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SUSTAINABILITY

Inspiration, Innovation and Inclusion

Proceedings of the 5th Annual International Conference on Sustainability - SUSCON V

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Proceedings of the 5th Annual International Conference on Sustainability - SUSCON V

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Message from Director

Sustainability is most often misinterpreted by many with environmental preservation or green business. However, sustainability is beyond mere fiscal economic growth, it encompasses healthy living for all in a healthy and enabling environment, where there are no sufferings from multidimensional poverty and inequality, injustice, and power imbalance; where empowerment of the weaker section at the bottom of the pyramid, health, education, and employment opportunities for all, are as important as maintaining healthy ecosystems. It has always been a great challenge before human society to maintain the ecological balance of the only living planet while exploiting its goods and services against the constant demand for growth and wellbeing. While we at IIM Shillong cherish the vision of creating global leaders with Indian thoughts, our mission remains to establish a sustainable society—wherein our special focus has always been for a responsible and inclusive business development with sincere commitments toward the bottom of the pyramid and the underprivileged sections of the society. I am happy to present the proceedings of SUSCON-V: Inspiration, innovation, and inclusion, the fifth annual international conference of IIM Shillong on sustainability which was dedicated to the former President of India, Bharat Ratna Dr. A P J Abdul Kalam, who graced the previous edition of SUSCON-IV: People, planet, and policy as the Chief Guest. I must congratulate my colleagues in the SUSCON Organizing Committee for successful completion of the conference and bringing these selected papers volume published. The papers in this proceedings are selected based on peer and blind review out of 83 papers presented in the conference. I congratulate all the authors for writing their papers in SUSCON. I hope the papers will bring different perspectives and insight in sustainability for one and all. I also take the opportunity to congratulate all the distinguished keynote speakers, eminent panelists, and delegates from India and abroad, and the sponsors for actively contributing to the annual conference. I hope the message of sustainability initiatives taken by IIM Shillong will spread across the nation and abroad, and will get a new momentum.

Wish all happy reading!!!

Prof. Amitabha De

SUSCON V Chair Speaks

SUSCON at IIM Shillong is not just an annual conference, but a movement to make our organizations, society, and the planet a better place to live in. Intense involvement in this movement for 5 years has opened up new doors of perception and ushered in fresh insights into the theme and the processes. There have been some powerful voices against the overall effectiveness and impact of Rio movement spaced 20 years between Rio summit and the Rio+20 summits. The hard truth has now dawned on many thinkers and practitioners that sustainability is not a matter of calculations, publicity gimmick, or temporary engagement. If the academic and business community as well as the Government, NGOs, and civil society groups are really serious about the issue of sustainability, then one must delve into the exploration of the very roots from where the concern for sustainability emerges. The source of all sustainability lies in the origin of inspiration that springs forth from the hearts of responsible and conscientious human beings and the enlightened minds of the visionary leadership in any field of endeavour.

In the face of adverse economic realities and sharp criticism from the strong advocates of market economy and bottom-line priorities, it is the power of inner inspiration that keeps the movement of sustainability going and growing against these formidable "pragmatic" forces which champion the cause of techno-economic development, following the gospel of linear and undifferentiated growth. The fire of inspiration within then ignites our creative energy and finds expression in meaningful innovation. It compels us to innovate new processes and methods, beyond the stereotyped mainstream formulae, to resolve the problematic issues around sustainability covering its multiple dimensions—individual, organizational, social, environmental, cultural, and planetary. The individual consciousness, thus, spreads from the domain of micro issues and local concerns to embrace the macro level in the global arena in a spirit of inclusion. The philosophy and practice of expansion and transformation of consciousness "From Me to We" thus becomes a reality.

Therefore, the Fifth Annual International Sustainability Conference of IIM Shillong weaves around these three main themes—Inspiration, innovation, and inclusion for a better tomorrow for every human being and the planet at large. This year the Conference comes as a tribute to the Bharat Ratna Dr. A P J Abdul Kalam, former President of India, who inaugurated SUCON III in March 2013. His presence at SUSCON gave a tremendous inspirational momentum to the sustainability movement in IIM Shillong. It was at IIM Shillong that this great son of India breathed his last while lecturing to our students on "Creating a Livable Planet Earth."

Dr. Sanjoy Mukherjee
Chairman: Organizing Committee

Acknowledgment

SUSCON—the annual international conference on sustainability is one of the important events of IIM Shillong that was started in 2010 as a mission mode and the movement has been continuing since then within the country and beyond, with an objective to sensitize, motivate, and equip everyone on the imperatives of sustainable development.

The fifth edition of SUSCON: Inspiration, innovation, and inclusion was successfully completed during 17–19th March 2016, with the hope and aspiration in "making the earth a more livable planet," with the active support and assistance from many stakeholders of sustainability. The program covered a total of 98 accepted paper presentation in 15 technical sessions, encompassing 32 thematic areas of sustainability and 5 plenary sessions with 227 accepted abstracts. We are really thankful to all those who have taken part in this noble cause and made it much stronger. SUSCON-V was possible only because of the faith and belief the IIM Shillong fraternity reposed under the able leadership of Prof. Amitabha De, Director, IIM Shillong. We are immensely thankful and are also grateful to the Director for his blessings and guidance to take forward SUSCON as a movement, and express our sincere thanks to all the invited guests, keynote speakers, and distinguished panelists for their intellectual contributions in SUSCON-V. Among them, few eminent speakers who enriched the conference are Dr Daniel S. Helman, California, USA; Prof. Manas Chatterjee, Binghamton University, New York, USA; Shri Bimal Arora, Chairperson—Centre for Responsible Business, UK; Prof. Sarit K. Das, Director, IIT Ropar, Prof. Sankarshan Basu, IIM Bangalore; Prof Biswatosh Saha, IIM Calcutta; Dr. Madhumita Chatterji, Director, IFIM Bangalore; Shri Ashish Gupta, IAS, Joint Secretary, Ministry of Home affairs, GOI; Ms Sapna Poti, Head of North East, National Skill Development Corporation (NSDC), and Mr Biren Bhuta, Chief of CSR, Tata Steel.

We express our sincere thanks to our corporate partners *viz*. State Bank of India, Indian Oil, Gas Authority of India Ltd. for their generous supports, participation, and sponsorships toward SUSCON-V. Behind every success there is a secret, as was visible in SUSCON-V-6-month long preparation, continuous engagement and deliberations among our committed faculty colleagues, dedicated PGP and FPM volunteers, officers and staff colleagues, through 12-subcommittees made it possible to organize this wonderful event at IIM Shillong. I must congratulate all the Scientific Committee members of SUSCON-V *viz*. Prof. Sanjita Jaipura, Prof. Khanindra Ch. Das, Prof. Arindum Mukhopadhyay, Prof. Bidyut Jyoti Gogoi, and Prof. Mousumi Bhattacharya for their support and contribution to bring out these proceedings.

We convey our heartfelt thanks to each of them. The present volume of SUSCON proceedings is the compendium of 22-selected peer-reviewed papers out of total 83 papers presented in the conference. We congratulate all the delegates who have participated and presented their research findings in the conference and to those in particular, whose papers are selected in this Conference Proceedings volume. We sincerely wish that all the papers will open up new vistas and insights on sustainability and encourage us to contribute through further research. This proceeding is not to be a mere volume in the library but a learning journal for all interested to join in the movement toward sustainability and ''making the planet earth more livable."

Dr Tapas Kumar Giri

Chairman: Scientific Committee

Contents

Message from Director *v*
SUSCON V Chair Speaks *vi*
Acknowledgment *vii*

1. Winning Rural Markets in India through Sustainable Marketing 1
   Aditi Naidu

2. Conservation Agriculture for Sustainable Livelihood in Changing Climate 10
   Gurpreet Singh, Yogesh Bhatt

3. Can Green Marketing Enhance Sustainability And Influence Customer Satisfaction? 21
   Debjani Banerjee

4. Today's Tweenager, Tomorrow's Customer: A Holistic Model towards Understanding the Consumer Group for Gaining a Sustainable Competitive Advantage 31
   Sunpreet Kaur Sahni, Yukti Ahuja

5. Consumer Perception towards Alternative Fuel Vehicles: An Empirical Study in India 42
   Nagendra Kumar Sharma, Gyaneshwar Singh Kushwaha, Mukesh Kaushal

6. Chit Funds and Behaviour of Marginal Investors: The Post-Saradha Scenario 55
   Rajib Bhattacharya, Pramit Sengupta, Sougata Majumder

7. Women-friendly Policies by Organizations: An Agenda towards Sustainability through Inclusiveness 64
   Shlesha Singh, Mrinalini Pandey

8. Role of CSR in the Consumer Decisionmaking Process 74
   Sudeepta Pradhan

9. Sustainable Development Model: Green Banking (A Review) 82
   Vivek Vyas

10. Enhancing the Untapped Potential 92
    Raman Preeja, Hareesh N Ramanathan

11. Meteorological Drought and Farmers' Perception of Climate Change: A Case Study of Manipur 102
N Laitonjam, S M Feroze

12. The Role of Human Values in the Adoption of e-book 112
Kallol Bagchi

13. Design, Fabrication, and Analysis of a Lawn Mower 113
Partha Pratim Dutta, Abhigyan Konwar, Arunjoy Baruah, Vinod Kumar

14. Commercialization and Marketing the Concept of Roof Top Rain water Harvesting through Public Private Partnership Model: An Experimental Stance 124
A Mahesh, G P Dinesh

15. Three Dimensional Frameworks versus Two Dimensional Frameworks as a Design Approach towards Sustainability 136
Usha Jumani

16. Water Literacy: An Empirical Study with Special Reference to the Apartment Dwellers in Bengaluru 152
B N Balaji Singh, Rekha H Aranha, Smitha Srinivasan, Priyanka Sharma

17. A Critical Analysis of National Voluntary Guidelines and Business Responsibility Report Framework 162
Rajinder Singh Randhawa

18. Enhancing Economic Sustainability through Microcredit: An Analysis over Different Activities 177
Biswaji Prasad Chhatoi, Pallabi Mishra

19. Measuring Financial Sustainability of Microfinance Institutions in India 197
Amarjeet Kaur Malhothra, Sandhya Prakash

20. Preserving Arctic and Antarctic Ice: Ideas about Artificial Processes 214
Daniel S Helman and Jacob Haqq-Misra

21. Evolving a Holistic Model for Sustainability: A Case Study of Walmart 224
P Anbarasan, Sushil

22. Service quality: A Measure of Sustainability of the Hotel Industry 241
Pallabi Mishra, Biswajit Prasad Chhatoi

Winning Rural Markets in India through Sustainable Marketing

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Abstract

Sustainability is emerging as an important area in management thought. Sustainable marketing implies long-term marketing that results in advantages to both the marketer and the customers. Evidence from rural markets in India demonstrates that to build and grow in rural India, organizations need to provide products that not only add value to the customers but also improve the living standards of the rural customers in the long run. To succeed in rural markets in India, a long-term approach to profitably serve the rural consumer is viable through building relationships and loyal customers built on the principle of sustainable development of rural India.

Keywords:

Sustainable Marketing, Sustainable Development, Rural Markets, India

Introduction

This paper strives to explore the role of sustainable marketing in winning rural markets in India. Sustainable marketing has been described here as a marketing that provides a long-term win-win situation for both the marketer and the consumer. It is a marketing that not only sells the product to the consumer but does so by improving the economic status of the rural consumer in the long run. Literature review and case studies form the major content of this paper.

Methodology

The primary purpose of this study is to explore the conceptualization of the term sustainable marketing, stemming from which actual practice in sustainable marketing in rural India is examined. Literature has been reviewed to identify the definition and scope of sustainable marketing. Further, case studies have been studied to ascertain how organizations are developing rural markets in India by employing means embedded in the sustainable marketing context. The meaning of sustainable marketing as established from literature and the examples of employing rural marketing strategies rooted in the principles of sustainable marketing lead to the establishment of specific sustainable marketing practices that aid in marketers succeeding in rural markets in India.

The Rural India Opportunity

Rural markets in India have increasingly become the focus of marketing organizations in India, with the opportunities they offer for growth having become an increasingly accepted phenomenon.

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Inspiration, Innovation
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pp. 1–9
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Consider the recent data on rural markets. Rural markets are growing faster than urban markets, with the latter considered to have become increasingly saturated. Per capita GDP has grown at a CAGR of 6.2% in rural India compared to 4.7% in the urban counterpart since 2000 (knowledge.wharton.upenn.edu). Between 2009 and 2012, rural India spending reached $69 billion, compared to $55 billion urban market spending (www.rediff.com, 2013). An ASSOCHAM report (2009) reported that 50% of revenues for the FMCG sector come from the rural market (www.assocham.org, 2009). The Tata Strategic Management Group team reported that with 69% of Indian population living in rural areas, rural markets represent a market opportunity that organizations cannot afford to overlook, especially considering that the rural consumption in value terms has grown at 17.2 % p.a. between 2008 and 2010 and that close to one third of FMCG and consumer durable sales come from rural markets (www.business-standard.com, 2014). The absolute size of rural market would be doubling that of urban market with the growth rates of a number of FMCG products being higher in rural than in urban markets (Raj and Silveraj, 2007).

As evident from the Annual report (2012–13) of the Ministry of Rural Development, a large part of this growth in rural markets comes from efforts of the government of India in the form of various schemes such as MNREGA which have provided employment and generated income, thus boosting the purchasing power in rural areas (www.rural.nic.in, 2013).

Sustainable Marketing

Murphy (2005) has stated that the term sustainable marketing has evolved from meaning ecological or environmental marketing to meaning green marketing to the more recent meaning which comprises sustainability of marketing activities. Sustainability has been defined as sustainable development, which has been defined in the Bruntland Commission Report (1987) as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Murphy, 2005). Van Dam and Ampledoorn (1996) defined sustainable marketing as marketing within and supportive of economic development. Sustainability has a broader context than only an environmental one and in fact includes both social and ethical contexts (Murphy, 2005). It is in the social and economic developmental context that this paper looks at sustainability as marketers in rural India strive to build a rural customer base through activities beneficial to both the marketer and the rural consumer.

Sustainable Marketing in Rural India

While rural markets offer a huge opportunity, they also pose tremendous challenges for the marketers. India's some 600000 villages are spread across an area of 3.2 million sq km; the per capita income is much lower than that in urban India; there is growing competition as more companies have begun to enter these markets (Kashyap, 2012).

Further, while there is data on the enormous growth opportunity in rural markets, poverty remains a chronic condition for almost 30% of the country's rural population. Poverty is deepest among members of scheduled castes and tribes in the country's rural areas. In 2005, these groups accounted for 80% of poor rural people, although their share in the total rural population is much smaller (www.ruralpovertyportal.org).

However, conditions have marginally improved with the Rural Development Report (2013–14) stating that the rural population categorized as 'very poor' in 2011–12 was 6.84%, down from 16.3% in 2004–05 (www.indianexpress.com, 2015). Specifically,

poverty among occupational groups in rural areas is the highest among agricultural labour (40%), followed by other labour at 33% and the self-employed in agriculture at 22%.

As per Prahalad (2005), subsistence consumers live in substandard housing and have limited or no education, have limited or no access to potable water and health care and earn minimal incomes as little as $1 a day (Weidner et al., 2010). Marketing to such consumers includes practices such as researching subsistence marketing to understand needs; designing the value proposition; harnessing social networks as done by Grameen Bank; co-creating products; localizing production; developing sustainable packaging which includes developing packaging to increase transportability, ease of use and affordability as well as creating ecological sustainable packaging using biodegradable and recyclable material as done by Novartis which developed blister packaging to limit loss or damage to prescription drugs; communicating to subsistence consumers; providing access to products by enlisting local resellers and creating innovative distribution systems as done in Hindustan Unilever Limited's (HUL) Project Shakti and managing adoption processes as done by an organization which provided free trial option to farmers who were reluctant to adopt new technology which had not been proven (Weidner et al., 2010).

The Accenture Report (2013), *Masters of Rural Markets-Profitably Selling to India's Rural Consumers* states that rural marketing faces challenges that can be categorized as reaching, acquiring and retaining rural consumers. Companies that are leading in rural markets, which the report terms as 'rural masters' have overcome these challenges by forging mutually beneficial relationships with rural communities and channel partners along with additional moves that go beyond traditional selling approaches. As per the Accenture Report (2013), a major finding was that forming collaborative channels, winning trust through locally appreciated activities and retaining the market by being part of the social set up was the way forward (Economic Times, 2013). In fact, the panel discussion around this report put forth that building trust was imperative to succeeding in rural markets. For instance, Lifebuoy expanded its reach and acceptance in rural India by building trust through teaching people to be hygienic (Economic Times, 2013).

Rural marketing involves various strategies which include client and location-specific promotion, joint or cooperative promotion, bundling of inputs, management of demand and developmental marketing (Goel and Garg, 2014). Developmental marketing refers to designing marketing programmes around the development objective in mind and using various managerial and other inputs of marketing to achieve these objectives (Goel and Garg, 2014).

From the review of literature as well as case studies of organizations that have built sustainable markets in rural India, specific approaches have been identified for winning rural markets through practices for creating win-win situations for both the marketers and the rural customers. The approaches primarily relate to partnering for sustainable marketing in rural markets; building sustainable livelihoods in rural markets; designing and delivering affordable value propositions and using technology-specifically Information and Communication Technology (ICT) for sustainable marketing in rural markets of India. These approaches are elucidated upon next.

Partnering for Sustainable Marketing in Rural markets

A long-term marketing strategy for rural markets includes partnering for sustainability which refers to laying and building a foundation for continuous and long-lasting relationship (Goel and Garg, 2014). For instance, Raymond set up exclusive Raymond

stores in partnership with locals, facilitating close interaction, thereby supporting the social and financial standing of the local channel partners exemplifying a major principle to win in rural markets of developing the rural ecosystem profitably by ensuring local channel respect and authority (Economic Times, 2013). Similarly, Maruti recruited more than 7000 locals as resident dealer sales executives as a major support for its rural marketing initiative. Lakshmi Cements partners with local talent and has a local person who accompanies the van that travels across villages testing cement as part of the organization's CSR such that the local person does the needful and creates an immediate connect. Godfrey Phillips too built on trust by connecting with the rural population by working towards women's health (Economic Times, 2013). Organizations such as Tata Motors and Idea Cellular have partnered with villagers in innovative ways to enhance their distribution reach in rural markets: for instance, Tata Motors has recruited and trained the local residents as 'Gram Mitras' (meaning village advisors) who work on commission to generate leads for the company's existing dealers' sales teams; similarly, Idea Cellular has recruited and trained some 4000 youths called 'Sons of the Soil' who live close to the company's cell towers. To extend its reach even further, Idea supplements these local workers with travelling *grameen pratinidhis* ('village representatives') who need extra income and are already visiting remote villages on business of their own (Kapur et al., 2014).

Sustainable Livelihoods for Sustainable Marketing

Other major organizations have been working towards the sustainable economic development of the local community to build markets in rural India. These organizations have been focusing on the marketing principle of improving business performance in the bottom of the pyramid, recognizing low income contexts as potential new markets for goods and services, based on the twin engines of consumption and entrepreneurship (Sridharan and Vishwanathan, 2008). For instance, ITC set up its e-choupal initiative in 2000, whereby farmers were equipped with a computer and Internet connectivity so as to meet challenges in Indian agriculture such as fragmented markets, weak infrastructure and the involvement of a large number of intermediaries. With the e-choupal initiative, farmers were directly linked with the company for the procurement of various agriculture products, enabling the farmers to directly negotiate their sales with ITC without the role of intermediaries. Additionally, the facilities also allowed farmers to access mandi prices as well as learn good farming practices. The initiative has led to not only securing higher incomes for the farmers but also creating efficiencies in ITC's procurement chain (siteresources.worldbank.org).

Also, Mahindra and Mahindra (M&M) through its Samriddhi initiative has been striving to build strong relationships with the farming community across the country as it aids the farmers in various agriculture issues thereby adding to farm prosperity. This in turn has led to M&M creating lasting relationships with lakhs of farmers converting them to loyal customers of its agribusiness (Naidu, 2015). The Mahindra Samriddhi initiative is a part of the Mahindra Farm Equipment Division which aimed at enhancing agricultural productivity through creative farming technologies, thereby leading to an increase in rural prosperity. Under this concept, several Mahindra tractor dealerships were transformed into Samriddhi Centres whereby farmers are provided with farming solutions such as soil and irrigation-water testing facilities, technology interface through the Internet, productivity demo farms, agri-counselling facilities, finance & insurance

products, sale of secondhand tractors, micro-irrigation products, seeds & crop care products. The efforts have led to the brand 'Mahindra Tractors' being transformed from a major, trustworthy, value for money, heritage 'tractor'' brand into an end-to-end 'Agri Products & Solutions' brand focused on delivering 'Farm Tech Prosperity' (Naidu, 2015).

HUL's Project Shakti, the company's rural direct-to-consumer retail distribution network was created as a self-sustaining model of micro entrepreneurs since the company realised its traditional distribution mechanism would not work in the rural areas. Project Shakti is the company's initiative to financially empower rural women and create livelihood opportunities for them. In doing so, it has provided a regular stream of income to the Shakti Ammas and their families. The project includes providing training on basic accounting, selling skills, hygiene and relevant IT skills to the Shakti entreprenuers (www.hul.co.in). Project Shakti has helped thousands of women, who are called Shakti Ammas, with these women investing a sum with the help of self-help groups that work with HUL and distributing the company's products in return of which they earn a decent livelihood. Launched in 2010, the Shaktimaan initiative encourages men of the Shakti Ammas' families to distribute its products in village clusters and provides them bicycles. The women earn profits worth ₹ 700 to ₹ 3000 per month as they not only sell HUL products but also teach rural households they visit about hygiene, educating girls and registering births and deaths. Through Project Shakti, not only has HUL empowered both men and women in rural India, but also, with some 48,000 Shakti Ammas and 30,000 Shaktimaans, the company has expanded its reach to over three million households in 100,000 villages across 15 states. With its success, Project Shakti has been replicated in Pakistan and Sri Lanka, with plans to expand into Africa soon. (www.businesstoday.in, 2013). HUL has trained thousands of Shakti Ammas across the villages, developing an entrepreneurial mindset and made them financially independent and empowered (www.hul.co.in). In doing so, HUL has managed to create sustainable livelihoods for the villagers as well as successfully develop inroads into rural markets.

Specifically, Project Shakti is a rural distribution initiative of HUL, targeting small villages with population of less than 5000 inhabitants: it is a unique win–win initiative which, while building business for the company, also catalyzes economic growth. Particularly, the project impacts the society in two ways: the Shakti Entreprenuership programme creates livelihood opportunities for the rural underprivileged women by which the company aids the women in accessing micro credit, thereby enabling them to become direct-to-home distributors in rural areas and HUL invests in training the rural women such that they evolve into confident entrepreneurs.

Similarly, telecommunication services have expanded primarily by providing affordable access to relevant information and knowledge services among the rural poor (Bhavnani et al., 2008), thereby empowering farmers as they learn about weather as well as local mandi prices. An example is Nokia's Life Tools (NLT). Started in 2008, Nokia partnered with the Maharashtra State Agriculture Board to provide commodity price information from some 300 mandies to thousands of farmers. Nokia extended beyond agriculture to also provide information on health and education. It has more than 100 million users, half in India and the rest in four emerging markets—China, Indonesia, Nigeria and Kenya. NLT subscribers pay a monthly subscription, choose a language and the company delivers information to their mobile phones (www.businesstoday.in, 2013). To develop and deploy NLT, Nokia has collaborated with a number of partners, including information service provider, Thomson Reuters, agriculture expert, Syngenta, weather expert Skymet and major telecom service providers—Bharati Airtel, Idea

Cellular, Reliance Communications and Tata Docomo (Redjou and Prabhu, 2012). Further, Nokia launched the Ovi Store in 2009, incorporating a group of m-apps called Ovi Life Tools (OLT) targeted at users in developing countries. These tools are geared towards narrowband, affordable m-apps providing health, education, agriculture and entertainment services (Qiang et al., 2012). Apart from information-based services which aid in agriculture and rural development, Nokia offers Nokia Money, a cell phone-based service offering banking services to millions of Indian consumers who are unbanked (Radjou and Prabhu, 2012). By serving the needs of the rural customers by identifying their needs, Nokia built a network of millions of users.

Designing and Delivering Affordable Value Proposition

Sustainable marketing, taken to mean marketing that can be sustained in the long run despite impediments such as low incomes, has been demonstrated also by designing a value proposition that is affordable as well as meets the needs of the consumers. Reliance Infocomm decided to offer its telecommunication services at the cost of a post card: its offering included a free digital mobile phone, unlimited free incoming calls, free value added services, a billing in 15 seconds time unit, charging a one-time fee of approximately $67 and a monthly fee of $13. Reliance Infocomm could do so by lowering its cost structures which it did by entering into exclusive agreements with hardware providers; mass production of a limited number of handset models as well as ensuring viability by charging slightly higher rental rates along with free airtime (Weidner et al., 2010). Similarly, in healthcare, Aravind Eye Care has offered affordable eye surgeries, such that of the 3.5 million surgeries in 2015, over 50% were subsidized, at a low price of ₹850 per surgery or even for free, paid for by customers who can pay for the market price or above. Aravind Eye Care is able to sustain this business model through highly efficient, 'mass produced' surgeries, mirroring McDonald's assembly line of production (www.thehindu.com, 2016). Similarly, Jaipur Foot, which produces and markets lower extremity prosthetics that are sold for $35 as against $8000–$10,000 similar Western made products has been able to achieve this affordability as the organization has employed a product development approach that starts with the target price and profit and works backward to the design. The company has been able to offer this product at such a low price also by mass production, use of locally sourced material and a simplified design (Weidner et al., 2010). Along with the affordability, the Jaipur foot is also designed such that it is customized to the lives of the consumers, allowing them, for instance to squat instead of sitting while conversing. The affordability and customization has built a value proposition such that in year 2006 alone, the company has served 70,000 patients (Weidner et al., 2010).

Use of Technology for Sustainable Marketing

Another approach in creating sustainable marketing for rural India is through the use of technology, specifically ICT. ICT is defined as a set of activities that facilitate the capturing, storage, processing, transmission and display of information by electronic means and can be utilized to enhance market reach by addressing the affordability angle of low-income groups (Cecchini and Scott, 2003). For instance, smart cards with an embedded microchip containing the clients' credit histories are utilized by SKS, a microfinance institution operating in the rural areas of Andhra Pradesh, allowing the organization to reduce its transaction costs. Smart cards have been found useful as

the solution to high cost of delivery in the microfinance context; gains in efficiency, reduction of paper work as well as in errors, meeting times and fraud leading to potential savings in operations to the tune of 18%, allowing microfinance institutions such as SKS to enable poor people to gain a broader access to financial services (Cecchini and Scott, 2003).

Conclusion

While the bottom of the pyramid, which includes the rural poor, is not a market that allows for traditional high margins, the poor can be a highly profitable market especially when companies change their business models, with this market primarily revolving around volume and capital efficiencies (Prahalad and Hart, 1999). Margins in this market are likely to be low by current standards; however, unit sales can be very high and managers who innovate and focus on economic profit stand to gain (Prahalad and Hart, 1999).

However, marketing successfully to the rural poor is not simple. For instance, in the context of marketing socially useful goods to the poor, Garrette and Karnani (2010) argue that while Prahalad (2004) stated that multinationals can make significant profits by marketing to the people at the bottom of the pyramid, there are others who claim marketing to the bottom of the pyramid may not be as profitable. They cite the examples of three organizations which had to divest their efforts when the same were not successful, leading to lessons that include recognizing that a market exists not because of the existence of unmet needs, but if there are buyers willing and able to pay such that the total cost of production, including the opportunity cost are covered; to profitably serve the poor, firms would require to drastically reduce their costs involving a quality trade-off to a certain acceptable level, and to succeed in BOP initiatives, efficient distribution systems are critical. Garrett and Karnani (2010) also state that achieving multiple social objectives would be more detrimental in attaining BOP success as "it is difficult enough to combine profitability with selling socially useful goods to the poor without adding more constraints, such as environmental sustainability" (pp. 6).

Despite the difficulties, succeeding in the long run is possible by creating sustainable markets to serve the rural poor in India. Some key elements that come forth as part of building a sustainable market in India's rural areas as showcased by successful cases include building mutually beneficial relationships with rural communities and channel partners along with additional moves that go beyond traditional selling approaches; fostering collaborative channels by partnering with locals, winning trust through locally appreciated activities; working towards the sustainable economic development of the local community to build markets; tying with the village community to create a self-sustaining model of micro entrepreneurs; providing affordable access to relevant information and knowledge services among the rural poor; designing a value proposition that is affordable as well as meets the needs of the consumers and creating sustainable marketing for rural India through the use of technology, specifically ICT.

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Conservation Agriculture for Sustainable Livelihood in Changing Climate

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Abstract

Conservation Agriculture (CA) is emerging as an alternative to conventional agriculture, as the soil and water resources are on their way to degradation and depletion, affecting crop productivity and global food security. CA promises, rejuvenation of soil health, in situ water conservation, carbon sequestration, increased fertilizer use efficiency, lower insects and weed infestation, improved production and lower costs of production. The technique was tested with farmers in groundnut-wheat crop cycle. This paper discusses how CA can buttress the emerging hope to mollify soil and climate change through adaptation resulting in sustainable crop production and the challenges posed for expansion through adoption of CA.

Key words

Zero-Tillage, Climate Variability, Carbon Sequestration, Organic Matter, Conservation Agriculture

Introduction

Indian agriculture has been accustomed to challenges, such as high cost of production, productivity gaps at inter-state and international levels, lack of price realization to farmers due to price volatility, lack of infrastructure support (Subramanian, 2015) and the problems related to inclement weather bolstered by climate variability (Saxena, 2014). In pre-green revolution era Indian agriculture was principally self-owned input based, subsistence farming. The traditional methods of cultivation of crops were systematically replaced with Green Revolution technologies with the help of state-led policies. The shift mollified India's food insecurity but it led Indian agriculture on a path of external input-reliant intensive monoculture farming. The question arises whether the current paradigm of input-intensive monocultures will be sustainable enough to meet the food and nutritional security challenges posed by the colossal population of India.

The United Nations has embodied 'sustainable development goals' targeted to be achieved by 2030. It has set 17 agendas, out of which two are of relevance from the point of view of agriculture, viz. 'Goal 2' i.e., *"*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*"* and 'Goal 13' i.e. "Take urgent action to combat climate change and its impacts" (UN, 2016). Agriculture, which has mostly become an input-output affair, needs to be redesigned in a framework where sustainability is not just talked about but achieved in the real sense. The issue is not

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pp. 10–20
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only that we have to be sustainable in our production system to achieve the two goals mentioned but we also that we require to consistently better the production so as to meet the demand which will be escalating with the population explosion marked to reach 9 billion by the end of 2050. The progressive increase in production is going to encounter the obstacle of fast-changing climate anomalies as already being confronted by Indian diaspora farmers. The UN website has recognized the fact, by stating, *"*Right now, our soils, freshwater, oceans, forests, and biodiversity are being rapidly degraded" (UN 2016), that the resources on which we rely for food production are vulnerable and disposed to degradation. Agriculture sustainability will be attained and maintained by overcoming the above-mentioned challenges, along with the proactive adaptation to unprecedented change in the climate which is already looming. From among the resources, there is this one resource 'soil' which as stated earlier might be belittled as dirt or considered just one physical raw material in the current industrial model of agriculture. This paradigm will lead us nowhere towards sustainability until we look down towards the biology and not the physics below our feet.

David Montgomery in his book *Dirt: The erosion of civilizations* writes about the paradigm which the society has bred about the life-giving soil,

*"*We try to keep it out of sight, out of mind, and outside. We spit on it, denigrate it, and kick it off of our shoes. But in the end, what's more important? Everything comes from it, and everything returns to it. If that doesn't earn dirt a little respect, consider how profoundly soil fertility and soil erosion shaped the course of history." page 7 (Montgomery, 2007)

The importance of the fertile soil is understood by the fact that, soil not only has nurtured civilizations but has also made it suffer when degraded. Triggered by drought between1930 to 1940, heavy wind- flows, and excessively tilled land, 'Dust Bowls' in the United States of America affected 30 million hectares of land causing distress migration of people (Baumhardt, 2003). Punjab, the prosperous Indian state, as we know was the torch-bearer of green revolution technologies during the late 1960s. The exorbitant use of pesticides, fertilizers and monoculture of rice-wheat, has led the state to face degradation of human (increasing cancer cases) as well as soil health (Singh, 2013). Soil is a living symphony for all the flora and fauna, orchestrated by a key musician—Soil Organic Carbon (SOC).

SOC is largely dependent on Soil Organic Matter (SOM) which is anything dead either sourced from plants or animals with a particle size of 2 mm or less along with micro-organisms decomposing the particles to chemical compounds rich with carbon (Sandra Corsi, 2012). SOM when well decomposed turns into humus—a brown and spongy-like substance, acting as a source of carbon and energy source for soil microbes and plants. The decomposition of SOM enhances with the tillage practices due to changes in abiotic conditions like water, air and temperature, and soil aggregates breakdown, accelerating soil erosion (Alan Sundermeier, 2005). SOC exists as mean 58 % of SOM mass and is prone to oxidation as CO_2 during decomposition (Sandra Corsi, 2012). The level of the SOC in soil is directly proportional to the organic matter contained in it. SOC gets released from the organic matter due to biochemical activities including decomposition, respiration and photosynthesis. Biomass decomposition by micro-organisms leads to loss of carbon in the form of CO_2 from the soil. The higher the temperature of the soil, the higher the decomposition of organic matter, due to the action of microbes present in the soil through respiration and which leads to the release of CO_2. With the threat of mounting temperature, rise in soil temperatures and respiration by the microbes in the soil is likely to increase (Alan Sundermeier, 2005). Increased temperatures can lead

to a vicious cycle as it leads to higher rates of decomposition of SOM releasing more amount of CO_2 acting as an amplifying feedback on climate change (Pataki, 2003). So, this is clearly indicative that SOM loss can lead to the degradation of soil health and sustainable productivity, being an integral part of fertility of the soil and the ecosystem services it supports in the soil. Moreover, it is also seen that the many insects also rely on SOM such as *Holotricha consegnia* larvae (White Grub) and termites. These two insects are considered beneficial for soil and crop production, as they are active participants in breaking down the soil organic matter into simpler and available forms to the plant and microbes within the ecological cycle. (Evans, 2011). These two insects have been seen to become a pest in the study area harming the crops by feeding on the root and seeds of crops like wheat, groundnut. The organic carbon is also in a compromising state in the study area. Let us examine the following data on the organic carbon presence in the soil in two villages as:

Soil health report cards, issued by the government of Gujarat, of 60 farmers of village Chankhwa and 80 farmers of village Kankasa, were analyzed for the status of soil organic carbon. In Table 1 above one can see that 82% of the sampled farmers have their soil under the category comprising "Medium" organic carbon while 7% is under "Low" category. In village Kankasa about 86% of the farmers had their SOC in the medium category, 14% were under "Low" category for SOC while none of the farmers fell in "High" category for SOC. A healthy soil is said to have a minimum of 1% of SOC (ICAR, 2013). The low organic carbon is pertained to a set of reasons; declining use of farm yard manure in the field as discussed with the farmers, deep tillage as promoted by the technical universities, malpractices such as crop residue burning after harvesting. Biomass burning is prevalent across the world in an area of 350 million hectares as in the year of 2000 (Pathak et al., 2010), becoming a potent source of greenhouse gases like sulfur dioxide, carbon dioxide, carbon monoxide, organic carbon (OC), methane. Burning of the residue of previous crops have a direct impact on soil organic carbon as it can reduce SOC by a mean level of 17% (Sateesh et. al, 2014) along with subsidizing water holding capacity and micro or macro nutrient in the soil (LW Johannes, 1965). Soil productivity sustainability is an ultimate loss by the anthropogenic intervention.

Table 1. Status of Soil Organic Carbon in Two Villages in the Area of Study

Status of Soil Organic Carbon (SOC)	Kankasa		Chankhwa	
	Number of farmers	Percentage of farmers	Number of farmers	Percentage of farmers
Low (<0.5%)	11	13.75	4	6.67
Medium (0.5–0.75%)	69	86.25	49	81.67
High (>0.75	0	0	7	11.67
Total	80	100	60	100

**Source: ikhedut.gujarat.gov.in, 2015*

How Conservation Agriculture can Help?

Conservation agriculture is a method of sustainable farming in which the soil is not tilled or disturbed minimally, keeping the soil covered with crop residues or by growing cover crops, and managing a diversified cropping system making production socio-

economically and environmentally viable (FAO, 2013). It is a matter of inquisition, how CA is different from conventional or traditional way of doing farming. In CA, the plough is completely abandoned. As against ploughing in conventional agriculture, CA principles include zero or minimal disturbance soil and leaving it naturally, while sowing is done with specialized implements just to place seed in the soil. Another contrast that can be seen in CA is, increasing biodiversity endorsed, by methods such as intercropping, growing cover crops, border plantation of trap crops and rotation of crops in contrast to the monocultures. The rationale behind the principle is to facilitate the development of a micro ecology in cropping and soil system where plant can sustain its nutritional requirements from the enriched soil itself and create ecosystem services, like management of pests, even without using many external inputs as against the conventional agriculture.

CA promises a win-win situation for the farmer, by cutting down the cost of production without harming productivity; for soil; for environment; sustainable production of food and adaptation and mitigation to climate change. Looking at them one by one, soil health enhances with an increase in SOC, which is on a decline in different soils due to frequent tillage, lower availability of farm-yard manure due to mechanization of farming (IARI, 2012) and field crop burning (LW Johannes, 1965). Soil with high organic matter is higher in productivity than the soil where the organic matter is poorly managed (Alan Sundermeier et. al, 2005). The proposed system ensures there is an increase in SOM by an addition of residue year after year. Carbon sequestration is enhanced by adoption of CA as more and more carbon can be stored back in soil. In conventional tillage agriculture, on the contrary, the release of CO_2 accelerates since release of CO_2 from soil is directly proportional to the volume of the soil, which is loosened by activities like tillage and inter-cultivation (T. Bhattacharyya et al., 2010).

Carbon sequestration and enhancement in SOM is one among the practical strategy to dispel the carbon emissions and make a substantial share to climate mitigation and adding resilience to agriculture production (Y.S. Saharawat et al., 2012). Soils' capacity for carbon sequestration can range from 100 to 1000 kg carbon per hectare per year as SOC and from 2 to 5 kg carbon per hectare per year as secondary carbonates, and CA can be one such technical options to bolster it (Rattan Lal, 2015).

