Green entrepreneurship in theory and practice: insights from India

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Abstract: The rising global concern on climate change and sustainable development has led to a paradigm shift in the Indian markets. Consumers today prefer green products over conventional products as they are growing environmentally and socially responsible. As a result of the growing base of eco-consumers several individuals and organisations are taking advantage of the contemporary Indian market scenario by innovating and redesigning their products with a green perspective. Hence, the concept of green entrepreneurship is slowly and steadily establishing stronghold in the Indian markets. This study is exploratory in nature as it offers insights into the emergence of the concept of green entrepreneurship and its role in the Indian context. Based on the available literature the study proposes a conceptual model which explains the nexus between environmental, economic and social actors in development of green entrepreneurship which further leads to achievement of sustainable development. The opportunities and challenges for green entrepreneurship development are also explored in light of the initiatives taken by business houses, individuals and the Government of India by taking up case studies of successful green entrepreneurship ventures in India.

Keywords: green entrepreneurship; ecopreneurship; green innovations; sustainable development.

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1 Introduction

In the 21st century, environmental degradation is perhaps the biggest concern for academicians, policy makers, government and civil societies all across the globe. The recently established Sustainable Development Goals (SDGs) have been embraced

worldwide as there is growing awareness regarding the ecological scarcities which have crept out of the global industrial transformation. The phenomenon of Climate Change has not only disrupted the fragile environmental and ecological cycles but also poses serious threats to the vitality and sustainability of the economies. There has been rampant depletion of natural systems in the wake of achieving economic growth. As a consequence of such unsustainable growth in the global economy, 'vital signs' are becoming prominently visible, that signal to the fact that the natural environment has reached its limit. Thus, there is an imperative need for a sustainable shift in the consumption and production practices so as to endure greater obligation on economic, environmental and social dimensions. The traditional efforts to solving environmental problems focussed on 'why' and 'how' existing enterprises can become greener. However, it was soon realised that a green economy cannot be mandated without addressing the issues of sustainability in businesses and industry right from their inception. Hence, the transformation to a green economy needs to be driven by entrepreneurs who have the capability and intent to develop innovative business solutions to deal with social and environmental challenges, thus paving way for a sustainable future. In light of the need to explore environmentally sustainable technologies, a new breed of entrepreneurs, driven by sustainability concerns are drawing attention of researchers and policy makers as well as civil societies.

The term 'green entrepreneurship' is easier to conceptualise but harder to explain. A series of philosophical and semantic arguments have emerged since 1991, when this term was first coined by Berle. However, there is still a lot to be answered regarding what are the key concepts that make up 'green entrepreneurship', and how can green entrepreneurs be discreetly defined and also differentiated from 'non-green' entrepreneurs? Thus, there is need for an extensive analysis of how green entrepreneurs identify new commercial ventures, incubate ideas and acquire specialisation, accumulate resources to develop their designs to commercial reality and finally launch and nurture their business venture to make it profitable. In the present era of industrialisation and rapid economic growth, India is also thriving valiantly in the process of keeping pace with the global growth. But in the blind chase of economic prosperity the earth's resources have reached their carrying capacity. Hence, green entrepreneurs stand as engines of change as they play a vital role in shaping the sustainable growth trajectory of India, by identifying the linkages between innovation and sustainability in the renewable energy sector. In our market-based economy the role of green entrepreneurs is not just confined to providing growth opportunities to first movers, but they also play crucial part in leading wider business communities to adopt green business practices. By demonstrating the economic benefits of developing comparative advantage in greener products, such innovative individuals serve as 'pull' factors that incentivise other firms to go green.

Today when 'sustainable development' is the buzz word, the Indian markets are also responding towards the global phenomenon of climate change, as there is a paradigm shift towards green production and consumption in the recent decades. The tastes, preferences, needs and demands of Indian consumers are shifting towards environmentally sustainable products and services. This change may be a result of rise in Per Capita Income, changes in lifestyle and increasing environmental awareness among consumers. The paradigm shift in the consumption patterns have led to emergence of green markets in India. Green markets serve as opportunities for entrepreneurs to cater to the changing demands of consumers by developing concepts, product designs, process design and innovative marketing policies.

The concept of green entrepreneurship endorses the concepts of innovations and new product development to not only cater to the shifting consumer demands but also partake in the process of Sustainable Development in the long run. Broadly green entrepreneurs are entrepreneurial individuals who recognise the linkages between innovation and sustainability and hence develop comparative advantage of their firms/businesses by selling differentiated products and services on the basis of their environmental benefits. Green commodities may either be environment friendly in them or may be produced and/ or packaged in an environmentally sound way. Thus, the role of green entrepreneurs is not merely limited to re-focusing, fine-tuning and enhancing the prevalent marketing scenario but they also seek to challenge the existing marketing approaches in order to provide a sustainably different perspective.

This study digs into the emergence and evolution of the concept of green entrepreneurship and explores the key elements that attribute to this phenomenon. The present study offers insights into the implications and need of green entrepreneurs in the changing Indian market scenario. The next section presents a conceptual model that explores the inter-linkages between economic, social and environmental factors which promote green entrepreneurship and pave way for sustainable development in the long run. Hereafter, the study takes up case studies from successful green business initiatives in India to look into the opportunities and challenges in developing green entrepreneurship in Indian markets. As India has a demographic advantage of around 50% of the population falling in the age bracket of 20 to 59 years, development of opportunities for innovation and enhancing entrepreneurial capabilities in the youth is seen as a significant step towards fuelling sustainable economic growth in the country. The role of state and private actors in building an innovation ecosystem and fostering green entrepreneurship in India is also looked into in this study. In conclusion, suggestions are offered to overcome the bottlenecks in promotion of a sustainable production and consumption cycle in Indian markets on the whole.

