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## **Green Entrepreneurship: Contemporary Issues on Technology and Innovation**

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### **Abstract:**

*As Environment is degrading, the need for protecting the environment is increasing. Today many industries are concentrating on conversion of products and its process into Green to utilise the limited resources effectively and to protect the environment. The Green products are one of the best sources to protect the environment. This Article deals with the importance of technology to produce Green products and the need of innovation to survival in this current era. Indeed, the development of green industries is very essential. In spite of its strengths, it has been facing many barriers with the advancements in Technology to implement in its operation. In this article, it is identified as, Technological barriers are in lack of knowledge about Green Technology, accessing Green Technology, budget constraints in importing the green technology, Suitability of Green Technology for available resources and very few Industries are able to gain Synergies. In Innovations, the problems are novel innovations restricted to niche segments, budget constraints in accessing global markets, lack of research and development, Lack of Government support in promoting innovations and technology etc. Many industries follow green initiatives in their process but very fewer industries convert their complete processes into green.*

### **1. Introduction**

Green Entrepreneurship refers to all activities and processes which will protect the environment or production of goods without causing any kind of pollution to the environment like creating wealth out of waste, Effective utilization of natural resources, Treating hazardous waste materials, Energy generation, Recycling, Agri products etc.

Indeed, there is an essential difference between the way of looking at green entrepreneurship in developed countries and developing countries. Developed countries and international organizations tend to put more emphasis on the term 'green' and on market opportunities while developing countries tend to focus more on the term 'entrepreneurship' and on market needs. Chinese and Indian entrepreneurs, for example, are genuinely transforming the emerging economies by developing affordable products that meet the needs of the poor, but still, many processes need to become greener (Khanna2011).

Green Entrepreneurs think about the present as well as future and their protection. Daft (2008: 154) defines "a sustainable business as an economic development that generates wealth and meets the needs of the current generation while saving the environment for future generations."

Their main aim is to protect the environment rather than making profits. They concentrate on utilising resources effectively and produce an efficient product. We can divide these industries into two types, one who produce eco-friendly products and the others who follow an eco-friendly process in the production of a product. Both will be contributing to the protection of the environment.

Green Enterprises can be divided into green manufacturing, green services and others. Green manufacturing includes green manufacturing like recycling industries, agro based products, renewable energy like solar and wind industries, eco bikes and cars, waste management industries etc. There are many new kinds industries like Sustainable hotels, Sustainable stationery, Sustainable wood, Sustainable jewellery, Sustainable supply chain management, Sustainable business process re-engineering, Sustainable mutual funds, Green HRM, Green finance, Green marketing etc.