Apart from the discussed promises of CA to enhance soil organic matter, it reduces the vulnerability of soil from different forms of erosion and is cost-efficient for farmers as they can save their cost of production of tilling/ploughing the land (U.K. Behera, 2014). In CA, with every subsequent crop cultivated, the cost of production reduces as the soil fertilizer use efficiency increases, and there will be a lower dependency on fertilizer, It also has an impact on weed infestation as the cover crops and mulching suppresses the weeds in the soil. (Amir Kassam, 2012).

In 2014, globally conservation agriculture was applied over an area of 155 million hectares of arable cropland (11% of the total arable cropland) (FAO, 2016). Paraguay is the leading country to adopt it on a large scale with over 52% of its cultivable land under CA, followed by Australia, Canada, and the USA. Presently 25–30% of wheat in rice-wheat growing areas of the Indo-Gangetic plains, making a substantial share of 2.3% of world total (FAO 2016), is marked under CA facilitated by a zero tillage implement Happy seed drill used in direct sowing of wheat. Although CA adopted in the belt is not the complete adoption of CA principles, as in the subsequent season of summers and Kharif the farmers again till their land and transplant seedlings in puddled[1] fields of rice.

[1] Puddling is a process done in a water-filled field and is mis-mashed to make fine mud for transplanting.

Methodology

Th is empirical research paper is based on the extrapolation of the field experiences of the adoption of CA by the farmers. This paper draws its premises from qualitative and quantitative primary data collected on an empirical study piloted in Mangrol block of Junagadh district in Gujarat. The sampling was a purposive based sampling, as the results from four testing sites of CA, which the farmers had adopted with proper supervision, in a participator approach. For primary data, the farmers were interviewed for feedback and experiences thus were qualitatively put on paper. The study also undertakes analysis of secondary data from various research papers and soil analysis data from government websites for the presentation in the paper.

Discussion and Field Results from CA

When we explain the principles of CA to farmers, they get quite supercilious about the success of the technique in their field. Raised in five decades of Green Revolution in India and several years of practice of ploughing of land before sowing, the resistance is sure to strike the farmers at a conceptual level. So when one begins to co-learn (as the extension person also learns with the farmer) the technique, it is advised to make the farmer aware about the principles and its practice on a small piece of land, say 10% of the land he/she owns which can be called a *testing site*. Other important factors which are of utmost care initially—leveling the soil surface, breaking the compacted soil below soil surface with the use of sub-soiler[2] or a chisel plough, and to start managing mulch cover—either dry (crop residue) or green (cover crops) (FAO 2016).

After understanding the technique by the guidance of a renowned CA scientist and consultant to FAO, Dr. Amir Kassam, participatory but discreet trials with the farmers were undertaken to initiate the practice in the study area. Four farmers were selected to make them adopt *testing sites*. Farmer had sown groundnut in those testing sites in the Kharif season of 2015 from villages Kalej, Sheel, Seriaj and Kankasa. Along with the testing site, a control site was also maintained nearby the testing plot of 100 square meters where farmers had freedom to follow their conventional practice. In the case of CA testing site, practices included sowing of seeds directly in the soil without disturbing the existing structure of the soil. Normally, farmers sow the seeds of groundnut in the soil after preparation of good seed bed with the help of furrow opening seed drill; in the case of CA farmers had sown their seeds directly in the soil, after the rainfall, using a hand operated hoe. Farmer had slit the soil and the seeds were placed directly in the soil at a line sowing spacing of 66 cm. All other variables such as fertilizer use, seed rate, irrigation numbers and pest management were kept the same in both the sites. In CA, additional treatment of straw, mulch[3]cover was added in between the rows so as to cover the soil (one of the important principle of CA) and to increase biodiversity pigeon pea was cultivated on the border of the plots. Extension team with the farmers monitored the field results timely.

The following observations taken from all the farmers:

[2] A sub soiler is an implement which can penetrate soil up to 60 cm in order to break compact soil below the root zone purposefully done to increase filtration of water in soil and root penetration.

[3] Mulch is anything (straw, leaves, green cover) which is spread as a layer to the surface of soil with a purpose to save moisture and suppress weeds

In Table 2 it can be seen that in the groundnut grown conventionally, the number of weeding[4] operations was higher when compared to CA. Table 2 clearly speaks for itself that in the case of farmer Bhimabhai the number of weeding operations was just one in CA while in conventional plot he had to weed the plot 6 times; reduced number of weeding operations was also experienced by other farmers. In CA, there is a substantial decrease in the weed infestation over the period as discussed previously and as experienced by the farmers, the only condition is that the mulching and cover crops is grown by farmers with utmost care into the cultivation. The second result, which is of prime importance to farmers as also shown in Table 2, is that yields encouraging in the first year of adoption of the CA. When seen for the production comparison of the crop groundnut from the two methods of cultivation in an area of 100 square meters, there were increments seen in yields when compared to conventional and in one case, it was as high as more than double. The results have encouraged farmers to adopt CA in next season too. Although the paper limits itself to a complete analysis of the cost of production and cost benefit ratio, it is evident and accepted by the farmers too that the technique is cost-friendly as there is no requirement of ploughing, weeding. Also, there are also fair chances that the method will need lower irrigations due to moisture retention by mulch cover. Another additional advantage which was forecasted by the farmers is that they can avoid field burning in order to plough and to sow the consecutive crop, as the crop residue will naturally work as mulch cover for the soil and will add organic matter to the soil. These results are not only realized by the farmers of the study area but is also observed in other parts of adoption across the globe. A thorough research study on CA in a South American developing country, Paraguay, comprising small farms of not more than 20 hectares and with no mechanization concluded that CA on 48,00,00 hectares of land gave economic benefits of $ 941 million. The returns were achieved not by monocultures but by sustainable agriculture system of CA, enhancing farmer's income and least affecting the environment (Sorrenson, 1998). Of the total cultivated land in Paraguay, 52% is now under CA (FAO, 2016) and it is high time when India makes a move to ameliorate Indian farmers and agriculture.

Table 2. Comparison of CA and Conventional Groundnut with Yield and Weeding Operations Done

S. No	Farmer	Method	No of Weeding Operations done	Yield kg/100 sqm	Percentage change yield in CA
	Bharada Ramesh bhai	Conventional	5	32	0
1	Babu bhai	CA	2	35	9.4
	Bhuva Bhimashi bhai	Conventional	6	12	0
2	Jetha bhai	CA	1	27	125
	Bhadarka Pancha bhai	Conventional	4	39.5	0
3	Naranbhai	CA	2	49.8	26.1
	Balas Bhaya bhai	Conventional	3	27	0
4	Bhima bhai	CA	1	33	22.2

**Source: Primary Data, 2015*

[4] Weeding is removal of unwanted plants present in the field which can cause economic loss to a crop

Opportunities in Adoption of CA and Climate Change Adaptation

The technique as mentioned has enormous potential to adapt to extreme weather events such as, torrential rains, high temperatures and degrading soil health for sustainable food production. It takes 1000 years with a typical climatic pace to form 2.5 cm of fertile soil. The top soil degradation removal can occur by the agents such as high-speed winds, hefty rain water and high soil temperatures which are likely in climate change. The Western Ghats, coastal and north eastern hill regions are reported to lose 20–40 tons of soil per hectare per year (ICAR, 2013), due to soil erosion. The soil erosion not only affects the land by taking away top soil rich in nutrients but also leads to siltation of water resources down the streams, affecting the drainage of water leading to localized floods, degrading coastline (ICAR, 2013). Due to climate change anomalies, there is an expectation of 'decrease in the number of rainy days, with a corresponding increase in rainfall intensity regarding rainfall per day ranging from 1 mm/day to 4 mm/day' (Jayaraman, 2014). It is already forthcoming with the Indian sub-continent. The examples of Uttarakhand, Kashmir and Chennai disasters cannot be unkempt in 3 consecutive years of 2013, 2014 and 2015, triggered by the unprecedented inclement rainfall within a short span of time. Such incidences which are generally isolated instances can be a common happening identified as 'increase in extreme rainfall events in terms of frequency of occurrence, intensity, and amount of precipitation' (T. Jayaraman(a), 2014).

No doubt, the ramifications of heavy and unprecedented rainfall are not only likely to be seen in human life and livelihood but will also affect the fertile top soil, as heavy rains are more expected to wash away fertile top soil along with water splash thus generated. Sleet erosion is more likely to happen in a tilled land than on covered soil, making it an imminent threat to the civilization to save the soil loss from heavy rains catalyzed by climate change. Tillage agriculture not only speeds up the loss of SOM by 'enhancing the microbial decomposition through increased microbial activity' (Zak D. R., 2000) but also encourages enhancement of soil erosion vulnerability (Lemus, 2005). Adoption of CA has been known to help the soil retain more moisture by checking evapotranspiration losses and thus reduces irrigation needs and increases water recharge (Amir Kassam et al., 2012). In CA, the mulch cover is capable of reducing the sleet soil erosion, prevents soil evaporation loss, allow more water to stand on the soil facilitating water to percolate down in the lower aquifers and add to ground water in spite of a run-off (Garcia, 2012). In-situ water conservation at the micro level along with soil conservation cannot be neglected for coping with climate change ramifications.

With subsequent addition of mulch or crop residue in the soil the addition of humus also helps to keep the soil resilient to soil salinity (a major problem for the study area facilitated by salinity ingress) due to humic acid (Kassam et al., 2012) content. The root zone also benefits from increased nutrient uptake, as against the case of saline soil, due to osmotic pressure variance between soil and root zone (K. Mesut Çimrin1, 2010). With all other discussed benefits of CA, there are no negative trends seen in production, in the research available and as was also observed by the four farmers who have adopted the testing sites. It increases the production with the reduction of cost of production (Friedrich et al., 2009) as also resonated in the case of four farmers. While we talk about the management of residue of the field and avoiding burning, the solution lies in using it as a mulch material for practicing CA. The farmers are held responsible, for the practice of burning the field crops post-harvest and are also banned by the National Green Tribunal in India but the challenge which farmers bear is totally different. The

shortage of labour during peak harvesting season has pushed the farmers to move to mechanized harvesting in the case of wheat and rice crops. Mechanized harvesting has its ramification, as combine harvester cuts and lifts the plant from a greater height, making it difficult for the farmer to incorporate longer straws in the soil while tilling the land for next crop (primary source). Again the lack of labour makes it difficult for the farmer to manage the residue to which they find a simple solution as burning. To check the field burning for the cultivation of wheat post rice crop, National Green Tribunal has pushed promotion of *Happy Seeder*, a zero till seed drill (Jain, 2015). CA comes as a rescue of environment by preventing crop burning, saving 0.2 billion tons CO_2 equivalent per year solely facilitated by biomass burning (FAO, Media 2014)

Challenges posed for the Adoption of Conservation Agriculture

CA has sure to give a lot to adapt to changing climatic conditions and at the same time mitigate global warming by carbon sequestration process in the soil. The major challenge for the extension workers to promote CA with farmers is to overcome the paradigm of tillage. Being completely reliant on income from agriculture, a farmer always fears the apparent risk of failure of a new technique or approach. Assiduous attempts including frequent training and practicing CA in testing sites with identified lead farmer, making them visualize the benefits of the practice and continuous hand-holding of the facilitator can result in mindset change in farmers. Once the facilitator establishes the testing sites with the right methodology with the lead farmer, other farmers can follow the league without much effort. Talking about the extension, before we go to the farmers, extension workers including, technical universities also need to get the orientation and development of trust on the practice.

Another key adoption challenge, which a facilitator or extension worker can face while practicing CA along with farmers, is the availability of implements according to the local need to practice sowing seeds with zero tillage, be it wheat or groundnut. Customized zero tillage implements (Bullock or tractor-driven) can slowly be developed and promoted among farmers. Thus, implements like zero till seed drill for small and large farmer are critical, so in the longer run government can also introduce suitable implement support policy to promote no-till seed drill as the farmers does it currently with the help of *Happy Seeder* drill for direct sowing of wheat in Punjab. Developed countries such as the USA, the Canada, the Brazil, the Australia, etc. have made a successful attempt to adopt CA with the introduction of tractor mounted huge zero tillage implements as they have large size land holdings. In the Indian context, along with the innovation of zero tillage tractor mounted implements, there is a need for small implements which can be driven by bullocks, keeping in mind small land holders. Zimbabwe had met the challenge by keeping focus towards small land holders and thus developed bullock-driven CA implements and jab planters[5] (FAO, 2016). Such innovations need to be either incorporated in India or designed locally based on local needs.

CA, when practiced around the world has its 3 mentioned principles as its root but the strategies and technical understanding of the crop cycle in the new system, is site specific (FAO 2016), what will work in one location is sure not to work in another. The adoption knowledge inculcation by the farmer is also subject to knowledge of the promoter and extension person whether he/she has understood the principles completely and what steps can be taken to make sure the three principles are followed. Taking as an example, cover

[5] Jab Planters are hand operated direct seed planters with a tapering end directed towards soil, sowing seeds when the handles are squeezed before making hole by open handles

crops are the important part of this system, due to the need of the green mulch cover and managing weeds by cover crop competition, as the seasons across the nation vary so one type of cover crop necessarily will not grow well temporally and spatially. So the lead farmers need to evolve their system while adopting to the process which can further be scaled with peer learning and using information and communication technologies

Conclusion

Indian agriculture is at crossroads where policy makers need to think critically about addressing different challenges. India needs to ensure food for all and at the same time; it also needs to guarantee rationalization of subsidy for ensuring judicial use of resources such as soil water and finances for fertilizer subsidies. The challenge is to push for sustained growth in agriculture at a pace of 4% per annum. India needs growth to achieve with the mounting pressure of world community on climate change mitigation. World agriculture shared 5.3 billion ton CO_2 equivalents in the year of 2014 and contribution of developing country is high, due to the presence of rice cultivation and high livestock population, which can share 10 and 39% of the total agricultural and allied sector emissions of the world (FAO, Media, 2014). Considering all these different dimensions, CA is not a choice but the call of hour. CA extended to organic farming while incorporating other principles of sustainable agriculture can become a long-lasting solution for global agriculture. At the international level, FAO has taken the lead to promote CA and many countries are already practicing it. India where land holdings are small and subsistent, CA has a huge potential—not only to mitigate and adapt to climate change vulnerabilities but also to sustain income and food security. It is of great help to farmers to save inputs, save and replenish nature's paramount gift, soil and ensure increment in natural resources such as healthy soil with micro flora and fauna, and water in aquifers, while feeding our population. Government initiatives for soil and water conservation, like Neeranchal and MGNREGA, push for organic farming under Paramparik Kheti Programme:, rational use of nutrients by promoting 'soil health card', push for drip irrigation under 'per drop more crop' and so on are some initiatives to sustain natural resources. This needs to be channelized with innovations like CA, which all research institutes including ICRA, state agriculture universities and KVKs need to promote religiously. How can CA be linked to new biotechnology, new scientific developments in agriculture needs much exploration in India. Farmers also need to think again out of the box as it happened in the 1970s during the Green Revolution to bring new evergreen revolution; beyond involving all stakeholders and testing new ideas like CA, it would be difficult to achieve. Sikkim state was recently converted into a complete organic state if envisioned by other states to follow the league with sustained food security, CA becomes inevitable. CA can add to the organic movement by generating localized ecological service supporting systems to become productive and promising right from the beginning of its incorporation last but not least a happy farming community.

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Can Green Marketing Enhance Sustainability And Influence Customer Satisfaction?

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Abstract

There is no single definition of Sustainability. The trend to preserve the environment for future generation has influenced acceptance of going green and concern for environment protection. The developed world today has started realizing the "inconvenient truth" as has been referred by Ehrenfeld (2008), which turns its focus towards sustainability. This human behavior needs to cater towards three basic pillars- Environment Sustainability, Economic Sustainability, and Social Sustainability. Companies are adopting to go green and thus enhance customer's satisfaction for better sustainability.

The paper would facilitate subsequent researchers in estimating the impact of green marketing in evaluating customer satisfaction and environment safety.

Key Words:

Sustainability, Environment, Green Marketing, Customer Satisfaction, Human Behavior.

Introduction

The concept of awareness towards environment protection and its safety has been in vogue since last two decades. During late 1980's and 1990's the existence of the concept of green marketing came into being. The marketers started understanding the influence this societal protection policy can have in impacting the mind of the consumer. There had been several studies done both in developed and developing nations to understand its impact. The result exhibited that companies, which are stewards of environment concern stands a higher position in gaining customer preference and loyalty. Yet thorough study would facilitate to obtain the level of customer satisfaction associated with green marketing, and its impact in different product category, so that marketer can focus in its adoption through their marketing mix, to gain competitive advantage and facilitate towards better sustainability and environment safety.

"Green Marketing refers to holistic marketing concept wherein the production, marketing consumption, and disposal of products and services happen in a manner that is less detrimental to the environment with growing awareness about the implications of global warming, non-biodegradable components, and having emphasis towards environment safety and prudent conservation of the existing resources."

Sustainability: Inspiration, Innovation and Inclusion
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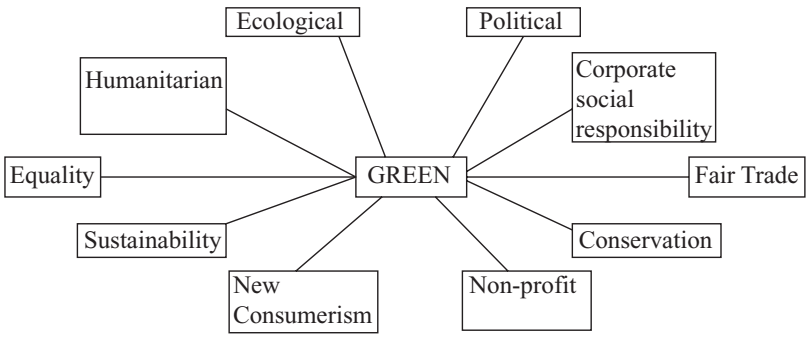
Figure 1. the many meanings of green



Source: (Peattie, K., Enviroment Marketing Management, p. 26)

Sustainable Development& Green Marketing:- A Brief Review of Literature

The concept of sustainable development given by World Commission for Environment and Development (WCED) emphasized on a world development where progress would continue without effecting the human civilization. The definition of sustainable development as proposed by WCED in 1987 says "Sustainable Development means meeting the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Thus, a sustainable society balances with the natural world from generation to generation without depleting its resource base by exceeding sustainable yields and never produces pollutants in excess of nature's capacity to absorb them (Wright, 2007a). Among different view Carter and Rogers (2008) were the pioneers to describe the term sustainability as a tool with three legs integrating to comprise the world with its- People, Planet and Profit popularly known as Triple Bottom Line (TBL). However, this term Triple Bottom Line was first introduced by Elkington in 1997, which stated the extended responsibility of companies towards their environment and society. This is similar to the concept of societal marketing as was coined by Philip Kotler in 1999.

Today, both consumers and other stake holders are more conscious towards environmental issues (Anderson and Skjoett Larsen, 2009; as in Pradip Mitra 2012). Business is no more only with focus of financial drive- environment, economy, and social factors play a vital role (Mitra Pradip, 2012). The principles of social responsibility are being incorporated into sustainability guidelines compiling these three pillars (Sean Milno- Chemical Market Report, 2005).

Thus, the field of sustainable development can be conceptually broken into three constituent parts: environmental sustainability, economic sustainability, and social sustainability. The three dimension of sustenance simultaneously aims in resolving conflict between the contemplating goals of these three dimensions- economic prosperity, environmental quality, and social equity. According to HasnaVancock (2007), as in Saxena Ravindra, and Khandelwal .k. Pradeep (2010) sustainability is a process, which tells of a development of all aspects of human life affecting sustenance, through environment, economy, and socio-political aspect.

"The three Pillars of Sustainability" emphasizes on indefinite pursue of Environmental sustainability through take care of renewable and non-renewable resource depletion,

economic sustainability, providing support towards a defined level of economic production, and social sustainability extending to ensure a functional and defined level of social well-being.

Figure2 The Three Pillars Of Sustainability

The market place was washed away rapidly with the surge of environment consciousness in developed nations following "Earth Day' in 1990. In every poll, consumers exhibited the idea of being ready to change their buying habit and move towards greener products- for which they were ready to pay more- as it would mean a better environment protection, Consumer Reports, 1991as in Coddington, 1993. Many studies have been done by authors to perceive that customer have high level of involvement, which increases with the growing alertness for environmental consciousness. The companies, which exhibit their greenness through packaging, promotion or advocating their eco-friendly approach, gain more customer loyalty as consumers want to associate with companies and products that take care of environment safety. Between 1989 and 1990, those organizations whose package informed of green claim their acceptance doubled from 4.4% to 11.4%. Marketing Intelligence Service (Consumer Reports, 1991). According to an audit by the advertising agency J. Walter Thompson (Consumer Reports, 1991), even the number of green advertisements, which appeared on television and in major print outlets, was more than quadrupled during the same period.

The marketers need to keep their consumers well informed. Scholossberg's sentiments are shared by Ottman (1997) and Zint and Frederick (2001) and they argued that green companies are not supposed to assume that consumers are well informed about the environmental issues or actions with which the companies are engaged in. This would increase better association and trust towards green marketers.

The adoption of green marketing has been a step towards acceptance of ethical and moral responsibilities by business firms. This eco-marketing orientation would help them to enjoy competitive advantage both domestically as well as internationally, McCarthy and Perreault (1984), Singh B.P., and Pandey Kamal (2012) stated that successful marketer do not view their customers as people with appetite for material requirement but as human beings whose material need to be fulfilled along with societal take care. Surf Excel through its ad slogan stated that only two bucket water can give the desired cleaning- thus it not only provides information of product attribute but also speaks of water conservation.

There are innumerable companies who are making shift from company centric to eco-centric in their approach as it not only protects environment but creates a better synergy towards bottom line. Thus, companies like coca-cola, Dow, Du point, Electrolux, LG, Mitshubishi, Nippon Steel, Pacific Gas, S.C. Johnson, Proctar, and Gamble to name a few has embraced this greener approach, as reported by Saxena Ravindra and Khandelwal K. Pradeep (2010). They studied 44 durable producing companies,

36 non-durable producing companies, and 32 service companies to find the result that those with greener image has distinctive advantage in market place and have longer sustainability and competitive advantage.

Narges et al. (2013) studied in Quatar to understand consumer purchase behavior towards green product and observed that ad message towards eco-label and eco-brand had clear edge in purchase decision. A similar study conducted in Mauritius by Thanika Devi et al. (2012) also showed a similar result stating that when both public and private companies expressed environment concern, it was observed that consumers had better appeal to buy their products.

Research Gap

Different literature shows that green product has market acceptance but does not evaluate level or degree of customer satisfaction. It's not easy to go green, as initially it may call for higher cost and customer should be able to optimize their satisfaction vis a vis the price they pay. Satisfaction being subjective would vary between different product category and with change in customer demography.

The scope of this paper is limited to conceptual understanding of the issues and challenges in going green

Objective and Methodology

The concept of green marketing, though, has been accepted by both developed and developing nation as an important phenomenon for mankind yet its implementation has been very limited. Literature from divergent perspective has shown the acceptance of this concept, but the impact on customer satisfaction has not been analyzed empirically.

This paper attempts to throw light on the conceptual issues associated with green marketing. The present study is exploratory in nature to provide a clear guidance for empirical research, subsequently to be done to understand customer satisfaction through green marketing in different product category. It is also descriptive where the focus is on fact finding investigation with an adequate interpretation. For this purpose secondary data were collected, from different research papers from journals, magazines, books, newspaper, government reports, and conference proceedings etc.

Process of Green Marketing and Marketing Mix

A. Green Marketing Process

The concept and shape of Green marketing has been an outcome of Sustainable development. The agenda of sustainability had been evolved to protect the world's resources. But in more true sense it aimed at usage of resources with prudence so as to conserve it and make things, which would be environment friendly.This has led towards the march of the concept of "greening" of the companies. This holistic take care would facilitate and distinguish the organization and enable it to prosper in the dynamic, global marketplace of the 21stcentury (Menon and Menon, 1997).

The study of Peattie (1992) as in Sarkar Anirban (2012) had identified certain internal and external components, which fulfilled the objective of Green marketing. Thus, Green marketing process comprises of the external and internal Ps culminating to obtain the satisfaction through achievement of sustainability. After integrating external and internal

Ps, green success will automatically come through four Ss. The External 7 Ps are Payments made to customers, Providers of various components, Politicians, Pressure groups, Problems, Partners, and predictors; Internal 7Ps consists of Products, Price, Place, Promotion, Provider of information's, Policies, and Processes. After integrating external and internal 7Ps, we can find out the green successes through 4 Ss such as Satisfaction fulfilling the stakeholder need, Safety means both for the product and process, Social acceptability –of the company, and Sustainability and safety- of all its activities. These satisfactions would be able to ensure the degree in which a consumer is satisfied in various product categories.

B. Green Marketing Mix:

The marketing Mix to be adopted by an organization depends on the factor of what is being made by the company- Product or Service and based on that the organization can adopt either 4 P's or 7 P's .

The greener approach entails an organization to instill the necessities of sustainability of environment, economy, and society through their marketing mix. Hence the,

Product: A product has to be made eco-friendly keeping in mind the ecological objective, which should be able to focus on reducing resource consumption that is scarce in nature. It must adopt such production technique, which can control pollution for the benefit of environmental safety.

Price: Price, which is the most critical and sticky component to determine the elasticity of demand of the product, should be able to justify the additional utility and value being greener. The perception of product value may be justified through various concepts like improved performance, function, design, visual appeal, taste, and all of them in a Greener approach. The satisfaction of consumer comes from the rupee- value analysis.

Promotion: While promoting the organization should be able to position its message in such a way that it reflects the green approach of the organization.

1. The Ad message should be able to highlight the relationship of the product/service with its biophysical environment.
2. Speak of the Green lifestyle that the product /service can obtain.
3. Inform of the Social responsibility and the ethical practices adopted and practiced by the organization.
4. Inform of the organic approach/ or intimation of not being tested on animals.

Place: The convenience of availability will ensure larger movement of any product. Hence, the marketer has to have effective distribution strategy to suit customer need.

Strategies: The marketers need to have effective marketing strategies for green marketing include: to enhance value for their customer, which may include the following:

1. Marketing Audit (including internal and external situation analysis).
2. Adopt a marketing plan keeping in mind its marketing mix.
3. Implementing the adopted green strategies.
4. Monitor and control the evaluated plan.

Key Attributes for Successful Green Marketing

The attributes that can enable this concept to be successful is based on consumer perception of value. The marketer has to highlight the benefits of this approach not only from the need fulfillment point of view of the consumers through product/service consumption, but over and above it in the form of additional benefits.

The marketing of Green products aim towards attainment of atleast five desirable benefits, such as:

1. Cost effectiveness and efficiency ;
2. Safety principles and healthconcern ;
3. Performance of the product;
4. Status and symbol established ; and
5. Convenience in terms of usage and availability.

When whirlpool tried to launch CFC free refrigerator in China in 1990, it did not fulfill any of the above mentioned consumer satisfaction criterion, and thus failed to establish customer satisfaction. On the other hand study of Raghavendra B. N, and Usha C (2013) has discussed that companies like HCL, Maruti, Xerox, ITC, and CNG being promoted as fuel option by government for public vehicle, had showed positive acceptance by the people, since the consumers could associate with the organization's objective on environment safety. The Green marketer who is successful does not view his consumers having appetite for product with materialistic approach but try to enrich their experience protecting their world around.

Eight Golden Rules for Successful Green Marketing:

The concept of Green marketing can facilitate the organization towards better profitability through longer sustenance, provided the right steps are adopted. They are as follows:

(i) **Being genuine:** As an organization one has to be practicing consistently what is being claimed, and thus be genuinely environment friendly.

(ii) **Educating the customers:** It is not enough just to practice green strategies and protect the environment, rather it needs to be explicitly made clear, and how that matters. Else it may end up as "So what difference does it make?" and it fails to create that value.

(iii) **Customer participation:** Giving opportunity to customers to participate and hence let them be associated as an integral part in the activity towards environmental concern.

(iv) **Knowing the customer:** This enables to create link between the customers need and the product being offered, and how the eco-friendly product would cater to that need with greater value.

(v) **Empower consumers:** Let the consumers be empowered to associate with the worthiness of the green product and not being imbibed on them.

(vi) **Being transparent:** The process should have transparency for the consumers to be convinced of the legitimacy of the product and not be deceived by spurious stuff.

(vii) **Reassure the buyer:** Let the consumer have their expectation fulfilled through the product promise

(viii) Consider your pricing: Eco-friendly products are likely to cost more due to its ingredient used as well as process adopted, hence the price charged should be able to justify the additional benefit.

Challenges to Go Green

Though consumers express their desire for green product considering its benefit at large, but there are certain challenges.

- **Lack of Standardizing Body:** There is lack of any standardizing body that can authenticate the claims made by marketing companies. Hence, consumers though desirous, yet get in double mind in purchasing. There need to be some regulatory authority towards quality control and check.
- **New Concept:** The concept of Green Marketing is being introduced and practiced in both developed as well as developing countries, yet its acceptance has not engulfed the masses.
- **Right Consumer Perception:** At times organizations in the spree to be environment friendly and consumer satisfaction may end up adopting certain procedure, which may not be environment friendly in a true sense.

In a nut- shell it can be said that it is good to go green but it has its own challenges, which need to be taken care of.

1. Renewable and recyclable material, are needed for Green products, which are expensive.
2. Since Green products have to go on evaluating environment safety, it requires lots of Research and Developmental expenditure on a regular basis.
3. The environment friendly water treatment technology is also very costly.
4. All these would push up the cost of the product, which all strata of developing population either may not be ready or affordable to pay.

Green Marketing adoption abides by five components:-

1. To hone out better opportunities or competitive edge amongst its competitors.
2. As a concept of corporate social responsibilities (CSR).
3. To implement government pressure.
4. To sustain in the existing competitive market.
5. To optimize long term cost or profit issues.

Customer Satisfaction and Green Marketing

Customer satisfaction is an outcome of either psychological perception towards a product/service or an experience resulting out of consumption, which may include perception from product consumed. Swenson, M.R., Wells, W.D. (1997), Churchill, Gilbert A. Jr., and Carol Surprenant (1982). There is a relationship between customer satisfaction and their loyalty as satisfaction leads to influence the customer attitude, and thus enhance purchase intention. Ottman, J. (1998), McIntosh, A. (1990), Menon, A. (1997), Page, N., Eddy, and C. (1999).

Thus, satisfaction is an overall outcome from customer's judgment towards a product/service. Environment protection has been the base of many investigation and studies. There exists relationship between human demography, their related cognitive psychology, their attitude and personality, and the various activities linked to environment safe keeping. The study of Pickett et al. (1994) has proved that psychological and social factors play higher role over demographic characteristics towards influencing green purchase behavior. The study of Manrai et al. (1994) has stated that knowledge and awareness towards environment friendly products and their benefit influences purchase behavior thereby increasing customer satisfaction.

The benefit that Green Marketing achieves makes it possible to grab customer satisfaction and enjoy better sustainability in the long run. These organizations can fetch:-

i) **Higher Profitability**: Since the products are Green based, it accrues lesser waste, which ensures usage of fewer raw materials and saves energy through prudent technique.
ii) **Better Competitive advantage**: The Companies, which exhibit environmental innovation will naturally enjoy competitive advantage.
iii) **Rise in their Market Share**:-The companies who are perceived to be environment friendly has better acceptance from their customers, and thus can enjoy increased market share.
iv) **Improved Quality**: Green production technique enhances product quality and extends benefit towards energy saving, higher performance, more convenient, and safe usage.
v) **World as a Better Place to Live**: The safe keep and concern of environment protection would reduce air and water pollution, waste energy depletion, protect global warming, deforestation, all of which would ensure a personal reward towards social and economic cause.
vi) **Ensure Sustainability**:- All of the above practices would ensure to meet the present need without asking the future generation to compromise.

Conclusion and Managerial Implications

The paper analyses various research paper both from conceptual back ground to quantifiable analysis of acceptance and impact of Green marketing and its association towards sustainable development. The concept of green branding and sustainability is strongly advocated both by organizations as well as consumers. Everybody realizes its importance from social and larger economic point of view. This states that there is positive sign of betterment of the World Environment from its entire stake holder to carry it forward for the future generation.

The acceptance had been wider in developed nation, but even in developing nation like India there is strong awareness and acceptance of this phenomenon. But larger education to consumer not limiting only to urban area would enable it to spread its benefit at large.

The adoption of green technique has increased its coverage among many marketers and that shall reflect to get a better and healthier place to live in. In this venture, role of the government is very strong. Strong initiation and implementation statute can change the scenario faster, ensuring higher sustainability of the society as well as the organizations. Adoption of Green technique will lead the nation march towards better technological development.

As marketing aims at customer satisfaction leading to customer delight, this paper would act as a base for the researchers to find out relationship in terms of customer satisfaction on different product category and then only it would be able to add true flavor to this conceptual analysis.

Direction for Future Research

Though this is a widely discussed concept and today people are aware of its benefit and existence. They have positive attitude to go green, but still this concept is at its nascent stage and needs many more in-depth study both in urban and rural context. Some of the areas in which further study can be conducted are:-

1. The acceptance of green marketing and its viability in rural context.
2. Today, there is so high concern of air pollution in metro's like Delhi, being followed by Mumbai. The decision of banning diesel vehicle is being discussed. Instead intense research needs to be done with Auto mobile Industry for implementation of technology for the restoration of environment.
3. Power sector and its emission needs to be taken care of. Hence, it has to be found out not only what is to be done for waste management, but how to reduce that and convert towards more bio-degradable conversion and look for "Green Power".
4. Estate should be another area on which it should be studied how to convert towards efficient green technique adoption.
5. How to shift towards "Green tourism" and "Green Investment".

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Today's Tweenager, Tomorrow's Customer: A Holistic Model towards Understanding the Consumer Group for Gaining a Sustainable Competitive Advantage

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Abstract

Tweenagers have emerged as a sizeable segment in India, which promises a lucrative and a growing market. This special age group can be broadly defined as those between 8 to 12 years. This paper reviews the literature, recommends hypothesis for empirical research and presents a model with important variables. Insights into tweenagers' characteristics, thought process and decision-making can be used for developing marketing strategies. It has been developed for the benefit of academicians working in the field of child consumer behaviour and marketing practitioners laying the bedrock for strategies targeting the segment.

Keywords:

Tweenagers, Consumer Behaviour, Marketing, Sustainable, Competitive

Introduction

Competitive advantage can be a by-product, marketing of a product or its production process. However, identifying the right audience and accepting the challenge to sustain it, in the long-run is the key to marketing success. One such competitive advantage can be attained by serving and nurturing a segment that is sizeable and offers a profitable slice of the pie today and tomorrow. In modern times, focus on child consumers has increased both from the social and the business perspective. The present literature celebrates the power of a child consumer in the market space (Kaur and Singh, 2006). By the age of 8 years, a child has all the skills to act as an independent consumer (Solomon, 1999). Parents also allow children to participate in the purchase decisions (McNeal, 1992). Children are an important group for the marketers to study because their attitude about the products and brands is in formative stages, and their current experience and learning will impact their future marketplace behaviour (Belch et al., 2005). More than half the brands used in the childhood and adolescence continue to be used later; hence, it is crucial for brands to build loyalty with children (Claycomb and Martin, 2002; Guest, 1955). However, children of all age groups cannot be seen as one large homogeneous segment;

Sustainability:
Inspiration, Innovation
and Inclusion
pp. 31–41
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they are made up of diverse subgroups which need to be investigated so as to target these groups effectively (Belch et al., 2005). A special age group, tweens, has evolved in the recent years and has become the apple of the marketers' eye (Chui et al., 2013). Tweens are worth deliberating for its segment lucrativeness and profitability. In the academic world, most researchers have delineated 'tweens' as '8–12-year olds' (Andersen et al., 2007, p. 340–50) whereas others have broadly defined them as '8–14-year olds' (Lindstrom, 2004, p. 175–82). Tweenage is a budding stage, where the children are considered to be grown up and start behaving like young adults. Tweens tend to develop their sense of identity and expect the treatment of an individual customer. Authors such as Tseng and Lee (2013, p. 259–77) opine that "tweens purchase behavior occupies a position in the current consumer market that cannot be ignored."

Methodology

Rationale for the Study and Research Questions

When one acquires attributes that allow it to perform at a level higher than others in the same industry it is called a competitive advantage. Though a competitive advantage can be gained by developing difficult to copy products, difficult to compete for prices or by significant location, right distribution, right supply chain etc., it can also be attained by choosing the right segment and delivering to it in more meaningful ways than others in the market. Tweens are an important consumer group. They could be customers, buyers, spenders, shoppers and consumers. Since, India has the world's largest cohort of tweens with 30% of our population being below the age of 15 years (Census, 2011), it becomes relevant to study the factors related to the tweens' segment. Catering to their needs and wants today and anticipating their future needs can give any industry or organization a sustainable competitive advantage. The paper sets to explore the interrelationship between dimensions of the reference group, media, individual factors, influence strategies and response strategies. The research questions are as follows-

1. How do the dimensions of reference group, media (traditional and digital) and individual factors influence the purchase intention of tweens?
2. How does the construct of purchase intention impact the influence strategies?
3. How do influence strategies impact the parents' response?
4. How do the constructs of personality, materialism, brand importance and shopping influence moderate the relation between influence strategies and parents' response?

The paper begins with the introduction of the subject, the rationale for the study and the research questions, and further discusses the conceptual framework culminating into the proposed model for research.

The key questions as discussed above are: the factors by which tweens are influenced; whether this influence is turned into behaviour directed at impelling family purchasing patterns, and the extent to which parents are swayed by such behaviour. The extensive literature study has been done to identify the dimensions for research work. The paper gives an overview of tweens and their characteristics and examines the degree of influence of reference group, media (traditional and digital) and individual characteristics on the purchase intention of tweens. Subsequently, it discusses the tweens' impact on the perceived parental response. The model introduces the dimensions of personality type, materialism, brand importance and shopping influence as key variables moderating the

prior dimensions. The paper is an analysis towards - (a) introducing the subgroup of child segment, i.e. tweens and their characteristics (b) identifying the decisive variables impacting the segment (c) establishing the interrelationship among the variables (d) develop a tween marketing model ensuring a rounded outlook. Through a literature multi-perspective analysis, it develops a prescriptive marketing communication model.