2 Green entrepreneurship – the key concepts

In the recent decades there has been considerate emphasis by researchers and policy makers on the determinants of green growth. However, an important issue that seems to have escaped the attention of policymakers and economists is that, the shift in production and consumption paradigm towards green products and services, ultimately requires 'green' entrepreneurship in the market (Farinelli et al., 2011). Green entrepreneurs are the economic actors who play central role in turning ideas into reality by transforming business designs or prototypes into commercially viable ventures.

Till date the relation between environment, sustainability and entrepreneur have been referred by researchers using different terminology. Some of the commonly used terms to describe this phenomenon are 'green entrepreneurship' (Berle, 1991), 'eco-entrepreneurship' (Schaper, 2002), 'ecopreneurship' (Schaper, 2010) and 'environmental entrepreneurship' (Keogh and Polonsky, 1998). These terms are often used interchangeably for entrepreneurship governed by environmental and sustainability motives. However,

Dean and Mc Mullen (2007) argued that sustainable entrepreneurship is somewhat a different concept and should not be substituted for green entrepreneurship. Sustainable entrepreneurship bases its foundations on the triple bottom line approach, i.e. it attempts to strike a balance between people, planet and profit (Elkington, 1998). In contrast, green entrepreneurship concerns itself with creation of ecological and economic benefits (Thompson et al., 2011). The various definitions of green entrepreneurship can be classified on the basis of the dimensions of entrepreneurship that they refer to. Table 1 offers a compilation of definitions of green entrepreneurship based on various aspects of the phenomenon focussed on by the authors.

Table 1 Definitions of green entrepreneurship

Author	*Aspect of entrepreneurship*	*Definitions*
Dean and McMullen (2007, p.53)	Organisational characteristic	"The process of defining and exploiting economic opportunities that are present in environmentally relevant market failures".
Kotchen (2009, p.28)	Process involved	"The practice of starting new businesses in response to an identified opportunity to earn a profit and provide (minimise) a positive (negative) environmental externality".
Anderson and Leal (1997, p.3)	Environmental outcomes	"Entrepreneurs using business tools to preserve open space, develop wildlife habitat, save endangered species and generally improve environmental quality".

Source: Author's compilation (Pachaly, 2012)

The literature on 'green entrepreneurship' can thus be classified as per the organisational characteristics' of the ventures, the 'process' involved in green entrepreneurship and 'environmental outcomes' that environmental entrepreneurs aim at. Schaper (2002) in his study has attempted to synthesise a framework for discreetly defining green entrepreneurship, based on the diverse ideas and literature available on this concept. He argues that although the phenomenon is quite assorted, yet in principle 'green entrepreneurs' can be distinguished from traditional entrepreneurship and its other counterparts on the basis of three distinctive features. Schaper (2010) proposed that green entrepreneurs share the first feature in common with its counterparts. His findings in this regard are in compliance with those of Thompson et al. (2011), who in a later study stated that all green entrepreneurs identify market opportunities, gain access to resources and make their venture profitable in the long run by taking up innovative ventures that involve risks and for which the outcomes are uncertain. Hence, like the traditional entrepreneurs, all green entrepreneurship activities are 'entrepreneurial'. The second characteristic of green entrepreneurs, which differentiate them from their counterpart, is that the 'net effect' of their commercial venture on the natural environment, and development towards sustainability is positive. However, Schaper (2010) did not suggest any method to evaluate the negative and positive effects of a venture. Given the manifoldness inherent in the green entrepreneurial activities it is almost implausible to measure the 'net effect' for such ventures. Thirdly, Schaper (2010) states that the intentionality or set of values and aspirations of green entrepreneurs' make them digress

from the path of commercial entrepreneurs. Green entrepreneurs are driven by the goal to protect the environment and achieve sustainable development by embanking on sustainable business strategies. They consider environmental benefits and ecological sustainability as the end and not just the means to achieve economic gains.

With the growing consciousness towards the threats of climate change there has been a shift in the consumption behaviour which has opened up new opportunities for entrepreneurs in the emerging green market scenario, globally (Paramashivaiah et al., 2013). With respect to this phenomenon a new breed of zealous and industrious individuals is creeping up to business positions as they fuse their entrepreneurial spirit with environmentalism, potentially marching towards an ecological society (Allen and Malin, 2008). Thus, environmentally concerned entrepreneurs oriented towards sustainable development are branded as Green Entrepreneurs or Ecopreneurs. According to Nikolaou et al. (2011) green entrepreneurship may be defined as a new business startup in production industry or environmental services which focus on preservation of natural conditions or natural resources such as eco-tourism, wastewater treatment, recycling, renewable energy and biodiversity. Thus, green entrepreneurship can be looked at from two perspectives, related to the output as well as the process of an economic activity. Entrepreneurs can either provide green products and services such as waste management, energy saving appliances etc. by working in an overtly green sector or they may offer products and services through an environment friendly process, e.g. eco-tourism and organic products.