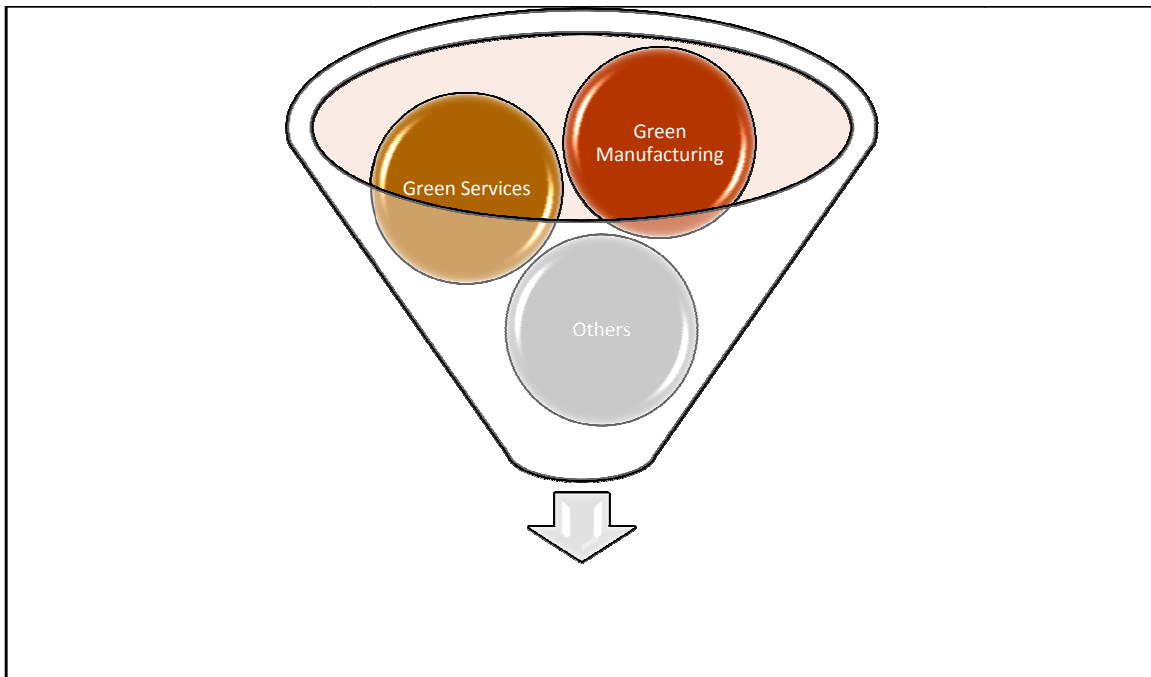


Figure 1: Green Enterprises

## 2. Defining Green Entrepreneurs

Bennett (1991), Berle (1991) and Blue (1990) first adopted the notions 'environmental entrepreneur', 'green entrepreneur', 'eco-entrepreneur' and 'ecopreneur' in their studies. Based on the review of such literature, the basic characteristics of green entrepreneurs are:

1. Green entrepreneurs undertake new business opportunities and ventures, which usually involve a very high risk. The outcome of these business ventures is often unpredictable.
2. Green entrepreneurs are intrinsically motivated. Their business activities have an overall positive effect on the natural environment and on economic sustainability, and consciously aim at ensuring a more sustainable future.
3. Green entrepreneurs often struggle to survive in the contemporary era.

Green Entrepreneurs are increasing and finding a new process, products Increasing their innovations, technology etc. But still, many industries are not successful.

In the present century, people are getting more concerned about the environment and the future consequences of ecological imbalance. Customers are showing interest to buy more of green and eco-friendly products. They are coming forward to contribute to saving the environment; especially millenia's contributed more to eco-friendly products.

This paper concentrates on the following concepts,



Figure 2: The Focused concepts in Green entrepreneurship.

## 3. Green Products

Green products are basically durable, nonhazardous and nontoxic, recycled, reusable, eco-friendly packaging, energy generation, Agri products, which are produced without any preservatives. Green Products can be in different forms and kinds it cannot be defined in specific terms. These products will concentrate more on the protection of the environment. The process used in the production of these products also will be green or eco-friendly.

#### 4. Green Technology

The term "technology" refers to the application of knowledge for practical purposes.

The field of "green technology" encompasses a continuously evolving group of methods and materials, from techniques for generating energy to non-toxic cleaning products.

