very important for nations that are still underdeveloped (Aneja and Lalvani, 2021; Modara and Bennet, 2017). This is because the level of technology product development in the private sector will affect the trade balance and national economic growth later.

Smalland medium-sized enterprises (SMEs) grapple with multifaceted challenges that impact their growth and sustainability. The critical factors influencing SME success are the research and development (R&D) index, the inflation rate, and the ease of obtaining credit in BRICS and other developing nations (De Blick et al., 2024; Vukovic, and Catenuto, 2023; Li, 2021). However, the interplay between these variables remains complex and poorly understood. SMEs often struggle to access funding due to inadequate credit systems, restrictive collateral laws, and cumbersome bankruptcy procedures (Hasran et al., 2023; Li, 2021). Additionally, variations in R&D investment across different sectors and regions further complicate the landscape. BRICS nations collaborate on scientific research through working groups and university networks. However, a larger global platform is needed to enhance collaboration further (Nature, 2021).To foster SME growth and innovation, it is imperative to address these challenges holistically and develop targeted policies that enhance credit availability, incentivize R&D, and mitigate inflation-related risks.

Though the literature has proposed various roles of innovation to facilitate economic development, it would be reasonable to consider innovation as a means to move to a higher stage of technological progress by enhancing technological capabilities. An increase in national innovative capabilities enables a country to produce a wider range of high-quality goods and services, thus improving the standard of living. This has a strong repercussion in terms of competitiveness in the global market, as technological capability directly impacts the ability to export. This can be evidenced by the trend that low-tech and low-skill products are now shifting to developing

countries in the globalized economy (World Economic Forum, 2016; Scot, 2006). Innovation is the panacea for myriad ills and the key to national growth in a competitive globalized economy. This made policymakers to create a conducive environment and develop innovation strategies to address the issues of innovation and innovative capabilities. While the developed countries quickly realized the importance of innovation and created an innovation-led economy, the developing countries have been slow to utilize innovation to secure high-value-adding activities and foster economic development (Lema et al., 2021).There is a need for a more comprehensive framework that identifies and analyzes the key factors influencing national innovation for SME growth. The current literature (Yahaya and Nadarajah, 2023) has overlooked some relevant factors(learning and entrepreneurial orientation). Adam and Alarifi (2021) have demonstrated that rather than improving a company's performance, external aid or assistance helps to amplify the benefits of SMEs' innovative practices on their ability to survive.

Goals and Objectives of the Study :

This study assessed how factors such as inflation rate, research and development, and the ease of getting credit influence national innovation investment for SME growth.

2..0. Literature Review

2.1. Definition and characteristics of SMEs :

SMEs are essential to the development of a nation's economy. They can adjust more quickly to the shifting demands of the market. SMEs encourage competition in product design, pricing, and efficiency. Big businesses would have a monopoly in practically every activity sector without SMEs. In certain operational areas where they are more capable of providing, SMEs also assist larger businesses. Providing. The definition of SME differs by country. Nonetheless, companies are divided into groups based on characteristics like as market capitalization, yearly revenue, the number of workers, the amount of assets the firm has, or any combination of these.

In India, plant and machinery investments by small enterprises in the manufacturing sector should be between 25 lakh and 5 crore rupees. Less than 2 crore rupees and more than 10 lakh rupees should be invested in equipment by the service industry. The manufacturing sector should invest more than 5 crore rupees and less than 10 crore rupees in plant and machinery for medium-sized businesses. The equipment should be purchased by the service sector for more than 2 crore rupees but less than 5 crore rupees. The total full-time equivalent of paid employees and the total yearly turnover are the two metrics used in South Africa to identify small and medium-sized enterprises (SMEs) (Feedough, 2022). Although the banking industry

uses several definitions based on internal criteria that match their respective targeted goals, the more widely acknowledged definition of MSEs in Brazil is based on the yearly turnover requirement (OECD, 2022).