Earlier studies on green entrepreneurship suggest that entrepreneurs embrace environmental values as the core component of their identity which they use to develop comparative advantage for their company in the green markets (Allen and Malin, 2008). However recent studies argue that green entrepreneurs may be driven by a well mix of green, social and ethical motives along with economic motives rather than being solely green oriented (Taylor and Walley, 2004).

Based on the existing studies green entrepreneurs are characterised as individuals or firms that undertake new business opportunities and ventures which involve certain level of risk. Eco-entrepreneurial activities also refer to Schumpeter's 'creative destruction' which disrupts the chain of existing businesses to innovate, formulate and implement corporate strategies for environmental advantage and create revenues simultaneously. Hence, green entrepreneurship ties significantly to the various dimensions of environmental sustainability and industrial ecology such as life cycle analysis, extended producer's liability, resource flows, material use and eco-efficiency (Sharma et al., 2015). In the emerging green market scenario in India the role of green entrepreneurs lies in solving environmental problems while boosting competition and increasing the welfare of society on the whole. The green entrepreneurial activities are shaped by the nexus of economic, social and environmental objectives which further lead to sustainable development. The components of green entrepreneurship can be observed in Figure 1.

Hence, so far it has been noticed that both entrepreneurship and green entrepreneurship are comparatively recent concepts. Although till date, there exists a relatively large body of literature that is intended to explore the multi-dimensional phenomenon of entrepreneurship, yet, this field in itself was recognised as a formal discipline only in the 1980s. The greening of management or green entrepreneurship is an even newer phenomenon as it gained the attention of researchers only in the early 1990s. Thus, the concept of green entrepreneurship is less researched, less well known and comparatively blurrily defined in comparison to entrepreneurship. Till date most of

the studies in this field deal with greening of existing businesses. However, recent researches argue that a paradigm shift towards green and sustainable markets offer a basis for new business exigencies.

Figure 1 Components of green entrepreneurship

Source: Author's compilation

3 Research objectives and methodology

The study aims to analyse various facets of green entrepreneurship development in India. For this purposes the following objectives have been set forth.

- To conceptualise 'green entrepreneurship'.
- To study the enabling factors and challenges faced by green entrepreneurs in India.
- To offer suggestions to promote green entrepreneurship in the changing Indian market scenario.

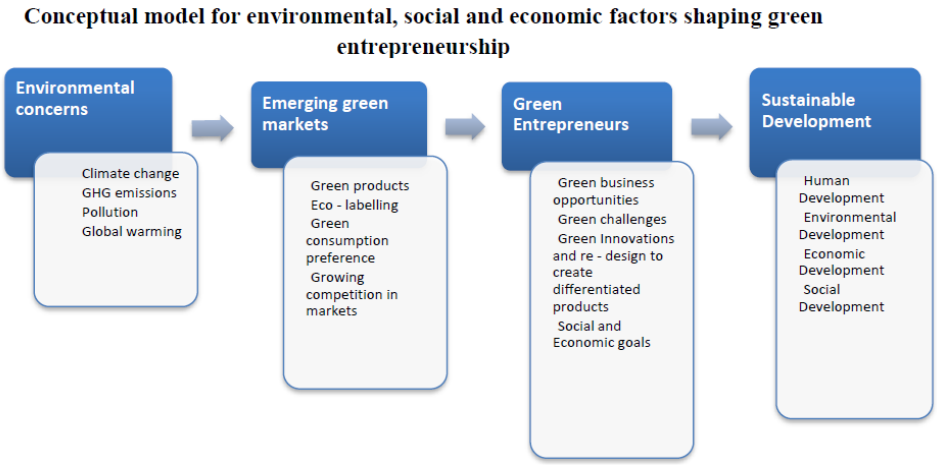
The study explores the concept of 'green entrepreneurship' using all the available secondary literature sources such as research papers, innovator profiles on NIF website and innovator's interviews on print and digital media. Based on the literature available, a conceptual model is derived which analyses the nexus between social, environmental and economic factors in shaping green entrepreneurship in the Indian markets.

The study further goes on to explore the motivating factors for and challenges faced by green entrepreneurs taking three elaborate case studies from India and presenting a cross – case analysis of the sample. Hence, offering suggestions to foster an enabling environment for green entrepreneurship in the country in light of the various innovation and entrepreneurship development strategies and flagship programmes taken up by the Government of India in the recent decades.

4 Conceptual model – green markets as an opportunity for green entrepreneurs

The growing environmental concerns regarding pollution, extreme climate events, Green House Gas (GHG) emissions and global warming led to a paradigm shift in the preferences of consumers towards green/eco-friendly products. This change in the consumption patterns which might be due to growing education and environmental awareness have led to emergence of green markets which demand innovations and redesigning of the conventional production and supply chain, hence creating new avenues for green entrepreneurship. Green business opportunities lead to emergence of green entrepreneurs who are driven by social, environmental and economic goals. Green innovations, green designs and greening the supply chain are some of the factors which facilitate these entrepreneurs to break the existing chain of production and supply. This also leads to building up of comparative advantage of firms on the environmental, economic and social fronts. As a venture becomes successful, as per Schumpeter's 'Creative Destruction' theory, other firms/business might follow the green practices in swarm like clusters which ultimately paves way for Sustainable Development in the long run.