#### 5. Examples of Green Technology Subject Areas

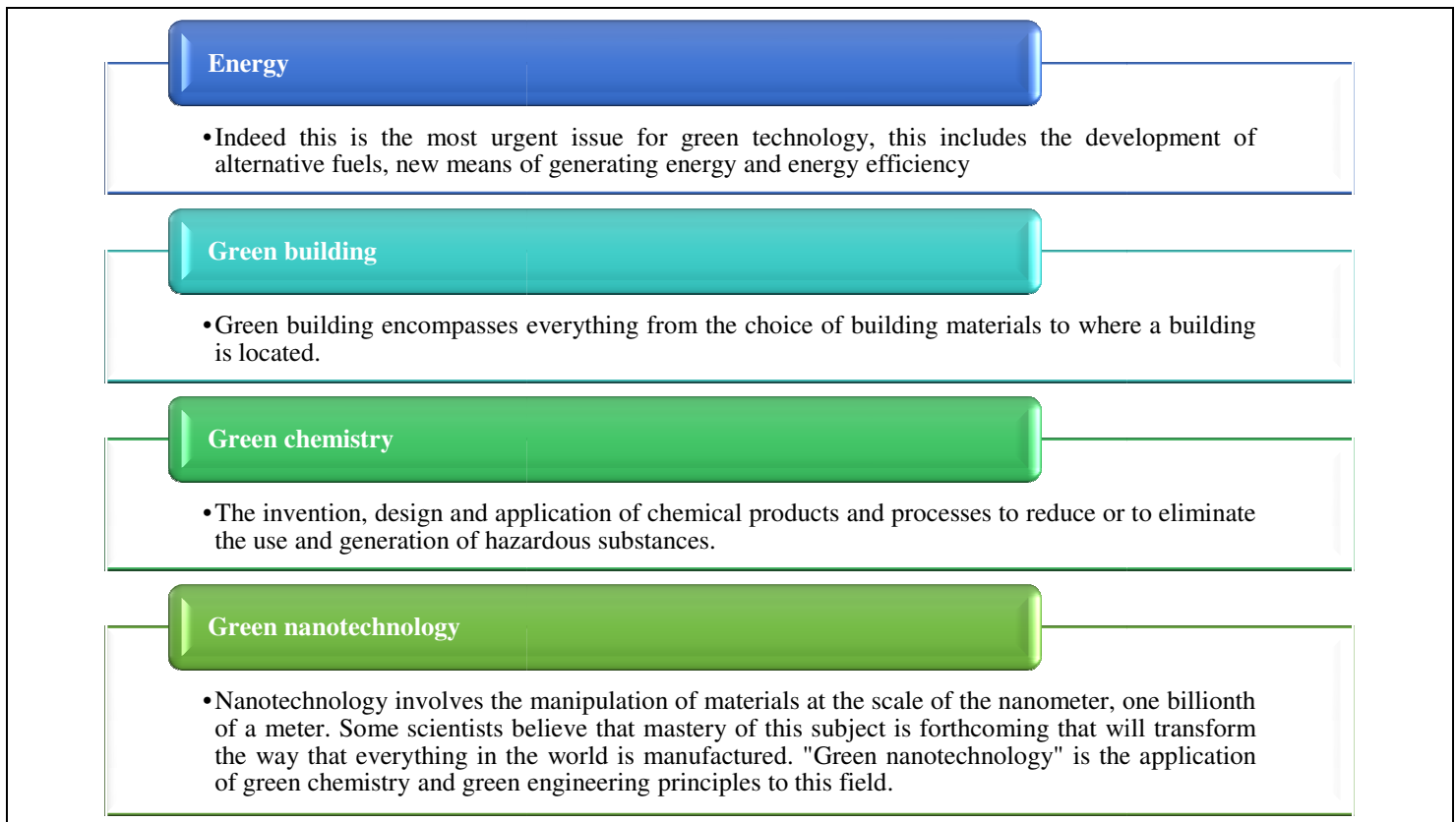


Figure 3

In 1995 NASA asked the questions that can it possible to grow lettuce on Mars? From this question, a technology was born.

Green technology enables higher productivity and profits. Green Technology refers to the technology which produces goods without causing pollution to the environment, not releasing any toxic materials to the environment, conserves natural resources, and reduces Greenhouse gases. Green Technology concentrates on finding the alternative resources of technology which will make the production flexible. Green Technology should be sustainable, source reduction, viable, innovative.

Today all the countries are going green and finding new processes which will make their productions green. But the development of Green Technology depends on the research and developments and more capital investments in this field.

#### 6. Green Innovations

Green Innovations are the tools, techniques, methods or processes which will help in producing goods without causing any negative effect on the environment. Green Innovations offers new technologies and are able to create new markets and new trends in the society. These Innovations not only concentrates about the present but also on the future.

Since, Green Innovations increases which will be able to create the sustainable economy and can make the future secure. These innovations need to be backed with capital, government support, more research and development centres and suitable environment for the creation of sustainable future.