2.2. Overview of national innovation systems (NIS) and their role in fostering SME growth :

The effectiveness of national innovation systems (NIS) in supporting SMEs' sustainable innovation activities can vary. For instance, despite continuous improvements in policies promoting SME innovation . In some countries, the NIS still lacks an autonomous structure and a comprehensive legal framework to encourage SMEs' innovation. (Jia et al., 2020). However, the effectiveness of these systems can vary, highlighting the need for continuous policy improvements and the establishment of robust legal and independent systems to support SME innovation National Innovation Systems (NIS) are frameworks within which government bodies, private sector entities, and academia interact to influence the innovative performance of a country (Acs et al.,2017). They are crucial for promoting the expansion of Small and Medium Enterprises (SMEs) in several ways:

1. Access to Strategic Resources: For SMEs to have access to vital resources like information, technology, capital, or skills, external networks are frequently necessary, which are essential for innovation and growth. These networks include production networks, knowledge and innovation networks (including academic institutions and providers of knowledge-intensive corporate services), and strategic partnerships (OECD, 2023).

2. Resilience and Sustainability: Networks offer sustainability and resilience, which aid SMEs in managing interdependencies and adjusting to changes and unpredictability. They can also assist SMEs in adopting new environmental standards and due diligence requirements.

3. Knowledge Spillovers and Economies of Scale: Networks facilitate knowledge spillovers and enable SMEs to achieve external economies of scale. Through network effects, digital platforms and information and communication technology (ICT) improve opportunities for knowledge and technology transfer and allow for external economies of scale.

4. Open Innovation and Collaboration: Market diffusion and innovation processes can be accelerated through open innovation. Smaller collaborative businesses typically exhibit higher levels of innovation than non-collaborative businesses.

Several studies have explored the relationship between innovation investments and the development of Small and Medium-sized Enterprises (SMEs). Fu et al., (2021) investigation focused on the connection between SMEs' performance and innovation. The study discovered a strong correlation between SME performance and

innovation. Additionally, it was shown that the performance of SMEs and innovation are moderated by the external environment. Lewandowska (2021) concentrated on the relationships that exist between innovation investments and the competitiveness of SMEs in outlying areas. The study demonstrated that competitiveness is not impacted by all investments. The biggest signs of reliance are found in the costs associated with marketing, protecting intellectual property, investing in machinery and equipment, and providing training. The overall connections between SME activity and entrepreneurship, economic growth, and job creation (OECD, 2010). Innovation is the driving force behind these economic and employment-generating impacts, as the establishment of new businesses and SME expansion boost productivity and activate idle or underutilized resources. Sun et al. (2023) investigate how government subsidies for innovation affect businesses. The findings validate the mediating role of finance limitations in this impact and show a markedly beneficial effect of government subsidies on the R&D expenditure of SME board-listed businesses. Using a partial least squares structural equation model (PLS-SEM) on 769 Spanish SMEs, Becerra-Vicario et al. (2023) examined the link between innovation and the performance of Small and Medium Enterprises (SMEs) and how Corporate Social Responsibility (CSR) mediates this association. The study found that performance is impacted by CSR and innovation. Using a least squares structural equation model on 104 SMEs, Larios-Francia and Ferasso (2023) examine the relationship between innovation and firm performance of micro, small, and medium-sized enterprises (MSMEs) in emerging countries. Product innovation and business process innovation were found to account for 47.1% of organizational performance, 41.0% of economic performance, 39.5% of commercial performance, and 36.9% of productive performance, respectively. Beynon et al. (2020) use the unique N-State Classification and Ranking Belief Simplex (NCaRBS) technique to examine the relationship between SME strategy and intention to engage in future innovation. The results show that the will to innovate is clearly correlated with personnel numbers, the number of locations and branches, and internet presence. Le et al. (2023) used a two-stage least square model with propensity score matching to investigate the impact of innovation on the performance of small and medium-sized enterprises (SMEs) in Vietnam. They find that SMEs that innovate tend to perform better than those that do not, and that one significant way that innovation benefits SMEs is through the improvement of their current product line. Lewandowska et al. (2021) examined financial support for investments as a lever for the growth of SME innovativeness from 805 Polish enterprises. The outcome demonstrates inefficiencies in the use of financial assistance, with microenterprises proving to be the least successful after obtaining funding from European Union (EU) sources. Using a partial least square structural model, Adam and Alarifi (2021) investigated the