Discussion

Constructs and Hypotheses

Extant literature has been reviewed to include the most pertinent dimensions for the study (Annexure). These key constructs are described in detail for a distinct understanding of the proposed model. The work also proposes hypothesis with respect to the probable relationship between the variables.

Purchase Intention

Schiffman & Kanuk (2009) suggest purchase intention as the possibility measurement of consumers purchasing certain products. They claim that higher the purchase intention, larger the purchase probability. Higher purchase intention assures a higher consumer willingness to buy a product (Dodds et al., 1991). Blackwell, Miniard & Engel (2001) suggest what does the consumer think and will buy in their mind represents the purchase intention. Blackwell, Miniard & Engel (2008) considered what consumers desired being a tool to predict consumer behaviour; intention as the subjective judgment on how to behave in the future and purchase intention as what people tended to purchase. Tweens are the primary market for many products and influencers for several others. Their purchase intent is undeniably a subject of deliberation.

Reference Group

Hyman (1942) introduced the term 'reference group', as a person or a group of persons significantly influencing an individual's behaviour. According to Schiffman and Kanuk (2007), a reference group is a group of people whose values and attitudes influence an individual's current behaviour and have significant impact on an individual's evaluations, aspirations, or behaviour. North and Kotze´ (2001, p. 91) state that family can be regarded as the primary source (agent) of consumer socialization and is a major reference group while studying the decision-making process. Foster family system (Khunsit, 2007; Sungkamanee, 2011) within the context of different Asian countries among Pacific Islands and Asian families is that if any decision is made it will be made by family members. Reference groups are the social network of an individual including family members, friends and colleagues and inspirational figures (Bachmann, John & Rao, 1993). Many researchers have investigated the role of parents and peers in influencing children, but not much has been discussed about the role of siblings and teachers. Hence, the authors propose to study the influence of all of them on the purchase intention of tweens with the following hypothesis.

H1: Reference group (parents, siblings, peers and teachers) significantly influences tweens' purchase intention

Media

Literature has evidenced that the more children interact with the mass media, the more consumer behaviour they learn. (Moschis and Mitchell, 1986; O'Guinn and Shrum, 1997). Parents have been at the centre stage of socialization but mass media has received the most attention (Moschis, 1987, p. 121). Children have access to information because they get an exposure to a variety of media. But the choice of media has undergone a transition over the last decade with digital medium gaining popularity. There is no research in the Indian context which discusses the impact of social networking forums, digital platforms on tweens. Thus, the gap leads to the following hypothesis:

H2: Media, both traditional (television) and modern (social networks, instant chatting and shopping websites) significantly influence tweens' purchase intention

Individual factors

Research has shown that individual factors can significantly impact variables related to consumer behaviour. Literature suggests that female children critically influence the family purchase decisions (Atkin, 1978, Moschis and Mitchell, 1986). Female influence has been found high in household items, like clothes, bakery items, etc. (Atkin, 1978; Lee and Collins, 1999; McNeal and Yeh, 2003). Females are more focused on products that are directly related to house and value the quality as well. Thereby, brands and quality have effect on consumers' purchase intention (Ahasanul, Ali & Sabbir, 2006; Safiek, 2009b). In a study related to products like video games, entertainment and fun items, boys were found to be more influential (Mc Neal and Yeh, 2003).

As the age of the child increases, his participation in the family purchase decisions grows (Mc Neal, 2007). Older children exert greater influence on parents (Moschis and Mitchell, 1986; Darley and Lim, 1986) this can be attributed to the cognitive skills of the elder children. As the ages of children increased, they preferred to shop without their parents. Bigne, Ruiz and Sanz (2005) explored if age of a consumer had an impact on the online shopping of mobile devices in Spain. This study concluded that the age of consumers has its own characteristics, need and demand, which affects their purchase intention. Moschis and Churchill (1979) found a positive relationship between the consumption ability of adolescents and their age.

Many researchers have confirmed that demographic factors of consumers have influenced their purchase intention and behaviour (Peter & Olson, 2008; Schiffman & Kanuk, 2007), however, certain important variables like Type of family, number of siblings, parents' occupation, parents' education have not been incorporated in the studies. The research gap led to the following hypothesis:

H3: Individual factors (age, gender, type of family, number of siblings, parents' occupation, parents' education) significantly influence tweens' purchase intention

Purchase Influence

The definition of 'influence' can be perceived as an active dimension as well as with a passive dimension (Rossiter, 1978). Child Purchase Influence (CPI) has been a key variable in the field of child research (Laroche, Yang, Kim & Richard, 2007). The

transition in the buying behaviour of families because of smaller family sizes and more disposable income has shaped up this strong purchase influence. Children use different techniques like asking, bargaining, persisting, using force, telling, being demonstrative, threatening, and using pity to influence the decision-making (Atkin, 1978). They offer to pay part of the cost, promise to help around at home, etc. (Soni & Upadhyaya, 2007). Strategies like directive, expert, legitimate, emotional, persuasions, request and bargaining are popular (Palan & Wilkes, 1997). There could be direct influence attempts from children towards parents has seven dimensions namely; asking nicely, just asking, bargaining, showing affection, displaying anger, begging and pleading, and conning (Williams & Burns, 2000). To study the relationship between intention to purchase and influence strategy, authors hypothesize:

H4: Tweens' purchase intention significantly impacts the purchase influence strategy

Purchase Influence and Parental Response

Studying the parental response is equally important as the children influence strategies. Parental styles that have an explicit impact on children are autonomy, support and involvement. These are pertinent on children regarding their decision about different occasions (Grolnick & Ryan, 1989). Baumrind (1971) classified parents into four different styles; indulgent, authoritarian, authoritative and neglecting. Maccoby & Martin (1983) identified that parents vary along demandingness (i.e., parental control of children's behaviour) in rearing children. Authoritative parents are high in demandingness while indulgent and neglecting parents are low in demandingness. Parents with high demanding attitude supervise the child behaviour and control his actions (Baumrind, 1989; Maccoby & Martin, 1983). In the case of low demandingness parents do not enforce any rules (e.g., neglecting parents) and do not impose anything (e.g., indulgent parents). These parents do not want to dishearten their children and hence can be easily persuaded (e.g., indulgent parents). Sometimes they just want to avoid the child's anger (e.g., neglecting parents). Children are likely to get approval from parents of this category if they use begging and pleading or reasoning as an influence strategy. The interrelationship between the influence and response needs deliberation for the tweens' segment, hence the following hypothesis:

H5: Tweens' purchase influence significantly impacts the parents' response

Personality, Materialism, Brand Image and Shopping Influence

Personality characteristics that increase the child's demand for autonomy will, *ceteris paribus*, increase their level of resistance to parental authority. Their effects on parental control will depend on parental resources (Lundberg et al, 2007). Longitudinal attachment studies depict that children with anxious attachment are emotionally disturbed and have a low self-esteem (Sroufe, 2001). Children also witness their parents' emotions and are watchful of how the parents interact with other people. Mostly, they imitate what they see their parents do to manage emotions (Morris et al, 2007). Personality of the child can be a critical variable while he influences and his parents respond to him.

Studies of materialism with adults have typically focused on defining and measuring materialism (Belk, 1984; Belk, 1985; Richins and Dawson, 1992) and generational differences in possessions valued (Belk, 1985; Csikszentmihalyi and Rochberg-Halton, 1981; Kamptner, 1991). Personality and behaviour traits' association has been studied with materialism (Fournier & Richins, 1991; Braun & Wicklund, 1989; Hunt, Kernan, Chatterjee & Florsheim, 1990). However, very few studies have examined materialistic values in children. The studies that are documented have been done with limited sample sizes and qualitative measures such as content analysis and referencing of consumer products in children's free speech (Dickins & Ferguson, 1957). Since, materialism is trending among the new generation kids it can alter the already existing relationships.

Bachmann & Roedder (2003) studied the meaning of brand names and concluded children at the age of 12 use brand names as an important conceptual cue in consumer judgments. Exposure to television, uninhibited access to the Internet and premature brand learning has led to the birth of consumerism in children. Clubbed together, they contribute to the future brand selection behaviour of children. Shopping influence is also a key construct for understanding the tweens' contribution in the buying behaviour. The tweens are aware, informed and learned to exert enough influence on the purchase decisions. Existing literature does not show any relationship between the above-given constructs and tweens' influence and parents response. These variables have the potential to moderate relationships hence the hypotheses:

H6: Personality can significantly impact the relationship between tweens' purchase influence and parents' response

H7: Materialism can significantly impact the relationship between tweens' purchase influence and parents' response

H8: Brand image can significantly impact the relationship between tweens' purchase influence and parents' response

H9: Shopping influence can significantly impact the relationship between tweens' purchase influence and parents' response

The hypotheses developed in this section have been formalized with the help of a framework in the research model in Figure 1(Annexure)

The model comprises the most relevant variables of study for the tweens' segment keeping in perspective the past literature and current relevant studies and research gaps hitherto. The model methodically captures the factors influencing the consumer group and the consumer group's impact on other variables. The model offers a holistic approach to the segment under review. Extensive study of concept variables has been done to stipulate the complex interrelation amongst them. Authors consider the model to be a preliminary one and suggest substantial primary research to test and refine the model which will provide the necessary validity to the framework.

Implications

The segment has been gaining popularity because children play an important role in family decision-making and are the future market which explains the purpose of studying them. This segment is old enough and wise enough to be receptive and responsive to marketing communication. This is the primary reason marketers want to cater to this highly profitable slice of the marketplace. They are a consumer force to be reckoned with because given their age they will continue to be prime consumers for many years to come.

Figure 1

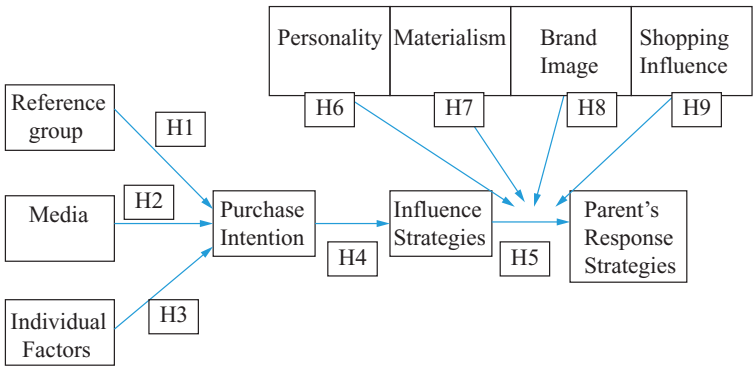

Table 1. Depicting the Constructs and Suggested Validated Scales

S no.	Constructs	Adapted from
1	Peer Influence	Dotson & Hyatt (2005)
2	Parents Influence	Dotson & Hyatt (2005)
3	Teachers Influence	Rich (1997)
4	Siblings Influence	Eze, Chin, & Lee (2012)
5	Television Influence	Dotson & Hyatt (2005)
6	Internet Influence	Kaur & Medury (2013)
7	Social Media	Kaur & Medury (2013)
8	Purchase Intention	Bower 2001 , Bower & landreth (2001)
9	Children's Influence Strategies	Cowan Avants 1988, Cowan, Drinkard, MacGavin 1984; Palan & Wilkes 1997 Manchanda & Moore Shay (1996)
10	Parents' Response Strategies	Cowan Avants 1988, Cowan, Drinkard, MacGavin 1984; Palan & Wilkes 1997 Manchanda and Moore Shay (1996)
11	Personality Type	(Gosling et al., 2003 b))
12	Materialism	Richins (1987)
13	Brand Importance	Dotson and Hyatt (2005)
14	Shopping Influence	Kaur and Medury (2013)

The given validated scales have been explored from the studies related to the Children Consumer behaviour. They are measured on Likert scale.

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Indian tweens have preferences, distinct from younger kids and teenagers. Marketers promotion through popular children's channels and websites, banner ads, videos and logos, will not only create a positive perception but will also establish a bond of relatedness with products and brands. Scholarly research on the impact of digital technologies on Indian tweens is conspicuously not evident. Therefore, by making use of social networking sites, mobile, etc. for their marketing and promotional strategies, the

marketers can tap this unexplored segment, channelizing it to become a profitable one. The marketing scholars can investigate the impact of relatives, teachers and celebrities, which will, in turn, facilitate the marketers to explore this domain to comprehend their contribution in forming an opinion and then resulting in a purchase decision. Other areas such as family size, the involvement of parents and grand-parents, choice of influence strategies and parental response can be the areas of proposed future research that will help the marketers in devising the marketing and communication strategies.

The most relevant variables have been identified from the available literature and gaps therein. These were found to be fundamental in studying the nature of the said subgroup. The work has significant takeaways for researchers to explore the dimensions and empirically test them. Consequently, the study will have marketing implications facilitating the marketers to formulate marketing tools and strategies specific to the Indian tweens, further assisting in targeting and positioning appropriately.

Tweens are a budding section of consumers that hold potential for the future market. Sustaining their loyalties is huge challenge to combat. Understanding their preferences and the impact of social and external factors on their purchase intention and decision-making will pave a new arena for the marketers and the scholars of marketing.

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Consumer Perception towards Alternative Fuel Vehicles: An Empirical Study in India

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Abstract

Increasing environmental concern is also leading to the emergence of innovative products which are favourable for the environment such as Alternative Fuel Vehicles (AFVs). But, the success of manufacturers of these AFVs will largely depend on the positive perception of consumers. Therefore, the objective of the study is to know the perception of the consumers towards AFVs. The study based on the structured questionnaire is empirical in nature. In this study we found that the perception of consumer is fractional for AFVs. The study would be beneficial for the marketer to understand the consumer thoughts in buying AFVs.

Keywords:

Alternative Fuel Vehicles (AFVs); Consumer Perception; Indian Automobile; The Environment

Introduction

Indian automobile industry is making a great success due to increasing sales in recent decades, and it has a very significant contribution to the economy. It is also an exquisite indicator of the economic prosperity of India. However, increasing numbers of vehicles hitting the road is leading to the dual challenge; one is traffic congestion and another increasing level of carbon emission which is majorly affecting the quality of air. New Delhi, the capital of India, is facing the worst consequences of the pollution created by the vehicles and other sources. Various national and internationals committees are coming up to save the environment, but still the solutions towards better environment and sustainable development are very less. In a recent development, the government is engaged in making various formulas to tackle all these problems. The Government of Delhi made some strict norms related to the mobilization of cars on odd and even days. It is still not very clear that how much this formula worked but it is sure that the government is serious about the quality of the environment. On the other hand, the Minister of Union Road Transport, Highways and Shipping, Mr. Nitin Gadakari focused on the use of alternative fuel such as ethanol, biodiesel, and electricity to

Sustainability:
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pp. 42–54
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power vehicles for a pollution-free environment (Sethi, 2015). It is one of the threats to the automobile industry in India as they can face a decline in sales of conventional fuel powered cars in future. Though automobile companies have realized this threat way back and started working on fuel efficient cars and alternative fuel vehicles (AFVs). Alternative fuels include gasoline, diesel, Liquefied Petroleum Gas (LPG), Compressed Natural Gas (CNG), methanol, ethanol, electricity and liquid hydrogen. AFVs options are relatively more sustainable with regard to fuel production as it lowers net carbon emissions and dependence on fossil fuel. These are mainly battery-powered vehicles; hydrogen-fueled vehicles and Ethanol-fueled vehicles (MacLean et al., 2004). There are a few Indian automobile companies who have introduced their AFVs such as Mahindra Reva E2O, Mahindra XUV500 Hybrid, Toyota Prius, Honda Accord Hybrid, etc. (Sood, 2014). The studies show that the consumers are also aware of the environmental hazards, and they are also changing their consumption pattern. Many consumers have started demanding green products in the stores, and also, they are attentive towards the use of energy-saving products. Indian automobile is making its continuous endeavours make the environment green and clean by introducing AFVs and fuel efficient cars. This phenomenon is also called green marketing. Green marketing is the process of producing and delivering goods to the consumers in a greener way.

Here, it is important to know the consumer views towards AFVs in India because the success of these vehicles will depend upon the customers. In India, much research needs to be done in the field of launching the green car nationwide as it requires the essential and common facility to manage (Joshi & Rao, 2013). Therefore, the objective of the study is to know the consumer perception towards attributes of AFVs.

Literature Review

Indian Automobile Industry

The Indian automobile industry is one of the prime industries in the world. The annual production was 23.37 million vehicles in the financial year 2014–15. The recorded growth rate was 8.68% over the last year. The automobile industry contributes 7.1% of the country's Gross Domestic Product (GDP). The passenger vehicle segment has 13% market share. India is also one of the important auto exporters (IBEF, 2016). The sales of passenger vehicles grew by 3.90% in April–March 2015 over the same period last year. Within the passenger vehicles segment, passenger cars, and utility vehicles grew by 4.99% and 5.30%, respectively (SIAM, 2015). As of 2013, Indian automobile has contributed 7% to the country's GDP, and the continuous efforts are going on to increase the figures (The Indian Automobile, 2015). Indian automobile has increased the export in the last financial year which was 3.5 million that is 15% increase what they managed (Mohile, 2015). India is a core pillar of global automobile market—policy, actions and strategies of Indian players will have a fundamental impact on the global auto landscape (Booz & Company, 2011). The automobile industry of India has shown tremendous growth in the past few years except a little lean leap in 2000–01 and 2007–08. Even most of the Indian companies have become globally competitive while large players of other countries have started to set up their manufacturing bases in India and they considered India as a future automobile outsourcing destination (Prahalathan & Mazumdar, 2008). India is the fifth largest producer of steel in the world ranking and

among the lowest cost ones as well, the country is expected to become second-largest steel producer by 2015. Steel is an essential raw material used in automobiles, which shows that India has tremendous potential in the automotive sector (IBEF, 2013).

Automobile, Environment and AFVs

Due to increasing number of private vehicles and high dependence on the conventional fuel, the environmental issues are on the rise (MoRTH, 2011). According to Sovacool & Brown (2010), transport sector in Delhi contributes 66% of the total carbon emission, which is highest among the top twelve mega cities of the world. The increasing purchasing power of the people has raised more vehicles on the road due to which problem of pollution and traffic congestion are increasing and making the urban life difficult (Tiwari, 2011). The automobile industry affects the environment in various ways, like the material used in the process caused environmental degradation and ends with the management of scrap, though the much of the environmental damage happened due to fuel emissions. In fact, some the countries started to levy charges if the car emission is more than 130 gms of CO2 per kilometer like the European Union (Hackbarth & Madlener, 2012). The Chinese government has also increased sales tax on cars with engine capacity more than 1 litre and reduced on cars with engine capacity less than 1 litre (Prahalathan & Mazumdar, 2008). The environmental regulations are presumed to be looking for green car innovation (Dijk & Yarime, 2010). The increasing concerns towards environment have compelled firms to produce green products and manufacturing processes to fulfill the environmental norms and overcome competitors through competitive advantages (Lin et al., 2013; Pujari, 2006; Huang & Wu, 2010).

The diffusion of AFVs will sharply rise in near future because of two reasons affordability and cost-effectiveness (Hackbarth & Madlener, 2013). In India, the Government had mandated the use of CNG, and now India is the fifth largest user of CNG vehicle in the world (Becker & Nagporewalla, 2010). Out of three fuel options, the most efficient and attractive option is cellulosic ethanol which has potentially low CO2. It is majorly used fuel in the US and Canada (MacLean et al., 2004) while Hydrogen and fuel cells could make to the realization of sustainable energy systems in future (Mierlo et al., 2006). Countries that have taken the initiative in making the green car (US, Germany, Israel, China, France and Brazil) found that the government involvement is significant to facilitate the process. From the last few years, there has been a massive increase in demand for eco-friendly cars and other vehicles because the environmental issues are becoming a major concern for both governments and individuals around the world (Electric, Hybrid Cars Stall, 2014).

Cost-effectiveness and Infrastructure

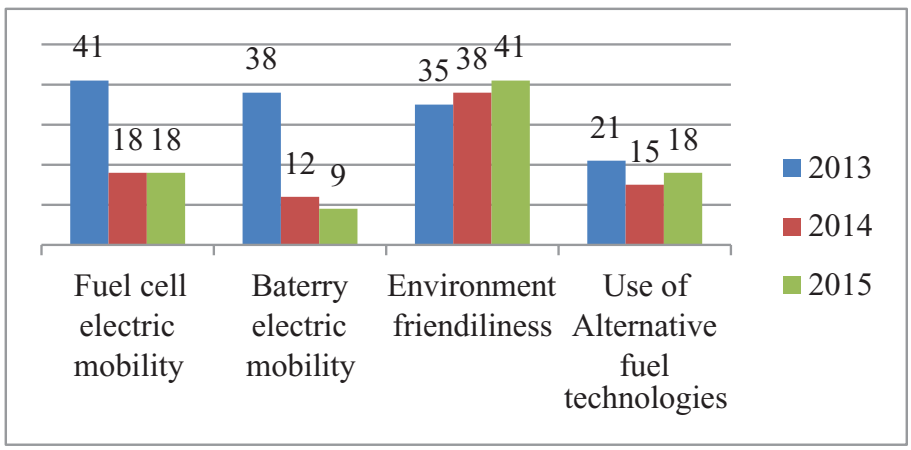
The volatility in prices of fuel affects the growth of automobile industry globally, and it can be understood easily as the costs of input in manufacturing process increase when the price of fuel increases. In addition to that fuel price also affects the disposable income and demand for the automobile by the customers. Fuel price further affects the overall running cost of the owners (Prahalathan & Mazumdar, 2008). Therefore, the consumers are highly sensitive to the price differences and reducing the purchase prices further increases the preference for the alternative fuel vehicles significantly (Eggers & Eggers, 2011; Dijk & Yarime, 2010). Cost efficiency in Indian automobile industry

enhances its competitive presence in the global arena as many global auto majors like Japan, have started cost reduction practices (Nag et al., 2007).

India is still facing the problem of road infrastructure and traffic congestion that could be a bottleneck in the growth of automobile sector. The lack of proper filling station, charging point for electric vehicles, service station for the hybrid car and appropriate parking place are the major issues in India and these questions should be resolved to manage alternative fuel vehicles (Prahalathan & Mazumdar, 2008). Until April 2010, India had 560 CNG pumps against 38,000 conventional fuel pumps (Becker & Nagporewalla, 2010) (***See*** Figure 1 in Appendices at the end.

In Figure 1, we can see that the fuel cell electric mobility was 41% in 2013 which decreased to 18% in 2014 and continues with the same in 2015 and the battery electric mobility was recorded as 38% in 2013 which further dropped to 12% in 2014 and again declined to 9% in 2015. The environment friendliness in the automobile segment was 35% in 2013 and increased to 38% in 2014 and 41% in 2015. The use of alternative fuel technologies was 21% in 2013 and decreased in 2014 to 15% which further increased to 18% in 2015 (KPMG, 2015).

Figure 1. Trends in Green Initiatives Taken by Automotive Sector



Source: KPMG's Global Automotive Executive Survey, 2015

Government Initiatives

Government of India allowed 100% Foreign Direct Investment (FDI) in the automobile sector and also aims to make auto manufacturing the key driver of 'Make in India' initiatives. The government has also developed the Auto Mission Plan (AMP) 2016–26, where the passenger vehicle market will be tripled to 9.4 million units by 2026. To make the environment green and clean the government had also decided to promote the eco-friendly cars such as CNG-based cars, hybrid cars and electric vehicles and also made 5% ethanol blending in petrol mandatory. The government has also introduced a scheme for faster adoption and manufacturing of electric and hybrid cars in India under the National Electric Mobility Mission 2020 to encourage the Electric and Hybrid vehicles in the country (IBEF, 2016). The government has also mandated the use of CNG to fuel the public transport in many cities of India (KPMG, 2015).

Consumer Perception and Behaviour

Mabit et al. (2015) found that apart from systematic effects, the attitude of an individual towards car features significantly affects the degree of loss aversion in the choice of the fuel type. Altmann et al. (2004) while explaining public acceptance and preferences for new environmental technologies, said that in the short run, the environmental concern will not be the critical influence on decisions to purchase cleaner vehicles. The key concerns will be price and performance. If alternative fuel vehicles can compete with internal combustion fuel vehicles regarding price and performance, then environmental concern may indeed act as a predictor of consumer choice. Mabit et al. (2015) stated that if AFVs are subsidized, it attracts only the innovator segments in entire population but not the average individuals. There are various factors which are very significant while buying a car such as safety, price, eco-friendly design, exteriors, performance, brands resale, after the sale, colour and interior, etc. (Joshi & Rao, 2013).

Research Methodology

Data Collection and Sampling

The data were collected by interacting face to face and online to the respondents. To obtain the responses, we have also visited some of the offices and colleges in Bhopal and taken the responses of the executives and students respectively. The selection of the respondents was by their demographic factors so that we can get a useful response for the study. The convenience sampling method has been adopted. We have targeted 500 respondents, but we finally got 279 useful responses which are 55.8%. Before giving them a questionnaire, we have explained about the alternative fuel vehicles so that respondents can understand the concept. The total numbers of Female respondents were 82 which are 29.39%, and total numbers of the male were 197 which are 70.60%. The majority of the respondents were in the age group of 21 to 30 years.

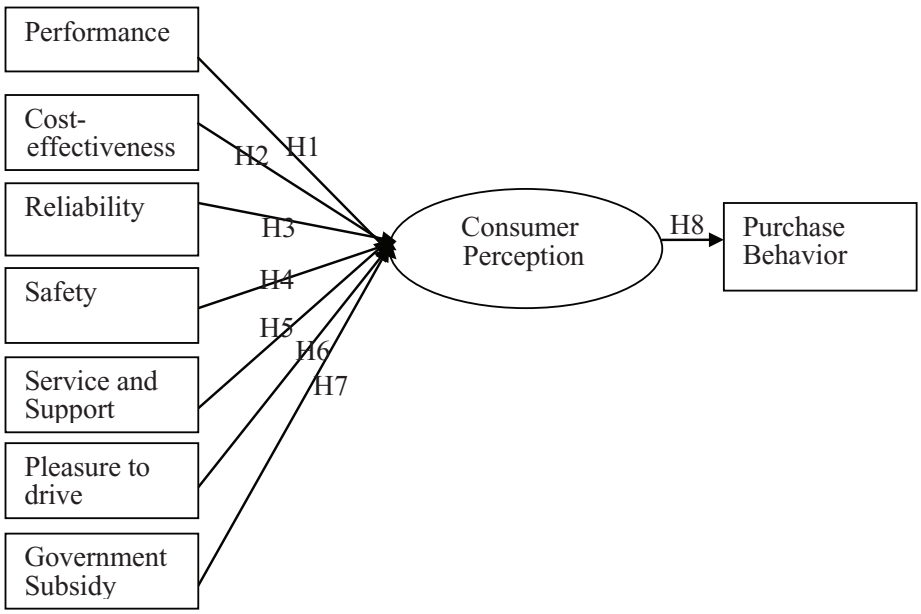
Conceptual Model and Hypotheses Development

With the help of extensive literature review, we have developed a theoretical model. The model shows few of the perceived attributes of the AFVs which are also identified variables for the study. Further we have hypothesized all these variables with the consumer perception. We have also developed a link between the consumer perception and purchase behaviour. The hypotheses have been developed as follows and have been given in Figure 2 (see Figure 2 in Appendices at the end)

Hypothesis 1 (H1): There is a positive and significant association between performance of the AFVs and consumer perception.
Hypothesis 2 (H2): Cost-effectiveness of the AFVs and consumer perception are positively and significantly associated.
Hypothesis 3 (H3): Reliability of the AFVs are positively and significantly related to consumer perception.
Hypothesis 4 (H4): Safety of the AFVs are positively and significantly associated with consumer perception.
Hypothesis 5 (H5): Service and support provided by AFVs have a positive and significant relationship with consumer perception.

Hypothesis 6 (H6): Pleasure to drive AFV has a positive and significant association with consumer perception.
Hypothesis 7 (H7): Government subsidy for the AFVs has a positive and significant association with consumer perception.
Hypothesis 8 (H8): Consumer perception is positively and significantly associated with purchase behaviour of the AFVs.

Figure 2 Conceptual Model



Measurement

There are seven independent variables in the study which is representing the attribute of the AFVs. These includes 'performance' which is represented by four items, 'cost-effectiveness' represented by three items, 'reliability' represented by three items, 'safety' represented by two items, 'service & support' represented by three items, 'pleasure' represented by four items and 'government subsidy' represented by three items. The 'consumer perception' represented by two items and 'consumer behaviour' represented by three items. Total numbers of the questions in the questionnaire were twenty-nine out of which initial two questions were ice-breaking questions which we have not taken in the hypothesis testing. The consumer perception towards these seven variables of the AFVs has been checked with the help of multiple regression analysis. Consumer perception has been taken as a dependent variable in the study. Further, consumer purchase behaviour was also tested by considering it as the dependent variable and consumer perception as the independent variable. All the elements were measured with the help of five-point Likert-type type scale anchored by 'Strongly disagree' (1) and 'Strongly agree' (5).

Results and Discussion

The internal consistency of these variables has been tested by Cronbach's alpha method. The Cronbach's alpha value for the overall questionnaire is .807 and for the 'performance' it is .636, for the 'cost-effectiveness' it is .712, for 'reliability' it is .689, for 'safety' it is .739, for 'service & support' it is .773, for 'pleasure' it is .671, for 'Government subsidy' it is .812, for 'consumer perception' it is .743 and for 'consumer purchase behaviour' it is .822. The values of Cronbach's alpha are above 0.60 which shows the internal consistency of the questionnaire is satisfactory (Juwaheer et al., 2012). All the 27 items in the questionnaire have been sent for principal component factor analysis for the validation purpose with the help of statistical tool SPSS-22. Those items having loadings <0.50 were dropped. Here we have dropped three items one from 'service & support', one from 'pleasure' and one item from 'Government subsidy'. Kaiser-Meyer-Olkin (KMO) of sampling adequacy found was 0.659 which is adequate. The Bartlett's Test of Sphericity has a significance of 0.0001. The Varimax rotated matrix showed that the nine factors representing 77.87% of the explained variance were extracted from the items. The first-factor 'performance' has an eigenvalue of 4.12, and it explains 19.60% of the variance. 'Cost-effectiveness' has an eigenvalue of 4.02, and it explains 14.81% of the variance. 'Reliability' has the eigenvalue of 2.79, which explains 8.60% of the variance. 'Safety' has the eigenvalue of 2.52 which explains 7.82% variance. 'Service and support' has the eigenvalue of 2.41 which is explained by 7.41% variance. 'Pleasure' has the eigenvalue of 1.64 which explains 6.09% variance. 'Government subsidy' has the eigenvalue of 1.50 which is explained by 5.57% variance. 'Consumer perception' has the eigenvalue of 1.09 which explains 4.06% variance and 'Consumer purchase behaviour' has the eigenvalue of 1.05 which explains 3.89% of the variance. All the factor loadings of the respective items have been shown in the Table 1 (See table no.1 in Appendices at the end).

To test the hypotheses, we have performed the multiple linear regression analysis. Here, 'consumer perception' has been taken as the dependent variable and variables such as performance, cost-effectiveness, reliability, safety, service and support, a pleasure to drive and government subsidy as the independent variable. The model explains 20.6% (R^2) of the total variables in explaining 'consumer perception'. The model also shows the F value of analysis of variance (ANOVA) is 10.05 ($P < 0.000$), which means all the variables are associated with consumer perception. However, the results show that the performance, cost-effectiveness, reliability, safety, and service and support are insignificant in influencing the consumer perception as the P value is greater than 0.05.

Hence, in this case, H1, H2, H3, H4, and H5 are not supported in the study. Whereas pleasure and a government subsidy are found significant and H6 and H7 are supported. The summary of regression analysis can be seen below in Table 2. Further, the regression analysis has been conducted to test the H8. Here we have taken consumer perception as independent variable and consumer purchase behaviour as the dependent variable (see Table 2 in Appendices at the end).

Table 1. Factor Items and Loading

Factor Labelling	Eigenvalues	% Variance Explained	Loadings	Variables Included in the Factor
Performance	4.12	19.60	.565	You think that AFVs can reduce the carbon emission.
			.500	You think that the AFVs can reduce the environmental problems.
			.518	You think that AFVs can not reduce your maintenance charge.
			.517	You believe that the AFVs cannot be more efficient than the conventional vehicles.
Cost-effectiveness	4.02	14.81	.733	You think that the AFVs have less running cost.
			.616	You think that AFVs are less expensive.
			.716	You think that the AFVs can give a real impact on my budget.
Reliability	2.79	8.60	.705	You believe in the claims by the AFVs companies.
			.608	You think that the big brand can give you assurance for the AFVs
			.726	You believe that the AFVs can be future of the automobiles.
Safety	2.52	7.82	.683	You think that the safety is primary concern for all type of vehicles same as for AFVs.
			.523	You believe that AFVs do not have any safety issues.
Service and Support	2.21	7.41	.638	You think that there is a lack of service centers for AFVs.
			.624	You believe that Indian infrastructure is not sufficient to make the AFVs a great success.

Pleasure	1.64	6.09	.573	You will love to drive AFVs.
			.644	You will feel delighted to own AFV
			.678	You will feel like a responsible customer by buying AFVs
Government Subsidy (GS)	1.50	5.57	.587	You think that government can promote the AFVs by giving some benefits to the consumers.
			.574	You believe that the Government subsidy can increase the sales of AFVs
Consumer Perception(CP)	1.09	4.06	.571	You think that AFVs makes you feel positive towards the environment.
			.871	You think that AFVs are worth for its objective.
Consumer Purchase Behaviour (CPB)	1.05	3.89	.571	You can buy AFVs as it is good for the environment.
			.871	You can pay more for it.
			.738	You can suggest others to buy it.
Total	**20.94**	**77.87**		

Table 2. Summary of Regression Analysis

Model	B	SE	t	Sig.	Collinearity Diagnostics (VIF)
Constant	.202	.066	3.076	.002	
Consumer Perception	.970	.016	60.810	.000	1.9

Adjusted R^2 =0.930 for model; F value of ANOVA=69.84; p value of <0.000

The model explains 93% (R^2) of the total variability in explaining the consumer purchase behaviour. The F value of ANOVA is 69.84 (P = 0.000), which shows the positive association between the variables. The results of the regression analysis found positively significant between these two variables as the P value is < 0.05 and in this case, H8 is supported in the study (see Table 3 in Appendices at the end).

Table 3 Summary of Regression Analysis

Model	B	SE	t	Sig.	Collinearity Diagnostics (VIF)
Constant	2.977	.786	3.788	.000	
Performance	.016	.121	.130	.897	1.029
Cost-effectiveness	.077	.155	.496	.620	2.420
Reliability	.126	.154	.819	.413	2.374
Safety	.120	.114	1.055	.293	1.286
Service and Support	.315	.118	2.663	.468	3.551
Pleasure	.210	.114	1.849	.003	3.561
Government Subsidy (GS)	.146	.115	1.267	.000	1.123

Adjusted R^2 =0.206 for model; F value of ANOVA=10.05; p value of < 0.000

The summary of regression analysis can be seen in Table 3. The regression table also shows the collinearity diagnostics, and the value of variance inflation factor (VIF) is less than five which shows there are no multicollinearity issues in the study (Malhotra, 1999).

The results of the study show that the consumer perception towards performance, cost-effectiveness, reliability, safety, service and support towards AFVs are not significant. Consumers are interested in the green product and environment. However, towards AFVs, they are not very enthusiastic. There may be several reasons, such as the AFVs are still not very popular in India, and very few manufacturers are involved in the manufacturing of the AFVs. Consumers are not sure about the performance of the AFVs and those who are the users of the AFVs they are not entirely satisfied with the performance. It is expected that the AFVs will be cost-effective, but many consumers are saying that the AFVs are cost efficient for running, but when it comes to maintenance it is expensive. Hence, they are not having a positive approach towards the cost-effectiveness of the AFVs. Reliability of the AFVs is also crucial to the success of it but due to less number of AFVs on the Indian road these consumers are not able to make a clear picture about the reliability aspect also. There is a negative perception of the service and support for the AFVs as there are fewer numbers of a service stations and refueling stations for these AFVs in India which is very evident. On the other hand, consumers have a positive perception towards the pleasure to drive and government subsidy for the purchase of AFVs. Results also show that consumer perception plays a crucial role in consumer purchase behaviour for the AFVs. According to the study conducted by Axsen & Kurani (2012), Heffner et al. (2007) and Steg (2005) consumer perception of vehicle image can also play a significant role in vehicle purchase behaviour (Axsen & Kurani, 2013). Consumers are interested in driving the AFVs, and they are also interested in buying it if the government provides some subsidy. Currently, the Government of India is providing some benefit for the AFVs buyers about which many of them are not aware.

Conclusion

As a researcher if we ask consumers about the green products and environment, many of them support it. However, when it comes to the specific research, the results

are beyond the expectations of this study. The primary reasons behind are the less number of awareness and popularity of the product as in the case of AFVs. The result of the study is very crucial for the automotive companies as if they want to establish a successful market in India. AFVs are the demand of the earth as the environment is degrading day-by-day. Many of the top automobiles brands are coming in this field such as Toyota, Tesla, Mercedes, Honda, Maruti Suzuki, etc. However, here it is also important for these manufacturers to think about consumer's perception towards these cars. As of now, the results of the study are disappointing and the companies have to take care of it. There is a lot more to be done in this area for these companies to make the consumer perception positive towards these cars. AFVs or Green cars are essential for the sustainable development in the long run, and therefore, special consideration should also be given by the Government. India is an emerging market because of 'Make in India' drive which is going on successfully and there is much space for the automobile industry.

Implication and Limitations

The results of the study indicate that the future of AFV is still lying in a shadow. There is wide gap which needs to be filled by the manufacturers and marketers of AFVs, so that it can create a meaningful attention from the customers.

It is believed that a proper study always carries some known limitation as this study does. The results of the study cannot be generalized to the whole population due to the limited sample size. There may be some more limitations which need to be identified by the readers and reviewers that can be removed in the further research.

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Chit Funds and Behaviour of Marginal Investors: The Post-Saradha Scenario

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Abstract

Financial markets are supposed to bridge the savers and users and to allocate capital towards the highest productive usage. However, marginal investors live and work in the informal economy by necessity. Marginal investors are consuming households and self-employed firms at the same time. Thus, consumption and production decisions, in their situation, are interconnected. This interconnectedness of consumption and production decisions creates a need for financial services to create and sustain their livelihoods, build assets and manage risks. Financial inclusion is delivery of banking services at an affordable cost to the vast sections of marginal groups.

However, the recent Saradha & Rose Valley incidences reveal that huge amount of money, mostly from marginal investors, have been channelized towards chit funds in spite of publicized efforts on the part of the government to mobilize such funds into the banking sector.

