

## Driving Sustainable Development through Start-up Innovation: Challenges and Success Pathways

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### Abstract:

Startups play a crucial role in fostering innovation and promoting sustainable development by addressing critical economic, social, and environmental challenges. This study explores the role of startups in advancing the Sustainable Development Goals (SDGs) through innovative solutions and identifies factors that may impact the sustainability of development. The unique characteristics of startups, including their adoption of disruptive innovation theory, new product development, and adaptive business models, enable them to contribute meaningfully to SDG challenges related to poverty, inequality, climate change, environmental degradation, prosperity, peace, and justice. By leveraging secondary data, this research illuminates key themes surrounding sustainable innovation and business model evolution. The findings reveal that while startups possess significant potential for sustainable development, they encounter several barriers, such as financial constraints, regulatory challenges, and fluctuating market demands. To maximize their impact, enhanced collaboration, policy support, and effective risk management are essential. This paper offers practical insights for stakeholders to cultivate an ecosystem that fosters sustainable innovation through startups.

**Keywords:** start-ups; Sustainable Development Goals; innovation; sustainability; economic growth; environmental sustainability.

**Jel Classification Codes :** L26; O31; O35; Q01; M13.

### ملخص:

تلعب الشركات الناشئة دورًا حاسمًا في تعزيز الابتكار وتعزيز التنمية المستدامة من خلال معالجة التحديات الاقتصادية والاجتماعية والبيئية الهامة. حيث تشير هذه الدراسة إلى دور الشركات الناشئة في تعزيز أهداف التنمية المستدامة من خلال الحلول المبتكرة، مع تحديد العوامل التي قد تؤثر على إستدامة التنمية. إن الخصائص الفريدة للشركات الناشئة مثل تبني نظرية الابتكار التخريبية، تطوير المنتجات الجديدة، ونماذج الأعمال التكيفية، تمكنها من المساهمة بشكل هادف في تحقيق تحديات أهداف التنمية المستدامة المتعلقة بالفقر وعدم المساواة والمناخ وتدهور البيئة والازدهار والسلام والعدالة. من خلال الاستفادة من البيانات الثانوية، يسلط هذا البحث الضوء على الموضوعات الرئيسية المحيطة بالابتكار المستدام وتطور نماذج الأعمال. تكشف النتائج أنه في حين تمتلك الشركات الناشئة إمكانات كبيرة للتنمية المستدامة، إلا أنها تواجه حواجز عديدة مثل القيود المالية والتحديات التنظيمية ومتطلبات السوق المتغيرة. ولتعزيز تأثيرها، فإن تعزيز التعاون ودعم السياسات وإدارة المخاطر أمر ضروري. تقدم هذه الورقة رؤى عملية لأصحاب المصلحة لتنمية نظام بيئي يشجع الابتكار المستدام من خلال الشركات الناشئة.

**الكلمات المفتاح :** الشركات الناشئة؛ أهداف التنمية المستدامة؛ الابتكار؛ الإستدامة؛ النمو الإقتصادي؛ الإستدامة البيئية.  
**تصنيف JEL :** L26; O31; O35; Q01; M13.

## I. Introduction:

In recent years, there has been a significant global commitment to sustainable development as societies confront urgent challenges such as climate change, environmental degradation, inequality, and poverty. Governments and organizations worldwide are striving to achieve transformative outcomes that will enhance the well-being of both people and the planet. A pivotal moment in this global effort occurred in September 2015, when 193 world leaders adopted the 2030 Agenda for Sustainable Development. This comprehensive framework includes 17 Sustainable Development Goals (SDGs) and 169 targets that are to be realized by 2030. These goals are universally applicable, necessitating integrated and inclusive approaches that ensure no one is left behind (Fallah Shayan et al., 2022).

Realizing the SDGs is a monumental challenge that demands coordinated solutions to interconnected global issues. It requires substantial financial and non-financial investments, as well as innovative business models and products. Start-ups, with their emphasis on innovation and disruption, are uniquely positioned to address these societal and scientific challenges. They can contribute significantly to one or more SDGs through the development of new products and processes that better meet environmental, social, and health needs. These start-ups often challenge established corporations, thereby driving more sustainable societal outcomes. However, this potential can only be achieved if the start-ups operate under successful business models and effective strategic and policy frameworks (Karbassi, 2024).