Figure 2 Nexus between environmental concerns, green markets, green entrepreneurs and sustainable development



Source: Author's compilation

5 Green entrepreneurs in India

Entrepreneurship is a complex phenomenon. The recent debates regarding emergence of green entrepreneurs draw attention towards the need to explore the various dimensions of this new class of entrepreneurs especially in the developing country scenario. In order to dig into the socio-cultural factors that shape green entrepreneurs, motivations and challenges faced by them as well as macro-level impacts of ecopreneurial activities the study has considered three elaborate case studies namely,

a) Mitti Cool Clay Creations

b) Green Oil Energy Sciences (Pvt.) Ltd.

c) Ma Danteshwari Herbal Products

All these innovative entrepreneurs belong to varied socio-economic as well as cultural backgrounds but are guided by common motives of creating environmental and social benefits with the help of their innovative ventures. Cross-case analysis of the sample reveals the environmental, social and economic impact of green entrepreneurship development in India and hence puts forth the need for the role of State as well as private actors and civil societies in making the Indian markets conducive for green innovations and ecopreneurship development.

5.1 Case study 1 – Mitti Cool Clay Creations

Mr Mansukhbhai Prajapati is the owner of the brand 'Mitti Cool' under which he deals in manufacturing and selling of innovative clay products. The entrepreneur is a resident of a small village Nichimandal, Morbi in Rajkot. Though a school drop – out at standard 9 – Mr Mansukhbhai is hailed as one of the most successful entrepreneurs in rural India. He was featured in the list of Forbes' top seven rural entrepreneurs in 2010 for his eco-friendly innovations.

Being his traditional family occupation Mansukhbhai was exposed to making clay products since childhood. He started his career in 1985 as a trainee at a wage of Rs 300 per month. The entrepreneurial spirit in him pushed him to take risk and create his own venture, as a result of which he left his job and took a loan of Rs 30,000 in 1988 from a local money lender to set up an earthen plate manufacturing factory. He successfully modified the hand press machine for making roof top tiles to develop a hand press machine with capacity to produce 700 units of earthen pans per day. He also experimented on the proportions of clay to derive a mix which was more durable and heat resistant. He registered his unit in 1990 as Mansukhbhai Raghavbhai Prajapati.

Unfortunately his business suffered a setback in the 2001 earthquake when most of his stock was destroyed. Mansukhbhai as an entrepreneur showed the ideal potential to innovate and endure adverse conditions as he drew inspiration from an article featured in *Sandesh*, a Guajarati newspaper. The daily featured a broken clay water filter manufactured by Mansukhbhai captioned as 'the poor man's broken fridge'. This caption sparked the idea to manufacture a clay fridge that would run without electricity. He was able to materialise his idea in 2002. Taking loan from his acquaintances and using his father's home as collateral for bank loan he spent three years on testing the clay mix and

designs for refrigerator in consultation with Gujarat Grassroots Innovation Augmentation Network (GIAN), Ahmedabad. The final working model of Mitti Cool fridge came out in 2005. This clay fridge works on the principle of evaporation. Water from the upper chambers drips down the sides and gets evaporated leaving the chambers cool. This clay refrigerator was priced at Rs 4000–4500 hence making it an affordable and green innovation. He registered his firm as Mitti Cool Clay Creations in 2007, having already filed the trademark application in 2001 as Mitti Cool with the assistance of National Innovations Foundation (NIF) (Trivedi, 2015). Apart from Mitti Cool his firm also creates and supplies other innovative products such as clay pressure cooker, non-stick pan and other cookware.

Mansukhbhai has not only been able to secure profits for himself simultaneously contributing to environment friendly and sustainable production, but he has also set an ideal for at least 500 potters in Gujarat which has led to revival of the art of clay utensils making in the state. Marketing of Mitti Cool Clay Creations products is done through his website, dealers in some parts of India and via word of mouth publicity (Moneycontrol.com, 2012). His enterprise broke even in 2010 after which he does not only supply products across India, but he has also received orders from 41 countries. In 2011–2012, Mansukhbhai's company registered a turnover of Rs 25 lakh growing at 15% annual rate. With the success of his clay products in the emerging green market scenario he now has a row of factories with an assembly line production of variety of clay products. Mansukhbhai himself has designed machines that mould clay into pots and pans in seconds hence catering to the rapidly increasing demand for his eco-friendly products. Presently Mansukhbhai has a turnover of 45 lakhs and has more than 35 employs in his company (Austa, 2015).

5.2 Case study 2 – Green Oil Energy Sciences (Pvt.) Ltd.

Green Oil Energy Sciences (Pvt.) Ltd. is an innovation-based waste to energy Company constituted by Mr Anupam Jalote. This company specialises in production of renewable energy and enriched organic manure from dry as well as wet organic waste (Green Oil, 2016). Anupam Jalote is a green entrepreneur who is not just fixated on profit margins but his concern regarding environmental degradation and its long lasting hazards motivated him to bear risks by leaving his cushy job as the Chief Process Officer in Airtel in 2008, to set up his own environment friendly venture. He was driven by the social and environmental goal of creating a technology that would enable rural people to generate their own affordable and renewable energy using locally available organic wastes. He started Green Oil Energy Sciences Ltd. with the active support of his wife. However, like any entrepreneur he had to endure adverse conditions as his power project got delayed due to unavailability of funds which he expected in 2010, but was able to secure them only in 2012.