relationship between innovative practices and SMEs' performance as well as the supporting function of external support. The results of the study showed that SMEs' adoption of innovative techniques improved their performance and chances of surviving the COVID-19 fallout.

2.3. Innovation policies and strategies in BRICS economies :

Innovation policies and strategies for Small and Medium Enterprises (SMEs) in BRICS countries (Brazil, Russia, India, China, and South Africa) are diverse and complex, reflecting the unique economic, social, and political contexts of each country. Here following are the innovation policies in BRICS countries.

1.Science, Technology, and Innovation Policies: The BRICS nations recognize innovation, science, and technology can spur economic expansion. They offer enormous prospects for development in addition to several shared traits and difficulties. Finding and examining them could lead to the discovery of viable avenues for achieving their potential for socio-political and economic growth (Cassiolato et al., 2009).

2.Industrial Clusters: A significant aspect of the innovation systems and territorial growth of many industrialized and growing nations, including the BRICS, are industrial clusters, especially those composed of SMEs. In addition to Gross Domestic Product (GDP) growth, they have a significant role in the creation of jobs and the fight against poverty (Biggeri, 2020).

3.Digital Economy: The BRICS nations have the potential to grow into significant actors in the digital economy through dynamic corporate development and improving legislative environments (International Trade Center, 2022).

4.Trade Facilitation: The BRICS Members exchange views and best practices on measures aimed at improving transparency for MSMEs, streamlining trade procedures, and facilitating trade at borders.

3.0. Comparison of innovation ecosystems across BRICS nations :

Understanding these ecosystems is crucial for assessing the strengths, weaknesses, and potential areas of collaboration among these dynamic economies.

Brazil boasts a burgeoning startup culture, particularly in sectors like fintech, agrotech, and health technology. However, challenges persist, including bureaucratic hurdles, limited access to funding, and a relatively small pool of skilled talent. Despite these obstacles, Brazil benefits from a supportive government, vibrant tech hubs such as São Paulo and Rio de Janeiro, and a growing network of incubators and accelerators. Brazil and India are better than South Africa in terms of startup skills and stand at the same level. However, they struggle with

internationalizing their entrepreneurs (Brazil) and technological absorption (India) (Bate, 2021, Alnafrah, 2021).

Russia's innovation ecosystem is characterized by a strong emphasis on technology and research, with a focus on sectors like cybersecurity, aerospace, and energy. Moscow and St. Petersburg serve as hubs for tech innovation, supported by government initiatives like the Skolkovo Innovation Center. However, concerns exist regarding intellectual property protection, bureaucratic inefficiencies, and limited integration with the global market.

India's innovation ecosystem is one of the most dynamic in the world, driven by a thriving startup scene, a large pool of skilled tech talent, and supportive government policies such as Startup India and Digital India. Major tech hubs like Bangalore, Hyderabad, and Pune are hotbeds of innovation, particularly in areas like software development, e-commerce, and biotechnology. Challenges include infrastructure gaps, regulatory complexities, and access to early-stage funding for startups outside major cities.

China's innovation ecosystem is characterized by rapid growth, massive investment in research and development, and a strong focus on emerging technologies such as artificial intelligence, biotech, and renewable energy (Gu et al., 2021). Cities like Beijing, Shanghai, and Shenzhen are global innovation hubs, fueled by a large domestic market, government support for strategic industries, and a robust network of tech giants, startups, and research institutions. However, concerns regarding intellectual property rights, market access barriers, and geopolitical tensions with other nations persist.China leads the BRICS group in terms of growth and the entrepreneurial ecosystem, according to the 2018 Global Competitiveness Index (GCI) and Global Entrepreneurship Index (GEI) (Bate, 2021).