This backdrop has set the primary research objective of our study, which had been undertaken in a block of Burdwan District in West Bengal. The research is being done primarily on marginal investors with an objective to find out whether they still invest in chit funds and if they are found to do so, the reasons therefore. Another intention of the study was to identify association, if any, between the demographic attributes of the investors and their decisions to or not to invest in chit funds.

The study revealed that a section of marginal investors still invested in chit funds although they were aware of the risk factor. The study identified the causal factors for such seemingly irrational behaviour. The study further attempted to frame a functional relationship between the demographic attributes of the investors and their investing decision regarding chit funds. The findings of this study may assist policy formulators to revise the operational blueprint for greater financial inclusion.

Keywords:

Financial Inclusion, Marginal Investors, Chit Funds, Demographic Attributes

Introduction

The recent Saradha scam has opened up a Pandora's box, which highlighted the extent and dangers of investing in chit funds. It was evidential that the principal investors in chit funds were marginal investors. Financial inclusion programmes which were already high on the national agenda gained momentum and various schemes to bring the marginal investors and borrowers were devised by banks and post offices. However, it was observed that in spite of such programmes and the pitiful condition of investors of Saradha, investing in chit funds as well as of borrowing from private moneylenders

Sustainability: Inspiration, Innovation and Inclusion
pp. 55–63
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was still going on in full swing, particularly in rural areas. Initially, it was thought that lack of proximity between the borrowers/investors and banks was responsible for this as it was impossible for banks and post offices to penetrate the rural and village areas adequately. However, this tendency of investors and borrowers was noticed in areas which had banks and post offices. It is against this background the present study was undertaken to delve deeper into the extent of investment in chit funds to borrow from private moneylenders and to identify the causal factors for such behaviour.

Literature Survey

Santhisree and Prasad (2014) highlighted the primary reason behind the problem being the diversion of chit amounts into various other businesses. Sanjay Kanti Das (2012) observed that the investors are still watching to get a strongly safe investment market in India. Panigrahi and Gaur observed that the chit funds are the output of inefficient Indian banking operations in which the investors are not feeling free to invest. Ravi and Gakhar (2015) showed that indigenous financial institutions such as registered chit funds and the well-spread postal network of national financial inclusion strategy had a significant impact. In an article published in Money Today (2013) it was stated that, chit funds continue to find favour with financial advisors.

The Saradha Group fraud was perpetrated through a Ponzi scheme In a Ponzi scheme, money from new investors in a chit fund is used to service the deposits from earlier investors.

Further to the above mentioned literature studies, this paper tried to understand investor's psychology towards investment in chit funds and other financial instruments. Gavini and Athma (1999) in their study found that old age is one of the main reasons for investment among urban and rural people. Somasundaram (1998) in her study found that people in rural India invest mainly in bank deposits and in a chit fund. Chandra and Sharma (2009) suggested that an individual investor can be driven by some psychological factors such as conservatism, opportunism, representativeness and informational inferiority complex. Dhar and Dey (2012) revealed that male investors dominate investment market in India & investors' education and experience influence investors. Heena Kothari in her study found that investors' age and perception plays and import role in individual investment. Mukherjee and Sengupta (2014) comment that media plays a pivotal function toward financial literacy and influence individual behaviour. Bhattacharya (2012) suggested a model explaining driving forces of individual investment behaviour. He opined that all available information passes through a filter constituted of available technology, accessibility of data & information and level of awareness of the investor. Available data on passing through this filter becomes gathered data to the investor who then again passes through a second filter constituted of experience, knowledge level, culture, advice from others, heuristics and human psychology. Gathered data on passing through this second filter becomes perceived data to the investor. This perceived data along with other factors like risk appetite, investing the horizon and expected returns, lead to the investment behaviour of the individual.

Scope of the Study

The area of the study has been limited to residents of four villages in one block in the district of Burdwan. The behaviour of investment in chit funds as well as that of availing of the loan from private moneylenders is captured in a dichotomous mode.

The respondents were the same for gathering information on their behaviour regarding investment in chit funds as well as that of availing credit facilities from private moneylenders.

Age, gender, education, monthly income (approx), occupation, risk perception about investment in chit funds and the influencing attribute of investment decision are the demographic attributes of the respondents on which data have been captured for the study on the investment behaviour regarding chit funds.

Such data has been captured using a structured questionnaire, that is mentioned below.

Age, gender, education, monthly income (approx), occupation, perception about rates of interest, risk of availing credit facilities and procedural convenience of availing of loan from different sources are the demographic attributes of the respondents on which data have been captured for the study on the availing of credit facilities from private moneylenders.

The study envisages probing into the existence of a significant association of investor behaviour and credit behaviour with the selected demographic attributes. The study also encompasses regressing such behaviours of prospective marginal investors using the above-said attributes.

As a corroborative study, information was also collected from regional/head offices of all Regional/Head Offices of PSU banks in Kolkata.

Objectives of the Study

The objectives of the study are three-fold. Firstly, this study envisages to find out the extent, if any, of the investment in chit funds by marginal investors as the primary mode of investment along with the reasons for such behaviour. As a parallel study, the extent of availing of a loan from private moneylenders along with the reasons thereof is also intended to be found out. Secondly, this study investigates whether there exists any significant association of selected demographic attributes of such investors with investment in chit funds. A similarity on availing loan from private moneylenders is also intended to be studied. Thirdly, this study probes into the possibility of regressing the investment behaviour regarding chit funds using the demographic particulars as predictors as well as regressing the behaviour of availing of the loan from private moneylenders using the same predictors.

Methodology

The Area Selected for the Study

The study is conducted in four villages of Bhalya, Maji, Pindira and Singot in the Mangalkot block in the district of Burdwan. The main occupation of the residents from the above said block is found to be agriculture. Some have their small businesses, and some are service holders. The majority of working women work as domestic help or attendants having fixed monthly income. They are clubbed into service holder for the study. Some of the women are homemakers. They do not have any formal source of income. However, they have an insufficient investible amount of surplus which they accumulate by saving from main earners in the family or from small-scale backyard poultry/goaty activities. A portion of the residents is retired persons. The majority of the population is within the age group of 30 years to 60 years. The level of education

of the majority of the population is up to higher secondary. The demographic profile of the respondents is shown in the Table 1.

There are two Post Offices and four banks (two Gramin Bank branches and two Public Sector Bank branches) within the periphery and near vicinity of the villages. The two Public Sector Bank branches are of Canara Bank and UCO Bank.

The residents of the said four villages are approached with the help oflocal youth who are known faces all around. Letters from the Panchayat Heads were obtained which helped to collect data for the study. The data is collected verbally, and the questionnaires were filled up by the collectors. Anonymity is assured to the respondents as a pre-condition to sharing of information and collection of data. The purpose of collection of data was explained to the respondents beforehand, and data was collected only from the willing respondents.

Between the months of June and August 2015, 504 persons were approached with the questionnaire from whom 325 valid data points are collected.

The Demographic Attributes

Regarding investment behaviour, the attributes are appended below with the respective codes in parentheses:

- *Primary mode of investment (PMI)*: Whether in chit funds or not, captured as categorical data coded as 'C'—Chit funds and 'NC'—Banks/Post Office
- *Approximate age in completed years (AGE)*:captured as scale data and recoded into ordinal data coded as 'A'—Below 30 years, 'C'—30 years to 60 years and 'B'—Above 60 years
- *Gender (GEN)*:captured as categorical data coded as 'F'—Female & 'M'—Male
- *Education (EDU)*:Captured as ordinal data coded as 'S'—Secondary and below, 'H'—Higher secondary, 'G'—Graduate and 'P'—Post Graduate as above
- *Approximate monthly income (MIC)*:Captured as scale data but recoded into ordinal data coded as 'A'—Less than `3,000, 'C'—`3,000 to `6,000 and 'B'— Above `6,000
- *Occupation (OCC)*Captured as categorical data coded as 'S'—Service, 'B'—Business, 'A'—Agriculture, 'H'—Housewife and 'R'—Retired
- *Risk perception about investment in Chit Funds (RCF)*:Captured as ordinal data coded as 'V'—Very much, 'M'—Moderate, 'N'—Nil and 'D'—Do not know
- *Major influencing attribute of an investment decision (CIO)*: Captured as categorical data coded as 'OE'—Own experience, 'AE'—Advise of the head of the family, 'AA'—Advise of Agent and 'SF'—Advise of friends, relatives, etc.

Regarding credit behaviour, the attributes are as appended below with the respective codes in parentheses:

- *Most preferred source of availing credit (WFR)*:Captured as categorical data coded as 'B'—Bank/Post Office and 'P'—Private Money Lenders
- *AGE, GEN, EDU, MIC and OCC* have the same meaning and coding as in investment behaviour
- *Perception about comparative interest rates on credit facilities from Banks/Post Offices and Private Money Lenders (WCH)*: Captured as categorical data coded as 'B'—Banks/Post Office and 'P'—Private Money Lenders

- *Perception of comparative risk of credit facilities from Banks/Post Offices and Private Money Lenders (WLR)*:Captured as categorical data coded as 'B'—Banks/Post Office and 'P'—Private Money Lenders
- *Perception about comparative convenience of credit facilities from banks/Post Offices and Private Money Lenders (WLC)*: Captured as categorical data coded as 'B'—Banks/Post Office and 'P'—Private Money Lenders.

The statistical techniques

As per the objectives, one part of the study was on considering chit funds as the primary mode of investment. Thus, the association of PMI was tested with AGE, GEN, EDU, MIC, OCC, RCF and CIO using Pearson Chi-Square Test. Moreover, the decision of the investors regarding chit funds as PMI was regressed using the other attributes as the predictors.

The hypotheses formulated for the Pearson Chi Square Tests were:

H_0 = There is no association between PMI and the other attribute
H_1 = There is an association between PMI and the other attribute

The hypotheses are tested at 5% level of significance.

As all the data were collected/recoded as categorical data, and the dependent attribute PMI is captured as dichotomous data (C/NC), the technique Binomial Logistic Regression was used to regress PMI using AGE, GEN, EDU, MIC, OCC, RCF and CIO as predictor variables.

The robustness of the model constructed is assessed by the following:

- Cox & Snell R^2
- Nagelkerke R^2
- Hosmer & Lemeshow Chi Square and testing of the hypotheses at 5% level of significance.

The predictive accuracy of the model is assessed by the percentage of correct prediction of the dependent Attribute PMI for the following at a cut-off value of 0.500:

- Positive (Coded as 1)
- Negative (Coded as 0)
- Overall

The second part of the study was on considering Private Money Lenders as the primary source for availing credit. Thus, the association of WFR was tested with AGE, GEN, EDU, MIC, OCC, WCH, WLR and WLC using Pearson Chi-Square Test. Moreover, the decision of the respondents regarding availing credit facilities from Private Money Lenders (WFR), was regressed using the other attributes as the predictors.

The hypotheses formulated for the Pearson Chi Square Tests were:

H_0 = There is no association between WFR and the other attribute
H_1 = There is an association between WFR and the other attribute

The hypotheses are tested at 5% level of significance.

As all the data were collected/recoded as categorical data, and the dependent attribute WFR is captured as dichotomous data (B/P), the technique Binomial Logistic Regression was used to regress WFR using AGE, GEN, EDU, MIC, OCC, WCH, WLR and WLC as predictor variables.

The robustness of the model constructed is assessed by the following:

- Cox & Snell R^2
- Nagelkerke R^2
- Hosmer & Lemeshow Chi Square and testing of the hypotheses at 5% level of significance.

The predictive accuracy of the model is assessed by the percentage of correct prediction of the dependent Attribute WFR for the following at a cut-off value of 0.500:

- Positive (Coded as 1)
- Negative (Coded as 0)
- Overall

For all the Pearson Chi-Square tests, the level of significance has been kept at 5%. Hence, the Null has been rejected in cases where the p-value of the test statistic is more than 0.05. The attributes for which the Null is accepted, are not probed into as there is no association between the two concerned attributes. However for those, for which the Null hypothesis is rejected, the trend is delved deeper.

For both the regression models, initially, all the predictors were considered. The Wald Statistic for each of the predictor is tested for significance at 5%. The predictors for which the Null Hypotheses are accepted i.e. for which the corresponding p-value was more than 0.05, were dropped for the next iteration. The iterations are continued till the Wald statistic were all significant at 5% level of significance.

To have a better understanding of the outcome of the analysis of data, data triangulation has been used in the study using multiple data sources. Regional offices of the banks operating in the area/vicinity thereof were approached to get their views on the behaviour of marginal investors and borrowers.

Results

Demographic Profile

The respondents were mostly male. The majority of the respondents are within the age group of 30 years to 60 years. Most of them had education till higher secondary only. About half of the respondents had a monthly income of over ₹6,000, about 10% of them earned below 10%. More than half of the respondents are engaged in agricultural activities. Others are into service, business or homemakers. A small portion of the respondents is retired persons.

Investment Behaviour Profile

Almost half of the respondents identified chit funds to be their most preferred investment option. Nearly half of them took investment decisions based on their self experience

and subsequent judgement. About half of the respondents knew that investment in chit funds is very vulnerable while about than 25% of them had no idea about the risk in investing in chit funds. More than half of the respondents cited higher rates of return to be the primary cause of their investing in chit funds.

Credit Behaviour Profile

About one-third of the respondents had availed of credit facilities. Of them about 40% preferred credit facilities from private money lenders. About 40% of those who preferred private money lenders, cited the fear of confiscation of security by banks to be primary reason of resorting to private money lenders.

Association between Investment Behaviour and Demographic Attributes

Null Hypotheses is rejected for the association of PMI with GEN, EDU, MIC, OCC, RCF and CIO.

Regarding GEN, female respondents were more inclined towards investing in chit funds. Regarding EDU, the level of education was found to be increasing with the decreasing tendency of investing in chit funds. Regarding MIC, respondents with income ranging between ₹3,000/- and ₹6,000 were found to mostly preferring chit funds. Regarding OCC, homemakers were found to be heavily choosing chit funds. Regarding RCF, respondents having no idea about chit funds were found to be mostly investing in them. Perception of the riskiness of chit funds was found to be moving in opposite directions with the preference for chit funds. Regarding CIO, respondents who mostly relied on advice of agents and advice by friends and relatives preferred chit funds more.

Association between Credit Behaviour and Demographic Attributes

Null Hypotheses is rejected for the association of WFR with GEN, EDU, OCC, WCH, WLR and WLC.

Regarding GEN, female respondents were more inclined towards private money lenders. Regarding EDU, an anomaly was noticed as preference towards private money lenders increased with level of education. Regarding OCC, homemakers were found to have more preference for private money lenders. Regarding WCH, the behaviour is observed to be according to the perceptions. Borrowers preferred that source which they perceived to be cheaper. However about 16% of the borrowers had the wrong notion that private money lenders lend at more cheap rates. Regarding WLR, borrowers preferred that source which they perceived to be less risky. However, about 44% of the respondents had the wrong idea that private money lenders were the less vulnerable source of credit. Regarding WLC, again behaviour of borrowers was as per their perception of convenience and preferred that source which was thought to be more convenient for them. However, about 67% of them had the notion that borrowing from private money lenders was more affordable regarding less procedural complexities and paperwork thereon.

Regressing PMI based on Predictor Attributes

On the basis of the different iterations done for regressing PMI, it is found that RCF and CIO are significant predictors for regressing PMI with percentage of correct prediction

of 84.70% for positive results, 80.70% for negative results and overall correct prediction of 82.50%.

Regressing WFR based on predictor attributes

The results of the different iterations done for regressing WFR reveals that when WFR is being regressed with OCC, WCH, WLR and WLC as predictors, the percentage of correct prediction for positive results is found to be 85.20%, for negative results it is 71.10% and overall correct prediction is 79.20%. Further removal of predictors reduces the percentage of correct prediction considerable and is thus not recommended.

Actions taken by the banks

It is observed that the measures of banks, mostly PSU banks, was concentrated on opening Jan Dhan Yojana (JDY) accounts, appointment of Business Correspondents (male candidates) and other measures to reach out to the people who were outside the ambit so far. Banks also stated that though a large number of JDY accounts are opened, a major portion of those remained inoperative and with very low credit summations therein. Doorstep banking and Human ATM facility have also been tried out in certain areas. A few banks opined that due to heavy NPA, lending to these sections has been restricted as credit scoring, documentation and security backing is tough for these sections. Moreover, resource constraint is a severely limiting factor in reaching out to remote and distant places.

Conclusion

It is evidential from the findings that the factors delinking the marginal investors and borrowers from the banking system are different from those that are considered. This explains why marginal investors and borrowers still prefer chit funds and private money lenders even after massive initiatives taken by banks and the postal department in this regard. The thrust areas identified by this study are as below:

- Female investors/borrowers, especially homemakers, are averse to banks/post offices
- Persons with low level of education fall prey to chit funds
- Marginal Investors with approximate monthly income between ₹3,000/- and ₹6,000/- are easy targets for chit funds
- A considerable portion of the marginal investors and borrowers have no idea or have wrong ideas about risks involved in chit funds as well as about the riskiness of borrowing from private money lenders
- A significant portion of these investors and borrowers follow the advice of agents and chit funds and private money lenders

The way ahead

- Banks should appoint female business correspondents who are expected to be more acceptable and trusted by the female investors and borrowers;
- More thrust to be given upon education as education can enhance awareness which can remove the ignorance and wrong notion from the investors and borrowers;
- Along with traditional education, financial literacy should be promoted in every block intimating such investors about the risks of chit funds and private money lenders and the prudent ways of investing and borrowing;

- Basics of financial literacy may be incorporated into school curriculum also.
- Banks should find novel methods to reduce the procedural complexities for these investors and borrowers. In this context training on techniques of handling marginal investors and borrowers may be imparted to bank personnel;
- Banks/Post Offices should adopt strategies to attract investors within the monthly income range of ₹3,000 to ₹6,000

Further Scope of Research

The findings of this study can be checked for validity by conducting similar studies in other areas with larger sample sizes. Studies considering other aspects/attributes may also be carried out. Moreover novel ways can be researched into for removing the misconceptions among the marginal investors and borrowers to remove the anomalous behaviour.

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Women-friendly Policies by Organizations: An Agenda towards Sustainability through Inclusiveness

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Abstract

Today, to sustain their position in market, organizations need to develop inclusive strategy from long-term perspective and human resource is one of the vital factors affecting sustainability. Considering the composition of workforce in the organizations, the untapped segment is the female talent. They are educated and equally competitive but have different career trajectory. Acknowledging this, companies are adopting women friendly practices. This paper attempts to study the various women-friendly policies of companies in India to counter the issue. A case study method has been adopted for the study and several implications have been discussed based on the findings.

Keywords

Women-friendly Policies, Sustainability, Inclusiveness

Introduction

Today, organizations are facing a key challenge of maintaining sustainable growth in the economic, environmental, and social domain. Sustainability has three pillars – economic, social, and environment, as said by Milne et al., (2006) "Sustainable development involves the simultaneous pursuit of economic prosperity, environmental quality, and social equity. The companies aiming for sustainability need to perform not against a single, financial bottom line but against this triple bottom line". This means to be sustainable, an organization needs to focus on these three aspects equally. Catering to only two of them would not benefit the firm in the long run. Because giving attention to only economic and social dimension will lead to ignorance of the natural resource and its degradation. Focusing on only the social and environmental aspects will affect the financial growth of the firm. Also, stressing on the financial and environmental aspects only, would lead to inequality and distribution among few.

The organizations have understood the crucial role of employees in maintaining the sustainability of the business in the industry. Specifically, there is a growing concern regarding the gender diversity and inclusiveness at the workplace. Since, women have been leaving their career for managing their personal life and this is leading to the non-utilization of the talent they possess. The study has proved that presence of more women in senior positions leads to better performance of the company (McKinsey, 2007). There are various workplace and personal barriers, which are causing women

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Inspiration, Innovation
and Inclusion
pp. 64–73
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to exit and this requires organizations to take initiatives to retain women employees. Carol and Roland (1994) in a study said that when compared to men, women face more dilemma and they have more different patterns in their career. Therefore, women need supportive practices to ease them with their career imbalances. A study by Ronald et al., (2006) observed that women are more satisfied and psychologically content when they know that in their organization there are practices catering to their need. Women-friendly policies are basically a set of strategic practices adopted by firms to make the workplace women-friendly so that women can successfully manage both personal and professional roles and responsibility. If an organization is women-friendly it means that the organization does not have gender biasness and encourages the gender diversity at the workplace. Chiu and Ng. (2001) have defined women-friendly policy as "policies that aim to either eradicate sex discrimination against women at work or ensure equal employment opportunities (EEO) for women and men, and improve women's work lives can generally be considered as women-friendly". Women-friendliness of the organization has been defined by Cattaneo et al. (1994), as "the nature of the organizational policy framework and the degree to which that provides for women the opportunity to integrate personal, work, marital, and family roles successfully".

To achieve sustainability, organizations need to invest in the economic, environmental and human capital, where female consists of nearly half of the population. The potential of this half of the population is being not recognized and utilized fully. They are being undervalued and it is believed that they can make significant contribution in the economic growth, environmental issues, and social development. Utilizing the talent of female and reducing the gender gap can help organizations to ensure sustainability of the business. Failing to make proper use of the female talent can take organizations out of the league since companies are competing for the skilled workforce and are trying their best to attract and retain them.

There is a dearth of studies on the topic related to actual practices, which organizations are taking-up in India for women and specifically in the context of their significance in the sustainable development of the organizations. The present study has been done with the objective to examine the importance of women in the sustainability and to know about the initiatives taken by companies in India for gender inclusiveness through adopting various women-friendly policies.

Importance of women in Sustainability

Women represent a group of talented employees with potential to succeed and are in significant numbers. As the competition to attract skilled employees in the current scenario of labor scarcity is increasing day by day, attracting and retaining this untapped segment of the workforce would give an advantage to the firm. In India, women consist of 48.5% of the total population according to Census (2011) and 45.9% of the total enrolled students for undergraduate program are women (MHRD, 2014). Despite the significant education level and employability, women's participation in the labor force is less. In India, during the period 2009-10, only 29% of women participated in the labor force, which fell from 37.3% in 2004-05 (ILO, 2013). According to a report of McKinsey Global Institute (2015), India can increase its 2025 GDP by 60% through utilizing the full potential of women workforce.

Considering the leadership qualities, women are also a better leader. According to a survey by Zenger, J., and Folkman, J. (2012), conducted on more than 7,000 leaders,

it was revealed that women scored better than men in 12 of the 16 leadership skills and scored equal in the other 4 skills. Also, presence of more women and better gender diversity at the workplace also impact the image of the organization. A study done by Bear et al. (2010), found that existence of more women affects the Corporate Social Responsibility (CSR) activities of the organizations, which in turn positively impact the reputation of the company.

To understand the importance of women as a major contributor in sustainability, the relationships between women and the three areas of sustainability has been explained by Steven, C. (2010) as:

Women and Economy

There are studies which have proved that more presence of women lead to the economic growth. According to Steven, C. (2010), countries which have government funded practices for childcare and family have more working women and also have a higher birth rates than other countries, which do not practice such schemes. However, it is the latter countries, which require boosting their growth and more children to tackle the problem of aging population. From the organizational perspective also women are important for the growth. A Study by McKinsey and Company (2007) shows more the number of women would be in management committees better would be the performance of the company. As per Catalyst (2013) study, companies with most women on boards outperformed than companies with least women on boards in terms of financial performance.

Women and Environment

Women are important to sustainable development specifically when it comes to environmental concern, since it is believed that they are the one who do the majority of household purchases. According to a study by OECD (2008), women buy more eco-friendly and recyclable products as compared to men.

Women and Society

The social aspect of the sustainable development is the most sensitive dimension. The main social concerns being confronted today are growing disparity in terms of income, increasing unemployment, and persistent gender gap. Unless these concerns are tackled, it would not be possible to achieve overall sustainable development. If women will not be given opportunity to study and work then they would not be able to enter the workplace and cannot make significant contribution in the social change at workplace. According to a study by Cumming et al. (2012), higher number of women on boards leads to better corporate governance and lesser unethical behavior. Another study by Catalyst (2011), showed that more females at leadership position resulted in more inclination of organization towards corporate philanthropy. A survey of 43 countries done by Terjesen, S., and Singh, V. (2008), revealed that the presence of more women on boards led to the presence of more women in management and smaller gender pay gap.

Research Methodology

The research method used in this paper is the case study method. Multiple cases from various companies in India have been taken to study about the women friendly policies

being adopted by them. The case study method has been defined by Yin (1989) as "an empirical enquiry that investigate a contemporary phenomena within its real-life context; when the boundaries between phenomena and context are not clearly evident, and in which multiple sources of evident are used".

The information has been collected form secondary sources. The data has been gathered from secondary sources such as company's websites, reports, research articles, newspaper articles, seminar papers, and web reports.

To study the initiatives taken by organizations for gender inclusiveness examples of ten companies' women-friendly policies has been considered. The study of first five organizations adopting the women-friendly policies is taken on the basis of ranking by Great Place to Work's survey of India's Best Companies to Work For Special Category of Supporting Women to Remain at Work 2015. The other five companies are those, which have adopted good practices to make their organizations women-friendly.

Cases of Women-Friendly Policies adopted by Organizations in India

The top five companies for women according to the study are SAP Labs India, American Express India, Intuit Technology Services Pvt. Ltd., Pitney Bowes Software India, and Inter Globe Enterprises.

SAP Labs India

SAP Labs has a forum named as Business Women Network in which the inspirational stories of various leading successful women are shared and women employees are motivated or inspired by giving the examples of role models. The company has maternity benefit of twenty weeks of paid leave along with an additional sixteen weeks of maternity leave with the loss of pay or with the option of part time work. During and post pregnancy, women employees are also given cab transportation. It also provides 20 weeks of paid adoption leave, and offers crèche facility for up to 250 children. SAPlings in-house crèche is for the children between the age group of nine months to six years. In this, SAP offers facility of children's day care, summer camps, and Montessori education along with other activities. The company also has a program called "Run Mummier", which is a maternity return program. It is a mobile app, which helps expecting mothers throughout their maternity period and till their returning to organization after the break. This program has helped SAP to reduce the maternity attrition from 40% in 2010 to 6% in 2015 as quoted in Business Line (2015).

American Express India

According to The Economics Times (2014), in collaboration with four other leading companies – Microsoft, PepsiCo, PwC, and Tata Group, took a very unique initiative called "Reach Out" for providing, mentoring, and training to women at senior positions. The senior women of these companies are given the opportunity to interact and learn from leaders of other companies. In this program, workshops are conducted and leaders share their experiences. Through this, companies also learn each other's diversity and inclusion practices. This program gives a good learning and development platform to women through engaging with leaders and peers of these organizations.

Intuit Technology Services Pvt. Ltd.

Intuit has been a successful organization in improving the gender diversity through its various women-friendly initiatives. It was able to increase its gender diversity ratio by 29% in 2014. Other than maternity and paternity benefits, company also offers discounted childcare facility at their partnered crèches. During the pregnancy period, women can avail the facility of dedicated vehicle for them to make their traveling easy and also get a parking lot specifically for them. Also, if an employee wants to adopt a child gets an allowance of Rs. 50,000 along with 84 days of adoption leave.

Pitney Bowes Software India

On the basis of information available form company website and The Economic Times (2014), the company took initiative for gender sensitization by launching Project Dharna. This initiative includes micro messaging sessions in which male leaders are engaged in gender conversation through panel discussion where special emphasis is given on the tone, looks, gestures, inflection, and syntax. This program is unique since it includes participation of males as well as for making it a holistic approach. Other initiatives taken by Pitney Bowes for making the workplace gender inclusive includes special benefits for women like workshops for health and fitness, forums like 'Balancing Multiple Roles', workshop on parenting and celebration of International Women's Day. The company also has a separate Gender & Inclusivity committee.

InterGlobe Enterprises

The physical infrastructure of the organization is equally important for making the workplace friendly for women and the company understands this very well. As per article published by Business World (2014), traditionally women engineers were not hired at the airport hangars since there were no rest rooms for them in the ramp where aircrafts are parked and also employees, who work there, are required to wear ramp shoes but they were not available for women. Therefore, to provide equal employment opportunity to women, InterGlobe built the rest rooms for them and also made ramp shoes available for female staffs.

Apart from the above mentioned top companies for women employees in India, there are various other organizations adopting the women-friendly policies for gender inclusiveness. The examples of practices of other organizations adopting good women-friendly policies are:

Godrej

Godrej has undertaken several women-friendly initiatives to make the environment women inclusive. In Godrej, if an employee refers a women candidate, then he can claim 1.5 times of the normal referral amount. Godrej has made two groups with cross-company leadership networks namely, Godrej alliance for women and Godrej alliance for parents. The issues pertaining to each group is addressed through regular training programs, workshops, and guest speakers. This helps in the professional development of the women employees. The company offers six months of maternity paid leave benefit along with flexi-time and part time work options (Rediff.com, 2015).

Flipkart

Flipkart, known for its e-commerce website, has recently launched a new policy, according to which its women employees can avail the same benefits of maternity leave policy for adopting a child below the age of 12 months. Accordingly, women can take six months of paid adoption leave with additional four months of flexible working hours. However, for adopting a child above the age of a year they can take three months of paid leave along with four months of flexible working hours. If required, they also have an option of taking a break of one year without pay. The company also offers adoption allowance of Rs. 50,000. It provides transport reimbursement of up to Rs. 600 per day to women employees for the period of two months before going on maternity leave (Business Today, 2015).

RMSI

The global IT services company RMSI provides self defense workshops of Tai chi for women. They distribute pepper sprays and organize sessions with women police officers and NGOs to inform them about women rights and safety (Rediff.com, 2015).

Tata Group

Tata Group has an innovative program named as Tata SCIP (Second Career Internship Programme) in which they motivate women to restart their career after taking a long break. This program facilitates women in re-entering into the corporate world. In this, the work schedule for the participants is flexible, which helps them in the adaptation to the working environment. The participants are provided with live business projects to revive their skills and strengths. Mentors are also provided to the participants throughout the program to guide them and to provide them assistance (The Hindu, 2012).

HCL

HCL has taken several initiatives for the advancement of women and promoting the gender inclusivity. It has a forum called 'WLB (Work-Life Balance) Chat' in which employees can discuss any personal or work related problems. They organize 'Feminspiration' series in which they invite eminent women leaders from the society and the industries to share their experiences, success stories and to give inspiring messages to motivate junior and middle level women to become future leaders. 'BlogHer', a blogging section is another initiative in which several women-centric and gender issues are discussed where both men and women are encouraged to share their thoughts and give some suggestions, which can be implemented. It has also incorporated women specific website 'www.hclwomen.com' where industry experts and mentors share different inspiring stories, their experiences and discuss on various current subjects. These experts also provide counseling on career or work related matters (The Hindu, 2012).

Results and Discussion

From the cases discussed above, it can be deciphered that organizations now understand the importance of women in sustainability of the firm. Therefore, many leading organizations are adopting the Diversity and Inclusion programs to retain women employees. The examples of women-friendly policies of different organizations are

from the broad range of industry, which shows that there is acceptance and applicability of the women-friendly practices across different sectors. However, mostly the top companies are taking these initiatives for making women inclusive environment at workplace. Hence, it is important that other medium and small scale company should also learn from these examples to adopt women-friendly policies according to their respective level.

The organizations should review its policies and practices in the light of reach of equal opportunity. The companies should ensure that the HR policies are taking care of each employee equally at various levels and specifically that of women. They need to ensure that policies are properly supporting the commitment of inclusion at all steps of employment like recruitment, selection, training, pay, promotion, benefits, and termination. Organizations need to be as effective and fair towards women as they used to be towards men throughout their employment tenure.

Though women are doing well in educational achievement, but still they are lacking behind in many non-traditional fields like science and engineering. To fill this gap of knowledge and utilize the potential of women, companies can encourage women to pursue these non-traditional careers. It can do so by providing internship to women through partnering with institutes and universities. Organizations can also provide On-the-Job Training to women to acquire those non-traditional skills.

Organizations have many talented women across different levels and departments but when it comes to women on boards, very few are there. Globally, women hold 22% of senior roles while in India only 15% of senior roles are held by women (Grant Thornton, 2015). Therefore, other companies should take inspiration from organizations, which are implementing policies for the advancement of women, to develop women leaders within the organization. It can be done by providing proper training and development program and by creating leadership network. Women leadership network helps in motivating women for leadership role, professional advancement, mentorship, and support to other women.

The culture of the organizations should be such that women do not feel uneasiness and intend to leave the organization. Initiatives should be taken, which caters to the unique needs of women. Many organizations have implemented such policies to comfort women at workplace but when it comes to medium and small scale organizations, they have to still start such policies. Organizations should provide flexible work schedule, childcare facility, maternity benefits and work from home option. These policies increases work satisfaction and retention of women employees.

Conclusion

This paper adds to our understanding that women are crucial for the sustainability of the organizations. An organization can achieve sustainable growth only when both male and female will equally participate in the workforce. Despite of knowing the fact that women are doing well in education, still they are very less in numbers at the workplace. There are challenges and barriers, which women are facing and need to be tackled head-on. These issues can be addressed by practicing gender inclusive policies at the workplaces since organizations need to meet the unique needs of women. The presence of women at key decision-making roles will help in leading faster towards sustainability. Therefore, attracting, retaining, and developing women employee is very crucial for the organizations.

This study has several useful implications for the industry, researchers, and government. Firstly, from the study the organizations would be able to understand the contribution of women in their sustainable growth and it will persuade them to implement policies to improve the gender diversity at workplace. Secondly, the examples cited about various women-friendly policies adopted by leading organizations would act as idea-base for other organizations, which have not yet implemented the gender inclusive practices. Thirdly, the government can mandate few practices for making the environment women-friendly.

There are few inherent limitations of the study, which can also be the scope for future research for academicians and researchers. First limitation of the study is that the women-friendly practices mentioned are of Indian subsidiaries of the companies, the researchers can take into consideration the examples of companies' practices across the globe. The other limitation is that the data collected are from secondary sources, better perspective can be drawn through primary data collection. Third, women-friendly policies of ten companies have been studied in the present paper; the researchers can consider policies of more companies.

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Role of CSR in the Consumer Decision-making Process

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Abstract

Customers today believe that by purchasing from a socially active firm, they indirectly contribute to the society. In the Indian context, the mandated Corporate Social Responsibility (CSR) expenditure due to the implementation of the Companies Bill, 2013, firms are now expected to contribute to social causes. A positive impact of CSR on performance would encourage firms to analyze their expenditures wisely and choose their cause strategically. This study attempts to clarify the process by which consumers use their perceptions of CSR to formulate their purchase decision. Qualitative analysis was used to understand the consumers' evaluation of their CSR perceptions during the purchasing process. Consumer responses collected through in-depth interviews were coded using content analysis. This study was carried on during 2014–15, when CSR was made mandatory for firms in India. The study intends to contribute to the field of marketing by capturing stakeholder (consumer) engagement by exploring consumers' beliefs of CSR, their perceptions, and the role of such perceptions in the decision-making process. The study revealed that the evaluation of CSR initiatives is an intricate, logical and structured process where consumers consider factors that are valued by them.

Keywords:

CSR, CSR Communication, Consumer Perceptions, Qualitative Research, Content Analysis

Introduction

A socially responsible firm is differentiated by the nature of responsible activities it performs for the betterment of the society. In a broad scenario, firms can support social causes and motivate other firms to do so. The recent surge of consumers' interest in the concept of CSR (O¨berseder, Schlegelmilch, & Gruber, 2011; Maignan, 2001) can be attributed to firms' increased involvement in CSR activities and making public such efforts (Snider et al., 2003). Consequently, this increased attention on CSR affected consumers' purchase intentions as empirically proven in extant literature (Mohr & Webb, 2005; Sen & Bhattacharya, 2001). Customers believe that by purchasing from a socially active firm, they indirectly contribute to the society. However recent studies failed to find any significant role of CSR in the decision-making process (Mohr et al., 2001). Prior studies in the field of CSR research have used experimental design, wherein respondents were briefed about CSR and then asked to respond accordingly. The major fallacy of such studies is their failure to capture the actual buying behaviour of a customer. Respondents of such studies also tend to respond in a more socially

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acceptable manner (Devinney et al., 2009). Companies in emerging economies face a lot of pressure to behave in a more socially responsible way (Mitra, 2012; Alon et al., 2010; Visser 2008). Given the mandatory CSR expenditure in India due to the implementation of the Companies Bill, 2013, firms are now expected to contribute to social causes. A positive impact of CSR on performance would encourage firms to analyze their expenditures wisely and choose their cause strategically. It has also been opined that the business environment of emerging economies is quite different from that of developed economies (Khanna & Palepu, 2000). Firms generally communicate their CSR activities through their sustainability reports or through advertising. However, it has been observed that firms generally fail to act on what they have promised in their annual reports. O¨berseder et al. (2011) opined that due to such differences in the reported intentions and actual behaviour, the role CSR in purchase decisions need to be scrutinized closely.

Due to the mandate of CSR in India, every qualified company expends on CSR. Most studies have analyzed the relevance from the managerial or organizational perspective. From a different perspective, this study attempts to clarify the process by which consumers use their perceptions of CSR to make their purchase decision. In order to do so, qualitative data was collected from in-depth interviews. It was observed that CSR initiatives affect decision-making in a very intricate and structured process.

Corporate Social Responsibility (CSR)

Businesses contribute to the society when they are efficient, profitable and philanthropic (Rowe, 2006; Moir, 2001). Business activities need to take care of an organization's "commitment to minimizing or eliminating any harmful effects and maximizing its long run beneficial impact on society" (Mohr et al*.,* 2001, p. 47).). CSR activities provide memorable experiences to customers, subsequently generating profits. CSR plays a significant role in circumstances with meagre governmental support. Lately the concept of CSR has moved from being a simple ideology to stark reality (McWilliams et al., 2006). In the current scenario, CSR is an absolute necessity defining the role of the organization in performing its social and responsible duties (Baron, Hajoto, & Jo, 2011; Lichtenstein et al., 2004). Emerging economies face a lot of pressure to behave in a more socially responsible way (Mitra, 2012) due to the difference between developed economies (Khanna & Palepu, 2000). Given the mandatory CSR expenditure in India, firms are now expected to contribute to social causes (Baron et al., 2011; Scholder, Webb, & Mohr, 2006; Vlachos, Tsamakos, Vrechopoulos, & Avramidis, 2009). CSR is expected to provide scope for communication and provide stakeholders to improve brand image, efficiency, corporate reputation and corporate image (Schwaiger, 2004; Sen, Bhattacharya & Korschun, 2006; Compton, 1995; Aaker, 1994).

