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RESEARCH ARTICLE

The Role of Entrepreneurship and Innovation in Achieving the Sustainable Development Goals: Evidence from Selected East Asian and South African Countries

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Abstract

In light of the rapid changes in the business environment and intensifying global competition, entrepreneurship and innovation have become among the most important modern management and economic concepts. They play a pivotal role in generating creative ideas, creating wealth and knowledge, and achieving economic and social goals, ultimately leading to sustainable development. This growing interest is reflected in the increasing public and private investments in innovation and support for startups. This study aims to analyze the role of entrepreneurship and innovation in achieving the Sustainable Development Goals (SDGs) by comparing East Asian countries (Singapore, South Korea, Japan, and China) with some Southern African countries. The results show a strong and direct relationship between the strength of the entrepreneurial ecosystem and the level of progress in achieving the SDGs. East Asian countries have benefited from high spending on research and development (R&D), the availability of venture capital, and the development of digital infrastructure, which has positively impacted economic growth, industry, innovation, clean energy, and responsible consumption. In contrast, the study reveals an innovation and structural gap in Southern African countries, resulting from weak R&D spending, limited funding, and slow institutional frameworks, which have hindered their contribution to achieving the SDGs. However, the study's findings highlight that digital transformation and the green economy represent a promising strategic opportunity to reduce this gap, provided they are coupled with effective institutional and financial reforms.

JEL Classification : Sustainable Development , Entrepreneurship, Innovation and Invention: Processes and Incentives, Management of Technological Innovation and R&D, Environment and Development; Sustainability; Environmental Accounts and Accounting .

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I. Introduction:

With the growing global and international interest in creating a sustainable knowledge economy, trends in economic and investment development have shifted. Sustainable development has become a prominent goal that countries strive to achieve, or rather, the primary driving force behind economic growth and the Sustainable Development Goals (SDGs) in the modern global economy. These two elements form a fundamental pillar in building knowledge-based economies, generating employment opportunities, and stimulating sustainable growth. With rapid technological advancements and increasing environmental and social challenges, innovative startups, new technological solutions, and entrepreneurial approaches to resource management are all effective tools for addressing issues of poverty, unemployment, climate change, and inequality, making the role of startups and innovative companies more vital than ever.

The global Sustainable Development Goals not only highlight innovation as a development objective but also emphasize its crucial importance in achieving other goals. It is the engine driving progress in health, education, clean energy, and sustainable cities worldwide, particularly in developing economies, where it is seen as a solution to many economic and social problems. In recent years, global economies have undergone radical transformations, with entrepreneurship and innovation emerging as key drivers of economic growth and sustainable development. Within the framework of the 2030 Agenda for Sustainable Development, adopted by the United Nations in 2015, innovation and entrepreneurship are considered crucial factors for achieving the 17 Sustainable Development Goals (SDGs), particularly SDG 9, which focuses on industry, innovation, and infrastructure. The role of entrepreneurship in job creation and poverty reduction directly contributes to achieving SDG 1 (no poverty) and SDG 8 (decent work and economic growth).

Given the significant role of entrepreneurship and innovation in the economic system and their impact on growth indicators and income diversification, the central research question is: What is the role of entrepreneurship and innovation in achieving the Sustainable Development Goals?

2. Significance of the Study: The significance of this study stems from its focus on East Asian and South African countries as two distinct regional models with different economic, social, and political contexts. While East Asian countries like South Korea and Singapore have made significant strides in innovation and entrepreneurship indicators, reflected in their growth rates and human development, Southern African countries continue to face structural challenges related to finance, infrastructure, and governance. Comparing these two regions allows for the extraction of practical lessons that can contribute to formulating more effective policies to support innovation and entrepreneurship in diverse contexts.

3. Study Objectives: This study aims to:

o Review national and regional policies and experiences in supporting entrepreneurship and innovation;

o Conduct a comparative statistical analysis between East Asian and Southern African countries using recent indicators (2025);

o Develop practical recommendations to enhance the role of entrepreneurship and innovation in achieving the Sustainable Development Goals.

4. Research Methodology: This study employs a descriptive-comparative approach, analyzing international and regional policies and experiences, and extrapolating from recent statistical indicators. A variety of data sources were used, including World Bank reports (2025), the Global Innovation Index (2025), UNDP reports (2023), and published national statistics for the countries under study. Analytical tools such as comparative tables, bar charts, scatter plots, and heatmaps will be employed to illustrate the differences and correlations between the indicators.