South Africa's innovation ecosystem is still in its nascent stages but shows promise, driven by a growing startup culture, increasing investment in research and development, and government initiatives like the Technology Innovation Agency. Johannesburg and Cape Town are emerging as hubs for tech innovation, particularly in sectors like fintech, agri-tech, and renewable energy. Challenges include socioeconomic disparities, access to funding, and the need for greater collaboration between the public and private sectors. While each BRICS nation has its unique strengths and challenges in fostering innovation, there are significant opportunities for collaboration and knowledge exchange. South Africa's entrepreneurial ecosystem is in a favorable position as compared to Brazil and India, according to the Legatum Prosperity Index (LPI), Index Economic Freedom (IEF), and GEI. Its poor performance in startup skills suggests that postsecondary education, when combined with a low view of talent, is less successful in preparing the populace to be entrepreneurs (Bate, 2021). The BRICS countries perform better at producing

scientific and technological knowledge than at commercializing the products of their universities and research institutions. By leveraging their respective strengths and addressing common barriers, BRICS nations can collectively drive global innovation and economic growth.

4.0. Research Methodology

4.1. Study Area :

The BRICS economies, comprising Brazil, Russia, India, China, and South Africa, represent a significant coalition of emerging economies. These countries are characterized by their rapid industrialization, increasing influence in global affairs, and substantial contributions to world GDP. The study focuses on these nations due to their strategic implementation of national innovation investments that have been pivotal in the growth and development of Small and Medium-sized Enterprises (SMEs). BRICS countries span three continents, encompassing diverse cultures, languages, and histories. Economically, they share commonalities such as large populations, vast natural resources, and a growing middle class.

4.2. Data :

Data for this study was obtained from the Global Innovation Indexand World Bank from 2013 to 2022.Variables included in the model are Ease of starting a business, Market sophistication index, Business sophistication index, Ecological sustainability, Ease of protecting minority investors, research and development index, interest rate, and ease of getting credit.

For SMEs, research and development (R&D) is a vital source of innovation. Investment in R&D might result in the creation of novel goods, procedures, or services, which can enhance the competitiveness and performance of SMEs (Adam and Alarifi, 2021). The level of interest rates affects the cost of borrowing for SMEs. High interest rates can deter investment in innovation by increasing the cost of finance, making it more expensive for SMEs to fund new projects or expand existing ones (OECD, 2020). Conversely, lower interest rates can encourage SMEs to invest in innovation by reducing the cost of borrowing. When credit is readily accessible, SMEs can easily invest in innovative projects that may require significant capital outlay (Nguyen et al., 2020).

4.3. Analytical techniques :

Principal component analysis (PCA) was used to generate an index to represent the performance of national innovation investments and the growth of SMEs. The

process allows for the reduction of dimensionality without losing significant information, making the data easier to explore and analyze. Hence, ease of starting a business, Market sophistication index, Business sophistication index, Ecological sustainability, and Ease of protecting minority investors were used to generate an index. The index generated was used as the dependent variable while the research and development index (percentage of countries GDP), interest rate, and ease of getting credit (score) were the explanatory variables. By implication, a higher index implies higher or better performance of SMEs.

To determine the factors influencing national innovation investments and the growth of SMEs in BRICS, a random effect model was used. The random effects (RE) model is a type of hierarchical linear model that is particularly useful when data are drawn from different populations or levels of hierarchy. It assumes that the parameters of the model are random variables, which allows for the analysis of variations within groups. It is given as:

$$y_{ij} = \mu + \beta X_{ij} + U_i + W_{ij} \qquad (1)$$

Where y_{ij} is the value of the performance index of the j_{th} country in the sample, μ is the average value of the performance index for all countries, βX_{ij} is the coefficient of R&D, interest rate, and ease of getting credit of countries, U_i is the BRICS-specific random effect. It measures the difference between the average value of explanatory variables in the i_{th} country and the average value in the entire country, W_{ij} is the country-specific random effect.