Understanding how start-ups innovate to pursue the SDGs can help design support programs that effectively promote investment from venture capitalists, private equity firms, state-owned enterprises, and large corporations. This insight can also aid existing financial institutions in developing strategies for funding these firms. Several start-ups that focus on sustainability objectives related to one or more SDGs have gained traction in various contexts, yet they require a supportive environment to balance their diverse goals and objectives (UNECE, 2024). This research explores startups' capacity to tackle urgent global issues, including poverty, inequality, and climate change, by leveraging their distinctive characteristics and innovative strategies. While the potential for meaningful impact is significant, the study also identifies the barriers that startups face, underscoring the necessity for collaboration and supportive policies to enhance their contributions to the Sustainable Development Goals (SDGs). This investigation aims to clarify how an ecosystem can be cultivated to foster sustainable innovation through startups.

## Background and Significance:

The adoption of the 2030 Agenda for Sustainable Development by the United Nations General Assembly in 2015 marked a historic moment in global efforts to achieve sustainable growth. The agenda outlines strategies to address poverty and inequality, promote education and labor opportunities, ensure access to essential resources, and combat climate change and environmental degradation (UN, 2015).

Operationalizing the 2030 Agenda necessitates a series of domestication processes, including the establishment of national institutional frameworks and long-term planning. Countries are encouraged to conduct future-proof assessments, prioritize SDGs based on national needs, and create coherent and transparent targets, metrics, and indicators. These processes should be implemented locally, fostering innovative agendas and mechanisms to address future challenges while advancing sustainable development (Weiland et al., 2021).

Start-ups, characterized by their innovative focus on products, services, and business models, operate at early stages in various markets. They often drive disruptive innovations that address market inefficiencies hindering growth and socio-economic development. Over the past three decades, extensive research on start-ups and entrepreneurship across management science, strategic management, economics, and public policy has highlighted that start-up success depends on multiple interacting factors.

The role of entrepreneurship in economic growth has been a significant theme in economic development literature, particularly since the 1973 oil crisis. Policymakers often view entrepreneurship as a universal solution for unemployment and wealth creation. This paper explores the systemic evolution of entrepreneurship in the 21st century and its role in addressing societal challenges, focusing on the distinct contribution of start-ups towards achieving the SDGs (Meyer & De Jongh, 2018).

## I.1 Purpose and Scope:

The primary aim of this study is to explore the multifaceted role of start-ups in advancing the UN's SDGs agenda. The research investigates how start-ups innovate and develop solutions to challenges related to the SDGs, the barriers they encounter in this process, and the contextual factors that enable their success. The research questions guiding this study are:

1. What innovations do start-ups develop to address sustainability challenges related to the SDGs?
2. What challenges do start-ups face while innovating for the SDGs?
3. What contextual factors contribute to the success of start-ups in addressing the challenges of innovating for the SDGs?

The analysis employs a thematic approach, highlighting various themes associated with the research questions. The study contributes to understanding the distinctive role of start-ups in addressing sustainability challenges, corroborating existing knowledge, and uncovering new aspects. While start-ups are adept at developing affordable solutions to stay-in-business challenges, they also address more complex technological and systemic changes through collaboration with other actors. This research underscores the importance of such collaborations and adds to the existing body of knowledge on innovating for sustainability.

## II. Overview of Sustainable Development Goals (SDGs):

The Sustainable Development Goals (SDGs) represent an ambitious agenda aimed at fostering a peaceful, sustainable, and prosperous world by 2030. The 17 goals encompass a wide range of complex economic, environmental, and social challenges, including the eradication of poverty and hunger, the promotion of health and education, gender equality, access to clean water and sanitation, sustainable energy, economic growth, and climate action (UNECE, 2024).

The SDGs, adopted in September 2015 at the United Nations headquarters, succeeded the Millennium Development Goals (MDGs) and apply universally, requiring the involvement of all sectors of society, including governments, the private sector, civil society, and other stakeholders. The agenda emphasizes that ending poverty must be coupled with strategies to enhance health and education, reduce inequality, and spur economic growth, all within the context of environmental protection (UN, 2024).

Successful implementation of the SDGs depends on a new global partnership characterized by collective responsibility and shared commitment. This partnership must be inclusive, involving various actors in mobilizing financial resources, facilitating technology transfer, and providing knowledge and innovative solutions.