##### 6.1. Observations on Green technology and Innovations

###### 6.1.1. Green Innovation

Innovation is the central issue in economic prosperity.

-Michael porter

The following are the observations based on empirical data on Technology and Innovation.

Volery (2002, p. 110), "Never before has there been such an opportunity and need for innovation that meets the needs of consumers without damaging the planet's natural resource base."

### 6.1.2. Sustainable Innovations

Sustainable innovations need to concentrate on the aspects like improving environmental Impact and commercial performance. Internal factors like cross-functional and intra-group cooperation, research and development (R&D) investments, and technical capabilities as the most important internal factors facilitating improved energy efficiency. It is found that it is difficult to maintain energy efficiency, gaining market attention and also concentrate on green innovations.(Gerstlberger, 2013)

### 6.1.3. Trends in Green Innovations

In developing countries, it might be difficult to implement green practices but in developed countries, many measures are needed to promote these green industries. Trends in green innovation are Electricity Access, Water Management, reducing emissions, Transport, Building energy efficiency, Agriculture. Patenting of green technologies creates limited access and they are not able to reach globally. It states that expanding the scope for low margin innovations, work creatively to face the new challenges, new business models and financial structures, technical knowledge, supportive structures.(Nathan, Sierra, & Allison)

### 6.1.4. Government Policies

Government policies support green innovations and simultaneously increase taxes on import of technology. Governments need to promote green innovations and encourage people to implement it. But the prices and taxes effect interest of the people in choosing new innovative technologies and importing them from other countries. To study this they constructed a hypothesis H1: prices related to innovations.H2: green innovations relative to non-green innovations. They found that nongreen technologies attract the investments and green technologies due to prices and lack of support from a government they tend to choose nongreen technologies.(Ley, Stucki, & Woerter, 2013)

Environmental innovation is different from other innovations the reasons are

(i) Develop new ideas, behaviour, products and processes, apply or introduce them. (ii) Contribute to a reduction of environmental burdens or to ecologically specified sustainability targets'. (Rennings, 2000)

The green innovations depend on consumers wish to pay higher prices for green products and internal strategies. Independent variables are Size, Performance, Training, Cooperation, openness, Tax deduction, Group. In this survey it has been proved that probability of green innovations has relied on firm's size. It concludes with the main aim of public policies would be to inform and support firms to reduce environmental footprint and to support innovation in a competitive edge.(Galia, Ingham, & PeKovic, 2015)

Environmental innovation involves improvement or introduction of sustainable products, processes, and practices. Large companies benefit from cost savings, but the small firms depend on the eco-innovations that benefit end consumers by gaining market advantages which increase the cost. They found that Environmental innovations as a highly important objective for the large firms, least for the medium and smaller have more involvement when compared to medium industries in Norway and Turkey as it is not the same in all other countries. Reduced materials usage and Efficient energy usage acts as a highly important objective.(Robinson & Stubberud, 2015)

## **7. Growth Synergy**

(Gurria, 2011)Opines that, there is a need for the good understanding of green growth synergies and support it with appropriate information. It needs some international data with some conceptual framework which makes clear sense to policy makers and public. The main features of green growth are the environment and resource productivity, economic and environmental assets, environmental quality of life, economic opportunities and policy responses.

## **8. Various Types of Innovations**

Green Innovation includes creation and commercialization, diffusion and adoption. Green innovations are the new methods to solve the environmental problems. The different types of innovations are

a) *Frontier innovation* has substantially increased a gap between developed countries and developing countries by holding 1500 patents in the United States.

b) *Green Based pyramid innovations* are innovations that meet poor consumer needs. They include formal and informal innovations. *Formal innovations* are public and private institutions and their partnerships. *Informal innovations* refer to local grass root inventors, largely through improvisation and experimentation. Prize funds are able to fill the gap of technologies and helps in promoting innovations.(Green Innovation and Industrial Policies).

