Green Products in India as the Commitment towards SDGs: Initiatives, Prospects and Challenges

Arindam Chakrabarty[1#] & Uday Sankar Das[2]

[1]Assistant Professor, Department of Management, Rajiv Gandhi University (Central University), Rono Hills: Doimukh, Arunachal Pradesh – 791112 India.
Email: arindam.management@gmail.com arindam.chakrabarty@rgu.ac.in

[2]MBA Graduate (2016-18) from Rajiv Gandhi University (Central University) Rono Hills: Doimukh, Arunachal Pradesh – 791112. Email: udaysankar2011@gmail.com

[#] **First and Corresponding Author**

Abstract

The global population is ignited to achieve the seventeen-goal agenda as mutually agreed at Paris Climate Conference (COP21). All the member countries have committed to achieve UN-SDGs by 2030. The global communities are now at the cross roads where they are expected to develop and deliver high configuration products to solve the complex problems and at the same time the global fraternity is very much concerned on the environmental issues. It is difficult to undermine any of this conflicting criteria green services, green manufacturing etc. have become the ultimate resultant solution. In fact green product is indeed a philosophy where we aim to minimize the adverse effect on environment without compromising the aspirations towards development vector. It is alarming that the natural resources are decreasing day by day and the human societies and other living organization are on the verge of extension if we do not stop massive exploitation of virgin resources. The global community is thriving towards renewable and reversible resources. The concept of circular economy has been emerging across the globe. It is high time to study and understand the status and preparedness of developing nations like India towards adapting green culture in the production and consumption pattern. The spirit of sustainability has been given top priority in all facets of developmental model. This paper has studied the scope of green products its initiatives and inherent challenges in Indian context. The study is based on secondary information retrieved from various reliable sources. This study has also enlightened how the global leadership has been excelling to promote green product within the state and beyond. This research work has suggested the state could boost momentum to the green product movements in India using positive reinforcement model instead of confining to negative reinforcement connotations.

Keywords: Green Products, UN-SDGs, Renewable and reversible resources, Circular economy, Green Culture, Positive and Negative Reinforcement, India.

Introduction

The world has been creating new products generating new ideas and services to transform quality of life. We are thriving after higher orders of comfort, convenience and contentment. Rapid technological advancement and commitments to research and development activities have been boosting to manifest our inherent gratifications. New ideas are being generated which ignite to develop innovative products. There are various stages and phases of production where there is need of extensive utilization of resources like raw materials water fuel, energy and so on. As a result the success of each production system consumes various forms of virgin resources and unintentionally it has impacts on environment. Most of the resources which are exploited and used for the production process are irreversible in nature. If we can imagine a set of production system that can minimize the negative impacts on environment and the outcome of system can be partially regarded as green product. However, the ambit of green product is not confined within the production process, rather it is extended throughout its life span i.e. how the product has value added to the society and finally its disposal once it cease to function. During the entire process it generates and releases pollutants and other hazardous elements, heat, which essentially diminishes the ecological balance which stands in contrast with the 'Brundtland Commission Report' on sustainability which defines sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." (Chakrabarty, A. 2019)

1.1 Concept of Green product

The term green product is ambiguous and it came into existence with the acknowledgement of business towards their commitment to sustainability, environmental aspects and use of renewable resources. This phenomenon gave rise to the labeling of corporate terminologies to include green in the nomenclature and formulate green strategies, green management, green innovation and green products

978-1-7281-3007-1/19/$31.00 ©2019 IEEE

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

etc. in the industry as well as academia. However there is no single dictionary definition of these terms and it can be loosely used for any products that was created using green technology, with minimum carbon foot print or used recycled material and renewable resources, and somehow contributes towards circular economy. In case of single use products it must be biodegradable and must not leech any harmful chemical into the surrounding nature.

1.2 Global Commitments to SDGs

Ever since its inceptions in October 24, 1945; the United Nations has been constantly focused on the development and living standards of the global community. This intention led to the formulation of MDGs or Millennium Development Goals in the year 2000 after the UN Millennium summit. MDGs had eight primary goals which focused mostly on Human rights, provision of basic infrastructure and create on of Human capital. The goals were manifested by earmarking the following agenda as follows: *Goal 1: Eradication extreme poverty and hunger; Goal 2: Achieving universal primary education; Goal 3: Promoting gender equality and empower women; Goal 4: Reducing child mortality; Goal 5: Improvement of maternal health; Goal 6: Addressing HIV/AIDS, malaria, and other diseases; Goal 7: Ensuring environmental sustainability; Goal 8: Exploring a global partnership for development.* The successor to Millennium Development Goals is Sustainable Development Goals (SDGs) which was adopted in the year 2015 by the United Nations General Assembly. The SDGs have a 17 point development goal focusing on both human capital improvement, contribution towards sustainable practices and adoption and propagation of green technologies that need to be achieved by the year 2030. The 17 SDGs are outlined below: *Goal 1: No Poverty; Goal 2: Zero Hunger; Goal 3: Good Health and Well-being; Goal 4: Quality Education; Goal 5: Gender Equality; Goal 6: Clean Water and Sanitation; Goal 7: Affordable and Clean Energy; Goal 8: Decent Work and Economic Growth; Goal 9: Industry, Innovation, and Infrastructure; Goal 10: Reducing Inequality; Goal 11: Sustainable Cities and Communities; Goal 12: Responsible Consumption and Production; Goal 13: Climate Action; Goal 14: Life below Water; Goal 15: Life on Land; Goal 16: Peace, Justice, and Strong Institutions; Goal 17: Partnerships for the Goals.* These goals also focus on environmental justice and propagation of peace and equality, amongst the participant nations.