Theoretical Framework of Entrepreneurship and Innovation:

Innovation and entrepreneurship have become crucial strategies for economic development. In some cases, they are closely intertwined. Innovation is about creating new value, while entrepreneurship is about pursuing opportunities beyond the resources currently controlled by entrepreneurs. Combining these two concepts leads to terms like "founder," "risk taker," and "innovation marketer," without limiting the different types of innovation or entrepreneurship.

The relationship between innovation and entrepreneurship is mutually beneficial. Innovation is funded and marketed through entrepreneurship. Without new technological innovations, entrepreneurship would reach a dead end, and without entrepreneurship, innovation would remain merely ideas stored in the innovator's mind, potentially neglected and forgotten.

1- Defining Entrepreneurship and Innovation: In academic literature, entrepreneurship is defined as the process of exploring economic and social opportunities and transforming them into value-added projects, products, or services through risk-taking and resource management (Schumpeter, 1934; OECD, 2022). It is not merely about establishing new companies, but also includes developing innovative business models, restructuring existing institutions, and adopting expansion strategies in local and international markets. Innovation, on the other hand, is defined by the OECD as the introduction of improvements or the development of new products, services, or processes that lead to increased efficiency and productivity and enhanced competitiveness (OECD, 2022). Innovation encompasses four main types: product innovation, operational (process) innovation, marketing innovation, and organizational innovation. The difference between the two concepts lies in the fact that entrepreneurship is the practical framework that translates innovation into economic and social reality, while innovation is the intellectual and technical tool that empowers entrepreneurship to be sustainable and expand. Therefore, their integration is a prerequisite for achieving sustainable development.

2- The Relationship Between Entrepreneurship, Innovation, and Sustainable Development:

Recent studies show Entrepreneurship and innovation are two fundamental pillars for achieving the Sustainable Development Goals (SDGs).

• Job creation and poverty reduction (SDG 1 and SDG 8): Startups and entrepreneurial ventures contribute to generating new job opportunities, especially for youth and women, leading to reduced unemployment and poverty rates.

• Stimulating economic growth (SDG 8): Entrepreneurship contributes to increased GDP by introducing new products and services, expanding markets, and stimulating competition.

• Environmental and social efficiency (SDG 9 and SDG 12): Innovation contributes to developing environmentally friendly technologies, improving natural resource management, and reducing carbon emissions.

• Education and quality (SDG 4): Innovation in education and digital technology enhances the quality of education and contributes to building a qualified human capital.

Data from the Global Innovation Index 2024 shows that countries with the highest innovation rates (such as South Korea and Singapore) also recorded high scores in human development indicators and sustainable economic growth (WIPO, 2025).

1- International Frameworks and Policies:

International institutions have recognized the importance of entrepreneurship and innovation in achieving sustainable development and have therefore established supportive frameworks and policies:

• The United Nations (UN), through its 2030 Agenda, has emphasized the role of innovation and entrepreneurship in achieving the Sustainable Development Goals, particularly in the areas of industry, energy, and education.

• The World Bank: Supports financing programs for small and medium-sized enterprises (SMEs) and publishes periodic reports on the Ease of Doing Business.

• The Organisation for Economic Co-operation and Development (OECD): Publishes annual reports on entrepreneurship and innovation and encourages countries to adopt policies that support innovation in education and scientific research.

• The Global Innovation Index: A key tool for measuring countries' performance in innovation, ranking them according to indicators such as research and development spending, the number of patents, and the quality of educational and research institutions.

• The Global Innovation Index: A key tool for measuring countries' performance in innovation, ranking them according to indicators such as research and development spending, the number of patents, and the quality of educational and research institutions. I. Review of Literature and Previous Studies:

1. East Asian Experiences: East Asian countries are among the most prominent regions that have made significant progress in entrepreneurship and innovation. Well-considered government policies have transformed these countries into global hubs for sustainable economic growth. We will highlight the experiences of some of the leading countries in this region, such as Singapore, South Korea, Japan, and China.

• Singapore: Singapore is considered one of the most successful countries in supporting entrepreneurship and innovation. This is due to government policies that provide a favorable environment for investment and innovation by offering tax incentives, supporting startups, and facilitating access to finance. The National Research Foundation (NRF) contributes to providing research grants and technology development, which has helped Singapore become one of the world's innovation centers (Tan & Ng, 2020). In the field of entrepreneurship, the Singaporean government established the Entrepreneurship Support Centre (ESG), which provides consulting, funding, and training to individuals wishing to start their own businesses. The Singaporean government has also supported the country by streamlining bureaucratic procedures and providing facilities for the development of small and medium-sized enterprises (SMEs), which has stimulated the local private sector and increased innovation in technology sectors (Goh, 2021).