Between 2016 and 2017, UN member states undertook a development phase to refine the SDGs, targets, and indicators. The High-level Political Forum on Sustainable Development (HLPF) and the UN General Assembly's SDGs Summit have since reviewed progress and institutional arrangements related to the SDGs.

### II.1 Definition and Framework:

The SDGs encompass 17 universal goals, and 169 specific targets outlined in the 2030 Agenda for Sustainable Development. Countries are encouraged to develop national frameworks to achieve these goals. Although various studies have examined SDG interactions, there is limited understanding of how macro-level interactions impact national frameworks (UN, 2024).

The SDGs aim to achieve broad social, economic, and environmental objectives. Social outcomes include access to clean water (SDG 6) and strong institutions (SDG 16). Economic goals focus on sustainable growth and decent work (SDG 8), while environmental targets address climate change (SDG 13), marine resources (SDG 14), and terrestrial ecosystems (SDG 15). The interconnectivity of the SDGs means that improvements in one area can positively impact others,

though trade-offs and negative interactions may occur. Countries must assess their national circumstances to identify key interactions and design effective frameworks for achieving the SDGs.

## **II.2 Importance of SDGs in Global Development:**

Since the adoption of the SDGs in 2015, development agencies and national governments have been working to address various economic, social, and environmental challenges. Targets have been set for reducing poverty, improving health and education, and ensuring sustainability. Innovative technologies and practices are being developed and scaled up to achieve these goals, though progress remains uneven across regions (Fallah Shayan et al., 2022).

Some SDGs, such as those related to food security, nutrition, and access to sanitation, are at risk of falling short globally by 2030. The COVID-19 pandemic has further exacerbated these challenges, disproportionately affecting poorer countries and highlighting disparities in vaccine distribution. This pandemic has intensified issues such as poverty, food insecurity, and educational disruption, underscoring the need for continued and enhanced efforts to achieve the SDGs.

## **II.3 Start-ups and Sustainable Development:**

### **II.3.1 Definition and Characteristics of Start-ups:**

According to Tödtling and Wanzenböck (2003), Start-ups are typically defined as newly established businesses that have not yet achieved an established status. The term is commonly associated with technology ventures and high-risk startups often funded by venture capital. However, there is no universal definition for start-ups, and their scope can range from local enterprises to global players. For this study, start-ups are defined as newly founded businesses that are less than five years old.

Start-ups are distinguished by their high level of uncertainty. They often require substantial upfront investment despite a lack of reliable information about market conditions, product offerings, and competitive landscapes. This uncertainty is exacerbated by the "valley of death," a phase where ventures face significant challenges in generating revenue after initial funding. Research by Gorman and Sahlman (1989) indicates that approximately 50% of start-ups fail during this stage. For tech start-ups, the complexity and demand for specialized skills further heighten this uncertainty.

Start-ups play a critical role in the socio-economic landscape. They contribute new capabilities and resources, which can disrupt established firms and drive technological and competitive innovation. At the national level, entrepreneurship can introduce new competencies and capabilities from different regions, creating opportunities and challenges for existing firms. The entry of new firms can either complement established companies or lead to processes of competence destruction.

Despite their potential, start-ups face numerous challenges throughout their lifecycle. These challenges span from initial formation to potential closure or bankruptcy. The business lifecycle includes the stages of pre-firm and firm formation, growth, stagnation, or decline, and eventual closure. The nature of these challenges varies based on whether the firms are conventional or extraordinary, and the timeframes for addressing these issues are crucial for their survival and success.

### **II.3.2 Contribution of Start-ups to Sustainable Development Goals:**

#### **II.3.2.1 *Economic and Social Impact:***

Start-ups are instrumental in revitalizing both rural and urban economies through job creation, skill development, and community empowerment. Rural start-ups, in particular, play a critical role in addressing SDG 8 (Decent Work and Economic Growth) by promoting economic resilience and improving the quality of life in underserved areas (Priya & Mohanasundari, 2024).

Furthermore, start-ups in developing countries, such as India, are recognized for their ability to drive socio-economic development by generating employment and fostering entrepreneurship (Sreenivasan & Suresh, 2023).

### ***II.3.2.2 Innovative Solutions for Sustainability:***

One of the most significant contributions of start-ups to sustainable development is their capacity to innovate. They often develop eco-friendly products and services that address SDG targets such as clean energy (SDG 7), sustainable agriculture (SDG 2), and waste management (SDG 12) (Böttcher et al., 2023). Examples include sustainability tech start-ups (STS) that leverage technology to create innovative solutions to pressing environmental challenges, thereby driving both revenue growth and sustainability (Kannan et al., 2023).