1.3 Emergence of Green Products as a corollary to SDG

Five of the Seventeen goals of SDG focus on environmental sustainability as the means of collective commitments of the global fraternity. These are *Goal 6: Clean water and sanitation; Goal 7: Affordable and clean energy; Goal 11: Sustainable cities and communities; Goal 12: Responsible consumption and production; Goal 13: Climate action*; While one *Goal 3: Good health and well-being* is indirectly linked for improvement of good health and wellbeing. Water till date remains the core need of agriculture production; 70% of available surface water is consumed via agriculture and irrigation globally and 40 % of this is consumed by the OECD countries (World Bank, July 2019). As climate change is becoming prominent in major cities across the globe that experiences severe drought and acute water crisis. A news report published by the British Broadcast Company (BBC) in 2018 highlighted that 11 major cities across the globe face drought and is nearing to zero-day. Two more cities i.e. Chennai in India and Johannesburg in South Africa have joined this list in 2019 where the local municipal governments have declared water emergency and restricted all non-essential water usage. With the rapid expansion of cities and human migration from rural to urban areas, cities are constantly burdened with the need to create sustainable and healthy living spaces that runs on clean energy produced from renewable resources. The 'United Nations Food and Agriculture Organization' points alarming problem of food loss which is due to unplanned food production, inefficient transportation and irresponsible consumption.

Region	**Food loss data from Production to retailing (KG/Year)**	**Food loss data at Consumer end (KG/Year)**
Latin America	198	24
Europe	187	94
North America and Oceania	181	115
North Africa, West and Central Asia	181	31
Industrialized Asia	165	70
Sub-Saharan Africa	159	7
South and Southeast Asia	115	13

Figure: Adapted from United Nations Food and Agriculture Organization

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

Forests are store house of bio diversity and cages deadly and infectious diseases away from urban masses. A report published by the Food and Agriculture Organization points out that deforestation is the major contributor towards emerging disease like 'Ebola' as similar pattern was also shown by the study done on microbiology by the seminal work of Afelt et.al 2018.
All these indicative facts and trends essentially converge to concentrate on creating and consuming green product / services. The world is passing through a vulnerable and deplorable condition as it is sacrificing the set of virgin resources in order to fulfill the greed of human comforts. The concept of circular economy is gaining momentum so that the people of today can gratify its present needs without causing much threat to the ecological balance. The UNSDGs have categorically pointed out the aspirations and commitments towards sustainable consumption and production. This has explored the essence and emergence of green product / service in our living kingdom.

2. Literature Review

Environmental issues took to the Centre stage as economic activities and industrialization gave rise to growth of highly populated cities in the emerging nations. A large number of organizations are willing to participate in what is called green manufacturing despite the hurdles, challenges and barriers to achieve the same. There is an attempt to understand and help formulate strategic decisions at both national and globally for propagation of green technology. **(Mittal et al. 2013).**

In attempt towards adoption of green technology, green supply chain management plays an important role. It not just helps the company differentiate itself from its competitors and contribute towards it environmental commitments but also stay ahead of the curve by improving its distribution performance and successfully improve its business. India will significantly improve its EPI ratings once the rest of the organizations move towards these green technology and reduce its carbon foot print. **(Dheeraj, N., & Vishal, N. 1992)**

Calculation of carbon foot print or using input-output analysis, it is assumed if India can be regarded as a pollution haven due to the increase of export activities. Despite the presumed and prevalent norms of pollution haven hypothesis regarding developing countries India has moved far beyond this indicated assumption. **(Dietzenbacher, E., & Mukhopadhyay, K. 2007).**

The formation of NGT or National Green Tribunal which became operational in the year 2011 has played a significant role in pollution reduction and disposal of the cases related to environmental offense. The body has also helped preserve flora fauna and forests as they directly came under its jurisdictions. Environmental justice became a norm after the formation of NGT. **(Shrotria, S. 2015)**

NGT is a body constituting of technical as well as judicial experts who are equipped with the necessary expertise in deciding the course of cases given the vested power. There is a wider impact of the possessed scientific knowledge and it contribution to the decision making process by the five benches of the green tribunal. **(Gill, G. N. 2016).**

National Green Tribunal Act 2010 in India not only played a significant role in the creation of the NGT as a specialized body and silenced the debate by exploring the composition of judicial process. **(Nain Gill, G. 2010).**

A study among 204 Indian youth consumers proposed the conceptual model of eco designed packaging material based on the framework of theory of reasoned action. The study also showed the intentions, purchase decisions and willingness to pay for a ecofriendly product based on the financial capacity of the consumer which in turn will reduce the adverse effects of packaging. **(Prakash, G., & Pathak, P. 2017).**

Raising pollution and increasing fuel prices are the main focus for governments across the globe. The use of fossil fuel for the production of electricity is the prime source of pollution. These are an urgent need for the hybridization of power grids and use of mix source of energy like solar, wind and other non-conventional sources. **(Jamel, M. S., et al. 2013).**

Green marketing is a modern phenomenon where most companies have rebranded their products and started to remarket them as green products or environmental friendly. There is an increase of business due to the such targeted approach as the concerned consumers are focused on directing their purchase decisions based on the environmental concern. **(Mishra, P., & Sharma, P. 2010).**

Renewable energy sources are the long-term solution provider to the long facing energy needs of the mankind and developing nations. Use to non-conventional sources has the potential to reduce the energy crisis of India. There will be a need to increase 3 to 4 times of the total energy needs consumed today. 33 % of India primary energy consumptions come from renewable sources. In the last decade India has aggressively focused on switching over to non-conventional sources**.**
(Kumar, et al. 2010).