Consumers & CSR

There are numerous reasons/perceptions why customers believe firms act in a social manner. These perceptions are derived from a firm's focus on ethics communicated through ethical statements (Stanaland, Lwin, and Murphy, 2011) formally stated by them (Stevens, 2008). Customers expect a profitable company to invest in social welfare and associate quality products with corporate citizenship behaviour of firms (Maignan & Ferrell, 2001) identifying themselves with it (Sen et al., 2006). Despite mixed feelings towards socially active firms, consumers believe such actions to be

value-driven and strategic (Vlachos et al., 2009), which consequently has a positive impact on consumers' trust (Becker-Olsen et al., 2006). However, one of the most common problems of CSR studies is that it links consumer behaviour to an artificial awareness of CSR (O¨berseder et al., 2011). Authors generally assume that consumers have a low level of CSR awareness (Pomering & Dolnicar, 2009) and when they are informed of CSR it positively affects their attitudes and purchase intentions (Sen et al., 2006). So, communicating CSR activities of a firm plays a significant role to augment CSR awareness (Pirsch et al., 2007). Corporate communications and reputation-building activities like advertising are predominantly used for the same (Roberts & Dowling, 2002). So, negative CSR information has a higher effect on consumers as compared to positive news (Marin & Ruiz, 2007). Also, the extent to which a consumer identifies itself with the company plays a role while evaluating a company. The more they identify themselves with the company, the higher they tend to assess it. In a nutshell, a company's CSR activities leads consumer to identify with the company, which helps in evaluating the company in a better way (Sen & Bhattacharya, 2001).

This study was undertaken in the Indian context during the time CSR was made mandatory for firms. So, one of the major objectives of this study was to explore consumers' beliefs of CSR, their perceptions, and the role of such perceptions in the decision-making process. In India, price of products plays a significant role for majority of the consumers. Taking that in consideration, the study also accounts for the role of price in the decision-making process.

Methodology

Qualitative Research Approach

Qualitative analysis is effective in analyzing situations where there are visible differences between attitudes and actual behaviour (Sinkovics et al., 2005). Therefore, in-depth interviews with consumers are used to get a clear and accurate picture of a respondent's behaviour (Ghauri & Gronhaug, 2002). Despite numerous opinions of cause-related marketing (CRM) (Bronn & Vrioni, 2001) CSR is accepted to be a part of CRM (Bower & Grau, 2009). Therefore, this study uses interviews to analyze consumers' evaluation of a company's through its CSR activities.

Data Collection & Sample

To remove social desirability bias, data was collected from interviews (Bristol & Fern, 2003). The respondents were selected randomly from colleges and interviewed at convenient locations to ensure that they answered the questions comfortably. These respondents knew what CSR is and had knowledge of such firms and products sold by them. They were asked whether they purchased from such firms and the reason to do so and whether they would purchase the same product at higher prices. A small diverse sample of eight interviews is sufficient for qualitative analysis (McCracken, 1988). Consumers with different backgrounds and demographic criteria were selected. 40 interviews were conducted over six months from February 2015 to September 2015 through theoretical sampling. The interviews were recorded in around 200 pages of text. The sample comprised of 24 males and 16 females from the age group of 25–50 years.

Data Analysis

After transcribing the interviews, data was analyzed by content analyzing the transcribed texts (Pradhan & Roy, 2011; Creswell 2007). Content analysis, also known as textual analysis, was used to study the content of communication. Characteristically, content analysis is a technique used to analyze 'open-ended' data used in diverse fields of research (Krippendorff, 1980; Kassarjian, 1977). It has been used in prior research to analyze textual material (Harwood & Garry, 2003; Sicilia, 2008; Jose & Lee, 2007). However, this method is subjective to the perception of researchers and the results should be checked for validity and reliability in order to generalize the results. To remove any biasness, the process of coding was conducted by two researchers. The inter-coder reliability was calculated and found to be acceptable at 0.95. Analysis included coding and categorization to identify patterns and themes (Spiggle, 1994; Neuendorf, 2002; Strauss & Corbin, 1990).

Findings

The findings have been categorized on the basis of willingness to pay and on the basis of openness to CSR. There were mixed responses by respondents who were open to the idea of CSR and believed in being informed of CSR spending and various CSR initiatives.

CSR as Perceived by the Consumer

When questioned about the significance of CSR, there were mixed responses. Some believed in CSR by firms while others opposed it. Respondents believing in the concept, believed CSR to be the duty of the company. On the contrary, there were respondents who considered CSR as a waste of company resources and increases costs of stakeholders and not as efficient as advertisements.

CSR as Purchase Criteria

Around 80% of the respondents believed in the role of CSR in increasing the reputation of a company as compared to price, quality or service (Bray et al., 2011; O¨berseder et al., 2011) but it failed to play a role in their purchase decisions (Mohr et al., 2001). There are other factors that increase chances of CSR in making purchase decisions. Factors such as corporate image, credibility and peer pressure also have an effect on the decision-making process. However, peripheral issues could not be distinguished given the novelty of the concept of CSR.

Other Factors

Despite the fact that 95% of the respondents believed that a company should do CSR activities, only 75% were willing to purchase from such firms. It was a matter of personal opinion for them rather than any other factor. For 60% of consumers, the quality of products and requirement affected their decision. Additionally, information regarding the nature and extent of CSR plays a crucial role in the process. Consumers need CSR information to make their decision (Bray et al., 2011). The amount and nature of CSR information also modifies consumer perceptions regarding the firm. Consumers formulating their decisions on the basis of CSR activities have prior knowledge of such activities. So, firms need to provide information to help them evaluate the firm. If the ideas of a consumer the firm match, they prefer purchasing from the firm.

In the Indian context, the consumer's financial situation is significant in the purchase process. Indian consumers are highly price sensitive, so it is significant in decision-making. There are numerous consumers interested in contributing to the society by purchasing from socially active firms, but fail to do so due to monetary constraints. Purchasing ability plays a major role in affecting decision-making as compared to ethics. When firms charge a premium on the basis of CSR, respondents may hesitate in purchasing from such firms. It is affordable to pay a small increase as compared to high premiums. In case of low price increase, respondents preferred purchasing products from a socially responsible firm over a non-responsible firm. Of the 40 respondents, only 25 were willing to pay a premium, while 10 had no intention of doing so. The remaining five respondents were willing only to pay a marginal premium. Only a few were price insensitive and willing to pay a higher price, but for better quality products/ services. However, the number of people willing to pay such high premiums was very low. Customers were unwilling to pay an extra amount and believed it was the duty of the company rather than charge it from customers.

Discussion

This study analyzed the perceptions of the consumer and not that of managers and firms as done in prior studies (Mishra et al., 2010). This study identified factors affecting a consumer's purchase intentions while purchasing goods from a socially responsible firm. In the Indian context, price plays a highly crucial role. Despite awareness of CSR by respondents, few of them did not believe in the concept, while a few were not willing to pay a higher price for it. To asses CSR as a purchase criterion, factors such as price, credibility, trust and personal beliefs need to be considered.

Implications

The study was conducted to determine the importance and role of CSR for a consumer. The study investigates the intricate process explaining the role of CSR in the decision-making process. This study provides a better insight in the intention - behaviour gap. There were consumers who believed in the concept of CSR and were willing to purchase from a firm engaged in CSR activities. While, there were others who fail to purchase from such firm even after having strong beliefs in the concept of CSR. This study makes an attempt to look into the discrepancy of such CSR beliefs and actual purchase behaviour. The complexity of the process and lack of awareness of CSR prevents consumers from making the actual purchase.

Managerial Implications

Managers have the option of ignoring consumers' approach towards CSR and neglect it in their marketing activities; and/or focus on CSR in their marketing communications and advertisements/corporate communications. As it is statutory for Indian firms to spend on CSR due to the rules laid down by the Companies Bill, 2013 companies have started investing in such activities. So, such expenditure should be used strategically and communicated effectively to have an impact on large number of consumers. Firms should identify channels to reach out to significant stakeholders.

Limitations of the Study

As every qualitative study, this study suffers from the inherent limitations, i.e., biasness (Wooten & Reed, 2000) and non-generalizability of the results (O¨berseder et al., 2011). Qualitative research intends to explore and conceptualize and not generalize results (McCracken, 1988). Content analysis has a major drawback that it analyzes content while neglecting the context of the communication. So, close-ended studies in the context would provide more accurate results. Moreover, most respondents in the study who believed in the concept of CSR are not aware of firms doing CSR activities or products they deal in.

Scope for Future Research

Working on the drawbacks of qualitative studies, quantitative methods can be designed for future research. Close-ended questionnaires can also be used to analyze the CSR perceptions/motivations. A cross-cultural study would also enhance the findings and also make the results generalized.

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Sustainable Development Model: Green Banking (A Review)

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Abstract:

Globalization and economic development in world as well as Indian economy brings changes in the Indian banking system. The most attractive feature is its reach; banks are now in not only metropolitan cities and large towns but small villages also. Technology is a driver in the banking industry, which creates new business models and processes and also revolutionizes distribution channels. Adoption of technology also enhances the quality of risk management systems in banks. It is seen that the banking sector has not responded positively towards green activities as compared to other sectors. The International Institute for Sustainable Development (IISD) informs that the integration of sustainability into banking sector has taken two major directions namely social initiative and integrative product design, mission policy and strategies.

Green is slowly becoming the symbolic colour of eco-consciousness in the world. Green banking is a conscious effort by the banks to make the industries go green and in the process it restores the natural environment. The concept of 'Green banking' will be mutually beneficial to banks, industries and the economy. The banking sector is profit driven; it needs incentives and governmental support to assist environmental protection, which is beneficial for the whole economy and society and also to the banking sector in the long run. Public sector banks such as PNB, private sector bank as ICICI and International banks as Yes banks are working in the field of Green initiative.

Keywords:

Green Banking, Technology, Equator Principle, Risk, Sustainability

Introduction

Indian economic policy is based on the philosophy of economic growth with social justice. The concept of banking has undergone a dynamic change in keeping with the need to achieve rapid socio-economic progress. The most striking feature is its reach; banks are now no longer confined to metropolitan cities and large towns. The branch network is extensive, and these branches are now spread out in the remote areas of country. In terms of number of branches, Indian banking system is one of the largest. An equally significant achievement is the close association of our banks with the development efforts. The diversification and development of our economy and the acceleration of the growth process are no small measure as a result of the critical role our banks have played in financing economic activities in various sectors. The identification of the priority sectors for the purpose of financing by banks has given a

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pp. 82–91
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new orientation to Indian banking system as it turned to purpose-oriented from being security-oriented. Agriculture credit has risen from under ` 200 crores in June 1969 to ` 53, 685 crores in March 2011 with its share being 15% of total bank credit.

The increasing realization of the banking system to fall in line with the socio-economic objectives necessitated the expansion of network of branches to the under-banked area of the country. At the end of June 2002, rural branches accounted for 49.1% of all branches. The 'area approach' is another method adopted by the banking system to correct the regional imbalances in development. The 'Lead Bank Scheme' is the instrument of this aspect of banking policy. With globalization and development in world as well as Indian economy, changes in Indian banking system are also reflected in terms of development of banking habits, attitudinal changes on part of bankers, emergence of retail banking, virtual banking, thinking of financial super markets or global banking, change from money lenders to development banking, establishment of specialized branches and focusing on customers.

In spite of the impressive performance of the Indian banking system, certain qualitative aspects have been overlooked. According to Shekhar K.C. and Shekhar Lekshmy (2013), in Indian banking system attention needs to be given in different areas, such as: revamping the organizational structure

- developing excellence in managementimproving corporate governance standards
- updating the level of employee competencies
- adopting appropriate technology
- bringing down the level of non-performing assets
- improving quality of loan portfolio
- restricting high growth of credit to few sensitive sectors
- improving credit flow to rural areas
- confirming to the priority sector lending target
- persevering with the task of further strengthening financial inclusion
- improving credit administration and strengthening risk management strategies
- formulating a realistic approach in relation to sick industrial units
- adhering to proper profit planning
- improving customer service
- reviewing the operations of foreign banks
- transforming the banking system to a global level formulating a long-term policy, keeping in view the growth expectations of the economy.

The global challenges faced by the Indian banks identified in the area of enhancement of customer services, application of technology, implementation of Basel II, improvement of risk management systems, implementation of risk management standards, enhancement of transparency and disclosures and compliance with KYC (Know Your Customer) aspects.

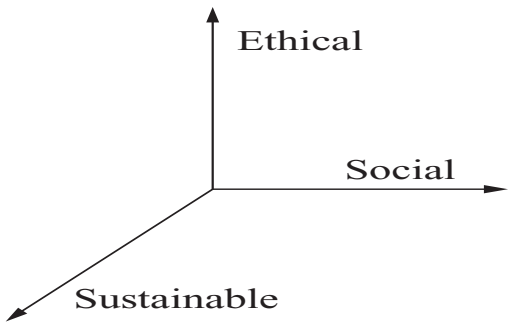
It had been seen that the banking sector has not responded positively towards green activities as compared to other sectors (Bhardwaj & Malhotra, 2013). The banking sector is environment- friendly in terms of emissions and pollutions (Biswas 2011).

Technology as a Key Driver: According to Leeladhar V. (2008), technology is a key driver in the banking industry, which creates new business models and processes and also revolutionizes distribution channels. Banks that have made an inadequate investment in technology have consequently faced an erosion of their market shares. Technology also

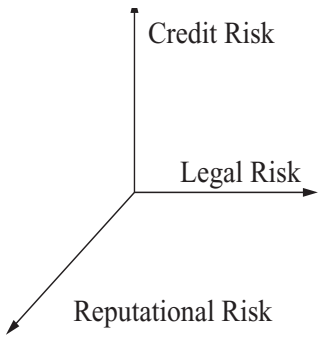
enhances the quality of risk management systems in banks. For technology adoption, banks have four options: build a new system themselves buy the best of the modules buy a comprehensive solution and outsource. (Sharma Manoranjan (2008).

Green Banking

Generally green banking coverage includes sustainable banking, ethical banking, green mortgage, green loans, green credit cards, green saving accounts, green money market account, green checking account, mobile banking, online banking, remote deposit, waste management, roof gardening and green financing (Singh & Kaur, 2012). Green bank is like a normal bank, which considers all the social and environmental or ecological factors with an aim to protect the environment and conserve natural resources. It also called as ethical bank or sustainable bank. Green is slowly becoming the symbolic colour of eco-consciousness in the world. Green banking is a conscious effort by the banks to make the industries go green, and in the process, it restores the natural environment.



Banks are exposed to a diverse portfolio of customers. So, they have reoriented their activities to a risk-based approach to their lending and investment activities. Financial institutions are exposed to three types of risks. These risks are the credit risk, the legal risk and the environmental risk (Dlamini, 2010; Guo, 2005; Jeucken & Bouma, 1999). Biswas (2011) and Chakraborty (2011) stated that banks are responsible and accountable if their client's portfolio has any negative influence on the environment. The bank's function of being a risk assessor plays role in achieving sustainability. Banks being a source of funds can play a crucial role in encouraging the reduction of carbon footprint emissions by the industries to which they provide loans. (Figure 2)



The International Institute for Sustainable Development (IISD) informs that the integration of sustainability into banking sector has taken two key directions:

i. The pursuit of environmental and sustainable responsibility in the bank's operation through environment initiatives and socially responsible initiatives.
ii. The integration of sustainability into the bank's core business through the integration of environmental and social considerations into product design, mission policy and strategies.

Sustainable banking, therefore, requires that the bank's commercial activities should not only benefit its owners and employees alone, but also its customers and the wider economy; at the same time minimizing any adverse events in the society and in the natural environment. (Figure 1) Intergovernmental Panal on Climate Change discusses a number of difficulties with the term, sustainable development. Sustainable banking has many labels and manifestations, viz Corporate Social Responsibility (CSR), Corporate Responsibility (CR), Corporate Citizenship, Environmental and Social Governance (ESG) and other variants. Sustainability is now increasingly recognized as central to the growth of emerging market economies.

Recently, the banks began to realize the impact of the sustainable development in the way of ulterior-development of the society and, implicitly on the way of creating of the banking value in the future. In project finance, establishing standards for assessing and managing social and environmental risks world over banks signed up to the "Equator Principles." (Figure 2) The UN's Human Development Report-2013 has pointed out that sustainable growth momentum requires policy focus on enhancing equity, managing the demographic changes and confronting environmental pressures. In the early 1990s the United Nations Environment Programme (UNEP) launched UNEP financial initiatives (UNEPFI). It is reported that almost 200 financial institutions around the globe become signatories of this initiative statement to promote sustainable development.

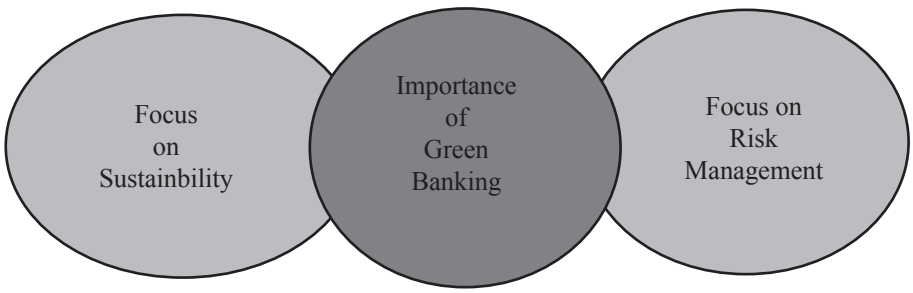
It was realized that cooperatives, particularly the banking and credit sectors, also have a role to play in this task of immense importance through an action play and strategy. Great potential and desirability led banking to view green banking option as new business opportunities, rather than looking at a narrow-angle of the risk-evasion mechanism. Green banking provides a detailed account of success stories in developing sustainable green banking business model to attract green investments/funding support forthcoming both from financial and nonfinancial institutions. The country-specific green banking business models recently developed by the USA, Canada, China, India, UK, Germany, The Netherlands, Athens, Bangladesh, Lebanon, Philippines, etc. also represent green banking at global banking platform. The report stated that the adoption of green banking strategies will help the bank to deal with these risks involved in their business operations. Green banking strategies involve two components (Figure 3): managing environment risks and identifying opportunities for innovative environmentally oriented financial products (IFC, 2007).

Some key strategies for sustainability include paperless banking (Bahl, 2012; Dua, 2013); corporate social responsibility; green buildings (Bahl 2012a, Nath, Nayak & Goyal, 2014); green financing (Mehar, 2014); green retail banking products (Mallya, 2012); sustainable reporting (Kalia, 2011); efficient use of resources (Mallya 2012) and carbon credit business (onlinecarbonfinance.com, n.d.). Some methods for adopting green banking are: online savings accounts (Singhal, Singhal & Arya, 2014); credit and

debit Cards (Singhal et al., 2014; Bahl, 2012b); electronic fund transfer (Bahl, 2012b); mobile banking (Jha and Bhome, 2013) and online banking (Jha and Bhome, 2013).

Green Banking in India

India is on the higher growth trajectory for last one and half decade and the industrial sector played the most important role in India's growth story. However, Indian industry faces the challenges of controlling environment impact of their business, i.e. reducing pollution and emission of their clients. The government has been trying to address the issue by framing environmental legislation and encouraging industry to adopt environmental technologies and practices, but the impact was not enough, given the poor track records of enforcement, public awareness and inability to derive competitive advantage by producing eco-friendly products.



1. Command and control regulations are ex ante regulations that are designed to dissuade environmentally damaging projects. This is implemented by using industry-specific pollution standards while scrutinizing the projects and granting/denying permissions by concerned authorities like Ministry of Environment and Forest.
2. The liability laws are ex-post in nature and implemented by enforcing authorities through imposing fines, closing down the defaulting industries, etc.

Government initiatives towards green banking cover guidelines from the Government, in the form of:

- issuing guidelines (Department of Financial Services, Ministry of Finance, Government of India, 2012)
- green initiatives taken by Reserve Bank of India (RBI notification No: RBI/2007–08/216, Verma 2012) international initiatives, like global reporting initiatives, the Equator principle and United Nations Environment Programme Finance Initiative, etc.

However, there is no law in India that can hold the banks responsible for scrutiny of investment projects before financing and for the environmental damage created by their clients. As far as Green Banking in India is concerned, the banking and financial institutions are running behind the schedules compared to global trends. None of our banks or financial institutions has adopted 'Equator Principle'. Mor (2008) and Mallya (2012) stated that none of the banks in India are a signatory to the Equator principle.

According to Biswas (2011), very few banks in India have awareness about the Equator principle. None of them are signatory to the UNEP-FI.

The British business newspaper and Financial times which together nominate banks for sustainable banking awards for Leadership and Innovation in integrating social, environmental and corporate governance objectives into their operations did not find a single Indian bank (except Yes Bank, small player in Indian banking sector) in 'Emerging Market Sustainable Bank of the Year category in 2006. For 2007, ET sustainable banking awards, only two banks (Yes Bank and ABM AMRO Bank) has filed nominations. This shows the ignorance on the part of our banks about the green initiatives at the international level. For the first time, the WTO ministerial talks in Seattle had in its agenda the issue of the environment. The fall of demand for the product of the units because of green consumerism will make the unit suffer and, in turn, affect the quality of the assets of lending institutions. Therefore, banks need to be more careful in India about the environmental aspects of their clients and products because:

1. Future of exports and product market are going to go through stringent environmental rules, and the eco-friendly product will have a better market.
2. Increased demand for pollution control equipment will require more financial assistance from banks.
3. Reserve Bank of India may follow environmental guidelines for the banks in lines of IFC and Asian Development Bank, etc.
4. The Recent announcement of the government to use economic instruments for environmental control may include banks in future.
5. Big investment projects supported by international organizations like the World Bank and ADB require Environment impact assessment.

Therefore, the banks should design implementing procedures (as shown in figure 4):

i. Assessment of risk due to the environment.
ii. Environmental audit management.
iii. Assessment of credit requirement and loan follow up before investing in different projects.

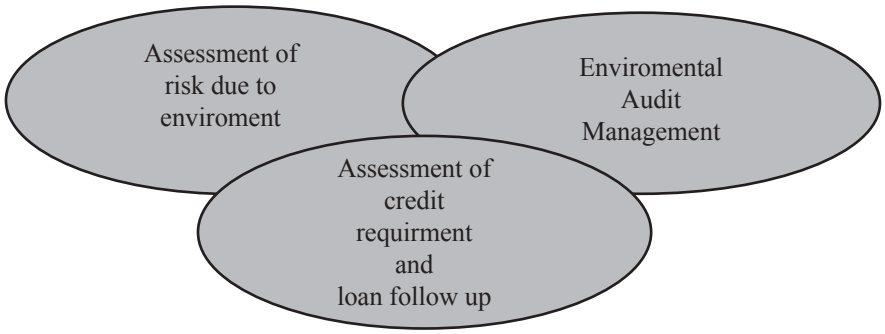
However, since banking sector is profit-driven, it needs incentives and governmental support to assist environmental protection which is beneficial for whole economy and society and also to the banking sector in the long run.

Green Banking Initiatives in Indian Banks

There is a strong relationship between banks and the economy of any nation. In India, the total contribution of banks to GDP was 5.7 % in the year 2011–12. There has been a rapid increase in the assets of the Indian banking sector. It reached the level of Rs. 83 trillion in the year 2012 (Khan 2013). The concept of green banking in India is in its initial stage.

Green Coin Initiative by Reserve Bank of India: Recently IDRBT 2013 has proposed the introduction of standard rating for green efficient banks and banking practices among Indian Banks. Under this rating system, both the infrastructure and operations of the banks are being considered. IDRBT coined the term of Green Rating Standard as 'Green Coin Rating'. Banks' primary business must not be money-making only, but it should

also keep in mind social and environmental relating to its operations. Green Coin Rating will be in line as energy star rating given for appliances. Banks will be judged based on the rate of carbon emission out of their operations, the amount of reuse, refurbish and recycling concept being used in their building furnishings and in the systems used by them such as computers, servers, networks, printers, etc. They are also being evaluated on the number of green projects being financed by them and the amount of rewards and recognition they are paying for turning businesses green.



Banks such as State Bank of India (SBI), Punjab National Bank (PNB), Industrial Development Bank of India (IDBI), Bank of Baroda (BOB), Industrial Credit and Investment Corporation of India (ICICI), National Bank for Agricultural and Rural Development (NABARD), IndusInd Bank and Yes Bank are considering green banking initiatives as an issue of concerning. According to Verma (2012), Indian banks realized the need to shift their vision from profit motive to motive of triple bottom line that is planet, people and profit (Figure 2). According to Mani (2011), banks are socially responsible corporate citizens and also play an important role in the reduction of carbon emissions.

Indian Banks need more Consciousness

The most striking feature of Indian banking is its reach; banks are no longer confined to metropolitan cities and large towns. The branch network is extensive, and these branches have now spread out in the remote corners of our country. With globalization and development in world as well as Indian economy, major changes in Indian banking system are also reflected: development of banking habits; attitudinal changes on part of bankers; emergence of retail banking; virtual banking; financial super markets or global banking; movement away from money lenders to development banking; establishment of specialized branches and focusing on customers.

Table 1: Indian Banks' Cases for Green initiatives

Name of Bank	State Bank of India	ICICI Bank	Yes Bank
Brief about Bank	Multinational India-based bank owned by GOI, As of Dec. 2012, it had assets of US $ 501 million and 15,003 branches including 157 foreign offices (Yadav & Pathak, 2013)	Second largest commercial bank, its go green initiative saved 30, 000 trees in the year 2009–10 and 16 crore litres of water. The bank also supported other organizations (Singh, 2012)	Private bank in India with headquarters in Mumbai. With more than 550 branches and 1158 ATMs, Yes bank won Golden Peacock Award for Corporate Social Responsibility in 2013.
Green Initiatives by Indian Banks	Green Home Loan Scheme	Set up Technology finance group with GOI (Mathur, 2012)	EMC-Environmental Management Committee (Yes Bank 2011)
	Green Project Loan	Leadership in Energy and Environmental Design (LEED) (Nath et al. 2014)	Signatory to the carbon disclosure project also won FT-IFC sustainable banking award (Yes Bank 2011)
	Green Channel Counter	TFG (Technology Finance Group) (Mathur, 2012)	Adopting '3-R' approach (Reduce, Reuse and recycle) (Yes Bank 2014)
	Banking on Green Energy with Suzlon	Corporate Environmental stewardship programme with Bombay Natural History Society (D'Monte, 2010	Promote 'Green procurement' to the maximum possible extent. (Yes Bank 2014)

Source: Compiled from Different Reports and Research papers on these Banks by Author.

Technology is a key driver in the banking industry, which creates new business models and processes and also revolutionizes distribution channels. Banks with inadequate investment in technology have consequently faced an erosion of their market shares. Adoption of technology also enhances the quality of risk management systems in banks. Green is slowly becoming the symbolic colour of eco-consciousness in the world. Green banking is a conscious effort by the banks to make the industries go green and in the process it restores the natural environment. The concept of 'green banking' will be mutually beneficial to banks, industries and the economy. As far as

green banking in India is concerned, the banking and financial institutions are running behind the schedules compared to global trends. The government has been trying to address the issue by framing environmental legislation and encouraging industry to adopt environmental technologies and practices, they would not enough given the poor track records of enforcement, public awareness and inability to derive competitive advantage by producing eco-friendly products. The fall in demand for the product of the units because of green consumerism will make the unit suffer and, in turn, affect the quality of the assets of lending institutions. Therefore, banks need to be more careful in India about the environmental aspects of their clients and products. However since banking sector is profit driven, it needs incentives and governmental support to assist environmental protection which is beneficial for whole economy and society and also to the banking sector in the long run.

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Enhancing the Untapped Potential

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Abstract

India is providing reservation for women in local self-governing bodies to increase their political participation. For a woman leader to perform well in the system of governance, she should possess certain skills. The study found that political leadership is the enabler of good governance. So,the policy of providing reservation to women can be sustainable, by providing training in political leadership skills. It includes contextual intelligence, political communication skills, negotiation skills, ability to create an ethical vision and organizing capacity.

Keywords

Governance, Political Leadership, Elected Women Representatives, Local Governance Barometer

Introduction

"By not performing work you will never find freedom. By giving up action, no one attains perfections," (Bhagavad Geetha 3.4, (Yogananda, 1950)). Lord Krishna points out that the whole of nature including human nature is nothing but conditioned action. Merely by being inactive or restraining from action one cannot achieve anything. The so-called inaction is a negative deed, which is against the dharma of every individual. India women can attain development when they also actively participate in the system of governance. Their inaction to political involvement will not provide the way for women development in the country. By diligently performing the duties as a political leader women can bring about their empowerment.

The 73rd Constitutional Amendment provided reservation for women in local self-governing bodies, thereby enhancing the political participation of women. With these reservations, many women were able to come to the forefront of the society. However, the policy of providing reservation will thrive only if these elected women representatives can provide good governance.

Passion, in a sense, is the fuel that ignites the mind and imagination of the individual. When India started providing reservation for women in local self-governing bodies, some of the major questions raised were whether Indian women have a passion for political leadership? Whether they will be ready to contest the election and deliver service to the society? Quashing all these questions, Indian women came forward and soon became the crucial part of the local governance system. Reservation of women had provided a chance for many women who were confined to their houses to come forward to mainstream of the society. Now the prominent question is whether these women can deliver proper governance with the political leadership traits they possess? The study

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pp. 92–101
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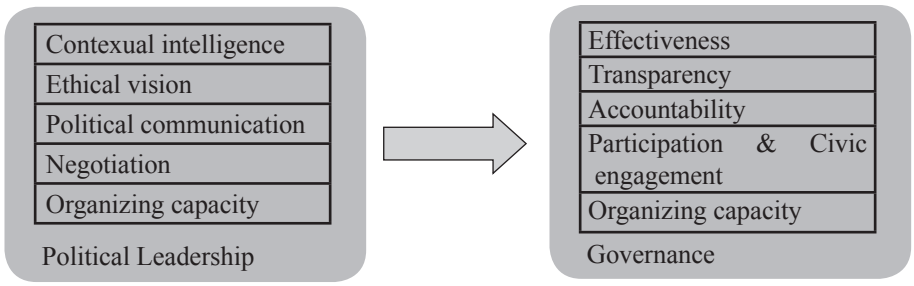
focuses on developing a framework of political leadership qualities which will enable them to deliver good governance(Shown in Figure 1).

The main hypothesis tested during the study is,

H1: Political leadership has a significant and direct effect on good governance

Figure 1: Hypothetical model



Many studies with regard to the participation of women in Panchayats have been conducted earlier. These studies show that women can perform, but they face certain issues in handling this new position. Women led Panchayats, have even experienced a dramatic increase in their revenues, sponsoring the auction of village ponds, community forests and village markets for the larger welfare of the community (Jayal, 2006). The study by (Kaul & Sahni, 2009) illustrates that neither the reservation for women nor their actual presence in the Panchayats have helped in addressing the problems associated with the common village women. Many of the women representatives who are brought into the fore front of political system did not have any exposure to the political skills before. This points to the need for conducting a study to find out the political skills which can act as an enabler for good governance among elected women representatives.

Research Methodology

Exploratory research was carried out in the first phase of the research. It is done to have a fundamental acquaintance in the area of political leadership, governance. Local bodies were visited and Focus Group Discussions (FGD) were conducted with officials to understand the basic structure of governance.FGD was also organized with a few academicians and political leaders to fine-tune the traits for political leadership. Political leaders belonging to different ideologies were included to get unbiased information.

Scholars focus on social leadership as a whole, and deal with political leadership as a part of it (Grint, 2005; Grint, 2000). Social leadership and political leadership manifest themselves in formal positions and behaviourally. Scholars who stress that political leadership is a special part of social leadership also affirm that leadership is related to power. A political leader (in the behavioural sense) is a person who is able to modify the course of events (Blondel, 1987) (Aaron Wildavsky, 2006). Political leadership denotes the ability of a person to lead a society and understand the various issues society faces. In the framework proposed by Fred Greenstein and Joseph Nye, political leadership is defined in terms of public communication, organizational capacity, political skill, vision, cognitive style and emotional intelligence (Erich, Leonard D, Jeanette, & Louis G, 2009). Literature also suggests that political leadership implies followership (Nye, 2010) (Heifetz, 1994), as it is about achieving group task through innovative adaptation

in a specific situation and institutional cultural context. Thus, organizing capacity was included as one variable in the study.Team work is also essential for a leader to productively maintain a group of followers. Followership can be practised either by inner instinct (Mant, 1999) or through other factors as have been attributed in many literatures as significant factors for a leader's success or failure (Kellerman, 2008). Another factor pointed out in literature as the quality of a leader is the ability to have ethical-political visions (Bennis, 2005).Contextual intelligence was also pointed out as one such factor (Tucker, 1995). The study points out that contextual intelligence is required by the leader for diagnosing problems, prescribing solutions and mobilizing followers or supporters to solve those problems.

In this study, political leadership is measured with five different variablesas, proposed by Fred Greenstein and Joseph Nye (Erich, Leonard D, Jeanette, & Louis G, 2009). These are: contextual intelligence, ethical vision, political communication, negotiation and organizing capacity. Contextual intelligence refers to the practical wisdom of a leader to interpret situations. Ethical vision denotes the ability to form vision about the society. Political communication is an art a political leader should possess by which they can easily attract and maintain followers. Negotiation is another characteristic which helps a political leader to take stands which are acceptable to both parties in a conflict. Organizing capacity is also measured using the instrument. The instrument was adapted to Indian context after consulting with experts.

Governance was measured using Local Governance Barometer (LGB) developed by (Impact Alliance(PACT, IDASA ,SNV), 2005).Good governance denotes an efficient system of governance in which all the issues of society are well-addressed and sustainable growth is possible. The overall objective of the LGB is to describe, analyze and understand local governance situations, to develop the capacity of local actors to promote and sustain good governance and improved service delivery (UNDP). LGB model contains five main criteria of good governance: effectiveness, transparency, accountability, participation and equity.

A pilot study was conducted using the framed questionnaire with a sample of 30 respondents. The collected data from 30 respondents were studied in detail and the variances in the response were analyzed. Some necessary changes were incorporated to the questionnaire after the pilot study for increasing the ease of filling. Reliability analysis using the classical Cronbach alpha model was done for the collected data. Reliability concerns to the extent to which measurement of phenomena provides stable and consistent results (Carmines & Zller, 1979). Cronbach alpha values for various constructs of political leadership are: contextual intelligence 0.857, political skill 0.653, organizing capacity 0.881, ethical vision 0.856 and art of political communication 0.821. When the reliability statistics of LGB was calculated, the values obtained are: effectiveness 0.883, accountability 0.708, transparency 0.708, equity 0.874, participation and civic engagement 0.861. Since all these values are above 0.6, the data can be considered reliable.

The population of the study was defined as the elected women representatives of local self-governing bodies. Since it is very vast, the sample frame was set to include elected women representatives of the municipality who have completed one year of service. The size of the population under study is 1139 as obtained from the Local self-governing department. To estimate the sample size from the finite population, the confidence interval was fixed at 95% with a 10% margin of error. The sample size was calculated to be 89. However, the researcher collected 120 data. The sampling procedure adopted was

multistage random sampling. Districts of Kerala were divided into three different zones and total sample size was proportionally divided into these three zones. Random sampling was used to select the district. From the selected district, again random sampling was used to select the municipality. The detailed list of elected women representatives from each district of Kerala was obtained from local self-governance department website. Elected women representatives used to meet twice a month for attending the council meeting, this opportunity was used by the researcher to meet them and collected the data. Care was taken to ensure that respondents filled the questionnaire during free time, so that accurate data was obtained for the purpose of the study.

Analysis and Discussion

"If you want me to tell you what a nation is like, or what a social organization is like, tell me the position of their women", Pandit Jawaharlal Nehru (Boraian, 2008). As pointed out by the great leader, development of a country will be possible only if women also participate in the process. With this endeavour, the government of India has adopted 33% reservation for women in local self-governing bodies. Moving a step forward Bihar, Uttarakhand, Himachal Pradesh, Madhya Pradesh, Rajasthan and Kerala are providing 50% reservation.

When the descriptive statistics for political leadership was considered, a mean value of 78.577 with standard deviation 8.31 was obtained (Table 1). Political leadership was measured in a scale of 19–95 and in that a mean value of 78.577 indicates there is a good level of political leadership skills among the respondents. Contextual intelligence is measured in a scale of 5–25 and a mean value of 17.16 with standard deviation 1.99 was obtained. Political skill is measured in the range of 5–20 statements in which a mean 16.24 with standard deviation 2.18 was obtained. Among all the constructs, standard deviation was found to be high on political skills. The mean value of good governance was obtained as 85.164 with standard deviation 13.49 on a scale of 22–110 (Table 1).The value of standard deviation and range (Range = 54) indicates that there is wide disparity among the respondents in the ability to provide governance.