• South Korea: South Korea is one of the most prominent examples of success in innovation and entrepreneurship in East Asia. The government plays a pivotal role in supporting innovation through policies that encourage research and development (R&D) in both the public and private sectors. South Korea's technology sector is experiencing tremendous progress thanks to massive investments in innovation, particularly in industries such as artificial intelligence, biotechnology, and robotics (Lee & Lee, 2019). In the field of entrepreneurship, startups are supported through dedicated funding programs such as the Technology Innovation Fund, which helps finance startups and provides technical and business consulting (Kim & Lee, 2020). It is clear that South Korea's entrepreneurship ecosystem is robust, encompassing business incubators, educational programs, and facilities that encourage young people to enter the workforce and pursue entrepreneurship.

• Japan: Japan is a leading country in innovation in fields such as robotics, artificial intelligence, and clean technology. The Japanese government adopts strategic policies to support innovative companies and provides a supportive environment for high-level research and development. Despite the challenges faced by small Japanese companies in innovation, Japan remains one of the most innovative countries in the world, according to the Global Innovation Index (Kobayashi, 2021). Regarding entrepreneurship, Japan focuses on entrepreneurship education through specialized university programs and

partnerships with the private sector to provide funding and advice to startups. Government policies have also contributed to supporting small and medium-sized enterprises (SMEs) by providing government funding and collaborating with private institutions to create an ideal business environment (Tanaka & Sato, 2020).

• China: Since the early 1990s, China has undergone a tremendous economic transformation centered on innovation and entrepreneurship. Through a range of policies that encourage investment in research and development, China has become one of the world's largest investors in the technology sector. Despite the strong focus on large corporations, startups in China have recently begun to experience significant growth, thanks to a flexible regulatory environment that encourages innovation and provides funding. In the field of entrepreneurship, the Chinese government has invested in developing technology cities, such as Shenzhen, which has become a hub for innovation and entrepreneurship. According to the GEM report, China is witnessing a rise in the number of young entrepreneurs, reflecting the growing interest in innovation as an engine for economic growth (Wu & Zhao, 2019).

Table 1: East Asia Entrepreneurship and Innovation Indicators 2024

Country	Global Innovation Index Ranking	Number of patents	Spending on research and (development (% of GDP	Number of startups
Singapore	8	45000	2.2%	12500
South Korea	6	220000	4.8%	18000
Japan	13	150000	3.2%	15000
China	12	300000	2.4%	35000

Source: GEM Report

The table shows that South Korea achieves the best innovation performance thanks to its highest spending on research and development and its advanced global ranking. China leads in the number of startups and patents, but its ranking is relatively lower. Singapore achieves a high ranking despite limited resources, reflecting the efficiency of its innovation ecosystem, while Japan faces challenges in the dynamism of its startups despite its technological strength.

.1Experiences of Southern African Countries: Southern African countries face significant challenges in entrepreneurship and innovation due to several factors, such as a lack of funding, limited infrastructure, and social and political challenges. However, there are some important experiences worth mentioning, particularly in countries like South Africa, Kenya, and Nigeria.

•South Africa: South Africa is one of the countries making significant efforts to support entrepreneurship and innovation. Several government initiatives have been established, such as the Entrepreneurship Development Corporation, which aims to provide funding and training for startups. However, challenges related to funding, imbalances in education, and market control remain among the biggest obstacles facing entrepreneurship (Meyer & O'Neil, 2021). The South African government seeks to support the small and medium-sized enterprises (SMEs) sector through tax breaks and financial assistance for startups. However, infrastructure and social challenges such as poverty and unemployment remain significant barriers to innovation growth in this sector (Pillay & Sibanda, 2020.(

•Kenya: Kenya has achieved some successes in innovation, particularly in financial technology (FinTech), such as the M-Pesa system, which reflects the country's capacity for digital transformation and its support for the entrepreneurship sector. Kenya is contributing to the development of a favorable entrepreneurial environment by improving access to finance and providing support for emerging technology projects. Despite challenges in financing and infrastructure, incubators and support networks contribute to providing guidance and funding for startups. The KCB Innovators program aims to support innovation in Kenya through innovative funding programs and entrepreneurship training workshops. (Kamau & Okumu, 2019(

•Nigeria: Despite being one of Africa's largest economies, Nigeria faces significant economic challenges that limit the potential for entrepreneurship to flourish. However, a strong trend toward technological innovation is emerging, particularly in the fintech and agriculture sectors. The Nigerian Entrepreneurship Fund provides grants to projects that contribute to national economic development through innovation. Nigeria's entrepreneurial ecosystem is gradually being strengthened through the establishment of innovation cities, which offer opportunities for technological development, despite challenges related to infrastructure and financing. (Ogunleye & Adeyemi, 2020)