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

Use of non-conventional sources also comes with a risk when calculated using the whole value chain of the energy cycle. The material used in production, labour used, and the procedures implemented in the energy storage accounts to this whole chain. This is a relatively new discipline and therefore careful evaluation is needed. **(Inhaber, H. 1979)**

The consequence of the Bhopal tragedy led to the strict implementation of environmental regulations and stringent measures for environmental cases, and environmental justice. Corruption, multilayered enforcement, political interference and lack of public participation has wreaked the whole process. **(Gill, G. (2013).**

PIL is welcomed by the victim class people who don't have the strength to bear the financial burdens of the judiciary. NGT has played a tremendous role in fulfilling the alternate need to environmental justice via the PIL procedure. **(Khandare, J. (2015).**

The NGT act 2010 states the polluters pay the price in track with the international environmental policy and sustainable development goals. The NGT plays an important role towards achieving these international roles. The Indian context with special reference to international standards and commitments are explored. **(Gill, G. N. (2014).**

The role of non-conventional oil is explored using the USA oil production data as a validation method. The study showed more than 10 % sustainable growth of non-conventional oil production is needed for the decline of conventional oil within the next decade. **(De Castro, et al. 2009)**

With the strategic shift from cleaner process to greener products, firms have the opportunity to gain strategic advantage through innovation allowing them to differentiate using green manufacturing. Products face an environmental burden through its entire life cycle. There is a lack of comprehensive study when it comes to the study of impact of environmental foot print of a product. **(Sdrolia, E., & Zarotiadis, G. 2019)**

3. Research Objectives

1. To study the scope and emergence of Green Products across the world with special reference to India.
2. To explore the initiatives, prospects and challenges for promoting Green Products in the country.

4. Research Methodology

The present study has been conceptualized reviewing various literatures, secondary information like policy reports, dissertation, project work, etc. The research papers were extensively collected from reliable sources. The policy documents like UN-SDGs were also consulted. The study has attempted to understand how India is poised to actively participate in the Green Product Market. To the commitments of building sustainable world, it is an endeavor of the researcher to enquire the prospective roles of India Incorporation so that, it could achieve the rapid socio economic transformation with the commitment and compliance to global green movement.

5. Analysis and Interpretations

5.1 Analysis – I

5.1.1 In the era of global commitments towards sustainable developments, the firms are gradually inclining towards offering green products. The focus of the community has been shifting towards responsible use of resources in the spirit of sustainable consumption and production so that we should preserve the resources for the future generations without compromising the needs of the present. The concept of circular economy has been emerged both in letters and spirit. The 9R framework for circular economy and over all sustainability propound by Potting, J., et al 2017 are canvased below

Smarter Product Use and Manufacturing	R0 Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
	R1 Rethink	Make product use more intense
	R2 Reduce	Increase efficiency in product manufacturing or use by consuming fewer natural resources and material
Extended life span of product and its parts	R3 Re-Use	Reuse by another consumer or discarded product which is still in good condition and fulfills its original function
	R4 Repair	Repair and maintenance of defective product so it can be used with its original function
	R5 Refurbish	Restore an old product and bring it up to date
	R6 Remanufacture	Use parts of discarded product in a new product with the same function
	R7 Repurpose	Use discarded product or its parts in a new product with a different function
Useful application of materials	R8 Recycle	Process material to obtain the same (high grade) or lower (low grade) quality
	R9 Recover	Incineration of material with energy recovery

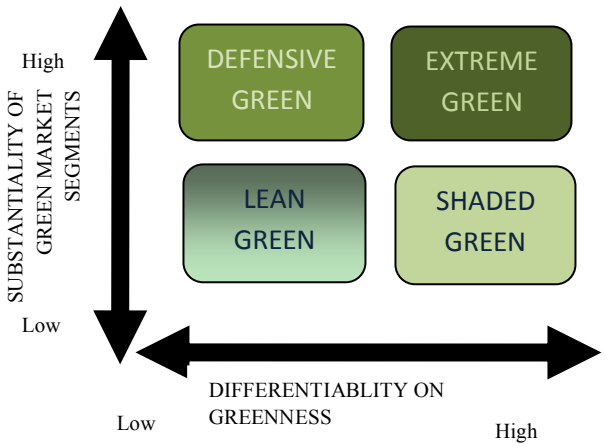
Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

Adapted from Potting, J., et al 2017

5.1.2 With the growing popularity of sustainability issues and the 9R framework, it is important to know what has been promoting the organizations to adopt Green Marketing Policy. From various literatures the following indications are observed namely

- The prospective organization seems to incorporate green marketing policy in order to capture an emerging opportunities for achieving three corporate objectives [Keller, 1987; Shearer, 1990]
- The intending firms feels they have moral responsibility and social obligations in order to adapt green items in the product basket [Davis, 1992; Freeman and Liedtka,1991; Keller,1987; McIntosh, 1990; Shearer, 1990]
- There are growing compliances to adhere to government legislations as far as the promotion of green product for ensuring the practice of sustainable production and consumption; on the contrary intra rivalry within the Industry compels the firm to take up Green projects in their product marketing policies [NAAG, 1990]
- The intending firms find it difficult and costlier to dispose the wastages of non-green products. The prohibiting dimension to ensure regular and abandoned supply of resource material for producing non green items. All these inhibiting propositions force the firms for thinking and absorbing greenness concept in their product portfolio management. [Azzone and Manzini, 1994;].