Table 1: Descriptive Statistics

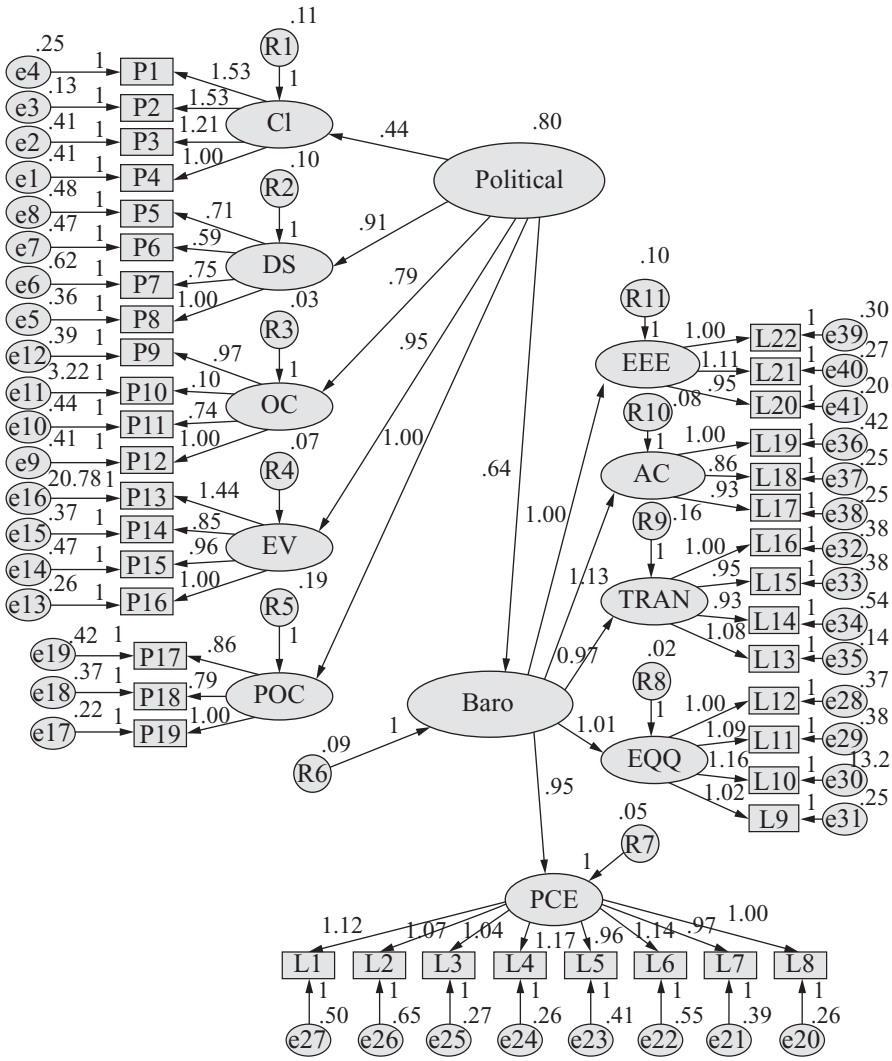
	N	Range	Mean	Std. Deviation	Scale
Political Leadership	120	34.00	78.55	8.316	19-95
Contextual Intelligence	120	8.00	17.16	1.99	5-25
Political Skill	120	9.00	16.42	2.18	4-20
Organization Capacity	120	7.00	16.99	1.87	4-20
Ethical Vision	120	9.00	16.42	2.12	4-20
Art of Political Communication	120	9.00	11.55	2.30	3-15
Good Governance	120	54.00	85.06	13.49	22-110
Effectiveness	120	21.00	32.18	5.39	8-40
Accountability	120	12.00	15.89	3.16	4-20
Transparency	120	8.00	12.27	2.15	4-20
Equity	120	8.00	12.27	2.15	3-15
Participation and Civic Engagement	120	8.00	12.44	2.15	3-15

Source: Data Analysis

Now, to explore the relationship between political leadership and good governance, the second-order Confirmatory Factor Analysis (CFA) was attempted. The second-order CFA is a statistical method to confirm that the theorized construct in a study loads into a certain number of underlying sub-constructs or components. It helps to estimate the effect of main construct on its sub-constructs.

Various measures of statistics are used to describe the fit of a model in CFA. CMIN statistic denotes the minimum value of the discrepancy between the model and the data. CMIN/DF is the chi-square divided by its degrees of freedom. Acceptable values are below the range of 3. Using this criterion, the proposed model is suitable as its CMIN/DF value is 1.821(Table 2).

Figure 2: Model Fit Summary



Root Mean Square Error of Approximation (RMSEA), a measure of fit introduced by (Steiger & Lind, 1980). RMSEA incorporates a penalty function for poor model

parsimony" and thus becomes sensitive to the number of parameters estimated and relatively insensitive to sample size (Browne M. , 1987). The goodness-of-fit of the model was evaluated using the RMSEA. Here an RMSEA of 0.083(Table 2) was obtained, which indicates an acceptable fit .Since the p-value is less than 0.05,the model is statistically significant. The study by (MacCallum, Robert, Browne, & Sugawara, 1996) have used 0.01, 0.05 and 0.08 to indicate excellent, good and mediocre fit respectively. Use of confidence intervals and tests of PCLOSE can help understand the sampling error in the RMSEA. There is greater sampling error for small df and low N models, especially for the former. Thus, models with small df and low N can have artificially large values of the RMSEA. For this reason, (Kenny, Kaniskan, & McCoach, 2014) argue to not even compute the RMSEA for low df models.

Table2. Model Fit Statistics

Measure	Acceptable Value	Observed Value
CMIN/DF	Below 3	1.821
RMSEA	0.01: Excellent fit 0.05: Good fit 0.08: Mediocre fit	0.083
CFI	0 Poor fit 1 Good fit	0.813
TLI	0 Poor fit 1 Good fit	0.801
ECVI	Small values	13.13

Another commonly reported statistic is the comparative fit index (CFI).The comparative fit index evaluates the fit of a user-specified solution in relation to a more restricted, nested baseline model, in which the covariance's among all input indicators are fixed to zero, or no relationship among variables is posited (Brown, 2006).CFI ranges from 0 for a poor fit to 1 for a good fit. The value obtained here is 0.813 (Table 2) which indicates that there is a good fit for the proposed model.

Tucker-Lewis index (TLI) is used for comparative fit that includes a penalty function for including freely estimated parameters (Brown, 2006). TLI can also be interpreted in a similar fashion as CFI, but it can have a value outside of the range of 0 to 1 (p. 86). Here a value of 0.801(Table 2) is obtained for TLI which adheres to the standard of a good fit.

The expected cross-validation index (ECVI) is also used as a measure of fit statistics. ECVI is used to measure the discrepancy between the covariance measure that is fitted and the expected covariance matrix that would be obtained in another sample of equivalent size. The model with smallest ECVI indicates good measure. They exhibit the greatest potential for replication. The study conducted by (Byrne, 2001) have suggested that ECVI values can take on any value and there is no predetermined approximation range of values. Here the obtained ECVI value is13.13 (Table 2)which indicates that there can be small discrepancy between the covariance measure that is fitted and the expected covariance matrix that would be obtained in another sample of equivalent size.

Thus the various statistics shows that the model fits the data (CMIN/DF =1.821, GFI = 0.656, CFI = 0.813, RMSEA = 0.083). Thus the model connecting political leadership and good governance was found to be fit for further studies.

Now, the factor loadings for each sub-constructs on the two main constructs is examined. The results show that political leadership loads well on its five sub-constructs. The factor loading of contextual intelligence, political skill, organizing capacity, ethical vision and art of political communication are high (0.44,0.91,0.79,0.95 and 1.00) (Figure 2) This reflects that five sub-constructs contribution of political leadership is good, and thus, the theory of five sub-constructs for political leadership is well supported. Table 2 also shows that all the regression values are significant.CR denotes 'Critical Ratio', which is equivalent to the regression weight divided by the standard error of this weight. The distribution of this ratio resembles a z-distribution. CR values that exceed 2 are regarded as significant at the level of 0.05. Here the regression weights shows that all the CR values are above 2 (contextual intelligence: 6.173, political skill and negotiation: 9.594, organizing capacity: 8.821, ethical vision: 10.642) (Table 3).

Contextual intelligence is an essential leadership skill, which enables elected representatives to understand the various problems they face in the society. A clear understanding of these problems is required to solve it judiciously. Another skill required by a political leader is the ability to be a negotiator. A political leader will come across various situations in which they need to resolve conflicts between parties. Social good and private interest will be certainly conflicting across various issues, for which political leaders need to find a solution through negotiations. Elected leaders need to work as team players and organize many programmes for the benefit of the society. Thus organizing capacity is essential for them. Ethical vision is about creating a long-term solution for a problem rather than finding a quick fix mechanism that may not be sustainable. An elected representative can bring progress to the society only if they have a clear vision for the development and create strategies for achieving that. As in the case of any leader, communication skill is indispensable for a political leader. Political leaders should be able to attract and gain support through their power of communication. Thus, it is seen that all the above described factors are essential skills of a political leader.

Table 3: Regression Path Coefficients between Political Leadership and its Sub-constructs

Sub constructs		PL	Estimate	S.E.	C.R.	P	Result
Contextual intelligence	←	Political leadership	.444	.072	6.173	<0.05	Significant
Political skill and negotiation	←	Political leadership	.907	.095	9.594	<0.05	Significant
Organizing capacity	←	Political leadership	.788	.089	8.821	<0.05	Significant
Ethical vision	←	Political leadership	.954	.090	10.642	<0.05	Significant
Art of political communication	←	Political leadership	Reference point				

In the case of political barometer also, the five sub-constructs: effectiveness, accountability, transparency, equity and participation and civic engagement have high factor loadings (1.00,1.13,0.97,1.01,0.95) thus supporting the concept of LGB (Figure 2). Table 3 also shows that the effects of LGB on all sub-constructs are significant. Here also all the CR values were found to be greater than 2 (Effectiveness: 7.080,

Accountability: 7.832, Transparency: 8.146, Equity: 7.862 (Table 3).Thus, it has been proved that local governance of an area could be measured with these five sub-constructs. Effectiveness of governance includes the ability to make a clear vision, excellent management of financial resources and having a correct decision-making process. Accountability points to the capability of elected women representatives in taking the responsibility of decisions. Transparency corresponds to the proficiency of these women leaders to adhere to the rules and regulations and work in a legal framework. The sub-construct equity points to the capacity of the leader to provide equal opportunities to all strata of society.

Table 4: Regression Path Coefficients between Good Governance and its Sub-constructs

Sub constructs		Governance	Estimate	S.E.	C.R.	P	Result
Effectiveness	←	Governance Barometer	.968	.137	7.080	***	Significant
Accountability	←	Governance Barometer	1.010	.129	7.832	***	Significant
Transparency	←	Governance Barometer	.946	.116	8.146	***	Significant
Equity	←	Governance Barometer	1.134	.144	7.862	***	Significant
Participation and civic engagement	←	Governance Barometer	Reference point				

Now the association between the two key constraints is examined. On testing the hypothesis that political leadership leads to good governance, it was found to be significant with R^2 as 0.80 (Figure 2). R^2value or coefficient of determination explains the percentage of variation caused by one construct over the other. Thus, 80% of variation in governance could be attributed to political leadership skills. Table 5 also shows that the critical ratio value is 7.984. This indicates that an elected women representative possessing political leadership qualities will be able to deliver good governance.

Table 5: Regression Path Coefficients between Political Leadership and Good Governance

Construct	Path	Construct	Estimate	S.E.	C.R.	P	Result
Good Governance	←	Political leadership	0.637	0.80	7.984	***	Significant

Source: Data Analysis

Conclusion

The policy of providing reservation for women would essentially help in their empowerment, provided they are equipped with the necessary skills for governance. The present study has pointed out that once they have these political leadership skills it will be an enabler for good governance. Five key political leadership skills were identified for successful governance. These skills could be imparted to women

leaders in many ways, like training, exposure to NGO's, etc. Training curriculum can be designed to enhance these political leadership skills, i.e. contextual intelligence, negotiation skills, communication skills, organizing skills and ability to create the vision. The formation ofwomen community groups can be another step in this regard. Community groups provide the opportunity for women to interact with various issues in the society and organizing events. These experiences will help them to nurture their political leadership skills. Kudumbasree units in Kerala, is an example for this. Kudumbasree units are popular self-help groups of women. These units are involved in various activities like small-scale business, agriculture, community programmes, etc. When women are exposed to these kinds of activities their political leadership skills will improve.

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Meteorological Drought and Farmers' Perception of Climate Change: A Case Study of Manipur

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Abstract

The paper has analyzed the occurrence of drought and farmers' perception of the changing climate in Manipur. There was occurrence of drought even during the critical stages of paddy. During 1975- 1989, there was increasing and significant trend in annual rainfall whereas it exhibited negative and significant trend at 5 % level of significance for the period 1990- 2007. There were occurrences of mild and moderate drought. Majority of the farmers recalled about late as well as low rainfall during monsoon (87% and 91%) and winter (81% and 81%) seasons and perceived that temperature has increased.

Key words

Mild Drought, Moderate Drought, Perception, Manipur

Note: The article is part of M.Sc. thesis of first author submitted to CAU - IMPHAL

Introduction

Drought is natural phenomena caused due to deficiency of water availability over a large geographical area for an extended period (Rossi, 2000). The India Meteorological Department (IMD) classified drought into meteorological drought, agricultural drought, hydrological drought and socio-economic drought. Meteorological drought is the situation when the seasonal rainfall received over the area is less than 75 % of its long-term average value. Agricultural drought occurs when available soil moisture is inadequate for healthy crop growth and causes extreme stress and wilting. Hydrological drought can be defined as a period during which the stream flows are inadequate to supply established use of water under a given water management system. Socio-economic drought is the condition when abnormal water shortage affects all aspects of established economy of a region which in turn adversely affects the social fabric of the society (www.imd.gov.in).

The incidence of drought has been increasing, globally (IPCC, 2007) and there is evidence of changing trends of monsoon rainfall around the world and also in India (Naidu et al*.,* 2009). During 1969-2005 in India, the annual temperature increased by

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pp. 102–111
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0.30^0C or 0.08^0C per annum. In the semi-arid temperate zone, the annual rainfall declined by 96 mm in *Kharif* season but there was significant increase in *rabi* rainfall (31 mm) in humid zone (Birthal et al., 2014a). During 1969- 2005, there was a decline in *Kharif* rainfall by 22 mm in India and the coefficient of variation (CV) of *Rabi* rainfall was more erratic than the *Kharif* rainfall (Birthal et al., 2014b).

A study by Gore et al. (2010) reported that North-Western part of India has the highest probability of drought whereas, West Coast and North-Eastern Region (NER) has the lowest probability of drought during 1901- 2001. But in contrast, Ravindranath et al. (2011) studied the climate change vulnerability profile indicating the water stress districts of NER and reported that majority of the districts in NER are subject to climate-induced vulnerability currently and shortly.

There are 100 most climate-vulnerable districts in India as identified by the Central Research Institute for Dry Land Agriculture (CRIDA), Hyderabad and out of which 16 districts are located in the NER. Two districts in Manipur, i.e., Imphal East and Senapati are also among them (Venkateswarlu et al., 2012). There were instances of drought in NER, though it falls under high rainfall zone. In the year 2005, there was prolonged dry period in many parts of Mizoram, and the natural wetlands were shrinking (Das et al., 2009b). In the year 2006, unprecedented drought-like situation affected severely in the whole NER. In 2009, there was rainfall deficit of 45 % in Assam and Meghalaya compared to 32% in 1986 showing the highest rainfall deficit year in the last three decades. Worst was the situation in Manipur where there was rainfall deficit by 67%; followed by Nagaland (-63%), Meghalaya (-56%) and Assam (-34%). This rainfall deficit and drought-like situations harshly affected the sowing and transplanting of rice in the affected areas in NER, and there was 25% reduction in rice production during 2009. The total areas affected by agricultural drought during south-west monsoon period constitute about 40% of the total geographical area of North-Eastern regions and 39% of rice cultivated area. There was a significant overall change in seasonal rainfall, and the monsoon rainfall was found to decrease during the last century at the rate of 11 mm per decade, approximately in South Assam Meteorological sub-division that covers the hill states of Nagaland, Manipur, Mizoram, Tripura and Assam (Das et al., 2009a).

Like the other states in NER, rice-based agriculture is the largest source of livelihood for the majority of the people of Manipur. In 2013, rice occupied 95.21% of the total net sown area (0.23 mha) in the state (GoM, 2013). Rice is grown mainly in *Kharif* season in both valley as well as the hill districts of Manipur. In the hill districts- *jhum* cultivation and terrace farming are prevalent where the local rice varieties are grown. While, in the valley districts, the High Yielding Varieties (HYVs) of rice are mainly cultivated. The adoption of HYVs of rice was low in the hill districts. Thus, a slight change in the amount of precipitation, primarily in the *Kharif* season will have a direct effect on rice. Hence, the present paper analyzes the weekly, monthly, seasonal and annual drought in Manipur and farmers' perception of climate change.

Methodology

The present study has been conducted in Manipur. The state is located at a longitude of $93^o03'$ E to $94^o78'$ E and latitude of $23^o56'$ N to $25^o68'$ N. It is located in North Eastern Himalayan Region of India neighbouring Myanmar in the East and surrounded by Nagaland, Mizoram and Assam state.

Manipur has a typical monsoon climate with variation ranging from sub-tropical to temperate conditions in hilly areas. The maximum temperature during the summer

season is 32°C while during the temperature often falls below 0°C winter season. The state received an annual rainfall of 1467.5 mm with its distribution ranging from 933 mm to 2593 mm. Rice is the staple food of Manipur and had been grown in both valley districts and hill districts. Among the N.E. states, the productivity of rice is highest in Manipur (GoM, 2010).

Sampling Technique

Manipur was selected purposively as the state has been experiencing water crisis in the last few decades. Das et al. (2009a) in their study in North-East India during 1983-2009 reported a rainfall deficit of 67% in 2009 in Manipur. The state experienced rainfall deficit even during the peak monsoon season. In 2011, among the N.E states Manipur was registered the highest rainfall deficit (-52%), followed by Meghalaya (-48%), Nagaland (-41%), Mizoram (-33%), Assam (28%) and Tripura (23%) during monsoon season (www.icarzcu3.gov.in). Senapati district and Imphal West district was selected purposively as they ranked first in area under rice and production of rice among the hill districts and the valley districts, respectively (GoM, 2013). Kangpokpi block from Senapati and Imphal West-1 CD block were selected randomly. A cluster of two to three villages was selected from each of the selected blocks. From each of the cluster, a list of rice growing farmers was made, and 40 farmers were selected randomly from a block. Hence, a sample of 80 farmers was drawn from the two districts of Manipur.

Data

To meet the objectives of the present study, both primary data and secondary data were collected. Primary data were collected from the randomly selected farmers through the personal interview with the help of pre-tested and structured schedule to analyze farmers' perception on climate change. Secondary data on daily temperature (1 x 1 degree) and rainfall (0.5 x 0.5 degree) were retrieved from the IMD gridded data for the period of 1975- 2009 and 1975- 2007, respectively to analyze the meteorological drought in Manipur.

Analytical technique

The weekly, monthly, seasonal (i.e., June to September - monsoon; October to December– post-monsoon; and January to May– pre-monsoon) and yearly rainfall was analyzed. Total numbers of drought weeks, months, seasons and years were estimated using the following definition:

Drought week: It is the situation when the amount of rainfall is equal to half of the normal weekly rainfall or less (Ramdas and Malik, 1948).

Drought month: If the actual rainfall is less than half of the average monthly rainfall, then it is considered as drought month (Sharma et al*.,* 1979).

Drought season: According to Marathe et al*.,* (2001), it is the condition where the annual rainfall is deficient by more than twice the mean deviation of the season.

Drought year: It is the situation when the annual rainfall is deficient by 20- 60% of the average yearly rainfall.

The intensity of drought was based on the percentage departure of rainfall from normal and was calculated using the following equation:

$$Di = \frac{(Pi - \mu)}{\mu} \times 100$$

where, D*i* = percentage deviation from long-term mean
Pi = annual rainfall (mm)
μ = long long-term mean of annual rainfall

The intensity of drought was categorized into five different categories, namely no drought (M_0), mild drought (M_1), moderate drought (M_2), severe drought (M_3) and extreme drought (M_4), as per IMD Protocol (IMD, 1971).

Table 1. Drought codification based on percentage deviation of rainfall from normal value

Percentage departure of rainfall from normal	Drought intensity	Code
0.0 or above	No drought	M_0
0.0 to - 25.0	Mild drought	M_1
- 25.0 to - 50.0	Moderate drought	M_2
-50.0 to - 75.0	Severe drought	M_3
-75.0 to less	Extreme drought	M_4

Results and Discussion

The analysis on weekly, monthly, seasonal and annual rainfall during 1975- 2007 is presented in Table 2. The study of weekly rainfall reveals that the normal rainfall was the lowest (1.05 mm) on 49th Standard Meteorological Week (SMW), i.e., 2nd week of December and was the highest (65.78 mm) on the 31st SMW (1st week of August). The critical stages of rice are transplanting stage (23rd SMW), active tillering stage (28th, 29th and 30th SMW), panicle initiation stage (32th SMW) and milking stage (37th SMW). The normal rainfall during this period ranged from 46.84 mm (37th SMW) to 63.92 mm (28th SMW). There was the occurrence of drought week during the critical stages of rice. These may lead to crop loss and in turn, reduce the productivity of rice. During the critical stages of rice, the highest number of drought week occurred during 23rd and 32nd SMW (24%) which coincide with transplanting and active tillering stage, respectively. About 21.21% of the 28th SMWs, 15.15% of 29th SMW and 18.18% of 30th SMWs were drought weeks which coincide with the active tillering stage. About 18.18% of the 37th SMW was drought weeks and this week overlapped with the milking stage of rice in the study area.

According to monthly rainfall analysis revealed that the highest rainfall had been received during the month of July (274.09 mm) followed by August (250.65 mm), June (242.73 mm) and September (201.59 mm) whereas, the lowest had been received during the month of January (9.63 mm) and December (14.32 mm). The percentage of drought month was highest in December (51.52%); followed by January (45.45%), November (39.39%), and March (36.36%). During the study period, there was no occurrence of monthly drought during monsoon season, unlike the weekly analysis, except during September (6.06%).

The normal seasonal rainfall received during pre-monsoon, monsoon and post-monsoon were 407.35 mm, 969.07 mm and 164.94 mm, respectively. There were no drought month during monsoon season, except during post-monsoon (24.24%) and pre-monsoon season (3.03%).

Table 2. Weekly, Monthly, Seasonal and Rainfall and Drought Situation in Manipur

SMW	Date	Weekly Normal Rainfall (mm)	% of Drought Week	Monthly Normal Rainfall (mm)	% of Drought Month	Seasonal Normal Rainfall (mm)	% of Drought Season	Annual Normal Rainfall (mm)	Frequency of Drought Intensity (%)
1	01–07 Jan	1.97	78.79						
2	08–14 Jan	2.48	69.70	9.63	45.45				
3	15–21 Jan	1.60	63.64						
4	22–28 Jan	1.89	75.76						
5	29–04 Feb	7.79	57.58						
6	05–11 Feb	7.14	60.61	37.51	24.24				
7	12–18 Feb	9.36	60.61						
8	19–25 Feb	10.68	57.58						
9	26–04 Mar	10.56	54.55						
10	05–11 Mar	9.92	57.58	69.25	36.36	407.35	3.03		
11	12–18 Mar	11.36	45.45						
12	19–25 Mar	23.56	48.48						
13	26–01 Apr	21.92	39.39						
14	02–08 Apr	21.54	42.42	122.67	12.12				
15	09–15 Apr	30.84	36.36					1541.36	
16	16–22 Apr	27.18	39.39						
17	23–29 Apr	33.30	30.30						
18	30–06 May	35.80	42.42						
19	07–13 May	32.65	21.21	168.30	9.09				
20	14–20 May	44.81	30.30						
21	21–27 May	39.71	42.42						
22	28–03 Jun	35.73	24.24						
23	**04–10 Jun**	**61.47**	**24.24**	242.73	0.00				
24	11–17 Jun	61.56	12.12						
25	18–24 Jun	58.58	18.18						42.42 (Mo)

26	25–01 Jul	59.09	15.15					54.55 (M_1)
27	02–08 Jul	61.09	12.12	274.09	0.00			3.03 (M_2)
28	**09–15 Jul**	**63.92**	**21.21**					
29	**16–22 Jul**	**59.13**	**15.15**					
30	**23–29 Jul**	**56.43**	**18.18**					
31	30–05 Aug	65.78	24.24					
32	**06–12 Aug**	**60.07**	**24.24**	250.65	0.00			
33	13–19 Aug	57.71	18.18			969.07	0.00	
34	20–26 Aug	51.84	21.21					
35	27–02 Sep	53.71	18.18					
36	03–09 Sep	50.12	21.21	201.59	6.06			
37	**10–16 Sep**	**46.84**	**18.18**					
38	17–23 Sep	40.79	30.30					
39	24–30 Sep	46.52	36.36					
40	01–07 Oct	36.57	27.27					
41	08–14 Oct	32.25	45.45	119.12	30.30			
42	15–21 Oct	31.48	48.48					
43	22–28 Oct	12.50	48.48					
44	29–04 Nov	13.86	57.58					
45	05–11 Nov	9.91	60.61	31.50	39.39	164.94	24.24	
46	12–18 Nov	7.00	66.67					
47	19–25 Nov	3.28	63.64					
48	26–02 Dec	5.10	72.73					
49	03–09 Dec	1.05	90.91	14.32	51.52			
50	10–16 Dec	3.88	78.79					
51	17–23 Dec	3.27	78.79					
52	24–31 Dec	4.78	75.76					

Note: The bold figures indicate values at critical *Kharif* rice growing stage

During 1975- 2007, Manipur received a normal annual rainfall of 1541.36 mm. There was no sign of occurrence of severe (M_3) and extreme (M_4) drought during the study period, except the occurrence of mild droughts (54.55%) and moderate drought (3.03%).

Table 3 presents the linear trend in annual rainfall for two sub-periods, i.e., 1975 to 1989 and 1990 to 2007 and for the complete study period 1975 to 2007. Over the year during 1975- 2007, there was increasing but the insignificant trend (β = 3.52) in annual rainfall. But in the two sub-periods, there was an increasing and the significant trend (β = 20.66) in annual rainfall during 1975- 1989 whereas it exhibited negative and significant trend (β = -18.49) at 5% level of significance for the period of 1990-2007 which may be due to change in climate. This significant decline in annual rainfall may be a cause of concern for the rice farmers of the state.

During 1990- 2007, there was increasing and significant (β = 0.06) trend in maximum as well as minimum temperature (Table 3). Over the years during 1975- 2007, there was also a significant increase in maximum (β = 0.018) as well as minimum (β = 0.03) temperature.

Table 3. Linear trend coefficients for annual rainfall and temperature (maximum and minimum)

	Rainfall		Minimum temperature		Maximum temperature	
Year	Trend	*p*-value	Trend	*p*-value	Trend	*p*-value
1975- 89	20.66**	0.045	- 0.003	0.77	0.003	0.832
1990- 2007	- 18.49**	0.036	0.06**	0.025	0.066**	0.009
1975- 2007	3.52	0.325	0.03***	0.0003	0.018**	0.028

and * indicate 5% and 1% level of significance, respectively

Survey Results

The results of the survey data collected from the respondent farmers are presented in the following section.

The average age of the respondents was 46.48 years, and a family was comprised of, on an average six members in the study area. There were 1090 females per 1000 males, which were higher than the sex ratio in the state which is 992 females per 1000 males (Census, 2011). The majority of them resided in *kaccha* (50.00%) and semi-*pucca* (45%) housing structure. About 85% of the respondents were literate. The average operational landholding was 0.64 ha in the study area, and 46.90 % of the land was irrigated (Table 4).

Majority of the respondents experienced either droughts or low rainfall situations in both monsoon (98%) as well as winter (93.75%) seasons in the last ten years in the study area (Table 5). About 50 % of the respondents, primarily from Imphal West district, reported about the unexpected incidence of hailstorms during monsoon season. They have perceived that temperature has increased both in summer (95%) as well as in winter (59%) which is shown in Table 6.

During the survey, the farmers also reported about the change in crop area and reduction in the yield of rice during drought. Only 5.00% of the respondent farmers reduced the area under rice during low rainfall or drought which was experienced in Senapati district of Manipur (Figure. 1). During low rainfall, cent % of the respondents reported a decrease in rice yield and the average loss in the yield was estimated to be

35.09% of the normal productivity. Similarly, Devisti and Moetamed (2012) reported that the average area under paddy cultivation was reduced by 1% due to water shortage in North Iran which in turn led to reduction in the production of white- rice by 312 kg/ha.

Table 4. Socio-economic information of sample households

Particulars	Unit	Value
Average age	years	46.48
Family size	No.	6.32
Sex ratio	per 1000 male	1089.80
Housing structure	%	
Kaccha		50.00
Semi-*pucca*		45.00
Pucca		5.00
Educational status	%	
Illiterate		15.00
Literate		85.00
Operational land holding	ha	0.64
Upland		0.65
Lowland		0.63
Irrigated land	%	46.90

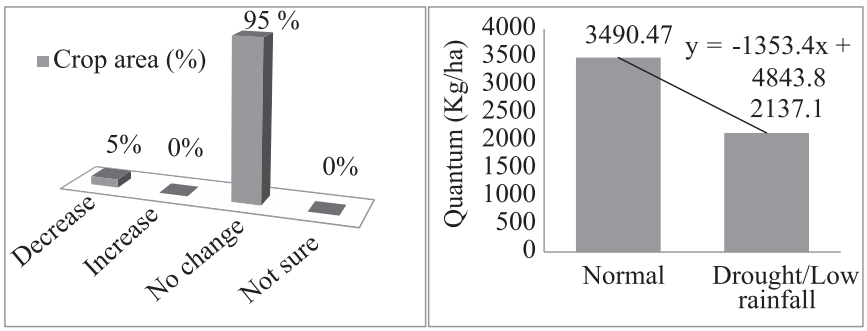
Table 5. Perception (%) about unexpected change encountered by the respondents

	Drought incidence or low rainfall		Hailstorm	
Response	Monsoon	Winter	Monsoon	Winter
No	0.00	0.00	48.75	97.50
Yes	97.50	93.75	51.25	2.50
No change	1.25	1.25	0.00	0.00
Not sure	1.25	5.00	0.00	0.00

Table 6. Farmers' perception of change in temperature

Particular	Summer temperature (%)	Winter temperature (%)
Increase	95.00	58.80
Decrease	0.00	32.50
Not sure	3.80	3.80
No change	1.30	5.00

Figure 1. Perception about effect of low rainfall or drought on crop area



Conclusion

The weekly rainfall and drought analysis showed that there were drought weeks during monsoon season and even during the critical stages of rice during the period of study (1975- 2007). This may lead to a reduction in the yield of rice; so, drought-tolerant rice varieties may be grown to reduce the effect of drought on rice yield. The majority of the annual rainfall was concentrated in the monsoon season; hence, water should be harvested during the peak monsoon season and could be supplied during the post-monsoon season for growing *rabi* crops. The annual rainfall declined significantly after 1990. During the study period, there was an occurrence of primarily mild drought. The analysis of the survey data revealed that the farmers also perceived low rainfall or drought in the past years and reported that it led to a reduction in cropped area and yield of rice. The state government may put emphasis on minor irrigation facilities, and research efforts should be directed towards the development of drought-tolerant varieties and late varieties suitable to the hill ecosystem.

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The Role of Human Values in the Adoption of e-book

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Abstract

A value-based ICT study using an information technology adoption framework is rare in IS research. Values serve as guiding principles in people's lives and can, thus, impact technology adoption scenarios. Using a 56-item value inventory survey, Schwartz postulated 10 basic value types that an individual may possess. These value types, designed at the individual level, are different from Hofstede's espoused cultural values. Indeed, four high-order values, Conservation (CON), Openness to Change (OC), Self-Transcendence (ST) and Self-Enhancement (SE) are formed from these 10 low-order values, and three of these (CON, OC and ST) are thought to moderate the relationships of technology adoption constructs and intention to use (INT), using a UTAUT-like model structure. A library-based e-book is selected as the technology of choice for this value-extended UTAUT model. Results show that three of these moderating hypotheses are significant and one is not.

Sustainability:
Inspiration, Innovation
and Inclusion
pp. 112
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Design, Fabrication, and Analysis of a Lawn Mower

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Abstract

Environmental pollution has always been an apprehension for the operation of any conventional energy-powered internal combustion engine. The cost of fuel also increases the operating cost of such systems. Solar-powered lawn mowers do not cause environmental pollution but they are not affordable for all sections of the society. Moreover, the solar lawn mower is not very much operative during cloudy days. With this background, the present effort directs to design and fabricate an ecofriendly manual/electric-driven sustainable lawn mower. This cost effective and affordable lawn mower model will be pushed by a human being, giving an average speed of a driving bicycle/rickshaw wheel around 40 rpm. A set of bevel gears and pulleys drive mechanism convert the cutting blade speed to around 640 rpm. The bicycle wheel is attached to the larger pulley through a coupling mechanism. Theoretical performance analysis at 800 rpm shows that the shearing force of the grass cutting blades is 20.625 N. This force is greater than the shear force that is required to cut the conventional lawn grass. Automatic lawn mower system uses electric motor and proximity sensors. The operating cost of most domestic gasoline powered lawn mowers is approximately Rupees 300–400 per day excluding semi-skilled labour charges. The proposed manual lawn mower will have zero operating cost. Once the improved manual/electric lawn mower models are sufficiently developed and demonstrated, the overall cost for such system will come down in future.

Keywords

Lawn Mower, Solar, Automatic, Manual, Hybrid

Introduction

Nowadays, environmental pollution caused due to fossil fuel combustion to perform various useful works is a principal issue for the entire world. Pollution is due to man-made activities starting from our own homes, mechanized agricultural practices in some rural areas and finally it deals with enormous industrial production activates for substance of present day technology biased civilization. Therefore, efforts are made worldwide for technological exploration and popularization of green technology-driven devices those are energy efficient and cause comparatively less environmental degradation with its scheduled operation. In this connection, it has been observed that commercially available lawn mowers use internal combustion engine for its propulsion. As a result, gasoline-powered lawn mowers cause environmental pollution

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Sustainability: Inspiration, Innovation and Inclusion
pp. 113–123
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when in operation. Moreover, the cost of conventional fuel normally increases with time, rendering the system economically a costlier affair. The present work explores a developmental design of a low cost, energy efficient manual lawn mower.

Literature Review

Research and development work available on lawn mower technology is relatively small in different literature. Therefore, to widely justify the present work, we are referring some indirectly lawn mower related works in addition to the few directly related literature. Tricycle rickshaw is a very cheap means of short distance transportation both in city and rural area. Traditionally, tricycle rickshaw is propelled by human energy. A study has been reported with the existing model and design of tricycle rickshaws. Researchers observed that traditional rickshaws use age-old technology, poor mechanical design and hence is non-ergonomic in maneuverability. They had directed an effort to design a light weight, high strength, and ergonomically designed both human-pulled and electric-powered hybrid rickshaws. The proposed model was powered with a 400 W 24 VDC motor drive, in addition to human power. Both the options might work independently as well as in hybrid mode. They performed analysis on structural design of the rickshaw using Analytical System commercial software to see the effect of different unbalanced stresses in frame of the hybrid tricycle. It was observed that the overall structural design was safe. The rear part of the tricycle is less effected (0.0001249 Pa) whereas front link connecting to front wheel is more likely to affect ($1.4438e^{8}$) by different unbalanced impacts tests (Dutta et al., 2013, 2014). Another study revealed an overview of design and fabrication of an eco-friendly human electric hybrid tricycle. The authors observed that in order to best equip the potential customer with a tricycle that provides them mobility, a look into comfort and ergonomics was necessary. Therefore, the focus of study was to design a vehicle that had lightweight, high strength and superior performance; easy maintenance coupled with adequate safety provision. Moreover, the human and electric-powered hybrid tricycle is projected as ergonomically designed. This can also prove to be a promising solution of the acute energy crisis that the world is facing. An analysis had been performed with in-house developed tadpole type hybrid electric tricycle. A comparison had been made on two designs (tadpole and delta) of hybrid tricycle. The relative scores obtained for design and utility aspects were 575 and 561 respectively. Considering ergonomics, lateral movement of the seat might be incorporated to accommodate back reclining position of the rider. Backrest angle was $(30–40)^{0}$ and low seat position was kept to preserve stability. Maximum load applied was 10780 N and the factor of safety was reported as 1.4 from front impact test. For roll over test, maximum load was 7000 N and factor of safety was 2.4. Such a light wheel vehicles might be used for short distance transportation in city and recreational purposes (Dutta et al. 2014). Another study revealed solar photovoltaic and bio fuel as two emerging and promising renewable energy sources for future automotive propulsion in hybrid power mode. Therefore, hybridization of vehicles i.e., coupling of battery-powered motors together with internal combustion engine is a green technology. Hybrid vehicles with internal combustion engine powered by biodiesel-blended fuel and batteries charged by electric power and regenerative-braking were reported for the present study. A lightweight vehicle with low rolling resistance and aerodynamic drag was supposed to have better fuel economy. Some special techniques of weight reduction and the use of some

lightweight material had been proposed. To minimize cost, energy and raw material consumption, recycling of used materials might be done wherever possible. Emphasis on appropriate microstructure of steel had been put to meet strength, toughness, etc. requirements for various parts of the vehicle. Biodiesel was one of the most promising green fuels for future automotive propulsion. Studies showed that B20 blend yields low hydrocarbon emissions. Therefore, this vehicle might be a parallel type hybrid in which engine powers the front wheels of vehicle and solar energy is used to recharge the battery that propels the electric motors coupled to the rear wheels. Splitting of power between engine and electric motor might be achieved by inducing the driver to modulate the pedal position until the desired vehicle power was reached. Li-ion batteries had been reported capable of many thousands of deep discharge cycles. Li-ion batteries with specific power of 2000 W kg^{-1} and a specific energy as high as 400 Wh kg^{-1} might be used. The auto ignition temperature of biodiesel was more than diesel. It is reported that the viscosity of biodiesel increases as the fuel temperature increases. This may be accomplished by preheating the biodiesel through a compact heat exchanger with exhaust gas. As a result, biodiesel viscosity decreases that atomizes it effectively. This would minimize the emission of gases like carbon monoxide due to incomplete combustion of fuel. By utilizing waste exhaust heat, we increase combustion efficiency of the vehicle and make it more eco-friendly from renewable energy sources (Dutta et al., 2014).

Solar energy powered lawn mowers are reported in literature. A solar-powered lawn mower may be described as the application of solar energy through photovoltaic effect to power a preferably a direct current electric motor. This electric motor in turn rotates the grass cutting blade and it performs the mowing of a lawn (Dipin and Chandrashekhar, 2014). There is a practical limitation for application of solar lawn mower without interruption because the solar lawn mowers are preferably effective only during sunny days. Moreover, the initial cost and weight of solar lawn mower is high because of heavy storage battery and solar photovoltaic panel integration with the system. This leads to difficulty for operation of solar power lawn mower as well. As a result, automatic electric lawn mowers are introduced. It has been reported that there is a shifting trend; about 15 times from traditional hand-guided or ride-on lawn mowers to automatic electric lawn mowers in certain cases (Dutta et al., 2016). However, the use of these automatic electric lawn mowers is quite costly and therefore, it is not affordable for all sections of people in a society. So we are trying to design and fabricate a manual lawn mower which is cost effective and user friendly. The principal function of the lawn mower under study is to cut the grass at desired height. It has to simulate the various forces, stresses acting on the shaft of the wheel and the other important parts of the systems. It may be noted that structural analysis of lawn mower frame relates to different criteria. According to the axis of rotation of blades, we may have reel lawn mowers where the axis is horizontal and conventional rotary lawn mowers where axis is vertical (Sujendran, and Vanitha, 2014). Based on the propulsive energy sources, we may have gasoline-driven, electricity-driven, or hand-driven lawn mower (Gabele, 1997, Newstadt, et al., 2008). Therefore, over the years, there have been numerous developments in lawn mower technology. But with technological advancement, there also arises the need to check the impact of machines on the environment as well as on man. Different scientific literature are available based on gasoline powered, solar and automatic lawn mowers design, development

and performance testing (Satwik, et al. 2015, Sujendran, and Vanitha, 2014). With this background, the objective of our present work is as follows.