4.5. Results and Discussion

4.5.1. Inferential statistics on the national innovation investment in BRICS Countries :

Table 1 shows the comparison of national innovation index scores by countries. The result shows that there is a significant difference in national innovation between India and Brazil, South Africa and Brazil, Russia and India. The national innovation in China is significantly higher than that in India, Russia, and South Africa. There is no significant difference in national innovation between China and Brazil. This implies that countries with higher innovation index have a better business environment for SMEs than others. Overall, the analysis of variance shows that there exists a significant difference in national innovation investment between countries.

Table 1: Comparison of national innovation scores by countries

Row-Column Mean	Brazil	China	India	Russia
China	0.3927 (1.000)			
India	-2.3433 (0.000)	-2.7360 (0.000)		
Russia	-0.9825 (0.092)	-1.3753 (0.004)	1.3607 (0.005)	
South Africa	-2.5760 (0.000)	-2.9687 (0.000)	-0.2326 (1.000)	-1.5934 (0.001)
Analysis of variance				
Between groups	F=27.53	Prob > F=0.0000		
Bartlett's equal-variances test: chi2(4) = 1.5912 Prob>chi2 = 0.810				

Note: values in bracket are p-values

4.5.1. Post-estimation tests for Random model

To validate the fitness of the model, some econometric tests were performed. These include multicollinearity test, heteroskedasticity test, and unit root test. Multicollinearity can cause large variances in the estimated coefficients, making them unreliable. Table 2 below shows that the model is valid with a low variance of the coefficients from the VIF test. The correlation matrix also detects multicollinearity, which occurs when two or more variables are highly correlated and can affect the precision of the estimated coefficients. Table 3 shows that the variables included in the model are not highly correlated. The heteroskedasticity test helps detect if the variance of the error terms is constant across time or if it varies with certain factors, which is crucial for the reliability of the model. Table 4 shows that the model is free from heteroskedasticity or unequal variance of the error term, hence, estimates from this model are reliable and efficient. Performing a unit root test is a critical step in ensuring the validity of any conclusions drawn from panel time series data analysis. Stationarity implies that the statistical properties of the series, such as mean and variance, do not change over time, which is a key assumption in many time series models (Hall and Mairesse, 2002). Panels are stationary if the p-value is greater than 0.05 or 5% it does not have a unit root. Table 3 shows that the model is stationary.

Table 2: Multicollinearity test (Variance Inflation FactorVIF)

Variable	VIF	1/VIF
R&D	1.82	0.550486
Interest rate	1.57	0.636098
Ease of getting credit	1.26	0.795698
Mean VIF	1.55	

Table 3: Correlation Matrix

	R&D	Interest rate	Ease of getting credit
R&D	1.0000		
Interest rate	-0.0154	1.0000	
Ease of getting credit	-0.3671	-0.5553	1.0000

Table 4: Levin-Lin-Chu test Unit root

Variables	Lag	Unadjusted statistics	Adjusted statistics	P-value
R&D	1	-0.4331	5.8E +15	1.000
Interest rate	1	-0.7661	7.9E +15	1.000
Ease of getting credit	1	-2.5058	1.8E +15	1.000