5.1.3 According to Green Marketing Mix Strategy (Ginsberg, J. M., & Bloom, P. N., 2004), four strategic orientations have been earmarked based on the commitments and compliance at various elements of marketing mix i.e. product, price, promotion, place popularly known as 4PS of marketing (Kotler, P. 1980). in terms of substantiality of green market segments (Y-axis) and corresponding differentiability on greenness (X-axis) compounded with high and low intensity level in both the matrix, green marketing strategy can be categorized into four entities 1.Lean Green Strategy 2.Shaded Green Strategy 3.Defensive Green Strategy 4.Extreme Green Strategy



Adapted from: Ginsberg, J. M., & Bloom, P. N. 2004

In 'Lean Green Strategy', the firm achieves the commitment towards greenness in their product development, design and manufacturing while in case of 'Defensive Green Strategy' the firm is posed to achieve desired level of competency by incorporating eco-friendly and greenness construct in their promotion along with the commitment towards product design and manufacturing. In 'Shaded Green Strategy' the firm is expected to augment green pricing along with their ecofriendly orientation towards product and promotion. The 'Extreme Green' is the ideal form of marketing strategy where the holistic commitments towards achieving green ness and sustainability among all the four elements of marketing mix i.e. product price promotion and distribution. The 4PS of marketing are to be adequately incorporated and coveted with the broad spectrum of green culture philosophy and practices.

Green Marketing Strategy				
4P's of Marketing	**Lean Green**	**Defensive Green**	**Shaded Green**	**Extreme Green**
Product	■	■	■	■
Promotion		■	■	■
Price			■	■
Place				■

5.1.4 The National Geographic Society and GlobeScan, a research consultancy major, jointly conduct a worldwide Tracking Survey on Consumer Choice and the Environment every year. The survey essentially identifies the extent of consumer awareness affinity, commitments and practices eco-friendly culture in the line of sustainable production and consumption. The survey attempts to rank consumers in the selected countries, how the consumer form the respective nations respond to the call of sustainable development.

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

A comparative analysis to understand how the consumers at the selected countries are behaving towards sustainable consumerism has been depicted below based on GREENDEX overall score.

Comparison of GREENDEX OVERALL SCORES: Consumers with Respective Countries – 2008 & 2014

GREENDEX 2008		Overall Rankings	GREENDEX 2014	
Country	Score		Country	Score
Brazil	58.6	1	India	61.4
India	58.0	2	China	57.5
China	55.2	3	South Korea	55.7
Mexico	52.7	4	Brazil	55.5
Hungary	51.7	5	Argentina	55.4
Russia	51.7	6	Mexico	55
Britain	48.2	7	Hungary	54.8
Germany	48.1	8	Russia	53.3
Spain	48.0	9	South Africa	52.2
Australia	47.8	10	Germany	51.3
Japan	47.4	11	Spain	51.3
France	46.5	12	Sweden	50.9
Canada	46.3	13	Australia	50.4
USA	42.4	14	Britain	49.5
		15	France	49
		16	Japan	48.4
		17	Canada	47.2
		18	USA	44.6

From this above figure, it is observed that the both the emerging economies in the Asian block grab the top positions in the GREENDEX overall score (2008 & 2014) i.e. India and China and South Korea where India and china had been consistent both in 2008 and 2014 ranking. It is surprising to see developed nations like USA, Canada and France has consistent low scores among the selected countries studied in the survey.

The superior score of India in this Index signifies that Indian consumers are more responsible and responsive to the call of sustainable environment. The study pointed out that the growing number of Indian consumers are showing their commitment in the Housing Sub-index where they are practicing responsible usage of freshwater and energy conservation by using normal water for washing clothes. The growing propensity for switching over to solar energy is another dimension of Indian consumers towards saving conventional energy.

According to GREENDEX 2012 report Indian consumers reportedly prefer to choose green products among the list of 17 countries under studies, however it is also observed that they are still in ambiguity and confusion about the core value proposition of the green product.

5.1.5 According to Dupont Green Living Survey: India 2014 on 'Consumer Awareness and Adoption of Bio based Products in India', the study was conducted among 1270 respondents spread over in 12 major Indian cities.

The study found that around 67% Indian consumers are well familiar with green products out of which around 69% belong to younger generation. The consumers prefer to purchase range of product category like garments, household, hygiene & personal care that ideally should be made of bio-based raw materials as it essentially enhances the desirability of green Products.

The survey also revealed that there are differentials in terms of green product familiarity at the four regions of India. The consumers form Southern India have represented the highest order of familiarity with the green products (83%) followed by the sampled consumers bellowing to Eastern India (68 %), northern India (53 %) and western India (42%) as evidenced in the survey. The study further noted that around 95% selected South Indian Consumers perceive that the green products are beneficial to protect the environment.

Familiarity of green product in India according: To Dupont Green Living Survey: India 2014 by TNS Global [add number]

Northern India • Around 53 % respondents acknowledged the familiarity of Green Product.	**Eastern India** • Around 68 % respondents acknowledged the familiarity of Green Product.
Western India • Around 42 % respondents acknowledged the familiarity of Green Product.	**Southern India** • Around 83 % respondents acknowledged the familiarity of Green Product. • Around 95 % respondents are confident that green products are better for the environment.

