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Role of Entrepreneurship in Sustainable Chemistry

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ARTICLE INFO	ABSTRACT
<p>Article history</p>	<p>Entrepreneurship plays a crucial role in sustainable development across multiple dimensions with respect to technology development, social innovation, inclusive business and economic growth, consumer behavior, market transformation, different policies and advocacy. Entrepreneurs drive innovation in green technologies such as renewable energy, water purification systems, waste management solutions, and energy-efficient products. These innovations help reduce environmental impact and promote sustainable resource use. There are the different aspects of entrepreneurship mentioned above which leads to decrease in the evil impact on environment and results in maintenance of sustainable chemistry which is the green chemistry or which involve the concept of green chemistry.</p>
<p>Keywords</p> <p>Entrepreneurship, green chemistry, sustainable development.</p>	

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Introduction

New concepts and ideas are necessary for green and sustainable chemistry, but it is also critical that they should be put into practice, such as in industrial settings, where start-ups are crucial. However, these endeavours may encounter difficulties that go beyond a brilliant scientific notion. There are several start-ups, discussing their contributions to green and sustainable chemistry, opportunities they face, and challenges they must overcome.

Sustainable chemistry refers to the design, development, and application of chemical products and processes that minimize the use and generation of hazardous substances. Sustainable chemistry seeks to minimize the environmental footprint of chemical processes and products. This includes reducing energy consumption, greenhouse gas emissions, and waste generation. It focuses on optimizing the use of raw materials, water, and energy throughout the lifespan of chemical products. This involves designing processes that use renewable feedstocks and improve overall efficiency. Sustainable chemistry prioritizes the development of chemicals that are safe for human health and the environment. This includes assessing and mitigating potential risks associated with chemical substances. It encourages innovation in chemical design and manufacturing processes to create greener alternatives to traditional chemicals and technologies. Sustainable chemistry aims to demonstrate economic feasibility and competitiveness, showing that environmentally friendly practices can also be financially rewarding. Sustainable chemistry plays a crucial role in achieving global sustainability goals by promoting cleaner production methods, reducing pollution, and contributing to a more sustainable future for industries and societies worldwide.

Entrepreneurs are often at the forefront of identifying and addressing sustainability challenges through new products, services, and business models. They create opportunities for sustainable consumption and production by offering alternatives that are resource-efficient, environmentally friendly, or socially responsible. Successful sustainable entrepreneurs can catalyze market transformations by demonstrating the viability and profitability of sustainable practices, thereby influencing industry norms and consumer behavior.

Entrepreneurship plays a pivotal role in advancing sustainable chemistry by fostering innovation, driving technological advancements, and promoting responsible business practices. Entrepreneurs in this field are catalysts for change, developing novel solutions that minimize environmental impact, enhance resource efficiency, and prioritize the use of renewable materials. They bridge the gap between scientific discovery and practical application, bringing sustainable products and processes to market. Additionally, these entrepreneurs often collaborate across disciplines, leveraging partnerships to scale sustainable innovations and influence industry standards. By embracing entrepreneurship, stakeholders can accelerate the transition to a more sustainable chemical industry, shaping a future where economic growth aligns with environmental stewardship.

Entrepreneurs develop business models based on circular economy principles, where products are designed for durability, recyclability, and reuse. This reduces waste and conserves resources.

Entrepreneurs influence consumer behavior by offering sustainable products and services that meet environmental and ethical standards. This creates demand for greener alternatives and shifts market norms towards sustainability.

Entrepreneurial ventures often set benchmarks for corporate responsibility and sustainability practices, influencing larger corporations to adopt similar initiatives. Entrepreneurship generates employment opportunities, particularly in emerging sectors like renewable energy, eco-tourism, and sustainable agriculture. This contributes to economic growth and poverty reduction. Sustainable entrepreneurs build resilient businesses that can adapt to environmental and social changes, reducing vulnerabilities and enhancing long-term economic stability.

Entrepreneurs often advocate for supportive policies and regulatory frameworks that incentivize sustainable practices and innovation. They collaborate with governments, NGOs, and other stakeholders

to shape policy agendas.

Entrepreneurs raise public awareness about environmental and social issues, mobilizing support for sustainable development goals and fostering a culture of sustainability. Innovation drives the development of new technologies that can enhance resource efficiency, reduce environmental impact, and improve overall sustainability. For example, innovations in renewable energy, waste management, and sustainable agriculture contribute to environmental sustainability. Entrepreneurs in sustainable chemistry develop novel technologies, processes, and products that reduce environmental impact. They often pioneer breakthroughs in renewable energy sources, eco-friendly materials, and waste reduction techniques.

Entrepreneurs introduce sustainable products to the market, influencing consumer behavior and industry standards. By demonstrating the viability and benefits of sustainable chemistry, they drive demand for greener alternatives and encourage broader adoption across sectors.

Entrepreneurial ventures in sustainable chemistry often collaborate with research institutions, government agencies, and other businesses to leverage expertise, resources, and funding. These partnerships accelerate innovation and facilitate the scaling of sustainable solutions.