Objective of Study

The objective of the present work is to design and fabricate a manual lawn mower. During the design process, sufficient care is taken that the materials for fabrication of manual lawn mower are available in local market for further popularization of the device once it is successfully developed and possibly to make it a low cost one.

Design Methodology

Frame

A mild steel *L* section was selected for construction of lawn mower frame. This mild steel *L* section had the required strength, workability, local availability and cost effectiveness. Sufficient care is taken to incorporate adequately various standard parts, like bicycle tyre, pulleys, bevel gears, cutting blade, etc., such that the total fabrication process of lawn mower become easily manageable. The technical specifications of the designed lawn mower have been presented in Table 1 below.

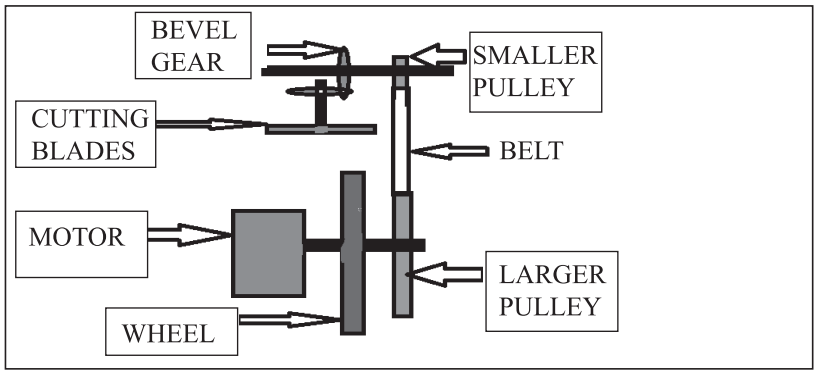
Table 1. Lawn Mower Frame Specifications

No.	Parameters	Numerical Values	Remarks
1.	Total Length	67 inch	Mild steel *L* section
2.	Breadth	40 inch	Mild steel *L* section
3.	Height	24 inch	Mild steel *L* section
4.	Wheel Base	37 inch	-
5.	Height of CG	08 inch	-
6.	Weight of Frame	07 kg	-

Driving Mechanism

The larger main driving pulley is of 24 inches and is attached to the wheel through a free wheel coupling mechanism. As the wheel rotates, the larger pulley rotates along with it in forward direction and no motion is transferred in reverse direction due to free wheel action. A small pulley of 3 inches is connected with the larger pulley through a belt. The power from the larger pulley is transmitted to the smaller pulley through a V belt. A bevel gear system is used in this system. The first bevel gear is connected to the pulley through a shaft. The other bevel gear is connected to the first gear perpendicularly. The set of bevel gears finally transmit power to the cutting blade. On the, other hand, another energy source comes from the motor which is connected to the bicycle wheel for driving the cutting blades The schematic view of driving mechanism is shown in Figure 1.

Figure 1. Schematic Views of Driving Mechanism



Speed Ratio

A briskly walking person with a bicycle may give speed of 30 to 40 rpm to the bicycle wheel. Therefore, a big pulley (24 inches) and a small pulley (03 inches) are used to transmit motion from the bicycle wheel. Therefore, the speed ratio (1:8) was obtained between the pulleys. A bevel gear is used in the system. The speed ratio between the bevel gears is 1:2. The pushing force of a human power is assumed to be 0.15 horse power. The wheel speed is assumed to be at maximum 40 rpm at this horsepower. By taking the speed and gear ratio, the maximum speed of the cutting blades obtained is 640 rpm. The force of the cutting blade obtained at this velocity is 20.625 N which is greater than the shearing force of the grass of general grasses available in a lawn.

Coupling Mechanism

The wheel and the pulley are coupled through a free wheel of bicycle. As the wheel rotates, the pulley also moves along with the bicycle wheel. Four bolts were inserted to a drilled plate at the hub of larger pulley. The bolt distance may be adjusted with insertion of appropriate size washer for alignment of larger pulley with smaller pulley. Likewise, the mechanism is locked with the free wheel.

Ergonomics and Safety

Safety is one of the most important factors while designing a lawn mower. For minimizing injury and fatigue to the daily users both mechanical as well as electrical components were considered. Ergonomically to be beneficial and comfortable to the users a tilt between 55.5^{o} and 57^{o} along with handle rotations between 53^{o} and 78.8^{o} is taken.

Material Selection

Material selection is an important step in the process of designing any machine component. In the context of product design, the main goal of material selection is to minimize cost while meeting product performance objective. Systematic selection of the best material for a given application begins with properties and costs of the candidate materials. After the whole analysis, we finalized AISI1018 mild steel for building the frame of lawn mower that consists of low carbon content, good machinability,

weldability and tensile strength (Dutta, et al., 2013). The material properties of steel are shown in Table 2.

Table 2. Material Properties of Steel Selected for Frame Structure of Lawn Mower

No.	Material	Steel
1.	Young's Modulus	2e+011N/m^2
2.	Poisson Ratio	0.266
3.	Density	7860 kg/m^3
4.	Coefficient of Thermal Expansion	1.17e-005 K
5.	Yield Strength	2.5e+008N/ m^2

Speed Loss Measurement

After installing the V-ribbed belt into the pulleys, the sliding bases are pulled apart until a specific belt tension is created. The driver pulley, rotated by the motor or when it is pushed manually actuates the belt. This in turn rotates the driven pulley producing a load on the belt drive system. Due to relative sliding between the belt and the pulleys, a difference arises between the speed of the driver and the speed of the driven pulleys. This is called speed loss that is referred to as 'slip' from now on, evaluated by the following equation for different sized pulleys (Balta et al. 2014).

Where, ω_{driver} and ω_{driven} are the rotational speeds of the driver and the driven pulleys, respectively.

Results and Discussion

Frame and Structure

The different views of manual as well as motorized/hybrid lawn mowers have been presented in Figure 2(a–e). Moreover, a view of ongoing fabrication process of pulley and bicycle wheel/free wheel main drive assembly is also presented. There are two small (6 inches) supporting wheel to appropriately balance the weight of lawn mower as well as to change its direction as and when required.

Figure 2a. CAD Model of Frame

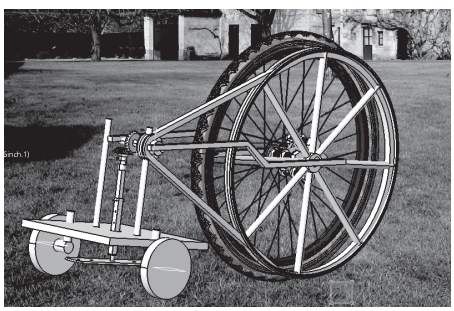


Figure 2b. Fabrication of Frame

Figure 2c. Side View of Manual Lawn Mower

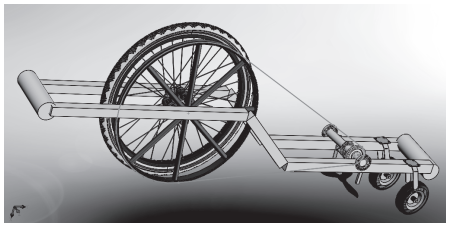


Figure 2d. Side View of Electric Lawn Mower

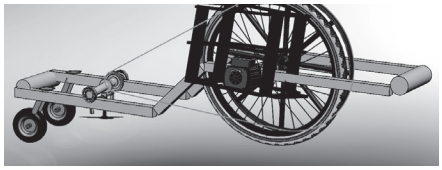


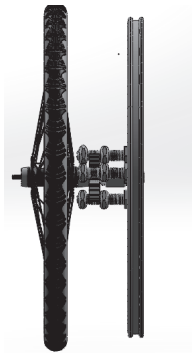
Figure 2e. A Top View of Hybrid Lawn Mower

Driving Mechanism of Lawn Mower

The power transfer mechanism of the designed lawn mower is presented in Figure 3a. A final velocity ratio of 1:16 is obtainable with manual power transmission mechanism.

Figure 3a. CAD Model of Driving Mechanism

Figure 3b. CAD Model of Coupling Mechanism



Coupling Mechanism

The coupling mechanism of the designed lawn mower is presented in Figure 3b. The bicycle free wheel mechanism is used with standard nut and bolt for coupling bicycle wheel with the bigger pulley.

Analysis of Speed Loss Acting on the Driven (Smaller Pulleys)

The individual effect of belt drive parameters on percentage slip losses are determined in which one parameter is changed at one time. Elastic modulus is assumed to be the only property of the belt material that affects slip behaviour. Accordingly, the elastic modulus is directly taken as a belt drive parameter. The results are shown below in different graphs. Figure 4a shows variation of smaller pulley slip with respect to slip. It is clear that with increasing speed of smaller pulley, there is a gradual decrease in slip. Figure 4b shows variation belt slip with respect belt length. It is clear that with increase in belt length there is liner reduction of belt slip. Figure 4c shows variation belt slip with respect to torque transmitted. It is evident that with increase in torque transmitted, there is a gradual increase in belt slip. Figure 4d shows variation of pulley diameter with respect to belt slip. As the diameter of smaller pulley increases, there is reduction of belt slip non-linearly.

Figure 4a. Variation of Smaller Pulley Slip with respect to its Speed

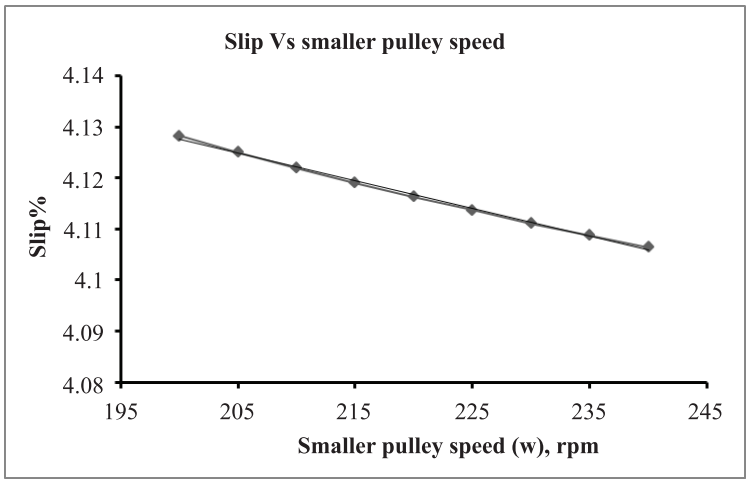


Figure 4b. Variation of Slip with respect to Belt Length

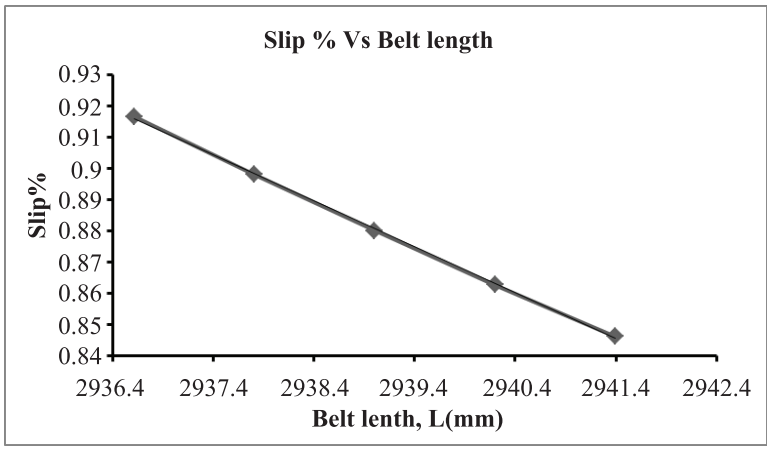


Figure 4c. Variation of Smaller Pulley Torque with respect to Slip

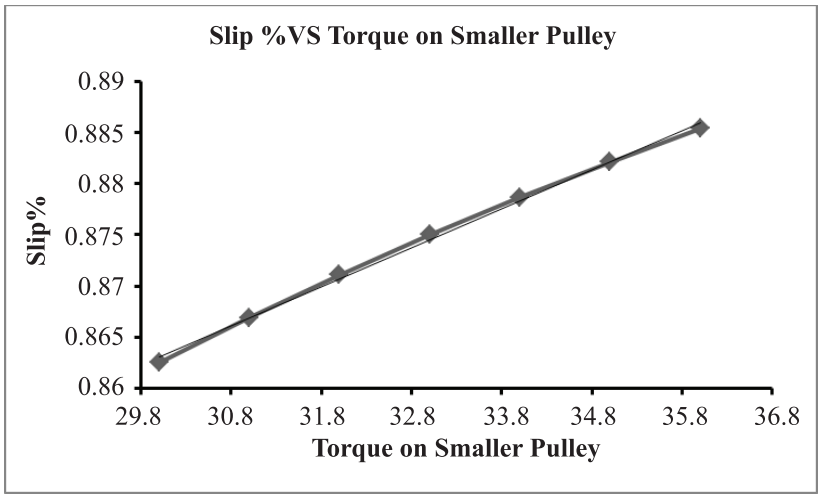
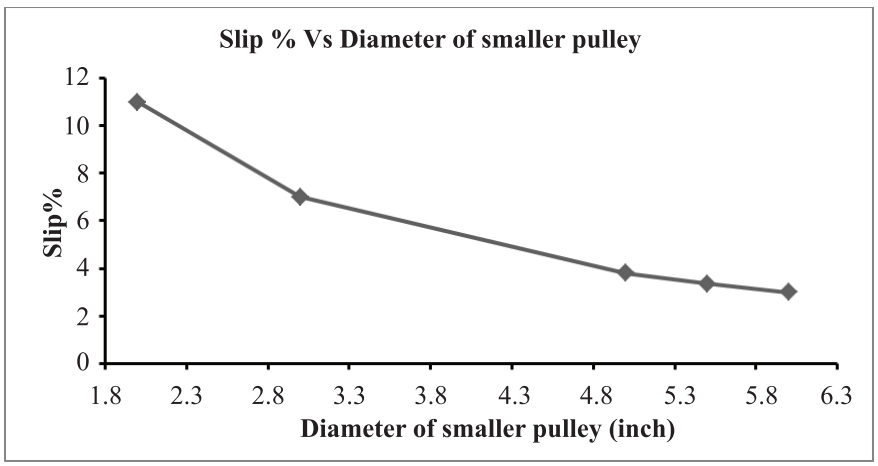


Figure 4d. Variation of Slip with respect to Smaller Pulley Diameter



Electronics

The control system comprises a Pulse Width Modulation (PWM) generated microcontroller. Higher the acceleration input (potentiometer attached to accelerator), higher pulse is the width modulation (pwm). Higher pulse width modulation will give rise to higher speed.

Arduino UNO R3 Board is an open-source development board based on microcontroller Atmega 328. Arduino board is used to control the speed of the cutting blades of lawn mower and as well as to detect obstacles. Writing control code with Arduino Uno, we have used the Open source Arduino software (IDE). Arudino UNO board is connected to the following components: 1. Motor driving circuit, 2. Potentiometer, 3.Ultrasonic sensor, 4. Buzzer The motor driving circuit is used to control the motor using IC L293D that consists of a H-bridge that drives the motor and is responsible for changing the direction of rotation.The total apparatus is connected between the battery and the motor

with which power supply goes through the Arduino UNO. Ultrasonic sensor and buzzer is directly connected to the board according to the program written. Sensor is placed in front of a machine so that it detects the obstacle which comes within a distance of 40 cms and buzzer produces alarm to avoid collision. Potentiometer contains a knob where it has 4 stages, with which we can vary the speed from stage to stage up to maximum 2000 rpm (Dutta, P.P et al., 2013).

Conclusions

A cost effective and affordable lawn mower model is designed and developed. It will be pushed by a human being, giving an average speed of the driving bicycle/rickshaw wheel around 40 rpm. A set of bevel gears and pulleys drive mechanism will convert the cutting blade speed to around 640 rpm. The bicycle wheel will be attached to the larger pulley through a coupling mechanism that will drive the smaller pulley through a belt. On the same shaft of the smaller pulley, a bevel gear is attached that will transmit power to the cutting blades. Theoretical performance analysis at rated speed shows that the shearing force of the grass cutting blades is 20.625 N. This force is greater than the shear force that is required to cut the conventional lawn grass. Automatic lawn mower system uses electric motor and proximity sensors. The operating cost of most domestic gasoline powered lawn mowers is roughly `300–400 per day excluding semi-skilled labour charges and that for manual proposed lawn mower will have zero operating cost. The different parameters like torque, belt length, small pulley diameter etc. affect belt slip. Once improved manual/electric lawn mower models are sufficiently developed and demonstrated the overall cost for such system will come down in future.

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Commercialization and Marketing the Concept of Roof Top Rain water Harvesting through Public Private Partnership Model : An Experimental Stance

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Abstract

This paper studies -people's behaviour towards water preservation using constructs of Social Cognitive Theory (SCT), evaluates reliability, factorial validity of SCT measures;, influencing people's behaviour towards water harvesting;, and develops PPP model for augmenting mass acceptance of water preservation. A questionnaire was developed based on constructs from SCT and was administered with two-week experiment–re-experiment basis. Reliability, factorial validity of scales was supported.: Indices imply model to be satisfactory-to-precise fit; internal consistency satisfactory-to-good; rank order reiteration strong (ICC = 0.80 − 0.92). Developed scales have usefulness for determining prospective SCT correlates of people's water preservation behaviour, marketing strategies and PPP model will augment water harvesting.

Keywords:

Social Cognitive Theory, Measures, Commercialization, Rooftop Rainwater Harvesting

Introduction

There is good evidence to indicate that people demonstrate poor water preservation practices, water is becoming ever scarce and a prized commodity due to uncertain monsoon, few perennial rivers, lack of storage, faster depleting ground water, ever escalating demand for water from agriculture/industries/households, grave wastage and incongruous consumption (Rosegrant et al. 2002)., Collectively all these factors are leading to stern water crisis (Amarasinghe, et al., 2007). Ironically expanding urban India depends heavily on ground water resulting in greater depletion of groundwater (IDSA., 2010. *Water Security for India:* External Dynamics. IDSA Task Force Report).; Unfortunately, educating programmes/interventions directed towards people have achieved limited success. A poor understanding of the mechanisms of behaviour change has been offered as an explanation for the lack of efficacy in water preservation intervention of the people. Evidence suggests that behaviour interventions guided by relevant theory (e.g. Social Cognitive Theory, Self-determination Theory) are more effectual in changing behaviour than non-theoretical approaches. These theories

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pp. 124–135
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theorize that an intervention's effects are achieved through causal '"mechanisms'" or mediators (e.g. self-efficacy or perceived benefits) that function in varying grades to facilitate the alleyway connecting an intervention and behavioural outcomes (Bandura, 1986). Testing the legitimacy of conjectural models applied to behavioural interventions permits for the advancement and enhancement of conjecture, which can support the design and delivery of more effective interventions. However, interventions targeting water preservation behaviour among people rarely assess the theoretical mechanisms of water preservation behaviour change. Moreover, the inadequate research exploring theoretical mechanisms of water preservation behaviour change among people has been compounded by the use of mediator measures with unknown, limited or poor psychometric properties (Cerin, Barnett, & Baranowski, 2009). As a result, little is known about affective mediators of water preservation behaviour change among people. Interventions to augment water preservation behaviour among people are often directed by SCT and there is support for social cognitive correlates of water preservation behaviour among people. To the authors' knowledge no preceding study has developed and tested the all-inclusive range of social cognitive scales for "water preservation behaviour among people. Establishment of the psychometric properties of evidence-based water preservation scales may contribute to an enhanced understanding of water preservation behaviour by providing a thrifty structure for the evaluation of interventions. In reaching the mass audience, marketing tools and techniques play a vital role. Roof top rain water harvesting is an innovation in the water preservation era. This innovation proves to be useful only if it is successful in reaching the mass audience (Jackson, 2005). Integrated marketing communication tools help reach mass audience alongside prove useful in creating awareness about roof top rain water harvesting, grabbing the attention of the people, arousing the interest, building the conviction and persuading people to act favourably. Thus one of the contributions of this study would be tailored marketing strategies for infusing the concept of rain water harvesting among the people. In making the innovation of roof top rain water harvesting more affordable and easy to implement/adopt by the people the conglomeration of public sector and private sector might prove effective. Public sector's credibility, trust and confidence coupled with private sector's technology, expertise and professionalism provides additive effect to the expected outcome; In this endeavour, this study aims to create a fundamental public private partnership model for effective management of roof top rain water harvesting concept. A Public–Private Partnership (PPP) is a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. Rest of the paper is organised as follows.: Section -2 Objectives, Section -3 Methodology, Section -4 Data Analysis, Section -5 Results, Section -6 Discussion, Section -7 Implications, Section -8 Marketing Imperatives, Section -9 PPP Model, Section -10 Conclusion.

Objectives

1. Developing instrument to assess major constructs from SCT theory relating to water preservation behaviours.
2. Evaluating reliability, factorial validity of SCT measures.
3. Developing marketing imperatives for augmenting awareness, influencing people's behaviour towards rain water harvesting.
4. Developing PPP model to make harvesting concept more affordable and acceptable.

Methodology

Developing and Establishing Scales and iItems

The content and psychometric properties of SCT were reviewed. a preliminary questionnaire comprising seven scales was developed based on SCT (Baranowski, Perry, & Parcel, 2002): self-efficacy, intention (i.e., proximal goals), situation (i.e., perceptions of the physical environment), behavioural strategies, social support and outcome expectations (i.e., perceived benefits) and expectancies (i.e., value placed on benefits) relating to water preservation behaviour. Intention is a key construct from the Theory of Reasoned Action (Ajzen, & Fishbein, 1980), and in Bandura's Social Cognitive Theory (Bandura, 2004) is considered to be a proximal goal. A definition referent for water preservation as guided by glossary of environmental statistics was provided for respondents in the questionnaire (Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997). An expert jury comprising of four experts in the areas of civil engineering, geology, and SCT and/or scale development were consulted to review and refine the preliminary scales and were asked to judge the content legitimacy, the appropriateness of reply options, and wording; evaluate item comprehension, and consider the potential for respondent burden.

Scales

Self-efficacy

For the nine-item self-efficacy scale respondents were asked to rate their resilience in personal capability to select a water preservation methods whenever a choice is provided using a six-point Likert-type scale (1 = strongly disagree; 6 = strongly agree), (e.g., I find it difficult to choose water efficient attachments/equipments such as, water efficient faucets/taps/showers)

Intentions

By means of a four-point Likert scale (1 = never true of me; 4 = always true of me), five items evaluated intentions to implement water preservation behaviours. The general discern "In the coming three months will you . . ." offered a time referent to guide respondents to look upon their intentions for the short-term future (e.g., do you intend to use water optimally during bathing for example, limiting the act of washing face twice while bathing).

Situation

Six items scrutinized an individual's mental depiction of the water available in their home setting. Explicitly, items scrutinized the stipulation of availability of water efficient showers, taps, toilets and appliances (e.g., at home water efficient appliances are available to use including taps, showers, faucets, etc.). A six-point Likert-type scale scrutinized the respondents' level of agreement/disagreement with each item.

Social support

Seven items reviewed the incidence of social support acknowledged from family/ friends/peers for water preservation using a five-point Likert-type scale (1 = never to 5 = always). A time referent was endowed with to support contemplation of supportive

behaviours received during the previous three months (e.g., how often did your family/ friends/peers supported in reducing the water wastage at your home or work place?).

Outcome expectation and expectancy

The expectations scale evaluated attitude towards the water preservation and benefits of preserving the water. The expectancies scale offered five analogous personal assessments of the significance of every expectations gain. Respondents rated the expectation and expectancy statements on a six- (1 = strongly disagree to 6 = strongly agree) and four- (1 = not at all important to 4 = very important) point Likert-type scale.

Questionnaire Administration

Questionnaire was administered among the select sample respondents. Total sample size was 200, out of which 173 respondents accepted to provide information.

Data Analyses

Reliability

Reliability examination was carried out for every scale. A one-way Analysis of Variance (ANOVA) was carried out to establish disparity between repeat administrations [Experiment 2 (E2) Experiment 1 (E1)]. To present a coefficient of individual repeatability the 95% limits of conformity were calculated. Scores for the dissimilarity amidst experiment administrations (E2 – E1) were plot against the experiment re-experiment mean [(E1 + E2)/2] for each individual, after which the range of dissimilarities falling within the mean of the dissimilarities ± 1.96 standard deviations was calculated (Bland, & Altman, 1986). Bivariate correlations between the experiment re-experiment dissimilarity and mean were also acquired. This determined whether confines of conformity were consistent all through the series of metrics, as specified by a small and non-significant correlation. Intra-class Correlation Coefficients (ICCs) present a gauge of rank order repeatability. For each scale, an ICC score ≥ 0.75 specifies outstanding dependability (McDowell, 2006). Cronbach's alpha coefficient was also calculated to estimate internal consistency for each scale, whereby acceptable values are >0.6 (Sim, & Wright, 2000).

Factor aAnalysis

CFA was carried to examine model fit for each of the scales. A non-significant Chi-square result ($p > 0.05$) specifies good fit of the model being inspected. A refusal of the conjecture model signals that Chi-square is too sensitive (Bollen, 1989), creates need for supplementary model-fit indices to be examined. Subsequent indices such as Chi-square index, RMSEA, GFI, AGFI and CFI were calculated from E1 data. RMSEA scores ≤ 0.08, ≤ 0.06, and 0.0, indicate satisfactory, close, and precise fits, in that order. To understand GFI, AGFI and CFI indices, scores ≥ 0.9, ≥ 0.95 or equal to 1 indicate sufficient, superior and precise fit of the model correspondingly. If data demonstrated multivariate non-normality (multivariate kurtosis value represented by a Mardia's coefficient >3) (Mardia, 1970), the Bollen-Stine bootstrap process was used to inspect model fit where prejudice corrected regression coefficients are stated (Bollen, & Stine, 1992).

Results

Descriptive Statistics

The study sample contained of 173 citizens of Ballari city (age = 20.72 ± 1.24; 62% female), who are in the milieu of middle class. There was no statistically noteworthy dissimilarity between genders for experiment – re-experiment scores (E2 – E1) for any of the scales. Hence separate investigation by gender was not considered. Table 1 presents outcome for scale means and standard deviations.

Confirmatory Factor Analysis

Self-efficacy

Primary examination illustrated that the unique single-factor self-efficacy metrics was a meagre fit of the hypothesized model and that additional fine-tuning was essential. A repetitive procedure was used gradually to take away substance that were symbolized by unacceptable factor loadings and were found to contribute poorly to the model fit indices. The ultimate compound was condensed to seven items which resulted in an acceptable-to-good fit of the model (Table 2).

Table 1. Mean, SD, Item Kurtosis values and Mardwia's co-efficient of Multi variate kurtosis

Constructs	Description		Statistics	
Self-efficacy	Participants were asked to rate confidence in their ability to adopt and overcome barriers to water preservation behaviours.	Experiment 1 [Base line]	Mean ± (SD)	4.05 ± (0.80)
			Item Kurtosis	1.05 to 2.36
			Mardia [z]	4.93*
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	4.22 ± (0.82)
			Item Kurtosis	1.07 to 1.82
			Mardia [z]	2.55
Intentions	Participants were asked to indicate their intentions to save water	Experiment 1 [Base line]	Mean ± (SD)	3.14 ± (0.53)
			Item Kurtosis	0.66 to 0.65
			Mardia [z]	4.83*
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	3.23 ± (0.56)
			Item Kurtosis	0.57 to 0.93
			Mardia [z]	7.14*
Situation	Participants were asked to respond to statements about their mental representation of the physical environment influencing their ability to save water.	Experiment 1 [Base line]	Mean ± (SD)	5.45 ± (0.58)
			Item Kurtosis	0.17 to 2.55
			Mardia [z]	15.05*
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	5.45 ± (0.57)
			Item Kurtosis	0.04 to 3.85
			Mardia [z]	20.96*

Behavioural Strategies	Participants were asked to rate the frequency at which they reinforced their own water preservation behaviours through setting goals, self-monitoring and strategies for enhancing preservation.	Experiment 1 [Base line]	Mean ± (SD)	0.95 ± (0.00)
			Item Kurtosis	0.15 to 2.58
			Mardia [z]	0.04
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	3.37 ± (0.76)
			Item Kurtosis	0.92 to 0.36
			Mardia [z]	2.09
Social Support	Participants were asked to rate the frequency with which family reinforced water preservation encouragement, role modelling, and accessibility to water preservation methods and equipment.	Experiment 1 [Base line]	Mean ± (SD)	4.27 ± (0.56)
			Item Kurtosis	0.36 to 6.06
			Mardia [z]	15.15*
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	4.32 ± (0.55)
			Item Kurtosis	0.67 to 7.28
			Mardia [z]	22.29*
Outcome Expectations	Participants were asked to respond to statements about various benefits of water preservation.	Experiment 1 [Base line]	Mean ± (SD)	5.37 ± (0.56)
			Item Kurtosis	0.08 to 4.07
			Mardia [z]	19.08*
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	5.37 ± (0.48)
			Item Kurtosis	0.66 to 6.58
			Mardia [z]	16.18*
Outcome Expectancies	Participants were asked to rate personal value placed on each corresponding outcome expectation item for water preservation behaviour.	Experiment 1 [Base line]	Mean ± (SD)	3.45 ± (0.46)
			Item Kurtosis	0.75 to 1.58
			Mardia [z]	4.34*
		Experiment 2 [2 Week Re-experiment]	Mean ± (SD)	3.46 ± (0.47)
			Item Kurtosis	0.74 to 2.17
			Mardia [z]	6.26*

Note. *Where Mardia's coefficient for multivariate kurtosis indicate, questionnaires which violate the assumption of multivariate normality (>3), the Bollen-Stine bootstrap procedure is employed to examine model fit.

Intentions

Analyses exposed the preliminary five-item intentions measure which did not necessitate additional fine-tuning. Table 2 shows that one-factor model demonstrated good model-fit as shown by adequate-to-good fit indices.

Situation

A condensed measure resulted in an enhanced four-item measure. The elimination of two items formed fit indices that were a good or exact fit of the model (Table 2).

Social support

Model-fit results for the unique seven-item measure did not suit all criterions. Two items were detached owing to their negative effect on factor loadings and fit indices. The final model resulted in fit indices which established an acceptable-to-good fit of the model.

Behavioural strategies

The original ten-item composite provided acceptable fit indices however; four items loaded poorly on the one factor construction and so were detached to give a more prudent gauge. The cutback supported the rationale of scale's structure where fit indices demonstrated the measure was a good-to-exact fit of the model.

Outcome expectation and expectancy

First round analyses pointed out additional enhancement of the paired six-item expectation and expectancy measure was necessary. The exclusion of one pair of expectation/expectancy items which revealed extreme platykurtic kurtosis resulted in substantial enhancement in model fit for the expectancy measure. The final five-item expectations structure fulfilled most model-fit criteria.

Reliability Analysis

Table 2 exposed concluding reliability results. Bland-Altman analyses exposed encouraging narrow limits of conformity for each scale. Non-significant bivariate correlations between the experiment -– re-experiment disparity and experiment – re-experiment mean pointed out the limits of agreement were consistent all through the series of measures for all scales. ICC scores for all scales revealed outstanding rank order repeatability ranging from 0.81 (situation) to 0.89 (self-efficacy, social support and outcome expectancy). Similarly, the internal consistency reliability of all measures proved adequate; Cronbach's alpha values ranged from 0.65 (outcome expectancy) to 0.79 (situation).

Design Methodology

Frame

A mild steel *L* section was selected for construction of lawn mower frame. This mild steel *L* section had the required strength, workability, local availability and cost effectiveness. Sufficient care is taken to incorporate adequately various standard parts, like bicycle tyre, pulleys, bevel gears, cutting blade, etc., such that the total fabrication process of lawn mower become easily manageable. The technical specifications of the designed lawn mower have been presented in Table 1 below.

Table 2. Reliability Results, Model Fit Indices and Factor Loadings Constructs of SCT

		Constructs of SCT						
		Self-efficacy	**Intentions**	**Situation**	**Behavioral Strategies**	**Social Support**	**Outcome Expectations**	**Outcome Expectancies**
Reliability Statistics	**Ra**	–0.03	0.08	0.04	0.06	0.15	–0.06	0.03
	95% LOM	–0.80	–0.71 to 0.89	–0.88 to 0.91	–0.84 to 1.00	–0.68 to 0.70	–0.70 to 0.74	–0.53 to 0.58
	ICC [95% CI]	0.89 (0.85 to 0.92)	0.83 (0.77 to 0.87)	–0.81 (0.75 to 0.86)	0.88 (0.84 to 0.91)	0.89 (0.85 to 0.92)	0.84 (0.79 to 0.88)	0.89 (0.87 to 0.92)
	CronbachAlpha	0.70	0.71	0.79	0.75	0.71	0.72	0.65
	$\chi 2$ [p]	17.41 (0.40)	9.77 (0.08)	0.90 (0.64)	6.69 (0.67)	0.723 (0.20)	14.67 (0.01)	14.67 (0.54)
Validity Statistics	**RMSEA**	0.07	0.08	0.00	0.00	0.05	0.11	0.00
	CFI	0.94	0.97	1.00	1.00	0.98	0.94	1.00
	GFI	0.97	0.98	1.00	0.99	0.98	0.97	0.99
	AGFI	0.92	0.93	0.99	0.97	0.95	0.90	0.97
	Factor Loading	0.40 – 0.73	0.43 – 0.81	0.44 – 0.86	0.43 – 0.75	0.47 – 0.70	0.45 – 0.77	0.23 – 0.71

NOTE: a Bivariate correlations between the difference (E2-E1) and the mean [(E1 + E2)/2]; 95% limits of agreement calculated as the range of differences falling within the mean of the difference ± 1.96 SDs. ICC intra-class correlation; CIs confidence intervals; $\chi 2$ = Chi-square, *p* = probability; RMSEA root mean square error of approximation; GFI goodness of fit index; AGFI adjusted goodness of fit index; CFI comparative fit index.

Discussion

The endeavour of this study was to build and assess the reliability and factorial validity of key SCT measures relating to water preservation behaviour. The outcome pointed out each of the scales presented to be dependable measure showing acceptable factorial validity. All measures confirmed minimum satisfactory internal consistency dependability *(α > 0.60) (Sim, & Wright, 2000)* and outstanding rank order repeatability (ICC > 0.75) (McDowell, 2006), and factor analysis exposed data to be sufficient fit for hypothesized models. The measures presented may provide solution for researchers about a set of water preservation behaviours.

Implications

The study offered proof for reliability, factorial validity of seven scales designed to measure SCT constructs related to water preservation behaviour. These scales provide prudent answers for researchers interested in understanding water preservation behaviours.

Marketing Imperatives

1. Specially designated vehicle:
This special vehicle contains display of information about need for water preservation, projector system exhibiting short film about water preservation.

2. Print Aids:
Informative posters, banners & billboards at the places of the public prominence. in English, Hindi and all the prominent vernacular languages.

3. Audio Visual Aids:
Short films produced in English, Hindi and other prominent vernacular to be exhibited schools, outdoors.

4. Advocacy by the Eminent Persons:
Services of the eminent persons have to be utilized to propagate the need for rainwater harvesting among the people. People like, Medha Patkar, Anna Hazare, Sudha Murthy, Kailash Satyarthi, etc. would prove useful.

5. Awareness Inception Programmes:
Conducting essay, quiz, elocution competitions at schools, colleges, about water. Publishing articles, facts, statistics about water crisis, demand vs availability, mortality rates due to non availability of water, in the papers, magazines, journals and other mediums. Advertisements on television, in newspapers and other media, trailers at theatres, and posters, and stickers to disseminate idea at public transport vehicles.

Trust Building Effort:

It is observed that majority people do not trust rain water harvesting technique; to eradicate this myth Ministry of Environment and Forestry aAffairs, town planning department, Ministry of Renewable Resources, Public Welfare and other key departments of the government haves to reinforce that water harvesting techniques are scientific, credible and are under the strict scrutiny of the government.

Public Private Partnership Model

Purpose of the PPP Model: The models aims at maintaining infrastructure, equipments for constructing water harvesting pits and their maintenance.

Proposed Project Structure: A partnership is proposed between private and public sectors; where private sector is responsible for providing certain facilities and services. Public sector pays for these facilities and services, The contract could be structured over 10–15 years.

Private Sector Role: Locating ideal site; construction of rain water harvesting pits; setting up of water harvesting equipments and maintenance of the equipments; provision of information management and technology solutions; facilities management such as rain water drain management, filtering, plumbing solutions, waste disposal management; helpdesk and reception management.

Private Sector Role: It sets performance parameters for private player's role, monitors parameters, and makes payments.

Technical issues: It signs contract with private sector 'operator'; who will provide certain prescribed services; Operator is paid for work over course of contract on a 'no service no fee'basis; it designs 'output specification', a document setting out what the operator is expected to achieve; If operator fails to meet standards, it loses element of its payment until standards improve.; If standards do not improve after an agreed period, the public sector authority is entitled to terminate the contract. Potential private sector players expected to respond are the existing civil construction companies, water management institutes, environmental management firms.

Conclusions

This research paper bestows support for the reliability and factorial validity of social cognitive measures related to water preservation behaviours among the people at Ballari. Furthermore this research paper has contributed towards building fundamental public private partnership model to ensure structural management of water consumption among public and also assure the augmentation of water preservation behaviour among the people; the strategic marketing imperatives coupled with integrated marketing communications have high probability of paving path for deep penetration of water consciousness among the people and a collective vision to preserve/conserve water for future generations.

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Three Dimensional Frameworks versus Two Dimensional Frameworks as a Design Approach towards Sustainability

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Abstract

Analysis of country level data of the United Nations Development Programme (UNDP) and the Global Footprint Network on Gross National Income (GNI), Human Development Index (HDI), and Global Hectares (GHA) using two versus three dimensional frameworks illustrates Medium GNI, High HDI and Low GHA as the aspirational focus for all countries to grow and develop in a sustainable way.

The 'citizens', 'consumers', and 'communities' roles of people with the state, market, and people as the corresponding players is presented in a three dimensional framework to understand state, market, and people success/failure compared to the commonly used two dimensional framework of state and market success/failure.