Figure: Familiarity of green products across various regions in India

However, the similar perception was recorded among 85 % consumers across the country which is more significant as compared to evidences indicated

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

amongst other developed nations like China (70 %), Canada (65%) USA (60%) recorded in recent previous studies.

All these arguments facts and figures essentially signify India has been emerging country of the world i.e. adopting green policy as far as Industrial development and societal participations are concerned. The affinity of Indians towards Green Products has been growing that has been penetrated even among the tribal population of Arunachal Pradesh which represents the least population density state in India (Chakrabarty & Tagiya, 2018). In fact, the environment issues are mostly dominated by governmental agencies but it is getting recognized, holistic support and desirable responses from all the stake holders that include state and non-state actors.

5.2 Analysis – II

5.2.1 Commitments towards environmental issues were largely driven by governmental regulations. Various laws and acts were passed by the government at different time phases of time as per the needs and commitments of the state. The indicative list of various acts and provisions are mentioned below.

Comprehensive Environmental Policy Laws	
A. Pollution related	• The Water (Protection and Control of Pollution) Act, 1974 • The Water (Prevention and Control of Pollution) CESS Act, 1972 • The Water CESS Act 1977 • The Air (Prevention and Control of Pollution) Act of 1981 • Environmental Protection Act 1986 • Noise Pollution (Regulation and Control) Rules 2000
B. Conservation Oriented Legislation	• Wild life Protection Act 1972 • Forest Act 1980 • The Schedule Tribes and other Traditional Forest Rights (Recognition & Forest Rights) Act, 2006 • Prevention of Cruelty to Animals Act 1960 and National Zoo Policy 1998 • Biodiversity Act, 2002
C. Waste Management Rules	• The Chemical Accidents (Emergency Planning Preparedness, and Response) Rules, 1996 • Hazardous Wastes (Management and Handling) Rules, 1989 (as amended up to 2010) • The Bio-Medical Waste (Management and Handling) Rules, 1998 (as amended in 2003) • Municipal Solid Waste (MSW) Management Rules, 2000 • Draft E Waste (Management & Handling) Rules, 2010
D. Other Environment Specific Legislation	• The National Green Tribunal (NGT) Act, 2010 • The Civil Liability for Nuclear Damage Bill 2010 Version
E. Laws Relating to Industry and Economy	• The Factories Act 1948 • Special Economic Zone (SEZ), Act 2005 • Environmental Impact assessment and Environmental Clearance Act • The Mines and Minerals (Regulations and Development) Act of 1957 • The Atomic Energy Act 1962 • The Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 • Batteries (Management and Handling) Rules, 2001 (amended in 2010) • Boiler Act, 1923 • The Bureau of Indian Standard Act, 1986 • The Coal Mines (Conservation and Development) Act, 1974 • The Electricity (Supply) Act, 1948 • The Industries (Development and Regulation) Act, 1951 • Energy Conservation Act, 2001

In fact, there is no specific legal provision / approach developed for promotion of green products in India. However some miniscule attempts were noticed from the part of government to prioritize eco-friendly initiatives in India for instance in 1991 government of India under the aegis of BIS coined the initiatives 'Eco-Mark' scheme through which by virtue of which if it is awarded to a product that essentially signify the product has followed appropriate ecofriendly norms. The Eco-Labels extensively share the information in terms of environmental performance indicators of the products. The firms

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

follow eco-friendly norms to receive financial incentives in the form of tax reduction or cost cutting by reusing remanufacturing, recycling, reducing etc. in the line of 9R framework. The broad spectrums of product category were covered under the ambit of eco-mark/ eco labels are depicted below:

- Soaps and Detergents;
- Paints
- Paper
- Plastics
- Cosmetics
- Textiles
- Batteries
- Wood Substitutes
- Propellants and Aerosols
- Food Items (edible oils – including Vanaspati, Tea and Coffee)
- Electrical and Electronics Goods
- Packing/Packaging Materials
- Lubricating/Specialty Oils
- Drugs
- Foods Preservatives and Additives
- Pesticides
- Leather

In India the environmental related issues are mostly reinforced by governmental agencies by means of well-defined regulatory framework. The focus is on controlling emissions and waste management. In fact India is in the nascent state in terms of defining, devising and implementing eco-friendly standards for product design and manufacturing. International Organization for Standardization (ISO) took a step in 1989 and formulized the ISO 14020 series to Eco label products. The three broad types are:-

ISO 14024 – Third Eco- labeling party certification

ISO 14021 – Self declared Eco-labeling

ISO 14025 – Quantitative data measuring environmental impact

Bureau of Indian Standards HAS identified and defined a set of standards for product service and process to be adopted by Indian Firms where the importance and emphasis on environment and ecology has been specially earmarked.

An indicative list of BIS standards have been mentioned below that ensure desired specifications towards environmental sustainability.