4.5.2. Factors influencing national innovation and growth of SMEs

Table 5 shows the factors influencing national innovation and growth of SMEs in BRICS countries from a random effect model. A percentage increase in research and development significantly and positively influenced innovation and growth. R&D can lead to the production of novel products or services, allowing SMEs to penetrate new markets or grow their share in already-existing markets. It can also result in improved processes, increasing efficiency and reducing costs, and helps SMEs adapt to changes in the market and technology, making them more resilient to economic fluctuations (Zamani, 2022). One percent increase in interest rate significantly increased innovation and growth by 2.8%. Higher interest rates can incentivize businesses to save more rather than spend. This increase in savings can eventually lead to higher levels of investment in innovation projects and SME growth as there is more capital available for lending to entrepreneurs and businesses (Surya et al., 2021). Foreign investors seeking larger returns on investments are

drawn to higher interest rates. This inflow of foreign capital can contribute to funding innovation initiatives and providing financing for SMEs, thereby fostering growth. Increased interest rates can signal a strong and growing economy, which can boost investor confidence. This confidence can lead to increased investment in innovative ventures and SMEs, as investors perceive the potential for higher returns on their investments. Higher interest rates make borrowing more expensive, particularly for riskier ventures. This can discourage excessive risk-taking and speculative investments, leading to a more prudent allocation of resources towards innovative projects with higher potential for long-term growth. Flexibility in ease of getting credit is negatively associated with innovation and growth. Excessive borrowing by SMEs, especially if not managed effectively, can lead to a debt overhang situation where businesses become burdened by high levels of debt (Veiga and McCahery, 2019). This can restrict their ability to invest in innovation and growth initiatives in the future as they focus on servicing existing debt obligations. Easy access to credit can sometimes lead to a misallocation of resources, where funds are directed towards less productive or speculative ventures rather than genuine innovation projects with long-term growth potential. This can impede overall economic efficiency and innovation (Bleck and Liu, 2017; Dong and Xu, 2020). A rapid expansion of credit availability without adequate risk management measures in place can increase the vulnerability of financial institutions and the broader economy to financial instability.

Table 5: Random effect estimates of the factors influencing national innovation and growth of SMEs

Variables	Coefficients	Standard errors	Z
R&D	1.6056	0.1548	10.37
Interest rate	0.0286	0.0090	3.17
Ease of getting credit	-0.0259	0.0085	-3.02
Constant	-0.4871	0.7215	-0.68
/sigma_u	0.5415	0.1472	3.68
/sigma_e	0.5462	0.0611	8.93
rho	0.4955	0.1516	
Diagnostic result			
Wald chi2 (3) = 221.55; prob>chi2 = 0.0000; log likelihood = -49.5999			
LR test for sigma_u=0: chibar2 (01) = 15.73; Prob>= chibar2 = 0.000			
Breusch–Pagan/Cook–Weisberg test for heteroskedasticity chi2(1) = 2.42; Prob > chi2 = 0.1195			

5.0. Conclusion

This research paper examined the factors influencing national innovation investments and the growth of SMEs in BRICS countries. The regression analysis revealed that increases in research and development expenditures and interest rates significantly bolster innovation investments. Conversely, the ease of obtaining credit was found to inversely affect both innovation investment and the growth of SMEs. These findings suggest that while supportive financial policies are crucial, there must be a balance to prevent the misallocation of resources that can stifle innovation and growth. Future research should continue to explore these dynamics, potentially incorporating a broader range of economic indicators and extending the analysis to other emerging economies.

References

1. Acs, Z.J., Audretsch, D.B. and Lehmann, E.E. (2017). National systems of innovation. J Technol Transf, 42: 997–1008.
2. Adam, N.A. and Alarifi, G. (2021). Innovation practices for the survival of small and mediumenterprises (SMEs) in the COVID-19 times: the role of external support. J InnovEntrep, 10(15).
3. Alnafrah, I. (2021). Efficiency evaluation of BRICS's national innovation systems based on bias-corrected network data envelopment analysis, Journal of Innovation and Entrepreneurship. Springer Heidelberg, 10(1), pp: 1-28.
4. Aneja, S., Lalvani, J. (2021). Role of the Private Sector and Technology for Future-Ready Educationand Training. In: Ra, S., Jagannathan, S., Maclean, R. (eds) Powering a Learning Society During an Age of Disruption. Education in the Asia-Pacific Region: Issues, Concerns and Prospects, vol 58. Springer, Singapore.
5. Bate, A.F. (2021). A comparative analysis on the entrepreneurial ecosystem of BRICS clubcountries: practical emphasis on South Africa. SN Bus Econ, 1(121).
6. Becerra-Vicario, R., Ruiz-Palomo, D., León-Gómez, A., Santos-Jaén, J.M. (2023). The Relationshipbetween Innovation and the Performance of Small and Medium-Sized Businesses in the Industrial Sector: The Mediating Role of CSR. Economies, 11(3):92.
7. Beynon, M. J., Jones, P., and Pickernell, D. (2020). SME development strategy andproduct/service innovation intention: A NCaRBS analysis of the role of uncertainty. The International Journal of Entrepreneurship and Innovation, 21(1), 3-16.