Green innovation is different from general innovation where it needs to consider environmental benefits and economic benefits parallel with R&D, which helps in creation of new green jobs. International trade will increase the flow of technology, expands the markets, and also help in the improvement of developing and underdeveloped countries. International investors should expand their space and develop the markets. The main challenges are effective utilisation of resources, waste management, prices of other consumer goods, public involvement.

Green innovations are growing both in academia and practice it deals with innovations related to green products and services. Eco-innovations refer to the innovations which bring Quality life to people, with minimal use of natural resources and release of minimal toxic substances by Europe INNOVA. Green Innovations are difficult but there is a need for further research and comparison with other countries. (Tim Schiederig, 2012)

Innovation is a key to avoid environmental damage. Sustainable products are able to create a competitiveness and future success. There is a huge increase in the demand for eco-friendly products. This study compares small, medium, large businesses in 9 different

areas. The introduction of new regulations like Kyoto Protocol and Waste Electronics and Electrical Equipment Directive make the companies to rethink about the products and process to create new environmental friendly strategies/technologies. SME's are reluctant to eco-efficiency by equating green with expensive. Proponents of environmental innovation argue that pollution means inefficiency and green innovations can increase productivity as implemented by Environmental protection agency and 3M. Large firms look for financial benefits from improved efficiency while the small firms concentrate on the niche. SME's are able to take advantage because of flexibility. Large companies are able to create the new environmental trends and have an impact on small businesses that struggle with challenges due to competition. Shortage of time and money are the primary obstacles in environmental concerns. The time and money should be utilized effectively to create a competitive edge. Such a Value-driven Ecopreneurship and Market-driven Ecopreneurship stand in contrast with Compliance-based Ecopreneurship. Hence the change can be from regulations and consumer demands. Entrepreneurs should be able to identify opportunities that can be exploited is the main element. Networks that provide additional knowledge and resources to SME's are very important for environmental innovation. Collaborations is the key to capture huge markets. New alliances that take in start-ups with established firms are necessary. Large firms can produce different products but small firms can produce only few products as the overall energy saving is more in large companies. Cleaner technologies reduce waste and pollution as it is more desirable than recycling. (Robinson & Hans Anton Stubberud, 2013)

### 9. Observations on Green Technology

Green manufacturing needs to be developed by considering both economic benefits and environmental protection. Green technology is costly and it is difficult for companies to implement. Green technologies are also called environmental technologies and are defined as production equipment, methods and procedures, product designs, and product delivery mechanisms that conserve energy and natural resources, minimise environmental load of human activities, and protect the natural environment. They include hardware, such as Pollution control equipment, ecological measurement instrumentation, and cleaner Production technologies. They also include waste management practices and conservation-oriented work arrangements. They are preparing an Analytical Hierarchy Process (AHP) and an Analytical Network Process (ANP). AHP helps in decision making, overall goal. It moves from general to specific. ANP can handle different relationships and form a super matrix. It includes re-engineering, supply chain performance, logistics, and performance management systems. The operation of objectives can be classified into time, quality, cost, service, environmental impact and resource consumption. Synergy is a green technology which helps in various methods for development and control. (Congbo Lia, 2010)

### 10. Opportunities of Green SMEs

Green technology protects ecosystem and human health. It effectively utilizes the resources. Cradle to cradle design for fully recycled goods, source reduction as changing patterns of production and consumption, Innovation and Viability as the centre of economic activity around technologies and products creates new careers that truly protect the planet. Green technology areas are energy, building, Government, chemistry and engineering. The emerging green technology fields are green government, green chemistry and green nanotechnology. Scientists and researchers, Entrepreneurs need to invest more time in application and development of green technology. (Gupta, 2010)

There is a need to analyse the green technology ventures and how partnership plays a major role in mobilising resources. The green tech ventures must develop green technologies which are profitable, operational economic advantages and meets the market needs. To meet the multiple needs partnership diversity is the solution which can gain access to more heterogeneous resources which mobilises the resources. Innovations are necessary for ecological development which helps in archiving the objectives; long-term sustainability and adaptability. Partnerships will help in gaining more innovative technologies. It concludes with for the development of green ventures innovations and technology are absolutely necessary which can be easily achieved by partnership. (Meyskens & Carsrud, 2013).