### ***II.3.2.3 Social Impact Assessment:***

Start-ups have developed frameworks like Prosper to assess and report their contributions to SDGs. Such frameworks empower start-ups to align their business objectives with sustainability goals, enabling them to track and improve their social impact (Gionfriddo & Piccaluga, 2024). Social impact assessments not only improve transparency but also help start-ups overcome sustainability barriers and better communicate their contributions to investors and stakeholders.

## **II.3.3 Key Factors Influencing Start-up Success in Achieving SDGs:**

### ***II.3.3.1 Business Models and Resilience:***

The success of start-ups in achieving SDGs is heavily dependent on the design and implementation of sustainable business models. Start-ups must balance economic, social, and environmental objectives to create long-term value (Christodoulou et al., 2024). Resilience and adaptability are key attributes that enable start-ups to maintain a competitive advantage while pursuing sustainability goals. Digital business models, which are increasingly prevalent, provide a platform for start-ups to integrate sustainability into their operations while remaining flexible in a rapidly changing business environment (Böttcher et al., 2023).

### ***II.3.3.2 External Support and Entrepreneurial Motivation:***

Government policies, technological advancements, and market orientation significantly influence the performance and sustainability of start-ups. Support from government initiatives, such as India's Startup India program, provides start-ups with the resources and opportunities needed to thrive ("Green initiatives of Indian start-ups to achieve sustainability", 2023). Entrepreneurial motivation, often driven by a desire to make a positive social impact, is another key factor shaping the success of start-ups in achieving SDGs (Hartati et al., 2024).

### ***II.3.3.3 Challenges and Risk Management:***

Start-ups face numerous challenges in achieving sustainability, including resource constraints, market volatility, and customer engagement. Effective risk management and the adoption of eco-friendly technologies are essential for navigating these challenges (Hota et al., 2024). Virtual collaboration and strategic marketing can help start-ups mitigate external challenges and enhance their performance in the long term (Hota et al., 2024).

## **II.3.4 Linking Start-ups to SDGs:**

The 2030 Agenda for Sustainable Development, adopted by the United Nations in 2015, outlines 17 Sustainable Development Goals (SDGs) aimed at creating a more socially just, environmentally sustainable, and economically prosperous global community. These goals address critical global challenges such as poverty, inequality, climate change, environmental degradation, peace, and justice.

Since the adoption of the SDGs, they have been integrated into global political agendas and various initiatives. However, there is ongoing debate about the SDGs' effectiveness in addressing existing inequalities and unsustainable trends. To achieve the SDGs, it is crucial to involve a wide range of stakeholders and adopt a more inclusive understanding of development.

Start-ups have the potential to contribute significantly to the achievement of SDGs. Initiatives such as the UN's "Earth to Paris" and The Start-Up SDG Acceleration Initiative, launched in September 2017, aim to align investment covenants with SDG targets. Additionally, the UNCTAD's Africa II Policy Brief (2018) highlights how start-ups can contribute to sustainable infrastructure development, urbanization, and sustainable energy.

National efforts, such as South Korea's "Comprehensive Plan of Promoting Start-ups" (2014), aim to create inclusive innovation ecosystems. This includes establishing social innovation funds, supporting vulnerable communities, and fostering joint ventures between start-ups and non-profit organizations.

By aligning their activities with sustainability concerns and the SDGs, start-ups can contribute to reducing negative impacts and promoting innovative solutions. Analyzing successful start-ups in the SDGs domains can reveal factors contributing to their innovative value and commercial viability, offering insights into new ways of engaging with the SDGs and shifting business paradigms.

#### **II.3.4.1 Challenges in Aligning Start-ups with SDGs:**

##### **II.3.4.1.1 Assessment and Reporting Challenges:**

Despite their contributions to SDGs, many start-ups struggle with assessing and reporting their impact due to the lack of tailored frameworks. Tools like Prosper help bridge this gap, but there remains a need for user-friendly, scalable frameworks to assess the social and environmental impact of start-ups (Gionfriddo & Piccaluga, 2024). Additionally, many start-ups are more focused on financial goals than on environmental or social outcomes, highlighting a need for greater awareness of SDG engagement (Di Vaio et al., 2022).