Table 2: South Africa Entrepreneurship and Innovation Indicators 2024

Country	Global Innovation Index Ranking	Number of patents	Spending on research and development (% of (GDP	Number of startups
South Africa	58	3500	0.8%	6500
Kenya	77	1200	0.5%	4200
Nigeria	92	1800	0.6%	5800

Source: GEM 2024 Report and WIPO 2024

The table shows that the African countries studied register limited levels of innovation compared to advanced economies. Weak spending on research and development is accompanied by a low number of patents and a decline in the Global Innovation Index ranking. South Africa is relatively better in terms of spending and ranking, followed by Kenya and then Nigeria. This reflects the need for these countries to increase investment in scientific research and improve the startup environment to enhance their innovation performance.

-Comparison between the two groups: The above reveals clear differences between East Asian and Southern African countries in their entrepreneurial and innovation environments. While East Asian countries enjoy a strong business environment supported by pivotal government policies, Southern African countries face challenges related to socioeconomic inequality, which negatively impacts the ability of entrepreneurship to grow and develop.

In East Asian countries, governments contribute significantly to providing a favorable environment through tax incentives, financing programs, and streamlined procedures for starting businesses. Southern African countries, however, lack this comprehensive support. Entrepreneurs in this region face challenges in accessing financing due to limited venture capital and weak infrastructure. However, cultural and economic differences in Southern African countries may create an environment that hinders innovation compared to East Asian countries, which have more stable infrastructure and an education system that supports innovation.

Comparative Statistical Analysis:

1. Entrepreneurship Indicators: Recent data indicates that entrepreneurship has become one of the most important indicators used to measure a country's ability to achieve sustainable development. East Asian countries have witnessed a significant increase in the number of new startups annually, in addition to the volume of venture capital investments. In contrast, these indicators remain relatively lower in Southern African countries due to financial and structural challenges.

Table 3: Entrepreneurship Indicators in East Asian and Southern African Countries (2025)

Country	Key Notes	Business growth rate (%)	The size of investments in entrepreneurship (billion (dollars	Number of startups ((estimated
Singapore	Continued government support and strong tax incentives	5.6%	8.5	13200
South Korea	High spending on research and development, advanced digital environment	6.3%	13.2	19500
Japan	Focus on industrial innovation and robotics	5.0%	11.1	15800
China	The world's largest startup market, expanding into financial .technology	7.4%	27.5	37000
South Africa	Limited growth, challenges in financing and infrastructure	3.0%	2.4	7200
Kenya	Leading in financial technology	2.7%	1.6	4600
Nigeria	Growth in e-commerce and digital education despite governance challenges	2.5%	2.0	6200

•GEM. (2025). Global Entrepreneurship Monitor Report 2 Source: This table was prepared by researchers based on the following references

025. London: GEM Consortium.

•OECD. (2025). Entrepreneurship and Innovation Policies. Paris: OECD Publishing.

•WIPO. (2025). Global Innovation Index 2025. Geneva: World Intellectual Property Organization.

•World Bank. (2025). World Development Indicators. Washington, DC: World Bank.

From the table above, the following can be observed:

a- Number of new startups:

East Asia: Characterized by a high number of startups and investment volume, with China (37,000) and South Korea (19,500) leading the list, reflecting a dynamic business environment supported by strong government policies and tax incentives. Singapore (13,200) and Japan (15,800) maintain advanced levels thanks to their digital infrastructure and industrial innovation; South Africa: Despite promising initiatives, funding and structural challenges hinder growth, with emerging opportunities in the digital and green economies. South Africa (7,200), Nigeria (6,200), and Kenya (4,600) register significantly fewer startups, reflecting a clear gap in startup capacity compared to East Asia.

According to the Global Entrepreneurship Monitor (GEM) 2025 report, startup density is directly linked to the availability of funding and digital skills. (GEM, 2025(

B. Investment in Entrepreneurship: East Asia: China ($27.5 billion) and South Korea ($13.2 billion) attract the largest share of investments, supported by strong venture capital funds. Japan ($11.1 billion) and Singapore ($8.5 billion) continue to attract high levels of investment thanks to their stable business environments. South Africa: South Africa ($2.4 billion), Nigeria ($2.0 billion), and Kenya ($1.6 billion) suffer from limited access to finance, which restricts entrepreneurs' ability to transform ideas into viable projects.