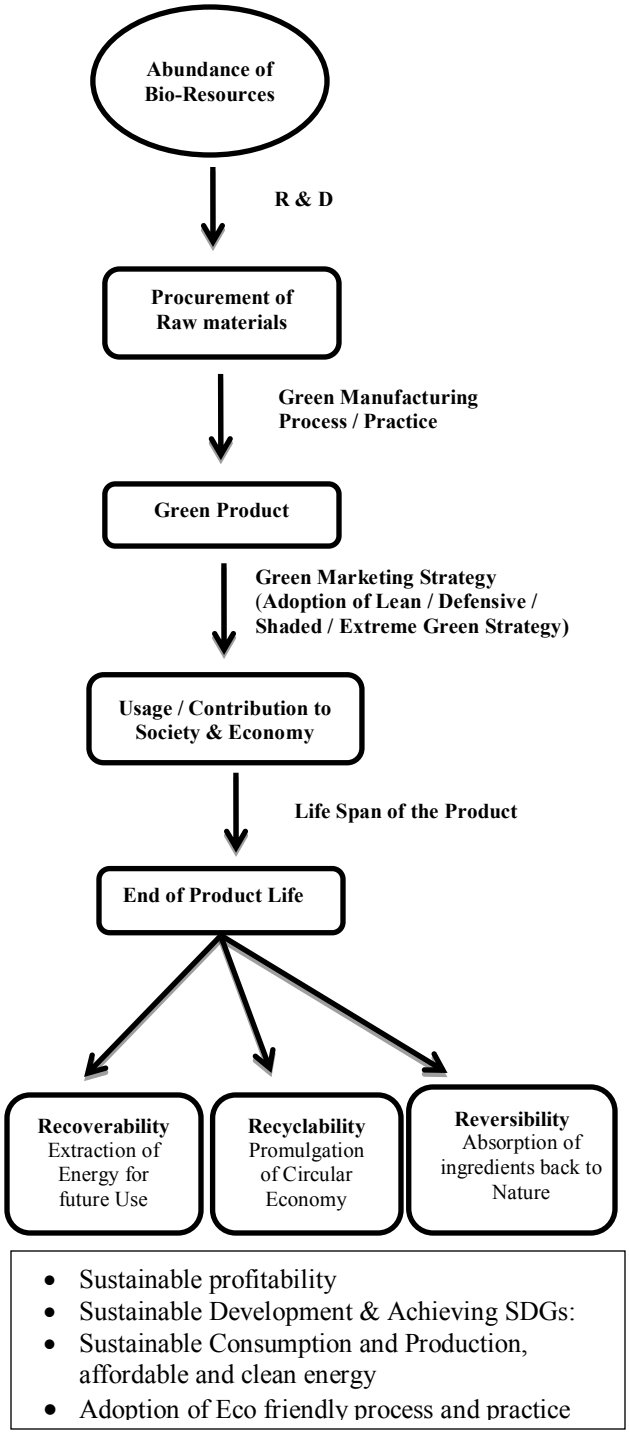
BIS Standards related to Ecology and Environmental Sustainability	**IS / IOS Nomenclature**
Occupational Health and Safety Management System	IS 18001
Food retail management - Basic requirements	IS 16019
Food Safety Management - Requirements for Good Hygiene Practices	IS 16020
Good manufacturing practices (GMP) – Requirements for organizations in the Food Processing Sector	IS 16021
Requirements for Good Agricultural Practices – India GAP - Part 1	IS 15930 Part 1
Social Accountability at the Work Place - Requirements as per	IS 16001
Environmental Mgt System (EMS) Certification	IS/ISO 14001
Energy Management System Certification (EnMS)	IS/ISO 50001
Food Safety Management System (FSMS) Certification as per	IS/ISO 22000
Hazard Analysis & Critical Control point (HACCP) Certification as per	IS 15000
Managing environment, occupational health and safety legal compliance-Requirements of good practices (OHSAS)	IS 15793
Occupational Health and Safety Management System (OHSMS)	IS 18001
Quality Management Systems - Requirements for service quality by public service organizations (SQMS)	IS 15700

Figure: Indicative list of IS standards related environments and sustainability

5.2.2 The model 'Prospects of Green Product: A Strategic Audit' clearly showcases the sustainable impacts of green products on socio economic and ecological life of all living creatures on this planet as mentioned below

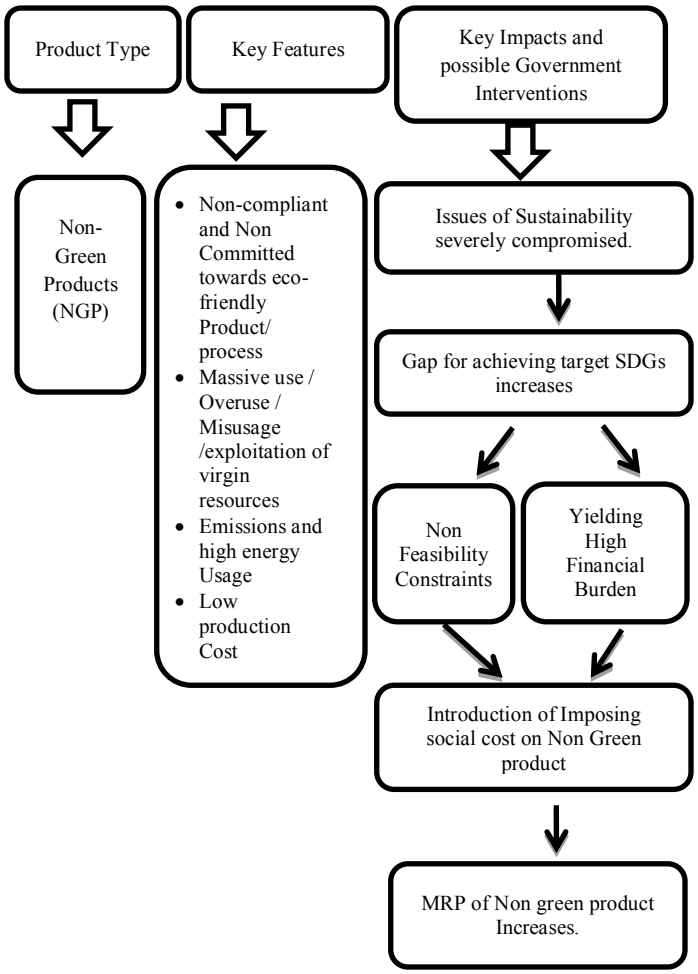
Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