Entrepreneurs can advocate for policies that support sustainable chemistry initiatives, such as tax incentives for green technologies or regulations that encourage ecofriendly practices. Their advocacy can contribute to a supportive regulatory environment that promotes sustainability.

Sustainable chemistry entrepreneurship creates opportunities for economic growth by tapping into growing markets for environmentally friendly products and services. It fosters job creation, attracts investment in clean technologies, and enhances competitiveness in global markets.

Entrepreneurs in sustainable chemistry play a crucial role in raising awareness about environmental issues and promoting the importance of sustainable practices. They educate stakeholders, including consumers, businesses, and policymakers, about the benefits of adopting green technologies and reducing ecological footprint.

Through innovation, entrepreneurship, and management practices, industries can reduce carbon footprints, conserve natural resources, and protect ecosystems. These practices can promote inclusive growth, improve livelihoods, and enhance quality of life by addressing social challenges and promoting equitable access to opportunities.

Sustainable practices can lead to long-term economic growth by fostering innovation, reducing costs, and creating new markets for sustainable products and services. Sustainability refers to an entity's ability to endure or persist over an extended period of time. In the business world, sustainability is dictated by a number of factors, including climate change, environmental degradation, and social, physical, and natural resources. These factors impact present and future economic, environmental, and social stability. For instance, the depletion of natural resources jeopardizes the ability of present and future generations to produce goods and sustain necessary growth. Consequently, the World Commission on Environment and Development (WCED) defined sustainability as the capacity to "meet present needs without compromising the ability of future generations to meet their own needs." In order to achieve sustainability, market, governmental, and corporate activity must interact. For instance, by establishing legislative frameworks and environmental standards, the government plays a crucial role in promoting environmental sustainability. These regulations contribute to the preservation of productive inputs and the standard of living in the business sector, which fosters innovation that lowers production costs and increases competitiveness. Environmental rules have an impact on corporate decisions about raw materials, energy use, and trash disposal, for instance, which improves ecological consequences (1,3,4,5,8).

The interaction between human activity and the environment is exemplified by sustainable development. It lists the different ways to keep developing over time. It is the ideal growth rate that establishes the allowable real per capita income growth rate without depleting the inventories of national capital

assets or the natural environment. By preserving the environment and eradicating poverty, sustainable development seeks to advance peace and prosperity. In this situation, it is imperative that the policy and practical interventions incorporate a range of factors, including who is responsible for the costs and losses incurred in many activities and whose interests and values are given priority in each choice that is made. In its literal sense, sustainable development means that advancements made today should not come at the expense of those made tomorrow (7).

Methodology:

Based on the entrepreneurship and concept of green chemistry involved in entrepreneurship mentioned in introduction part of this paper, then how the entrepreneurship plays a significant role in the sustainable chemistry are explained in the result and discussion part of this paper.

Result and Discussion:

Chemicals are employed in almost every business in the world today, and they are an essential element of daily living. Together with the food and beverage industry, machinery, and equipment, chemicals and chemical products are among the leading manufacturing sectors in the world. According to the American Chemistry Council's most recent projections, the output of chemicals is expected to increase significantly in emerging nations until 2021 while growing more slowly in wealthy nations.

Chemicals are used by millions of people worldwide to treat illnesses, preserve food-producing plants, and lead better, healthier lives. If not properly handled, they could also pose a risk to the environment, human health, and safety (6).

Significance of chemical industries is that it provides large number of useful product which makes the standard of living simple, easier and comfortable. Everything we use such as food, medicine, clothing, mobile devices has roots in chemistry. However, the industry also poses environmental challenges, including hazardous materials and pollution. Sustainable chemistry aims to improve resource efficiency while meeting human needs for chemical products and services. It is all about balancing economic growth with environmental responsibility (8). Entrepreneurs play a critical role in bridging the gap between scientific discoveries and practical solutions. They scale up innovations and transform lab-scale research into market-ready products. It create jobs and entrepreneurial ventures, lead to new employment opportunities. It also drive innovation and innovations become real-world solutions. Promote sustainability that is entrepreneurs focus on environmentally friendly practices (10). Climate change and plastic pollution demand urgent action. For this entrepreneurs can turn sustainable chemical technologies into commercial successes. By commercializing innovations, the environmental, economic, and geopolitical stability are observed. Sustainable chemistry needs entrepreneurial spirit to turn ideas into impactful realities (7,8,9,10, 11).

Conclusion:

Entrepreneurship, and effective management are integral to achieving sustainable development goals by driving technological advancement, fostering new business models, and integrating sustainability into organizational practices and strategies. They are essential for creating a resilient and prosperous future for all. Through encouraging innovation, advancing social inclusion, influencing consumer behaviour, boosting economic growth, and pushing for legislative changes, entrepreneurship propels sustainable development. Through their innovative ideas that strike a balance between social justice, economic prosperity, and environmental stewardship, entrepreneurs are essential to creating a sustainable future.

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