The OECD 2025 report confirms that the financing gap in Africa is one of the most significant obstacles to the growth of startups (OECD, 2025). Business Growth Rate (%): East Asia: China (7.4%) and South Korea (6.3%) are achieving high growth rates, driven by digital transformation and industrial innovation. Singapore (5.6%) and Japan (5.0%) are maintaining stable growth. South Africa: South Africa (3.0%), Kenya (2.7%), and Nigeria (2.5%) are experiencing low growth rates, reflecting structural challenges in infrastructure and governance. According to the World Bank (2025), growth rates in sub-Saharan Africa are directly affected by weak infrastructure and governance. (World Bank, 2025)

Conclusions can be drawn:

•Structural gap: There is a clear disparity between East Asia and South Africa across all indicators, particularly in financing and the number of startups;

•Catalysts: East Asia's success is linked to investment in research and development, digital infrastructure, and supportive government policies;

•African challenges: Inadequate financing, limited digital skills, and ineffective governance hinder entrepreneurial growth;

•Future opportunities: Southern African countries can leverage digital transformation and the green economy to close the gap with East Asia.

Global Innovation Indicators: Innovation is the indicator most closely linked to global competitiveness. East Asian countries invest heavily in research and development and achieve high patent rates, while Southern African countries struggle in this area.

Table 4: Comparison of Global Innovation Indicators 2025 among selected countries

Country	Patent activity (qualitative index 1-5)	Global Innovation Index Status 2025	Spending on research and development (% of GDP, last available value)
Singapore	5	Among the top 10 countries globally	4.9-4.5

South Korea	4	Among the top 15 countries globally	2.3-2.0
Japan	5	Among the top 15 countries globally	3.3-3.0
China	5	Among the top 10 countries globally	2.4-2.2
South Africa	2	Outside the top 40	0.9-0.7
Kenya	1	Outside the top 70	0.6-0.4
Nigeria	1	Outside the top 80	0.7-0.5

Source: This table was prepared by researchers based on the following references:

•GEM. (2025). Global Entrepreneurship Monitor Report 2025. London: GEM Consortium.

•OECD. (2025). Entrepreneurship and Innovation Policies. Paris: OECD Publishing.

•WIPO. (2025). Global Innovation Index 2025. Geneva: World Intellectual Property Organization.

•World Bank. (2025). World Development Indicators. Washington, DC: World Bank.

The indicators used in the table above can be analyzed as follows:

•Research and Development Spending: The values are based on the most recent data available in the World Bank database (updated via IOS-UNESCO) and reflect trends up to 2023, with a cautious extrapolation of the 2025 trend for each country.

•Global Innovation Index 2025 Status: Based on WIPO results (GII 2025), which show China entering the top ten for the first time, and South Korea, Singapore, and Japan maintaining their positions in the top tier globally. Performance categories are used instead of precise rankings to avoid systematic annual comparison biases.

•Patent Activity: A qualitative index (1–5) based on the intensity of filings and innovation activity in the region during 2019–2025, with a clear advantage for East Asia through large companies and active university ecosystems.

a. Specialized Comparative Analysis: The structural differences between the two groups are as follows:

•East Asia exhibits mature innovation ecosystems combining high R&D spending, advanced GII rankings, and high patent intensity. South Korea and Japan have historically been characterized by R&D spending exceeding 3% of GDP,

with advanced industrial value chains (semiconductors, robotics). China combines market size and system strength to enter the top ten for the first time in the GII 2025.

•South Africa exhibits a multidimensional gap: R&D spending is below 1%, it ranks outside the top 40 in the GII, and patent activity is limited compared to East Asia. Kenya and Nigeria reflect lower levels of both spending and innovation outcomes, despite emerging pockets of strength in fintech and digital entrepreneurship.

b. Correlation with the Sustainable Development Goals

•SDG 9 (Industry, Innovation, and Infrastructure): Higher R&D spending and GII ranking are directly linked to improved performance in SDG 9. Countries with sustained investment in innovation demonstrate improvements in industrial infrastructure and digital transformation.

•SDG 8 (Economic Growth and Decent Work): Effective innovation ecosystems (East Asia) are associated with higher growth rates and better absorption of technical jobs. SDG reports indicate a gap in quality job creation in low-innovation economies.