Prospects of Green Product: A Strategic Audit

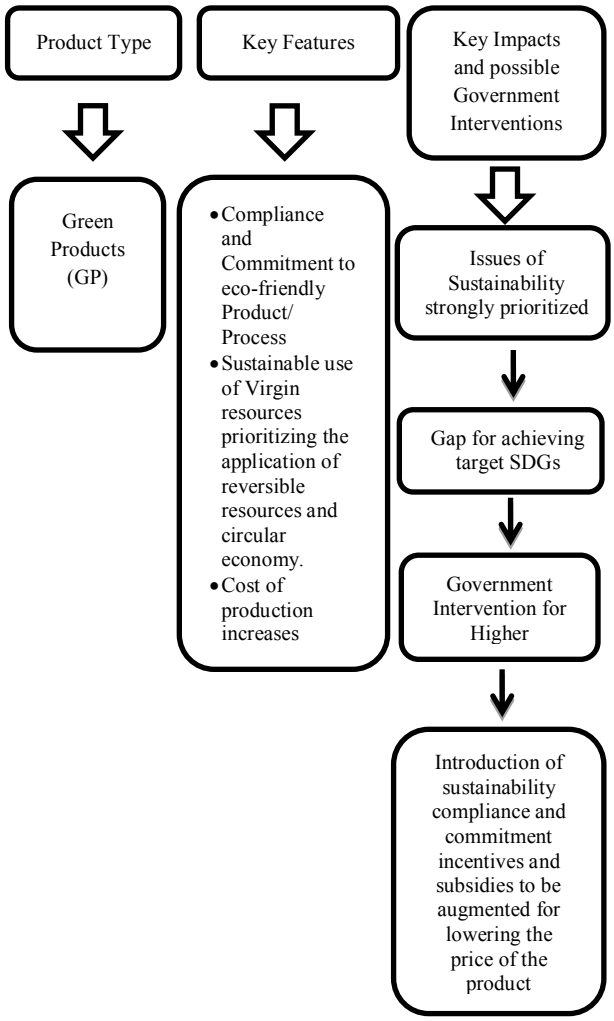


Model Developed by the Authors

5.2.3 Comparisons between Green and Non Green product: Key features, Impacts and Government Interventions.



Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.



The construct of both positive and negative reinforcement theory may be augmented in green and non green products respectively. If effective Government Interventions are adopted, MRP of a particular product category would become at par and competitive for both green and non-green product. As discussed earlier, majority of Indians perceives that green products are more beneficial for the environment. The switching over from non-green items to green products by the majority Indian consumers essentially shall be smooth and sustainable that would result permanent buying behavioral changes. This would ensure that India shall essentially achieve SDGs by 2030 and would vouch for consumer's solidarity towards green and sustainability movement.

5.2.4 There are inherent challenges for the promotion of green products that can address all the problems in life. In fact, all the products or benefits we desperately require cannot be mitigated by a hand full of minuscule ranges of green products. There are debates and deliberations for understanding the possible impacts of the products on environment at every stage of its product life span. For instance, it is difficult that all the green products would have equitable impacts at every stage of its span of life i.e. procurement, processing, product usage and its final discontinuation. It is also difficult to provide incentives or subsidies to all the green products so that these could be competitive in the market with their rival non green products.

6. Conclusions

The world has been transforming and shifting its priorities in consonance with the classical and contingency variables. The erstwhile Millennium Development Goals (MDGs) have been succeeded to multi-dimensional agenda popularly known as Sustainable Development Goals (SDGs). The spectrum of goals have been enhanced, canvassed and become larger priorities that are defined more holistically. But the core issues remain unresolved. This is simply because the human races are fonder of comfort &conveniences rather to solve the key issues through pragmatic, natural and achievable course of actions. The success and failure of any strategic interventions depends to the extent that an individual adapts the change dimensions and culture in the course of his activities, rather expecting the changes to come arbitrarily in the world as opined by the great philosopher Leo Tolstoy. The individual, group and the state should develop the culture for understanding the spirit of collective and peaceful coexistence for long term perspective.

References

Afelt, A., Frutos, R., & Devaux, C. (2018). Bats, coronaviruses, and deforestation: Toward the emergence of novel infectious diseases?. *Frontiers in microbiology*, *9*, 702.

BBC list of 11 cities most likely to run out of drinking water [https://www.bbc.com/news/world-42982959]

Chakrabarty, A. & Tagiya, M. (2018). *Awareness and Affinity towards Green Products among Young Generation: A Case of Arunachal Pradesh.* In Mathirajan, M (Ed.), 6th International Conference on Business Analytics and Intelligence 2018 (pp. 142-154). I.K. International Publishing House, New Delhi, India ISBN No. 978-93-86768-21-6

Chakrabarty, A. (2019). Intervention of NGOs & Knowledge-Bodies for Achieving Sustainable Development: A Resource Based View (RBV). *International Journal of Integrated Research and Development* Special Issue on 'Sustainable Living Concerns: A Perspective on Psycho-Social Environment.. Volume – 2, March Issue, 2019 pp. 181-188.