##### **II.3.4.1.2 Financial and Resource Constraints:**

Resource limitations, particularly financial constraints, pose a significant barrier to start-ups' ability to integrate sustainability into their operations. Many start-ups, especially those in developing economies, lack access to the capital needed to invest in sustainable technologies and practices (Abbas & Liu, 2021). This issue was exacerbated by the COVID-19 pandemic, which further hindered progress toward SDGs, particularly in low- and middle-income countries (Stevenson, 2023).

##### **II.3.4.1.3 Market and Human Resource Challenges:**

Market dynamics and the need for skilled human resources present additional challenges for start-ups striving to achieve SDGs. Start-ups must adapt to changing customer demands and evolving market conditions while maintaining their commitment to sustainability (Imricsko, 2024). Additionally, start-ups often struggle to implement effective human resource practices that align with sustainability goals (Priyanka et al., 2023).

Generally, Start-ups play a crucial role in advancing Sustainable Development Goals by fostering innovation, driving economic growth, and addressing environmental and social challenges. Their success in achieving SDGs, however, is contingent upon several factors, including the design of sustainable business models, access to external support, and effective risk management. Despite the challenges, start-ups have the potential to make significant contributions to sustainable development, provided they receive adequate support from governments, investors, and other stakeholders.

Addressing the barriers that hinder start-ups' alignment with SDGs—such as resource constraints, complex assessment frameworks, and market challenges—will be essential for maximizing their impact. As start-ups continue to innovate and adapt to changing global conditions, their role in achieving the SDGs will remain critical for creating a more sustainable future.

### **III. Innovation in Start-ups for SDGs:**

Innovation is a key driver for new markets and solutions, addressing unmet needs and creating opportunities. Start-ups, with their inherent flexibility and culture of innovation, are well-positioned to contribute to the SDGs through both technological and social innovations.

#### **III.1 Technological Innovations:**

Technological innovations are critical for advancing the SDGs. Start-ups often introduce new products, services, or technologies that can have a significant impact on various aspects of life. The digitalization of economic activities has facilitated the emergence of numerous entrepreneurs and innovators. Technological innovations can include advancements in products and services, production processes, management systems, and distribution methods.

Understanding how technological innovations can be leveraged to achieve measurable socio-economic and environmental impacts is essential for the SDGs. The Oslo Manual by the OECD provides a framework for assessing technological innovations, which can be supported by public resources and research grants. Technological innovations should be evaluated for their potential to contribute to the SDGs, addressing health, environmental, technical, and economic goals.

#### **III.2 Social Innovations:**

Social innovations involve new strategies, concepts, and organizations that address social needs and challenges. These innovations can include new forms of social entrepreneurship, changes in behavior, and alterations in stakeholder interactions. Social innovations can address issues such as violence prevention, social security, and community well-being.

For instance, social innovations can involve new approaches to prevent violence or abuse, leveraging technology and community engagement. Analyzing the factors influencing social innovations can reveal barriers and supportive elements, guiding efforts to foster a more secure and equitable society.

Generally, start-ups possess the potential to drive significant progress towards the SDGs through both technological and social innovations. By addressing the challenges and opportunities inherent in their development, start-ups can play a crucial role in creating a sustainable and inclusive future.

### **IV. Challenges Faced by Start-ups in Contributing to SDGs:**

Start-ups, lauded for their innovative capabilities, encounter unique challenges in their efforts to contribute to the Sustainable Development Goals (SDGs). These challenges primarily revolve around funding, financial constraints, regulatory hurdles, and policy barriers.

#### **IV.1 Funding and Financial Constraints:**

Funding is a critical issue for start-ups aiming to contribute to SDGs. Start-ups typically depend on external funding sources, primarily from private investors. However, many start-ups focus on innovative solutions for underserved populations or neglected issues, which often do not align with the interests of conventional commercial investors. For instance, in Africa, only 25 out of 300 start-ups secure equity investment. This disparity underscores the importance of grants from public donors, philanthropic foundations, and non-profit organizations, which have unfortunately become scarcer over the past decade.

Before achieving operational sustainability or positive cash flow, start-ups often rely on grants or concessional loans to cover immediate operational expenses, such as salaries and overhead costs. Upon reaching a more stable financial position, start-ups seek equity funding, which does not require repayment, or service loans, which entail interest payments, to support further development, including piloting, scaling, and replication of their solutions. Currently, there is a notable absence of intermediary vehicles that facilitate this continuum of funding for public donors. For example, while sectors like pharmaceuticals benefit from dedicated funding mechanisms such as the Global Alliance for TB Drug Development, similar structures are lacking in agriculture, sanitation, or education.