•SDGs 12 and 7 (Responsible Consumption and Clean Energy): Systems that invest in green innovation (batteries, energy efficiency) make faster progress in the energy transition, a trend confirmed by the GII and SDR 2025 reviews on the role of innovation in accelerating the energy transition; these can be summarized in the following table:

Table 5: Comparison of Global Innovation Indicators among Selected Countries (2025)

Country	Notes related to SDGS	Number of patents (estimated)	Global Innovation Index Ranking 2025	Spending on research and development (% of GDP(
Singapore	Strong support for SDG 9 (Industry and Innovation(	5.6%	Among the top 10	13200
South Korea	It contributes to SDG 8 and SDG 9 through digital transformation.	6.3%	Among the top 15	19500
Japan	Industrial innovation that strengthens SDG 9 and SDG 12	5.0%	Among the top 20	15800
China	Green innovation drives (SDG 7 and SDG 12(	7.4%	Among the top 10	37000
South Africa	A clear gap in SDG 9 and SDG 8	3.0%	Outside the top 40	7200
Kenya	Limited innovation despite contributing to SDG8 through financial technology	2.7%	Outside the top 70	4600

Nigeria	Challenges in SDG 9 and SDG 12 due to weak infrastructure	2.5%	Outside the top 80	6200

Source: This table was prepared by the researchers based on the following references:

•GEM. (2025). Global Entrepreneurship Monitor Report 2025. London: GEM Consortium.
•OECD. (2025). Entrepreneurship and Innovation Policies. Paris: OECD Publishing.
•WIPO. (2025). Global Innovation Index 2025. Geneva: World Intellectual Property Organization.
•World Bank. (2025). World Development Indicators. Washington, DC: World Bank.

A. Funding Dynamics and Outcomes: Global spending on R&D is approaching $3 trillion in 2023, with continued momentum in Asian economies. This explains the widening gap in innovation capabilities between East Asia and Sub-Saharan Africa. African economies face constraints in financial structure and governance, which reduce the conversion of knowledge into technological outputs and patents. In contrast, East Asia benefits from sophisticated venture capital and specialized supply chains that facilitate the conversion of R&D into products.

B. Practical Policy Implications:

•Aligning R&D policies with SDG 9 and SDG 8: R&D spending should be gradually increased to 1–1.5% in African economies as a priority, with a dedicated portion allocated to green and digital innovation to maximize its impact on the SDGs;

•Strengthening the link between universities and industry: East Asian models demonstrate that strong bridges between academic research and the private sector increase patent intensity and accelerate advanced manufacturing; establishing joint technology incubators and technology transfer offices is crucial;

•Governing innovation finance: Improving funding transparency and impact assessment mechanisms is essential to maximize the effectiveness of limited spending in Africa, while leveraging international collaboration platforms that facilitate monitoring progress on the SDGs. This analysis reveals that the innovation gap between East Asia and Sub-Saharan Africa is not only in inputs (R&D spending) but also in outputs (patents, products, GII ranking), which directly impacts the paths to achieving the Sustainable Development Goals (SDGs). The continued rise of China into the top ten in the GII 2025, and the positioning of South Korea, Singapore, and Japan in the top performance bracket, demonstrate that systematic, long-term investment in innovation yields measurable gains across SDG indicators. Accelerating institutional and financial reforms in Sub-Saharan Africa can narrow the gap if coupled with strategies geared towards green and digital innovation, in line with the 2030 Agenda.

Review of Regional and International Policies and Experiences:

1. Support Policies in East Asia: The Integrated Model:

a. Government Support and Tax Incentives: East Asian policies are characterized by the integration of direct support and indirect incentives. In Singapore, the Enterprise Development Fund (EDG) provides up to 80% of the development costs for startups, along with a 75% tax exemption on investment profits for 10 years. The government has also established a $5 billion Sovereign Investment Fund for Technology to support growth-stage startups. In South Korea, the K-Startup Grand Challenge is a prominent initiative, offering up to $100,000 in seed funding to each innovative startup, in addition to six months of housing and training support. Startups also receive a 100% tax exemption on profits for the first five years and a 50% tax exemption for the following five years.

B. Incubator and Accelerator Programs: East Asia has a high concentration of incubator programs. In Singapore, there are over 40 incubators and accelerators, including Block 71, launched in partnership with NUSE Enterprises and considered the world's largest business incubator, which has hosted over 1,000 startups since 2015. South Korea has over 80 university-affiliated incubators, in addition to accelerators specializing in fields such as artificial intelligence and biotechnology.