### 11. Discussions

Green Innovations and Green Technology are difficult as it takes into consideration the protection of the environment for future and it takes a huge time for research and developments. There is a strong need to increase these kinds of Innovations and technologies to make the future secure. Over the world we will see the countries who are striving to create green economy, green governments. There are also many developments in green chemistry, green Nanotechnology, and green buildings etc. There is a need to increase in research and developments, training, government support, capital, availability of resources etc.

Countries need to exchange resources and technologies, limit the patents, promote these kind of technologies and attain partnerships between the countries which will make the exchange process easy decrease the export and import restrictions on green technology and innovations will reduce the pollutions and helps in creating a sustainable environment for future generations.

### 12. Recommendations

There is a need to focus on the development of Green SMEs in all the functions, specifically in technology and innovations. The following are the key issues from the researcher point of view to suggest.

- i. Research and Developments in this field are less and they face capital problems which are restricting the growth of Innovations.
- ii. Government supports these kinds of industries but they take a very long time for procedures, an issue of subsidies.
- iii. It is suggested that government agencies should focus on generating skilled labour that meets Green SMEs requirement.
- iv. The problems of import and export of Technology can be solved by increase in partnerships with other countries,

v. The government needs to decrease the duties imposed on import and export for the growth of these industries. These are hindering the development of green technologies and innovations. The processes which are followed from the past by ancestors are more green, flexible and cost effective when compared to the new processes and practices. If a green product is provided with efficient quality and at the affordable price, people will definitely support these kinds of products as they are ready to pay premium prices. Hence, there is a need to increase in green innovations and technologies which help in the growth of green Industries and building a green economy.

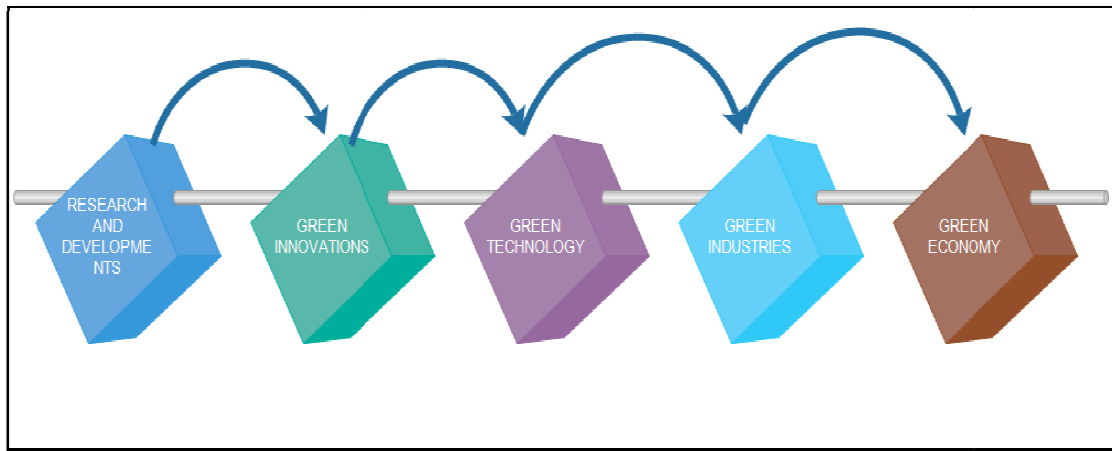


Figure 3: future scope in Green entrepreneurship

### 13. Conclusion

As whole world is aware of the benefits of sustainable future developments are increasing but there is a gap in the level of pollution created by these industries and the developments. This gap can only be filled by more of research and developments in green technology and innovations. Governments, Investors support to this kind of research as people are also aware and support these. More developments in this field will be able to create sustainable future.

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