The lack of standardized financial vehicles and an unsuitable legal environment further complicate co-investment efforts by development finance actors. Additionally, start-ups face regulatory and policy-related challenges, particularly in developing countries where national policies often prioritize attracting Foreign Direct Investment (FDI) over fostering domestic investment. For instance, only a few countries, such as the Philippines and South Africa, offer tax incentives for domestic investors. Furthermore, regulations concerning interest rate ceilings often set limits too low for affordable microfinance, thereby excluding micro-loans as a viable option for start-ups.

## **IV.2 Regulatory and Policy Challenges:**

Regulatory and policy challenges also pose significant barriers for start-ups contributing to the SDGs. Compliance with national and international regulations, including product safety and quality standards, often results in substantial administrative costs and time-consuming processes. The inconsistency of regulations across different countries—where some have stricter laws and enforcement than others—impedes international expansion for start-ups. Additionally, regulations that do not accommodate new and innovative solutions, such as emerging food products that may not align with existing nutritional labeling regulations, can stifle innovation. Some developed countries impose stringent import duties and tariffs on products from poorer or developing nations, counteracting the Nairobi Plan of Action's goal of fair trade for small enterprises in these regions.

Addressing these regulatory challenges requires a multifaceted approach, including efforts to collaborate with governments to align start-ups with public policies. Governmental initiatives often focus on established firms or large corporations, making public-private partnerships a potential avenue for overcoming regulatory hurdles. Additionally, reducing unnecessary regulatory compliance costs, providing financial services, and streamlining the regulatory process could support start-ups in navigating these challenges. However, these solutions require active participation from both the private and public sectors.

## **V. Success Factors for Start-ups in Achieving SDGs:**

Recognizing that businesses are not isolated entities; start-ups have increasingly embraced the value of collaborations and partnerships. Engaging with various stakeholders, including NGOs, NPOs, CSOs, and corporate entities, offers numerous advantages such as knowledge-sharing, market-entry, legitimacy enhancement, and access to funding, which collectively improve survival rates and revenue forecasts.

### **V.1 Collaborations and Partnerships:**

Partnerships with organizations in the education sector, NGOs, or CSOs can significantly benefit start-ups focused on SDGs. For example, collaborations with NGOs or CSOs facilitate access to low-income communities, while partnerships with entities in the education sector help address relevant audiences. These collaborations also enable pooling of knowledge about legislation and challenges, thereby strengthening the start-up's business model. Case studies from Colombia, South Africa, India, and the Philippines illustrate how start-ups providing responsible energy solutions, educational platforms, and health solutions have leveraged partnerships to enter markets and secure financial grants, thereby mitigating risk.

Such partnerships should be more broadly considered by start-ups aiming to contribute to SDGs. Balancing profit-maximizing objectives with social responsibility requires a clear business philosophy and ongoing employee training. Additionally, having a diverse management team with varied backgrounds enhances the survival rate of start-ups focusing on SDGs.

## V.2 Community Engagement and Empowerment:

Community engagement is vital for inclusive social innovation, which necessitates involving local citizens and organizations in the design and implementation of solutions tailored to local needs. Social innovation should be developed "with" rather than merely "for" citizens to ensure relevance, acceptance, and positive outcomes. Innovations imposed on communities without active engagement may lead to disempowerment or exacerbate unintended consequences.

A dual dynamic of engagement and disengagement exists between local citizens and social innovations. Local engagement in co-creating social innovations occurs within broader actor networks, knowledge arenas, and specific sociopolitical contexts, which may involve knowledge co-creation or prioritize global knowledge frameworks. Disengagement may result from global inequalities in knowledge systems and the capacity of citizens to participate in these practices.

Moreover, social innovations must be assessed for their local impacts to avoid misleading conclusions about their effectiveness. Engaging local actors in the innovation process is crucial for addressing community-specific issues and ensuring sustainable and relevant outcomes.