His company is although based in Delhi yet it sources waste from Jaipur. Anupam Jalote started small by producing organic manure and selling it on a small scale under the brand name 'Green Oil Karishma'. Over the last two years Green Oil has processed more than 2000 tons of farming and other wastes to produce more than 1000 tons of organic manure. The company has a 1 MW power plant commissioned in Samode Village, Jaipur. As per Jalote, "It is like a sophisticated gobar gas plant that uses waste to produce

bio-methane through anaerobic digestion". Apart from electricity generation the company also sells the by – product i.e. organic manure hence following the 'cradle to cradle' concept of cleaning the environment (Bisht, 2013). The company currently generates revenue of Rs 3 lakh to Rs 4 lakh per month and aims to set up 10 power plants of 1 MW capacity each in 5 years.

In 2013, Green Oil sold 30% of its stake to Zurich-based company LGT Venture Philanthropy, for Rs 3 crore which gave Jalote the much needed capital and resources for R&D. The project also has socio-economic benefits apart from environmental benefits. The plant has not only provided direct employment to locals but people also benefit economically by supplying local waste on their trucks and tractors to the plant.

5.3 Case study 3 – Ma Danteshwari Herbal Products

Dr. Rajaram Tripathi is a banker turned green entrepreneur who has scripted his success story by establishing an herbal company which cultivates plants using eco-friendly organic manures and use of bio-waste generated power. He started his venture Ma Danteshwari Herbal Products (MDHP) as a cottage industry in 1995 with only one farm which has now transformed into a 1000 acre herbal empire which currently generates revenue of 40 crores per year and employs 300 tribal households i.e. around 22,000 farmers (Meitei, 2015). The main products produced and processed by the company are Organic Herbal, Medicinal & Aromatic plants, Rare and Endangered species etc.

Dr. Tripathi as a banker was motivated by the social and environmental goal of generating sustainable work for marginal and small farmers in Chhattisgarh by developing a fruitful way of doing agriculture. He recognised the high dependence of Indian farmers on expensive chemical pesticides and fertilisers as a prime reason behind their mounting debts and miseries. Thus, he quit his job in 2001 and bore the risk of taking up organic farming. MDHP is an agro-enterprise which operates from a naxal ridden district, Bastar in Chhattisgarh. So Dr. Tripathi considered all the aspects that would ensure active operation of the venture from a remote and disturbed part of India.

The company has six warehouses with a capacity of 8000 tons and two processing units in Kondagon, Bastar. Apart from cultivation and processing of herbal products that have medicinal use, lifestyle usage as well as used for general well-being MDHP also offers services such as training to marketing, export and technology transfer, organic farming certification, documentation etc. The company established Organic Herbal Farmer National Organization in 2002 to serve as marketing platform for their products as well as for Organic farmers. The MDHP also participate in international trade fairs for promotion of their products.

Despite the recognition gained by MDHP due to the constant efforts of Dr. Rajaram Tripathi to reach out larger markets, the entrepreneur claims that his company still faces bottlenecks such as lack of funds, limited access to commercially viable agro technology, bank's reluctance to finance and middlemen dominating the market being a few of them.

MDHP bagged the 'best explorer award' in 2007. Owing to his initiative to develop an eco-friendly innovative venture with social and economic benefits Dr Tripathi was honoured by the prestigious Earth Hero Award 2012, instituted by Royal Bank of Scotland for biological diversity (AgricultureInformation.com, 2012).

6 Analysis and discussions

Green entrepreneurship a can be analysed from the above cases as entrepreneurs having opportunities to link their new businesses concepts to a wide range of green issues hence engaging others to help their ideas turn into reality.

The Table 2 shows the social and financial background of green entrepreneurs in India. While Mansukhbhai Prajapati was a standard nine dropout, potter and from a poor financial background, Anupam Jalote and Dr. Rajaram Tripathi are well educated and financially sound entrepreneurs. Hence, education and financial situation of entrepreneurs do not contribute majorly in development of green entrepreneurs. The entrepreneurial spirit to bear risks motivated by social, economic and environmental goals is the vital characteristics of green entrepreneurs.

Table 2 Socioeconomic background of green entrepreneurs

Name of venture	*Product details*		*Entrepreneur's background*	
	Name	*Features*	*Name of entrepreneur*	*Financial situation/ professional status*
Mitti Cool Clay Creations	Mitti cool fridge	Clay refrigerator that works without electricity on the principle of evaporation.	Mansukhbhai Prajapati	Resident of a small village, Nichimandal in Rajkot. Engaged in traditional family occupation i.e. pottery. Trainee at a clay roof top tile making firm at a monthly wage rate of Rs 300.
Green Oil Energy Sciences (Pvt.) Ltd.	Green Oil Karishma	Renewable energy and enriched manure from organic waste.	Anupam Jalote	Born in 1964 in Lucknow Schooling at St. Francis College. MBA – LU and Purdue University, Hannover. Chief Process Officer at Bharti Airtel Ltd.
Ma Danteshwari Herbal Products	Organic herbal medicinal and aromatic plants, rare and endangered species	Herbal products that have medicinal use, lifestyle usage as well as used for general well-being using eco-friendly organic manures.	Dr Rajaram Tripathi	Resident of Kondagaon, Chhattisgarh. BSC, MA (history, hindi, economics), LLB – Pandit Ravishankar Shukla University. Doctor from Inox University, Nagpur.