8. Biggeri, M. (2020). 'Small and medium enterprises and industrial clusters in BRICS countries', in PB Anand, Shailaja Fennell, and Flavio Comim (eds), Handbook of BRICS and EmergingEconomies Oxford, Pages 246–270.

9. Bleck, A. and Liu, X. (2017). Credit Expansion and Credit Misallocation. Journal of MonetaryEconomics, 94.

10. Cassiolato, J.E., Maria. H. and Lastres, M. (2009). Science, Technology and Innovation Policies inthe BRICS Countries: an introduction. In: Cassiolato J, Vitorino V, eds. BRICS and Development Alternatives: Innovation Systems and Policies. Anthem Press:1-34

11. De Blick, T., Paeleman, I. and Laveren, E. (2024). Financing constraints and SME growth: thesuppression effect of cost-saving management innovations. Small Bus Econ, 62: 961–986.

12. Dong, F. and Xu, Z. (2020). Cycles of credit expansion and misallocation: The Good, the Bad andthe Ugly. Journal of Economic Theory, 186: 104994.

13. Faga, P.H., Uchechukwu, U. and Obiekwe, A. (2016). The Role of Innovation in the Economic Development of Nigeria. International Journal of Innovative Research & Development, 5(6).

14. Feedough (2022). Small and Medium Enterprise (SME) – Definition, Characteristics, & Examples. www.feedough.com.

15. Fu, Q., Sial, M.S., Arshad, M.Z., Comite, U., Thu, P.A. and Popp, J. (2021). The Inter-Relationshipbetween Innovation Capability and SME Performance: The Moderating Role of the   External Environment. Sustainability, 13(16):9132.

16. Gu, Y., Hu, L., Zhang, H., and Hou, C. (2021). Innovation Ecosystem Research: Emerging Trendsand Future Research. Sustainability, 13(20):11458.

17. Hall, B.H. and Mairesse, J (2002). Testing for Unit Roots in Panel Data: An Exploration Using Realand Simulated Data. eml.berkeley.edu.

18. Hasran, N.I.L.b., Saputra, J., Haque, A.u. (2023). Is Interest Rate an Effective Instrument forControlling Inflation and Its Effect on Investment Activities in Developing Countries? In: Yamoah, F.A., Haque, A.u. (eds) Corporate Management Ecosystem in Emerging Economies. Palgrave Macmillan, Cham.

19. International Trade Center (2022). BRICS Digital Economy Report 2022. intracen.org.

20. Jia, C., Tang, X. and Kan, Z. (2020). Does the Nation Innovation System in China Support the Sustainability of Small and Medium Enterprises (SMEs) Innovation? Sustainability, 12(6):2562.

21. Larios-Francia, R.P. and Ferasso, M. (2023). The relationship between innovation andperformance in MSMEs: The case of the wearing apparel sector in emerging countries. Journal of Open Innovation: Technology, Market, and Complexity, 9(1): 100018.

22. Le, D.V., Le, H.T.T., Pham, T.T. and Vo, L.V. (2023). Innovation and SMEs performance: evidencefrom Vietnam. Applied Economic Analysis, 31(92): 90-108.