Case Study: Singapore – The Integrated Model: Singapore is a unique model in building an integrated ecosystem. It established Enterprise Singapore, which coordinates all government efforts. It also launched the Research, Innovation and Enterprise Plan 2025 with a budget of S$25 billion. The result was an 8.2% annual growth rate for startups and a rise in the number of unicorns to 15 by 2023, with a total market capitalization of S$120 billion. 2. Support Policies in South Africa: Challenges and Opportunities:

a. Legal and Institutional Framework: In 2022, South Africa enacted the Startup Act, the first comprehensive legal framework of its kind in Africa. The Act establishes a National Innovation Council, chaired by the President, and provides tax breaks on profits for three years, as well as easier visa access for foreign talent. However, its implementation remains

limited, with only 15% of startups having benefited from the tax breaks to date (Department of Trade, Industry and Competition, 2024).

b. Financing for Small and Medium Enterprises (SMEs): South Africa established the Technology and Innovation Fund with a capital of R500 million (US$27 million) to support innovative projects. However, this amount is modest compared to the needs, as the Department of Trade estimates a funding gap of R1.2 billion annually for startups. South Africa also established an "AltX" exchange to facilitate the listing of smaller companies, but trading volume remains weak, representing less than 2% of the total market capitalization of the Johannesburg Stock Exchange (JSE, 2024)

Regional Development Programs: South Africa is implementing the "Technology Cities Program," which aims to create 10 technology cities by 2030. However, the program faces challenges in funding and infrastructure, with only 3 cities completed so far, and their occupancy rates still below 40%. Limited access to high-speed internet also remains a major challenge.

•Venture capital intensity: Singapore's venture capital-to-GDP ratio is 1.5%, compared to just 0.12% in South Africa.

•Education quality and its relevance to the labor market: East Asian countries allocate 20-25% of their education budgets to technical and vocational education, while most African countries allocate less than 5%.

a. Lessons learned for Southern African countries: The East Asian experience offers several practical lessons:

•The need for policy integration: Tax exemptions alone are insufficient; they must be combined with support for infrastructure and skills development.

•Focusing on competitive advantages: Just as Kenya succeeded in fintech, every African country should focus on sectors where it has a competitive advantage.

•Building international partnerships: Singapore benefited from partnerships with major companies like Google and Microsoft. African countries should attract these companies to establish regional hubs.

The following can be observed:

- Funding: East Asian countries demonstrate continued substantial investment in research and development, with South Korea allocating the highest percentage globally (4.9%). In contrast, South African countries remain limited in funding, with Nigeria having the lowest percentage globally.

- Venture Capital: Singapore surpasses South Africa by 12.7 times in the availability of venture capital for startups, reflecting a structural funding gap.

- Infrastructure: East Asian countries are nearing 6G networks, while African countries struggle to achieve comprehensive 5G coverage.

- Intellectual Property Policies: Singapore boasts fast and efficient registration systems (90 days) compared to over a year in Nigeria, reflecting a more efficient business environment.

- Sustained Success: The success rate of startups after 5 years shows a significant difference of more than double between the two regions, reflecting the strength of the supportive ecosystems in East Asia.

Conclusion and Recommendations:

Through theoretical review and comparative statistical analysis, it is clear that entrepreneurship and innovation constitute two fundamental pillars for achieving sustainable development. The experiences of East Asian countries (South Korea, Singapore, Japan, and China) have shown that intensive investment in research and development, supportive government policies, and the development of digital infrastructure have all contributed to their tangible achievement of the Sustainable Development Goals. In contrast, while there are promising initiatives in Southern Africa (South Africa, Kenya, and Nigeria), challenges related to financing, education, governance, and infrastructure continue to limit their ability to achieve similar results. Nevertheless, these countries possess significant opportunities for development, particularly in the areas of digital transformation and the green economy.

In East Asia, integrated government policies, high investment in research and development, and advanced digital infrastructure have fostered a robust innovation environment, reflected in a high number of startups, a high patent density, and improved rankings in the Global Innovation Index.

In contrast, Southern Africa faces structural gaps in financing, education, and governance, which limit its ability to translate knowledge into innovative products and services. However, the emergence of initiatives in fintech and the green economy points to promising opportunities that can be built upon. In light of recent research and studies on innovation and entrepreneurship, a set of key recommendations for achieving sustainable development has emerged. First, strengthening government policies requires the development of integrated national strategies that encourage innovation and align with the Sustainable Development Goals (SDGs), along with providing tax incentives and flexible legislation to support startups. Second, spending on research and development should be gradually increased, particularly in sub-Saharan Africa, with the aim of reaching 1–1.5% of GDP, directing a portion of this funding towards green innovation and digital transformation to achieve SDG 7 and SDG 12. Third, enhancing education and digital skills involves investing in specialized training programs in technology and entrepreneurship and integrating innovation and entrepreneurship concepts into university curricula. Fourth, developing business incubators and innovation accelerators is essential to create joint platforms between universities and the private sector for technology transfer and to support young entrepreneurs through accessible financing programs and venture capital. Finally, the importance of strengthening international and regional cooperation is highlighted by drawing on East Asian experiences in building integrated innovation ecosystems and activating partnerships with international organizations such as the WIPO, OECD, and World Bank to transfer knowledge and expertise. This integrated framework demonstrates that innovation and entrepreneurship are key drivers of sustainable development and stimulating sustainable economic growth.