Source: Author's compilation

As we look into the drivers for green innovations among the above mentioned entrepreneurs (see Table 3) it is observed that all of them were motivated by environmental and/or social goals apart from the economic goals. Mitti Cool fridge is an

invention meant to make necessary amenities affordable for rural people especially in the earthquake prone regions of Gujarat. Similarly Green Oil Karishma and MDHP are innovations taken up to enable farmers to generate their own power by recycling organic wastes and reduce dependence on expensive and harmful chemical fertilisers and pesticides and adopt eco-friendly farming practices. The main sources of finance for these innovators was acquaintances and bank loan against collateral for Mansukhbhai and foreign investments and bank loans for the rest two entrepreneurs owing to their higher awareness regarding funding sources and sound educational background. NIF/GIAN offered microfinance and assistance to Mansukhbhai regarding patenting his innovation. However, in case of the rest two innovators there was no institutional support from Government or private agencies.

Table 3 Motivating factors for green innovations

Name of venture	*Drivers for innovation*	*Genesis of idea*	*Enablers for innovation*		
			Financial support	*Institutional support*	*Moral support*
Mitti Cool Clay Creations	Social and economic goals	Idea sparked by an article captioned 'the poor man's broken fridge', in *Sandesh*, a Gujarati daily that featured his broken clay water filter post the 2001 earthquake.	Loans from acquaintances, bank loan against father's house, NIFs micro-venture fund.	NIF/GIAN offered consultancy regarding testing of clay mix and designs and filing of patent.	Family and friends
Green Oil Energy Sciences (Pvt.) Ltd.	environmental and social goals	Unavailability of electricity in rural areas and high-health risks and economic prices of chemical fertiliser; believer in 'democratisation of power'.	External commercial borrowings – Zurich-based LGT –VP invested in green oils; angel investor partnerships.	None	Family and friends
Ma Danteshwari Herbal Products	Social goals	Recognised heavy dependence of farmers on expensive chemical fertilisers and pesticides as prime reasons for indebtedness.	Bank loan	None	Family and friends

Source: Author's compilation

The biggest bottleneck faced by all the three green entrepreneurs in setting up their businesses was the lack of funds from formal financial institutions due to lack of collateral against bank loans and reluctance of banks and risk averse nature of Indian investors (see Table 4). Limited access to commercially viable agro technology and dominance of the market by middlemen are other limiting factors for green businesses. There is a positive social, economic and environmental impact of green entrepreneurial ventures on the macro-level as they not only generate economic and social benefits for the entrepreneurs but also create employment and share significant share of their revenues with local farmers and entrepreneurs offering downstream services such as transport hence offering them a better standard of living. There is also an increase in consumer surplus as especially rural people get access to a variety of environmental friendly products at affordable prices. Environmental benefits such as reduction on dependence on chemical fertilisers and use of bio-manures, generation of clean and renewable energy from organic wastes and use of energy saving appliance are noticeable on the macro-level.

Table 4 Challenges and macro-level impact

Name of venture	*Challenges faced*	*Impact on society*		
		Economic	*Social*	*Environmental*
Mitti Cool Clay Creations	Lack of funds from formal financial institutions.	Higher consumer surplus; employment generation.	Revival of traditional art of pottery; access to affordable amenities.	Energy saving, works without electricity.
Green Oil Energy Sciences (Pvt.) Ltd.	Lack of funds as investors found venture risky.	Revenue goes to local farmers and entrepreneurs as payment for raw material and transport.	Affordable manures and bio methane energy; health benefits.	Clean and renewable energy and environment friendly manures.
Ma Danteshwari Herbal Products	Lack of funds; middlemen dominating; limited access to agro-technology.	Employment to 22,000 farmers; increased standards of living of organic farmers.	Training for organic farming, assistance in certification, awareness on environmental and health benefits	Reduced dependence on chemical fertilisers and pesticides, preservation of bio-diversity.

Source: Author's compilation

7 Role of state in entrepreneurship development

Entrepreneurship development is the key to generate employment opportunities coupled with a rapid economic growth. Hence, the State serves as an eminent stakeholder in facilitating green innovations that will further enhance entrepreneurship and consequently accelerate growth in the Indian economy. Realising the importance of

developing an innovation ecosystem, in March 2010 the 12th President of India, Mrs Pratibha Patil put forth the government's vision by announcing the current decade as the 'Decade of Innovation' (Abhyankar, 2014). It was not until 1991, when India opened up its economy, that the government as well as various stakeholders realised the importance of innovation in all industries in order to maintain competitiveness in the world economy.

As per the Census, 2011 around 41% of the total population of the country is below 20 years, and around 50% of the population falls in the age bracket of 20 to 59 years with only 9% of the total population falling in the age group above 60 years (FIRSTPOST, 2016).

The demographic dividend of India shows that 28% of the total population belongs to the age group of 15 to 29 years (Registrar General and Census Commissioner of India, 2011). Hence, creating jobs for the youth is the biggest challenge faced by the government. Owing the lack of employment opportunities in various sectors of the economy, the youth is mainly engaged in low income contractual jobs. This is evident by the fact that 93% of the workforce in India is employed in the informal sector (Sanghi and Srija, 2014). Although youth employment has received impetus by the government as a priority area yet, the employment guarantee programs are focussed on providing basic amenities, hence making provisions for labour intensive employment. These employment schemes lack linkages with developing innovation led self-employment opportunities and entrepreneurship among the youth.