23. Lema, R., Kraemer-Mbula, E. and Rakas, M. (2021). Innovation in developing countries: Examiningtwo decades of research. Innovation and Development, 11(2–3): 189–210.

24. Leo, J.G. (2022). National Innovation System and Economic Development in Nigeria. International   Journal of Research and Scientific Innovation (IJRSI), 9(7).

25. Lewandowska, A. (2021). Interactions between investments in innovation and SME competitiveness in the peripheral regions. Journal of International Studies, 14(1), 285-307.

26. Lewandowska, A., Bilan, Y. and Mentel, G. (2021). The Impact of Financial Innovation Investment   Support   on   SME   Competitiveness.   Journal   of Competitiveness, 13(3): 92–110.

27. Li, J. (2021). Sustainable Development in BRICS Countries: From Concept to Practice. In:Bolgov, R., et al. Proceedings of Topical Issues in International Political Geography. Springer Geography. Springer, Cham.

28. Meng, L., Qamruzzaman, M., Adow, A.H.E. (2021). Technological Adaption and Open Innovationin SMEs: A Strategic Assessment for Women-Owned SMEs Sustainability in Bangladesh. Sustainability, 13(5):2942.

29. Modara,M. and Bennet, A. (2017). The Impact of Government-Private Sector Collaboration on Innovation in a Developing Knowledge Economy.

30. Nature (2021). 'BRICS' nations are in a rush to boost their science links. The International Journalof Science, 600 (7).

31. Nguyen, P.A., Uong, T.A.T. and Nguyen, Q.D. (2020). How Small- and Medium-Sized Enterprise   Innovation Affects Credit Accessibility: The Case of Vietnam. Sustainability, 12(22):9559.

32. OECD (2023). OECD SME and Entrepreneurship Outlook 2023: The role of networks for SME innovation,   resilience   and   sustainability.   www.oecd-ilibrary.org.

33. Patanakul, P. and Pinto, J.K. (2014). Examining the roles of government policy on innovation. The Journal of High Technology Management Research, 25(2): 97-107.

34. Scot, A.J. (2006). The Changing Global Geography of Low-Technology, Labor-Intensive Industry: Clothing, Footwear, and Furniture. World Development, 34(9):1517-1536. DOI: 10.1016/j.worlddev.2006.01.003

35. Statista (2023). Gross expenditure on research and development (GERD) in Russia from 2010 to 2022. www.statista.com.

36. Sun, H., Yang, X., Tang, X., Peng, F. (2023). *How innovation funding leads enterprises to engagein research and development: Small and medium enterprises' perspective. PLoS ONE, 18(7): e0289166.*

37. Surya, B., Menne, F., Sabhan, H., Suriani, S., Abubakar, H. and Idris, M. (2021). *Economic Growth,Increasing Productivity of SMEs, and Open Innovation. J. Open Innov.Technol. Mark. Complex., 7(20).*

38. Veiga, M.G. and McCahery, J.A. (2019). *The Financing of Small and Medium-Sized Enterprises: An Analysis of the Financing Gap in Brazil. European Business Organization Law Review, 20:633–664.*

39. Vukovic, D.B., Catenuto, C. (2023). *The impact of inflation on BRIC (countries): a dynamic panelthreshold model evidence. Ind. Econ. Rev., 58: 259–280.*

40. World Economic Forum (2016). *The Fourth Industrial Revolution: what it means, how to respond. www.weforum.org.*

41. Yahaya, H.D., and Nadarajah, G. (2023). *Determining key factors influencing SMEs' performance: A systematic literature review and experts' verification. Cogent Business & Management, 10:3, 2251195.*

42. Zamani, S.Z. (2022). *Small and Medium Enterprises (SMEs) facing an evolving technological era: a systematic literature review on the adoption of technologies in SMEs. European Journalof Innovation Management, 25(6): 735-757.*