## VI. Case Studies and Best Practices:

Innovation and entrepreneurship have increasingly been recognized as pivotal elements in sustainable and inclusive development strategies, particularly with respect to poverty alleviation. The introduction of innovative products and services to the market is seen as a potent strategy for reducing poverty and fostering sustainable economic development. Start-ups, as a primary source of innovation and economic growth, play a crucial role, particularly in developing countries. Despite their potential, there is still a notable lack of comprehensive understanding regarding start-ups' dynamics and their impact on economic growth, as well as the policy responses necessary to support them effectively. This paper aims to bridge this gap through a large-scale longitudinal study conducted in a developing country, analyzing business start-ups registered over a one-year period. This rich dataset allows for an in-depth investigation into the start-ups' structures, dynamics, and their growing economic role, as well as the factors influencing their performance.

### VI.1 The Role of Start-Ups in Achieving Sustainable Development Goals (SDGs):

Over recent years, start-ups and entrepreneurial ventures have increasingly been acknowledged for their contributions to achieving the United Nations Sustainable Development Goals (SDGs). Start-ups can significantly impact various SDGs through innovation, job creation, and improved efficiency. The following case studies exemplify how start-ups can align with and advance specific SDGs:

1. **Ace Agri Co. Ltd.:** Based in the Philippines, Ace Agri Co. Ltd. has developed a non-toxic agricultural biological product containing *Bacillus thuringiensis*, targeting pests that affect high-value agricultural products. This innovation contributes to SDG 2 (Zero Hunger) by enhancing agricultural productivity, thereby increasing food availability, affordability, and access, which is crucial in Southeast Asia and other developing regions plagued by pest-induced crop yield losses.
2. **Paladin Registry:** Initiated by Bayer AG and Syngenta AG, Paladin Registry creates a global online registry for approved pesticides and fertilizers. With market presence in 130 countries, this initiative supports SDG 15 (Life on Land) by tracking pesticide and fertilizer usage, identifying high-risk areas, and collaborating with countries to improve regulations and risk management, thus promoting sustainable land use.
3. **Magic Green Rent a Car:** A China-based car rental start-up, Magic green rent a car focuses on environmentally friendly practices through proprietary big data technology. Their approach to zero-landfill and zero-air-condition cleaning processes supports SDG 12 (Responsible Consumption and Production) by monitoring emissions and preventing over-claiming, thus promoting sustainable consumption practices.

## VII. Conclusion and Future Directions:

The study highlights the significant role of start-ups in advancing the SDGs, particularly in low- and middle-income countries (LMICs). By focusing on innovative business models, the research identifies common challenges faced by start-ups in achieving SDGs and outlines essential success factors. Analyzing start-ups across various sectors and regions provides insights into their impact on SDGs and offers a conceptual framework for future research.

### VII.1 Summary of Key Findings:

The research underscores that start-ups with a focus on SDG-related innovations encounter specific challenges that may differ from those faced by start-ups pursuing non-SDG innovations. The study reveals that these challenges are often unique to the SDG context, emphasizing the need for tailored solutions. Key findings include:

- **Innovation Challenges:** Start-ups face significant obstacles, including financial viability, regulatory disruptions, and market access issues. These challenges vary depending on the start-up's engagement with SDGs.
- **Success Factors:** Effective start-ups often exhibit sustainable business models, transparency, market-oriented technology development, stakeholder support, and favorable regulatory frameworks.

### VII.2 Recommendations for Policy and Practice:

To harness the potential of start-ups as catalysts for SDGs, the following recommendations are proposed for governments, international agencies, and large businesses:

1. **Mobilizing Risk Capital:** Address the perceived risk barriers to start-up financing by promoting public and private investment partnerships. Emphasize early-stage investments in small and growing businesses (SGBs) in low- to middle-income markets, particularly in African and South Asian contexts.
2. **Establishing National and City Start-Up Policies:** Develop dedicated policy frameworks to encourage the growth of locally founded start-ups that address SDG challenges. Review and enhance the international competitiveness of start-up ecosystems in emerging markets.
3. **Supporting New Business Models:** Foster programs that support innovative business models and technology adoption. Address gaps in large-scale grant funding and explore targeted support for entrepreneurs and corporates focusing on SDG challenges.
4. **Redefining Procurement Policies:** Expand procurement practices to include small and informal firms in community-level supply chains. Consider establishing a 'Global Alliance for Local Procurement' to support this process through pooled funding and a dedicated secretariat.
5. **Implementing SDG Innovation Challenges:** Use high-stakes prize contests to stimulate the development of commercially viable solutions for specific SDG problems, addressing gaps in policy frameworks and financial instruments.

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