In the recent decade, the Government of India has realised that there is a need to foster an effective ecosystem for innovation which can tap the innovation potential of India's young population, hence, resulting in entrepreneurship development and accelerating the economic growth by creating job opportunities that the country needs. By harnessing the innovation potential India can sustain a rapid and inclusive growth which would facilitate the achievement of social and economic transformation (Dutz, 2007). As per the Global Innovation Index, India has shown considerable improvement as it moved up from 81st (2015) to 66th rank out of a total of 128 countries in 2016 (Indicator Rankings & Analysis | Global Innovation Index. n.d.). The Government initiatives as well as the role of the private sector in strengthening tertiary education, corporate R&D, promotion of software exports and market sophistication are recognised as the reasons for India's better performance.

However, the existence of a fragmented policy environment and lack of policy implementation, inadequate investment in R&D, complex and elaborate funding procedures, low levels of Angel investments, venture capital and early stage seed funding, weak linkages between the various stakeholders of the knowledge economy and the market, inadequate orientation of education system towards innovation and entrepreneurship, lack of rural infrastructure, risk aversive behaviour of entrepreneurs and weak Intellectual Property Rights regime are recognised as the key challenges faced by the State in making innovation ecosystem conducive and enhancing entrepreneurship development in India.

According to the World Bank's 2016 report, India ranks 130 among 190 nations in terms of Ease of Doing Business. The rank of India for Ease of Doing Business is estimated on the basis of 11 parameters as mentioned in Table 5.

Table 5 India's position on ease of doing business

S. No.	*Indicators*	*Rank (out of 190)*
1.	Starting a business	155
2.	Dealing with constant permits	185
3.	Getting electricity	26
4.	Registering property	138
5.	Getting credit	44
6.	Protecting minority investors	13
7.	Paying taxes	172
8.	Trading across boarders	143
9.	Enforcing contracts	172
10.	Resolving insolvency	136
11.	Ease of doing business	130

Source: Author's compilation (http://www.doingbusiness.org/rankings)

Although the World Bank statistics regarding startups and entrepreneurship development in India are not very promising, yet the Government has taken up several policy initiatives to improve India's ranking to the first 50 countries in the World Ease of Doing Business (Franchise India, n.d.).

Lack of training and finance are recognised as major problems faced by startups and SSIs in India, besides lack of infrastructure and counselling, procedural hassles and administrative hassles (Desai, 2008). As per the EY G20 Entrepreneurship Barometer the rank of India in terms of access to funding and entrepreneurship culture is 11th (Funding Global, n.d.). With respect to education and training India ranks last among the G20 nations (Education and Training Global, n.d.).

In light of the existing hurdles in entrepreneurship development, the State has set up policy reforms which have shown considerable positive impacts on growth of startups in the country. In the recent years India has evolved as the 3rd largest base of technology startups in the world. The number of startup ventures in India has increased by 40% in a year, hence creating 80,000 to 85,000 employment opportunities in 2015. As per 2016 statistics there exist 19,400 technology enabled startups in the Country out of which 5000 startups have been set up in 2015 alone (Bhargava, 2016).

Some of the recent state initiatives to develop India as a hub of innovation and entrepreneurship are discussed hereafter.

a) *Mudra bank*: The Micro Unites Development Refinance Agency (MUDRA) Bank was established by the Government of India on the 8th of April 2015, with an objective to provide finance for development of micro unites and non-corporate small business sector so as to boost entrepreneurship in India. Rupees 20,000 crore had been mobilised to the MUDRA Bank for refinancing banks, Non-Banking Financial Companies (NBFCs) and Micro Finance Institutions (MFIs) etc. to extend loans to small manufacturing unites and businesses having a requirement of credit ranging from Rs 50,000 to Rs 10 lakh (MUDRA Loan, n.d.)

b) *Ministry of skill development and entrepreneurship*: The Ministry of Skill Development and Entrepreneurship came into existence on 10th November 2014. The ministry holds responsibility for the co-ordination of all the efforts regarding skill development and promotion of entrepreneurship across India. The Ministry also works for introduction of policies to remove the existing disconnect between demand and supply of human resource or skilled manpower, building the framework for Vocational and Technical training, skill upgradation and promotion of new skills and developing innovative thinking (Ministry of Skill Development and Entrepreneurship, n.d.a).

The Ministry is aided by functional arms mentioned below:

- National Skill Development Agency (NSDA)
- National Skill Development Corporation (NSDC)
- National Skill Development Fund (NSDF)
- Sector Skill Councils (SSCs)

c) *National skill development mission*: Launched on the World Youth Skills Day, 15th July 2015, the National Skill Development Mission aims to generate convergence among various sectors of the economy and states on a whole in terms of skill development and training activities to materialise the 'Skilled India' Vision (Ministry of Skill Development and Entrepreneurship, n.d.b).

d) *National policy on skill development and entrepreneurship*, 2015: The Mandate of this policy is to link skill development to higher productivity and employability by providing an umbrella framework to various skill development activities that are being carried out within India and to even them up as per common standards. The policy aims at linking skill development and entrepreneurship with demand centres (Ministry of Skill Development and Entrepreneurship, n.d.c).

e) *Entrepreneurship development scheme*: The Entrepreneurship Development scheme is presently being developed by the Ministry of Skill Development and Entrepreneurship. This Scheme is being woven around vital aspects of entrepreneurship development in India, which include initiatives to educate and equip potential and early stage entrepreneurs by developing a world class education curriculum for entrepreneurship and delivering it free of cost to all aspiring entrepreneurs. Massive Open Online Courses (MOOCs), 50 nodal Entrepreneurship Hubs (E-Hubs) and integration of entrepreneurship education into the curriculum of 3000 colleges will promote a culture of entrepreneurship and innovation in the country. The Scheme also focuses on promotion of women entrepreneurs and entrepreneurship among underrepresented groups. Moreover, fostering social entrepreneurship by encouraging universities and academic institutions to launch online courses on 'social entrepreneurship' and laying impetus on grassroots innovation by collaborating with National Innovation Foundation (NIF) and other organisations will be the thrust areas of this scheme (Ministry of Skill Development and Entrepreneurship, n.d.d).