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

De Castro, C., Miguel, L. J., & Mediavilla, M. (2009). The role of non conventional oil in the attenuation of peak oil. *Energy Policy*, *37*(5), 1825-1833.

Definition of sustainability as per Brundtland Repot[https://www.sciencedirect.com/topics/computer-science/brundtland-report]

Dheeraj, N., & Vishal, N. (1992). An overview of green supply chain management in India. *Research Journal of Recent Sciences ISSN*, *2277*, 2502.

Dietzenbacher, E., & Mukhopadhyay, K. (2007). An empirical examination of the pollution haven hypothesis for India: towards a green Leontief paradox?. *Environmental and Resource Economics*, *36*(4), 427-449.

Dupont Green Living Survey: India 2014 Consumer Awareness and Adoption of Biobased Products[https://www.dupont.com/products-and-services/industrial-biotechnology/articles/india-green-living-study.html]

Financial Times, Chennai drought[https://www.ft.com/content/51007944-b456-11e9-bec9-fdcab53d6959]

Fu, X., & Zhang, J. (2011). *Technology transfer, indigenous innovation and leapfrogging in green technology: the solar-PV industry in China and India. Journal of Chinese Economic and Business Studies, 9(4), 329–347*.doi:10.1080/14765284.2011.618590

Gill, G. (2013). Access to environmental justice in India with special reference to National Green Tribunal: a step in the right direction. *OIDA International Journal of Sustainable Development*, *6*(04), 25-36.

Gill, G. N. (2014). The national green tribunal of India: a sustainable future through the principles of international environmental law. *Environmental Law Review*, *16*(3), 183-202.

Gill, G. N. (2016). Environmental Justice in India: The National Green Tribunal and Expert Members. *Transnational Environmental Law*, *5*(1), 175-205.

Ginsberg, J. M., & Bloom, P. N. (2004). Choosing the right green marketing strategy. *MIT Sloan management review*, *46*(1), 79-84.

Greendex 2008: Consumer Choice and the Environment – A Worldwide Tracking Survey[https://globescan.com/greendex-2008-consumer-choice-and-the-environment-a-worldwide-tracking-survey-full-report/]

Greendex 2012: Consumer Choice and the Environment – A Worldwide Tracking Survey[https://globescan.com/greendex-2012-consumer-choice-and-the-environment-a-worldwide-tracking-survey-full-report/]

Greendex 2014: Consumer Choice and the Environment – A Worldwide Tracking Survey[https://globescan.com/greendex-2014-consumer-choice-and-the-environment-a-worldwide-tracking-survey-full-report/]

Inhaber, H. (1979). Risk with energy from conventional and nonconventional sources. *Science*, *203*(4382), 718-723.

Jamel, M. S., Rahman, A. A., & Shamsuddin, A. H. (2013). Advances in the integration of solar thermal energy with conventional and non-conventional power plants. *Renewable and Sustainable Energy Reviews*, *20*, 71-81.

Khandare, J. (2015). Role of National Green Tribunal in Protection Environment. *Indian Journal of Research*, *4*(12).

Kotler, P. (1980). Strategic planning and the marketing process. Business, 30(3), 2-9.

Kumar, A., Kumar, K., Kaushik, N., Sharma, S., & Mishra, S. (2010). Renewable energy in India: current status and future potentials. *Renewable and sustainable energy reviews*, *14*(8), 2434-2442.

Mishra, P., & Sharma, P. (2010). Green marketing in India: Emerging opportunities and challenges. *Journal of Engineering, Science and Management Education*, *3*(1), 9-14.

Mittal, V. K., Egede, P., Herrmann, C., & Sangwan, K. S. (2013). Comparison of drivers and barriers to green manufacturing: a case of India and Germany. In *Re-engineering Manufacturing for Sustainability* (pp. 723-728). Springer, Singapore.

Nain Gill, G. (2010). A green tribunal for India. *Journal of environmental law*, *22*(3), 461-474.

Potting, J., Hekkert, M. P., Worrell, E., & Hanemaaijer, A. (2017). *Circular economy: measuring innovation in the product chain* (No. 2544). PBL Publishers.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. *Journal of Cleaner Production*, *141*, 385-393.

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.

Sdrolia, E., & Zarotiadis, G. (2019). A Comprehensive Review For Green Product Term: From Definition To Evaluation. *Journal of Economic Surveys*, *33*(1), 150-178.

Shrotria, S. (2015). Environmental justice: Is the National Green Tribunal of India effective?. *Environmental Law Review*, *17*(3), 169-188.

Tiwari, J. (2014). Green marketing in India: An Overview. *IOSR Journal of Business and Management*, *1*, 33-40.

Varghese, G. K., & Alappat, B. J. (2012). National Green Tribunal act: a harbinger for the development of environmental forensics in India?. *Environmental Forensics*, *13*(3), 209-215.

Wilcox, B. A., & Ellis, B. (2006). Forests and emerging infectious diseases of humans. *UNASYLVA-FAO-*, *57*(2), 11.

World Bank report on Agriculture and Water Usage[https://www.worldbank.org/en/topic/water-in-agriculture]

Authorized licensed use limited to: University of Gothenburg. Downloaded on November 19,2020 at 06:36:13 UTC from IEEE Xplore. Restrictions apply.