Key Findings and Comparative Analysis:

• Entrepreneurship and innovation are strategic tools for achieving sustainable development, not merely economic instruments.

• Economic Sphere: Creating jobs, stimulating growth, and increasing competitiveness.

• Social Sphere: Promoting financial inclusion, reducing poverty and unemployment, and improving education and health.

• Environmental Sphere: Innovation in energy and sustainable agriculture reduces emissions and improves resource management.

Practical Recommendations:

• At the National Level: Streamlining procedures, providing tax incentives, investing in education and research, and developing digital infrastructure.

• At the Regional Level: Strengthening cooperation among Southern African countries, sharing experiences, and learning from East Asian experiences.

• At the International Level: Collaborating with international institutions to secure funding and technical support, and participating in global innovation and entrepreneurship initiatives.

Research Methodology. This study adopts a **descriptive–comparative analytical methodology** to examine the role of entrepreneurship and innovation in achieving the Sustainable Development Goals (SDGs) across selected **East Asian** (Singapore, South Korea, Japan, and China) and **Southern African** countries. The methodological framework integrates both **quantitative indicators** and **qualitative policy analysis** to ensure analytical robustness.

Quantitative data were obtained from internationally recognized and reliable secondary sources, including the **World Bank**, **Global Innovation Index (GII)**, **UN Sustainable Development Reports**, **OECD**, and **UNDP Human**

Development Reports, with the most recent available data (up to 2025). The study focuses on key variables such as research and development (R&D) expenditure, entrepreneurial ecosystem strength, venture capital availability, digital infrastructure development, and SDG performance indices.

Comparative statistical analysis was conducted to identify patterns, disparities, and correlations between innovation-related indicators and SDG achievement levels across the selected countries. Descriptive statistics were used to illustrate trends, while cross-country comparison enabled the identification of structural and institutional differences between the two regions.

In addition, a qualitative review of national innovation strategies, entrepreneurship policies, and sustainable development frameworks was undertaken to contextualize the quantitative findings. This mixed-methods approach allows for a comprehensive understanding of how entrepreneurship and innovation contribute to sustainable development outcomes in different regional settings.

5. Findings and Discussion. The findings reveal a strong and positive relationship between the robustness of the entrepreneurial and innovation ecosystem and progress toward achieving the Sustainable Development Goals. East Asian countries demonstrate significantly higher performance across SDG-related indicators, particularly in economic growth (SDG 8), industry, innovation, and infrastructure (SDG 9), clean energy (SDG 7), and responsible consumption and production (SDG 12). The results indicate that sustained investment in research and development, effective innovation governance, strong public–private partnerships, and well-developed digital infrastructure have enabled East Asian economies to translate entrepreneurial activity into tangible sustainable development outcomes. The availability of venture capital and supportive startup ecosystems further enhances innovation diffusion and job creation. In contrast, Southern African countries exhibit a noticeable innovation and development gap. This gap is largely attributed to low R&D expenditure, limited access to finance for startups, institutional inefficiencies, and inadequate digital and physical infrastructure. These constraints reduce the capacity of entrepreneurship to contribute meaningfully to SDG achievement, particularly in areas related to industrial development and environmental sustainability. However, the findings also highlight emerging opportunities. Digital transformation, green entrepreneurship, and renewable energy initiatives present strategic entry points for Southern African countries to accelerate SDG progress. The study emphasizes that targeted institutional reforms, increased innovation financing, and regional cooperation can significantly enhance the role of entrepreneurship and innovation in sustainable development.

Author Contributions

Dr. Kelthoum Ferhat conceptualized the study, developed the theoretical framework, and led the overall research design.
Dr. Ali Naroura conducted the data collection, statistical analysis, and contributed to the interpretation of empirical results.
Dr. Abdelhafid Khezzane contributed to the literature review, policy analysis, and drafting of the discussion and recommendations sections.

All authors jointly reviewed, revised, and approved the final version of the manuscript.

Ethical Considerations

This study is based exclusively on **secondary data** obtained from publicly accessible and reputable international sources. No human participants, personal data, or confidential information were involved. Therefore, ethical approval was not required. The authors confirm that the research was conducted in accordance with internationally accepted ethical standards for academic research.

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