f) *Make in India*: The 'Make in India' initiative was launched by the Government of India on 25th September 2014 with an objective to promote skill development and job creation in 25 sectors of the Indian economy by motivating domestic as well as multinational companies to manufacture their products in India. Apart from this the initiative is also knitted around the objective of achieving high-quality standards and minimizing the impact of economic activities on the environment. The initiative also aims to draw technological and capital investments to the Indian manufacturing sector (Make in India, n.d.).

g) *Startup India, stand up India*: The 'Startup India, Stand up India' initiative of Government of India was launched on 16th January 2016 with an objective to foster a strong startup ecosystem by nurturing innovations and entrepreneurship in India. This flagship initiative has set forth an Action Plan to accelerate the Startup movement. The Action Plan is segmented across the following areas:

   i) Funding support and incentives

   ii) Simplification and handholding

   iii) Industry-academia partnership and incubation

This initiative aims at building a network of startups across the country (Standup India, n.d.).

h) *Self-employment and talent utilisation (SETU)*: SETU is a techno-financial, Incubation and Facilitation Programme operated by the NITI Aayog to provide support to all the aspects of startup businesses and other self-employment ventures. This programme has been initiated with special focus on the technology driven sectors (Sanghi and Srija, 2016). The NITI Aayog has extended an initial support of Rs 1000 crore for SETU (n.d.). Additionally, the programme aims to generate 100,000 jobs by facilitating a startup ecosystem in the country (SETU Scheme, n.d.).

i) *ATAL innovation mission*: The budget 2015, established the ATAL Innovation Mission to offer a platform for promotion of innovation by engaging academicians and entrepreneurs and building upon national and international experiences so as to develop a culture of innovation, research and development in the country (Pradhan Mantri Yojana Schemes, n.d.). The NITI Aayog has earmarked funds of Rs 150 crores under the budget, 2015 for the ATAL Innovation Mission.

j) *Pradhan Mantri Kaushal Vikas Yojana (PMKVY)*: The PMKVY is a flagship scheme launched by Ministry of Skill Development and Entrepreneurship to enable a large number of youth in India to take up industry relevant skill-training which would help them to secure a better livelihood. The scheme also assesses individuals with prior learning experience or skills and certifies them with a skill card under the Recognition of Prior Learning (RPL) (Pradhan Mantri Kaushal Vikas Yojana, n.d.). As on 3rd March 2016, 1,599,895 individuals were enrolled under the PMKVY. 956,871 people completed training and 290,002 were given certification to authenticate their acquired skills.

k) *Green India*: The major thrust of Government of India's flagship programme, Green India is to develop and promote renewable energy innovations and promote renewable energy innovations and technologies in India. 2015 Budget made special

allocations to launch 'Faster Adoption of Manufacturing of Electric Vehicles' (FAME), which is a new scheme that would complement the e-car production by Mahindra Group under the brand name REVA. The Green India Programme has also announced a new target of generating 175,000 MW of Renewable energy till 2022, through the Ministry of New and Renewable Energy. It is estimated that around 700,000 employment opportunities will be opened up by means of achieving the new renewable energy sector targets (Krishna, 2016).

8 Conclusions and suggestions

The study throws light on the concept of Green Entrepreneurs and their role as innovators who introduce greener production techniques, create green jobs and boost the demand for environment friendly products hence serving as hotbeds for sustaining a green economy. The SME sector lies at the heart of inclusive socio-economic development in India. Green entrepreneurship can provide solutions to youth unemployment and sustainability pertaining to the low entry-level requirements for entrepreneurs in several green sectors and their interest in innovative business solutions and sustainability deliberations. In addition as observed in the study green businesses are set up at a small scale and cater to the needs of rural people. Hence, such sustainability oriented startups offer new employment opportunities which are not limited to the urban areas.

Tendency of government policy to favour large businesses rather than SMEs, risk averseness of banks and other formal financial institutions as well as Indian investors to invest in green businesses and absence of training platforms to foster green entrepreneurship are some of the barriers to development of green entrepreneurship in the Indian context as identified by the study. Hence, there is a need for government intervention as well as environmental awareness programmes to develop a systematic approach towards green entrepreneurship. Nurturing a green business culture by promoting awareness among entrepreneurs regarding opportunities arising from green business models, complimented by creating an enabling environment by incentivising green investments and entrepreneurship may prove effective to do away with the existing bottlenecks in the development of a sustainable and green market scenario in India. There is also need for institutional support to emerging entrepreneurs via provision of financial and technical support such as business development services and micro-finance for startups. Although the State has played a significant role in fostering an innovation and entrepreneurship ecosystem in the country in the recent decade however there are lack of policies and incentives that focus specifically on promoting green entrepreneurial ventures rather than developing entrepreneurship in general.

Hence, the study concludes that there is immense opportunity for green entrepreneurs in the changing green market scenario in India and the other way round green entrepreneurs serve as drivers of change as they contribute to nurturing people's mindsets towards greener thinking and consumption, further boosting the dual effect of environmental and economic gains.

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