Keywords

Sustainability, Three Dimensional Frameworks, Two Dimensional Frameworks, Communities, People Failure/Success

Introduction

The ways, in which individuals, groups, organizations, and societies utilize various types of resources to nurture the potential of every human being, can become the basis of sustainability. This paper explores the contours of sustainability by comparing two dimensional and three dimensional frameworks of analysis, using country level data of the UNDP and the Global Footprint Network. It argues for the superiority of three dimensional frameworks and postulates them as a conceptual construct through the design approach towards sustainability.

The past 200 odd years in human history have been unique in many ways. The increase in human population, in consumption of natural resources, in national incomes, and in greenhouse gases emissions, are now at the highest levels in recorded history, with a sharp sustained spike in all four since around 1800 AD. This increase has been very unevenly distributed across countries leading to glaring differences between them in terms of incomes, consumption, and opportunities for nurturing the potential of their people, which raises policy concerns about the equitable use of natural resources to sustain all people in all the countries of the world.

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and Inclusion
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Methodology

The 3P Approach (adaptation of the Triple Bottomline Approach) has become one of the yardsticks of measuring balanced progress between People, Planet, and Profits. The most commonly used methods of measuring them at the country level are Gross National Income for Profits, Human Development Index for People, and ecological footprint in Global Hectares for Planet. These data are generated for most countries of the world by the United Nations and other international bodies.

The Data

The Human Development Report (HDR) prepared by the UNDP every year gives a value for the HDI along with the per capita GNI in USD for countries. The HDI score, which ranges from 0 to 1, is a cumulative score of a country's achievements on education, health, and income. The countries are classified as having Low HDI, Medium HDI, High HDI, and Very High HDI. This measure has been used for the P relating to People.

The World Bank classifies countries each year into Low Income, Lower Middle Income, Upper Middle Income, and High Income based on their per capita GNI. These categories have been used for the per capita GNI data provided in the HDR for each country. This measure has been used for the P relating to Profits.

The Global Footprint Network computes the per capita ecological footprint of countries in terms of Global Hectares (GHA) and publishes them as National Footprint Accounts (NFA) each year. This measure has been used for the P relating to Planet.

The HDR for 2011 and 2015, which is the most recent report, have reference years as 2011 and 2014, respectively. The most recent National Footprint Accounts 2015 Edition has GHA data for reference year 2011. Hence, data analysis using three data points for each country – HDI, per capita GNI, and per capita GHA – has been done separately for two years – 2011 and 2015.

There is some mismatch in the list of countries in the HDR and NFA. The HDR 2015 has data for 188 and the NFA 2015 for 182 countries. Twenty countries in the HDR do not figure in the NFA and 14 countries in the NFA are not there in the HDR. Hence, data for the common list of 168 countries in the HDR and in the NFA have been studied.

Within this list, the analysis has been done for countries with High and Very High HDI scores. The cutoff points for the HDI adopted by the UNDP are as follows:

Score upto 0.55	–	Low HDI
Score between 0.56 to 0.69	–	Medium HDI
Score between 0.7 to 0.79	–	High HDI
Score between 0.8 and 1.0	–	Very High HDI

The HDR 2015 shows 49 countries with Very High HDI and 56 countries with High HDI. Six countries each in the Very High HDI and High HDI list do not have corresponding GHA scores resulting in a total of 43 countries and 50 countries respectively in the data set.

The HDR 2011 has 47 countries with Very High HDI and 47 countries with High HDI. But three countries having HDI less than 0.8 are listed in the Very High HDI category and three countries having HDI less than 0.7 are listed in the High HDI category because the cut-off points used are different in that year. To maintain consistency, the HDI score of 0.8 and above has been used for Very High HDI and 0.7 to 0.79 has been used for High HDI countries in the 2011 data also. This results in 44

countries with Very High HDI and 47 with High HDI. Of these, six countries with Very HDI and four with High HDI do not have corresponding GHA scores, which results in a total of 38 countries and 43 countries respectively in the data set.

The 2014 and 2011 per capita GNI classification for countries by The World Bank is as follows:

2014		2011
Upto USD 1045	– Low Income	– Upto USD 1025
Between USD 1046 - 4125	– Lower Middle Income	– Between USD 1026 - 4035
Between USD 4126 - 12736	– Upper Middle Income	– Between USD 4036 - 12475
Above USD 12736	– High Income	– Above USD 12475

The World Economic and Social Prospects, 2014 document (United Nations, 2014) lists 36 countries including the European Union and other European countries, United States of America, Canada, Japan, Australia, and New Zealand as Developed Economies. Keeping the per capita GNI of these countries in view, which is much higher than The World Bank cut-off of USD 12736 for High Income, an additional category with a cut-off of USD 25000 has been added to The World Bank classification by the author in this paper and named as Very High Income group.

The Global Footprint Network calculates that a per capita ecological footprint of 1.7 GHA for all people on the earth would allow human beings to live within the bio-capacity of the earth meaning living within the equivalent of one earth. Presently, they estimate that the world is at an ecological consumption of 1.6 earth's level, with the footprint of humanity being 2.7 global average hectares per person. The number of earths required to sustain present ecological footprints of different countries has been used by the author to classify the per capita GHA categories as follows:

Upto 1.7 per capita GHA	–	Low (equivalent of one earth)
Between 1.8 to 3.4 GHA	–	Medium (equivalent of two earths)
Between 3.5 to 5.1 GHA	–	High (equivalent of three earths)
Above 5.1 GHA	–	Very High (equivalent of four earths and more)

The Data Analysis

Two dimensional frameworks have been used to create three graphs shown in Figures 1, 2, and 3 with data for reference year 2014 and three graphs shown in Figure 4, 5, and 6 with data for reference year 2011.

Figure 1 plots the HDI and per capita GHA scores of countries. Thirty out of 50 countries with High HDI have Medium per capita GHA, 9 have High per capita GHA, 2 have Very High per capita GHA, and only 9 have Low per capita GHA. These nine countries are Sri Lanka, Algeria, Jordan, Georgia, Dominican Republic, Columbia, Equador, Jamaica, and Cuba. Of 43 countries with Very High HDI, only 25 have High per capita GHA, 12 have Very High per capita GHA, and 6 have Medium per capita GHA. None have Low per capita GHA.

Figure 2 plots per capita GNI of the High and Very High HDI countries against their per capita GHA scores. Nine of the 50 High HDI countries have Low per capita GHA of which 8 are Upper Middle income countries and 1 is a High income country. Thirty High HDI countries have Medium per capita GHA with 15 of them being Upper Middle income and 15 being High income countries. Nine countries have High per capita GHA with 2 in the Upper Middle income, 6 in the High income, and 1 in the Very High income group. Two High HDI countries have Very High per capita GHA with 1 each in the High and the Very High income group.

Figure 1. Graph plotting countries with Very High HDI with reference to their Per Capita GHA.

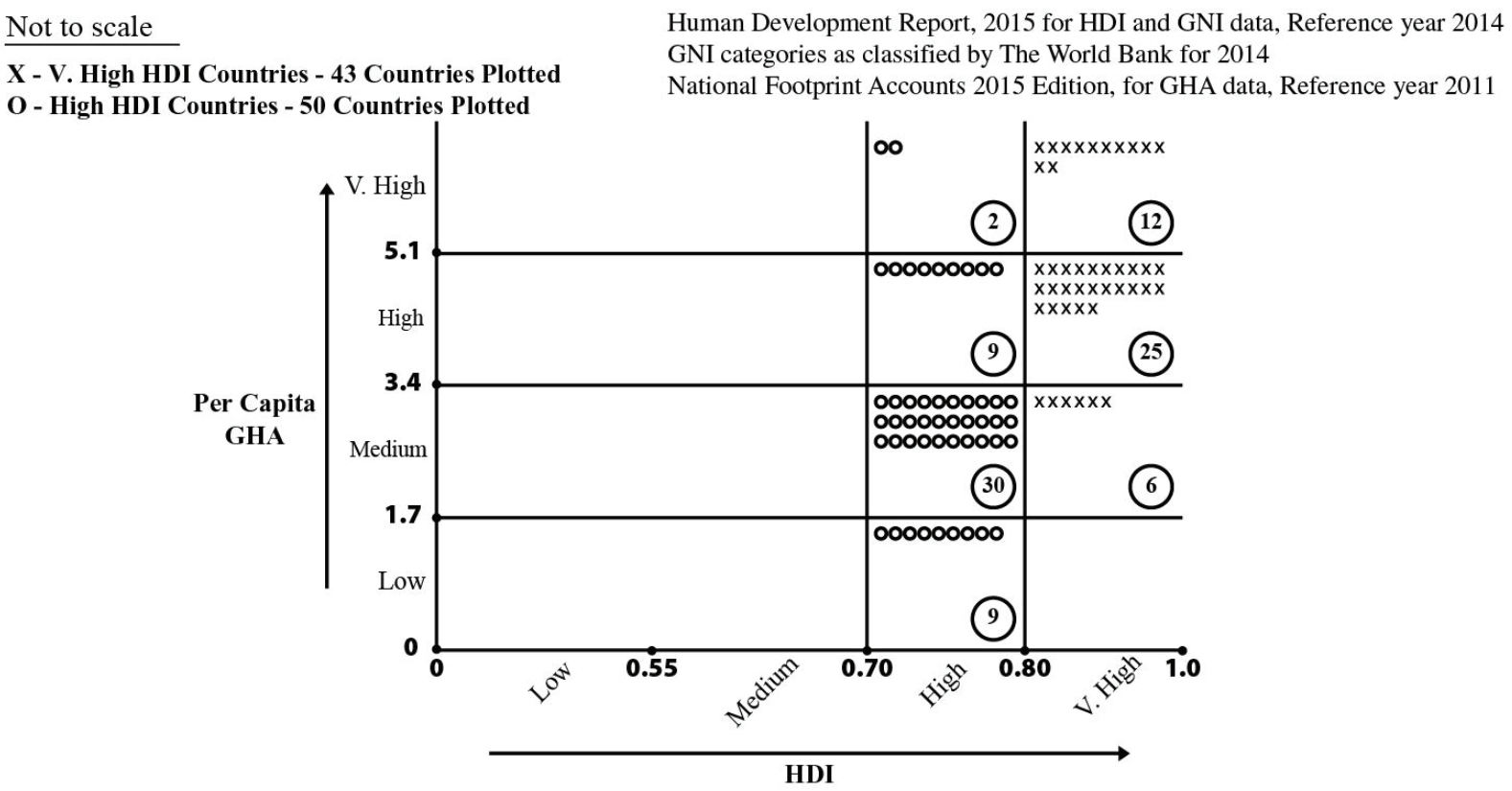
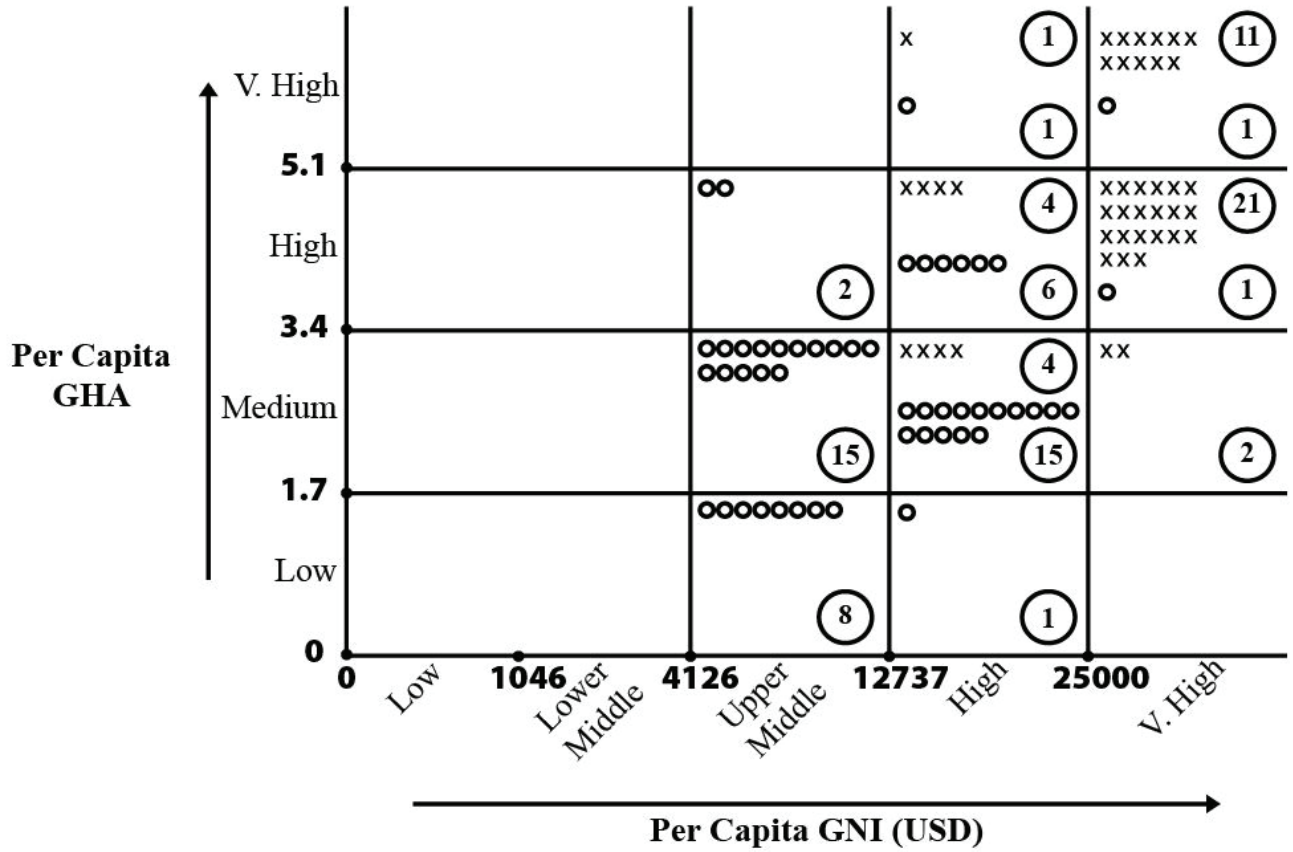


Figure 2. Graph plotting with Very high HDI with reference to their Per Vapita GNI and Per Capita GHA.



Twenty-five of the 43 countries with Very High HDI have High per capita GHA with 4 of them being High income and 21 being Very High income countries. Six Very High HDI countries have Medium per capita GHA with 4 in the High income and 2 in the Very High income group. Twelve Very High HDI countries have Very High per capita GHA with 1 being in the High income and 11 in the Very High income group. None of the countries with Very High HDI have Low per capita GHA.

Figure 3 plots the HDI and per capita GNI scores of countries. Twenty-seven of the 50 countries with High HDI fall in Upper Middle Income, 23 in the High Income, and 2 in the Very High Income group. Thirty-four out of 43 countries with Very High HDI fall in the Very High Income and 9 in the High Income group.

Figure 4 plots countries using their HDI and per capita GHA scores. Twenty-seven out of 43 of countries with High HDI have Medium per capita GHA, 8 have High per capita GHA, 3 have Very High per capita GHA, and 5 have Low per capita GHA. These five countries are Georgia, Cuba, Jamaica, Equador, and Columbia. Twenty-three of the 38 countries with Very High HDI have High per capita GHA, 3 have Medium per capita GHA, and 12 have Very High per capita GHA. None have a Low per capita GHA.

Figure 5 plots per capita GNI of the High and Very High HDI countries against their per capita GHA scores. Twenty-seven out of 43 countries with High HDI have Medium per capita GHA of which 20 are in the Upper Middle income and 7 are in the High income group. Five countries with High HDI have Low per capita GHA and are in the Upper Middle income group. Eight High HDI countries have High per capita GHA with 1 in the Upper Middle and 7 in the High income group. Three countries with High HDI have Very High per capita GHA with 1 each being in the Upper Middle, High, and Very High income group.

Twenty-four out of 38 countries with Very High HDI have High per capita GHA with 9 of them being in the High income and 15 in the Very High income group. Three Very High HDI countries have Medium per capita GHA of which 2 are in the High income and 1 in the Very High income group. Eleven Very High HDI countries have Very High per capita GHA with 2 in the High income and 9 in the Very High income group. None of the countries with Very High HDI have Low per capita GHA.

Figure 6 plots countries using their HDI and per capita GNI scores. Twenty-seven of the 43 countries with High HDI fall in Upper Middle Income, 15 in the High Income, and 1 in the Very High Income group. Twenty-five of the 38 countries with Very High HDI fall in the Very High Income group with 13 in the High Income group.

Results

The findings from the data analysis are presented as a comparison of two dimensional frameworks versus three dimensional frameworks to identify the truly sustainable zones for countries to aspire to.

Two Dimensional Frameworks

The two dimensional framework is used most commonly to understand the correlation between data on various aspects. In the six graphs presented here, it is easy to see how countries with High HDI and Very High HDI fare vis-a-vis their per capita GHA and their per capita GNI separately. These graphs also make it easy to understand the costs at which countries have achieved High and Very High HDI, which are in terms of their ecological footprint and the kind of incomes generated to provide the infrastructure and facilities created to achieve the High and Very High HDI. All the countries aspire to achieve High and Very High HDI to be compared favorably for good performance in the international community.

Figure 3. Graph plotting with very High and High HDI with reference to their Per Capita GHA.

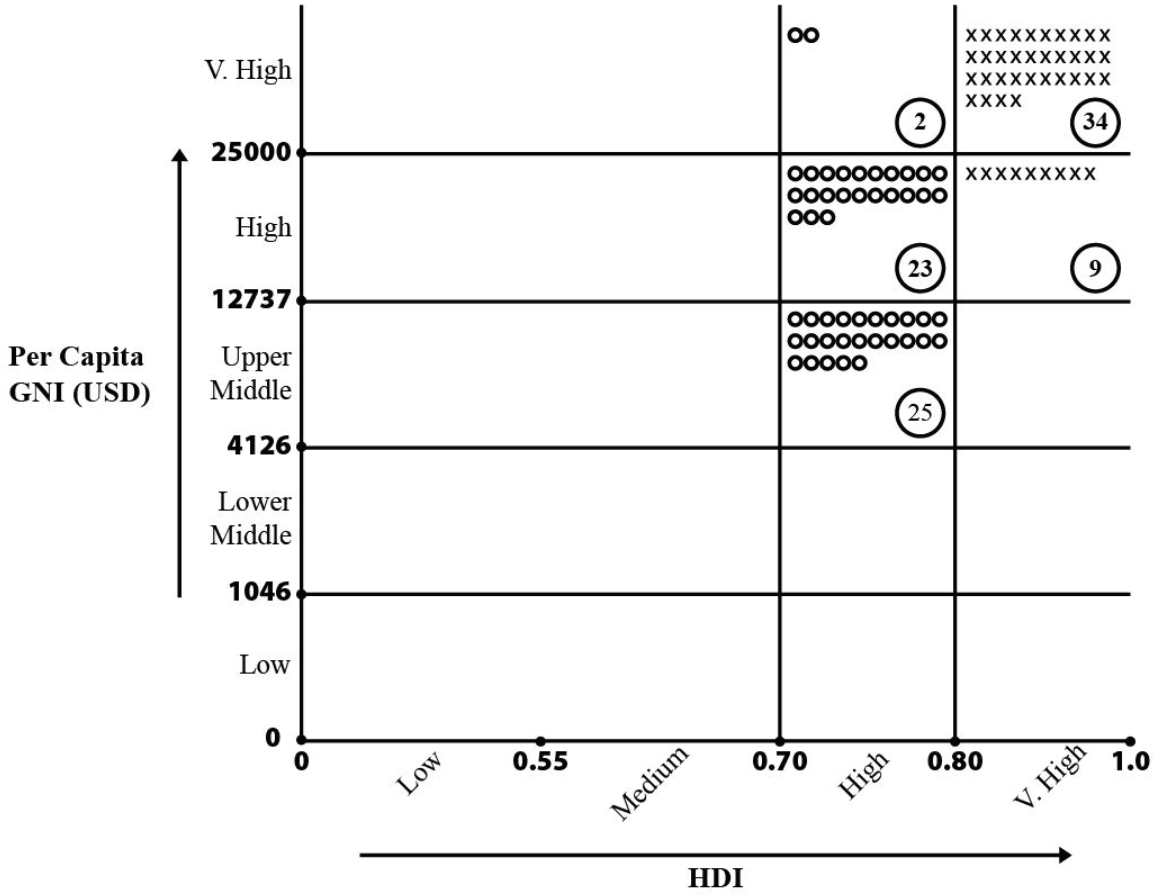


Figure 4. Graph plotting with very High and High HDI with reference to their Per Capita GHA.

Not to scale

X - V. High HDI Countries - 38 Countries Plotted
O - High HDI Countries - 43 Countries Plotted

Human Development Report, 2011 for HDI and GNI data, Reference year 2011
GNI categories as classified by The World Bank for 2011
National Footprint Accounts 2015 Edition, for GHA data, Reference year 2011

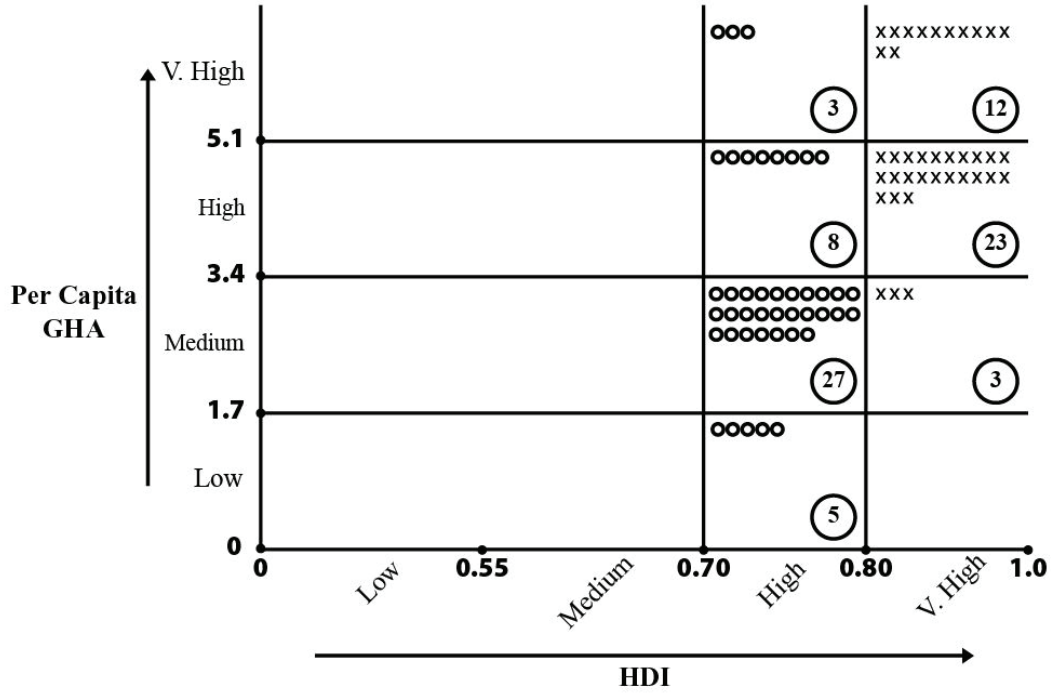


Figure 5. Graph plotting countries with very High and High HDI with reference to their Per Capita GNI and Per Capita GHA.

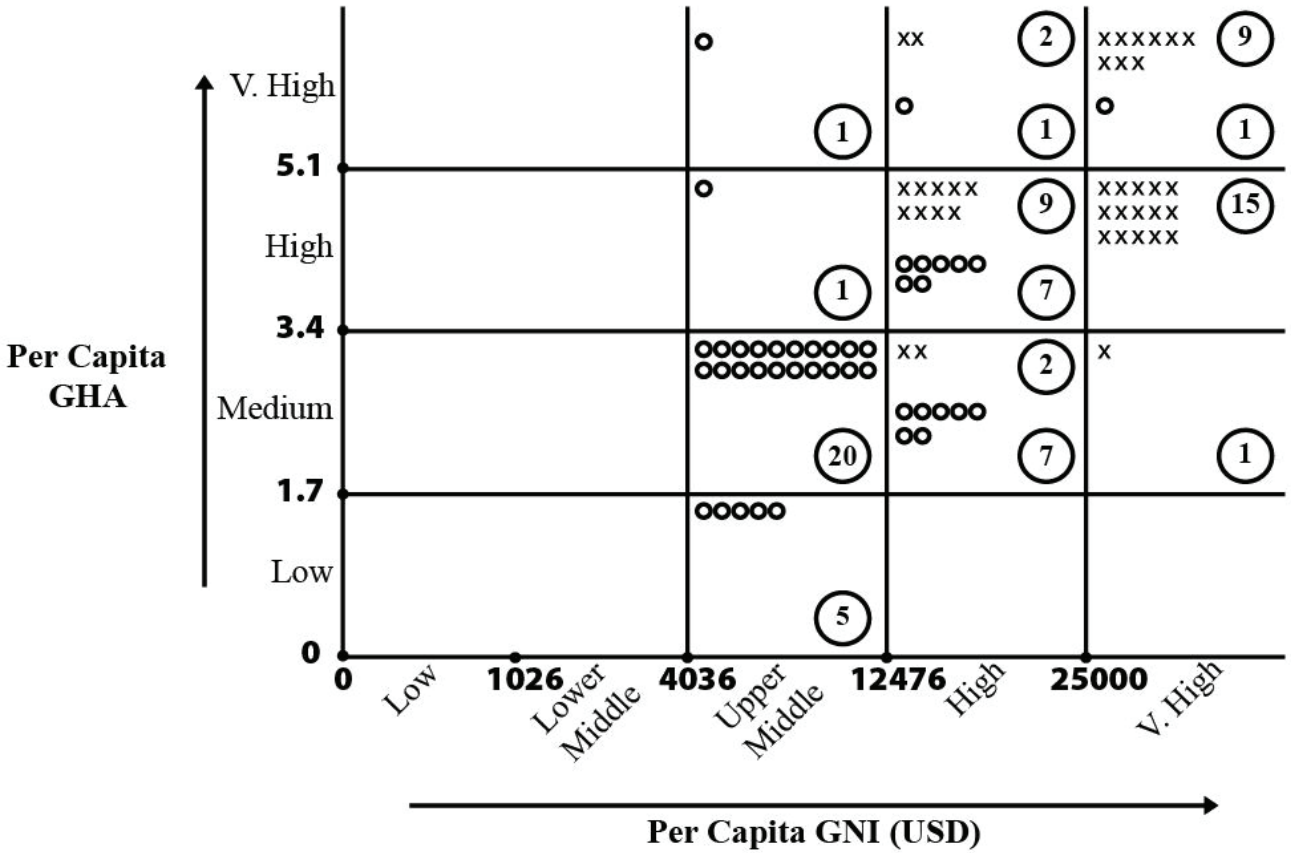
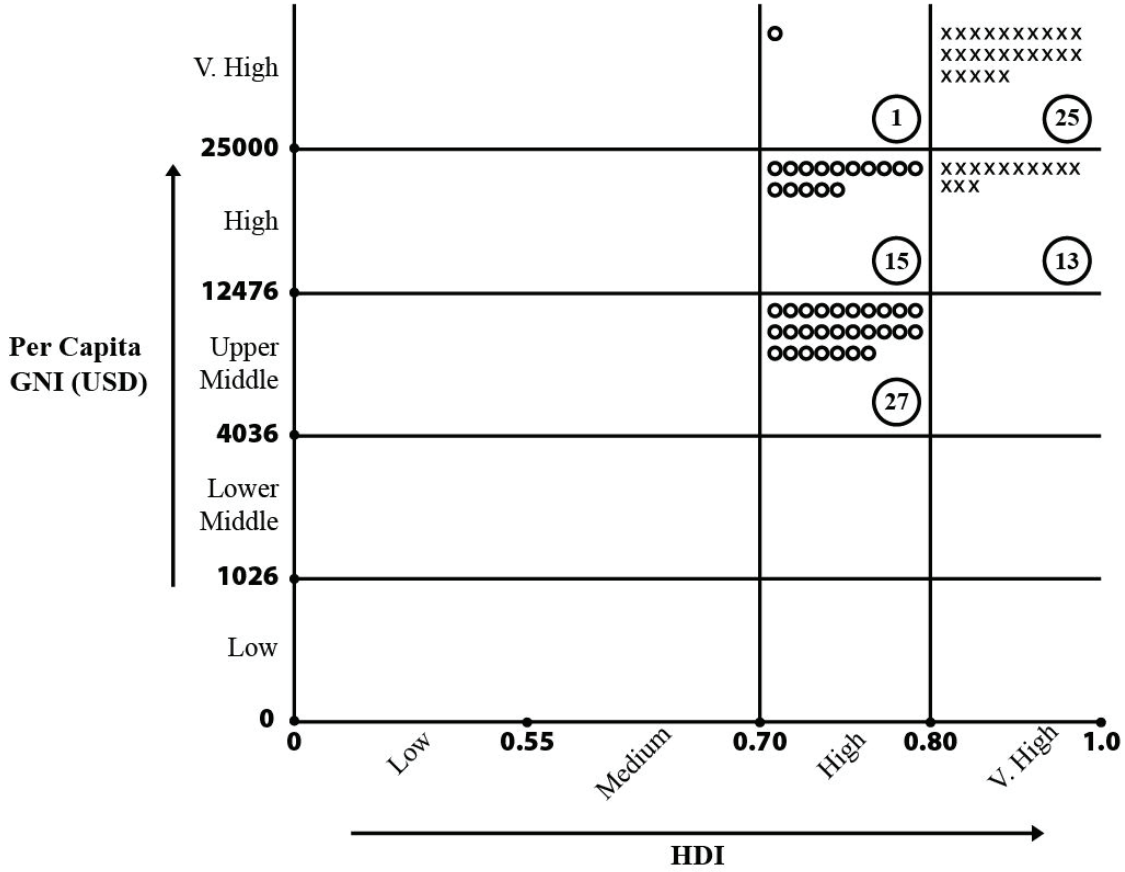


Figure 6. Graph plotting countries with very High and High HDI with reference to their Per Capita GHA.



In fact, the Global Footprint Network has analyzed the HDI and per capita GHA of almost all countries from 1980 to 2011 in a two dimensional animated graph, highlighting a sustainable zone bounded by High and Very High HDI and Low per capita GHA. This is the zone promoted as the aspiration zone for all countries to be able to live within the bio-capacity of one earth. This sustainable zone does not shed light on the incomes of the countries, which have achieved High and Very High HDI, for which another two dimensional graph has to be generated. The relationship between income and ecological footprint is very important for sustainability concerns, for which yet another two dimensional graph has to be generated. Hence, three two dimensional graphs are needed to identify the truly sustainable zone. While inferring that countries should bring down their per capita GHA to become sustainable, the first graph is unable to show how much per capita GNI has to be adjusted to move from Very High, High, and Medium per capita GHA to Low per capita GHA. It is unable to focus analytical attention on the close link between per capita GHA and per capita GNI, for which one has to refer to the other two graphs. It is unable to shed light on the incremental contribution of per capita GNI, above a threshold level, to increase the HDI value. What is this threshold level of per capita GNI needed to achieve an acceptable High level of HDI within the limits of Low per capita GHA? Such subtle nuances are missed out in two dimensional frameworks.

The three dimensions of HDI, per capita GHA, and per capita GNI need to be plotted simultaneously for all countries to identify the truly sustainable zones. Such an analysis has been attempted and is presented in the next section.

Three Dimensional Frameworks

Figure 7 presents the data of Figures 4, 5, and 6 (as all the data there refer to 2011) simultaneously as a three dimensional framework of a cube. The dimensions of HDI, per capita GHA, and per capita GNI are presented on the x-axis, y-axis, and z-axis of the cube respectively with the same categories being applied for each dimension as in Figures 4, 5, and 6. Instead of the number of countries plotted, as done in Figures 4, 5, and 6 earlier, the cube form of Figure 7 highlights the concentrations of the countries with different combinations of the three dimensions on different spaces of the cube using variations in shades of grey colour.

Thus, the cluster of countries having the combination of Very High HDI, High and Very High per capita GHA, and Very High per capita GNI are shown in dark shade of grey colour in the upper right hand corner of the cube (on the z-axis). This combination of spaces is indicated with the symbol of a star and has also been pulled out in miniature form with its three dimensions stated.

The group of countries with High and Very High HDI, Medium and High per capita GHA, and Upper Middle and High per capita GNI are highlighted in a lighter shade of grey colour in the middle section of the cube (on the z-axis). This combination of spaces too has been pulled out in miniature where its three dimensions are mentioned, and is indicated with the symbol of a triangle.

The combination of countries with High and Very High HDI, low per capita GHA, and a combination of part Upper Middle and part High per capita GNI – Medium per capita GNI – are highlighted in the lightest shade of grey colour in the lowest section of the cube (on the z-axis). This combination of spaces, indicated with the symbol of a circle, has been pulled out in miniature and mentions its three dimensions. An additional piece of information in this miniature is the band of part Upper Middle and part High per capita GNI, which has been shown as USD 10000 to 20000 as an indicative range.

Figure 7. Three dimensional cube showing the dispersion of countries with Very High. High and Low HDI with reference to their Per Capita GHA and Per Capita GNI in shades of grey colour code.

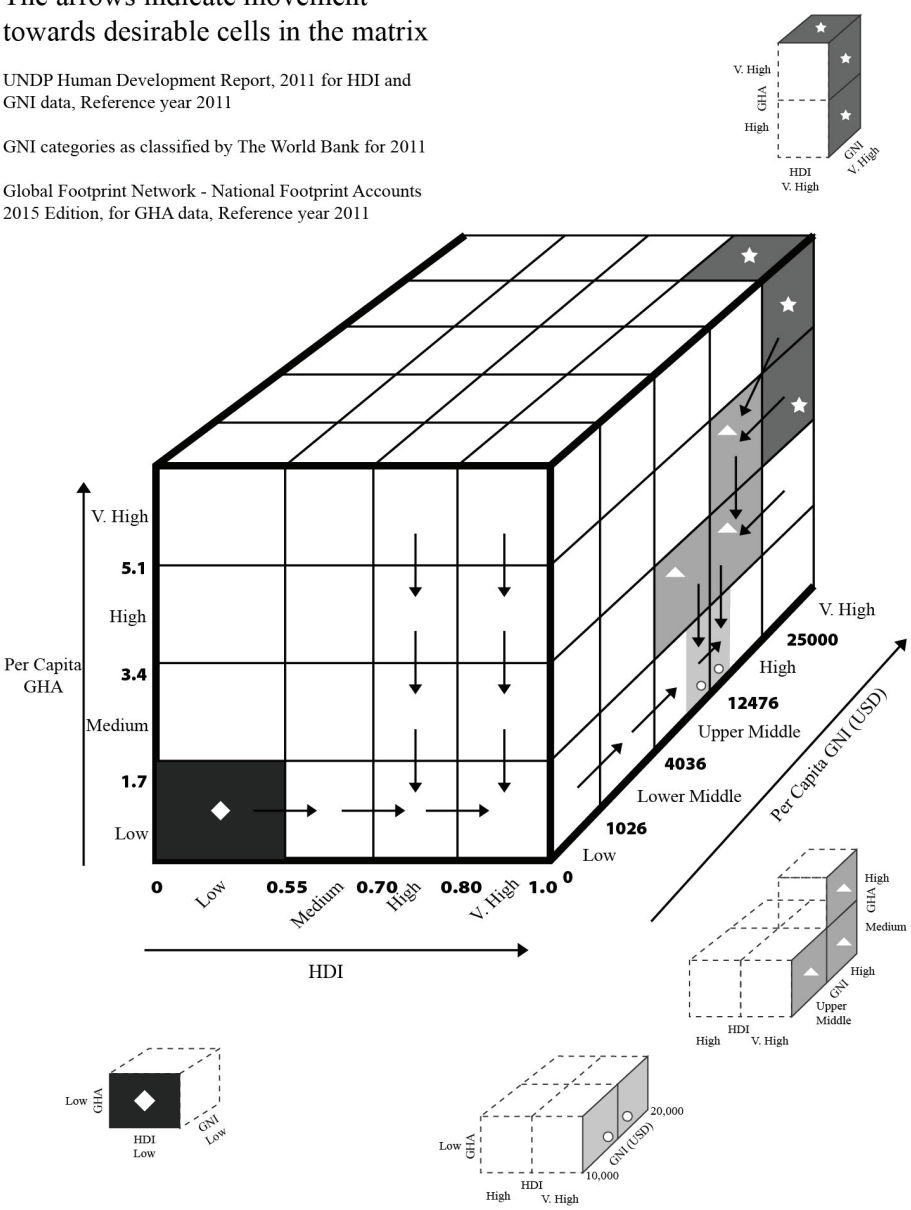
Not to scale

The arrows indicate movement
towards desirable cells in the matrix

UNDP Human Development Report, 2011 for HDI and GNI data, Reference year 2011

GNI categories as classified by The World Bank for 2011

Global Footprint Network - National Footprint Accounts 2015 Edition, for GHA data, Reference year 2011



The combination of countries with Low HDI, Low per capita GHA, and Low per capita GNI are highlighted in the darkest shade of grey colour in the lower left hand corner of the cube (on the x-axis). A miniature of this combination of spaces has been pulled out giving its three dimensions, and indicated with the symbol of a diamond. (This combination is not plotted in the two dimensional graphs).

When all the three dimensions are plotted simultaneously, it is easy to see the combination of the three dimensions, which is the sustainable zone. The spaces designating the sustainable zone in this three dimensional framework are different from the spaces, which emerge in the two dimensional framework.

It is quite clear that the combination of High and Very High HDI, Low per capita GHA, and Medium (part Upper Middle, part High) per capita GNI is the truly sustainable zone. No country has achieved the combination of Very High HDI, Low per capita GHA, and Very High per capita GNI, hence that zone is near impossible. The combination of Low HDI, Low per capita GHA, and Low per capita GNI is not desirable. The focus shifts to countries, which have achieved High and Very High HDI by staying within the limits of Low per capita GHA. Their per capita GNI, which falls around the range of USD 10000 to 20000 as per HDR 2015 with reference year 2014, is adequate to achieve the desired levels of HDI. (The data for per capita GHA are for 2011, so it is possible that by 2014 their per capita GHA may have increased with an increase in their per capita GNI).

What then is the incremental value of Very High per capita GNI above this level of USD 20000? Does it help to reduce the ecological footprint of the countries with Very High GNI to stay within the limits of Low per capita GHA? Is it possible to achieve the per capita GHA limit of ecological sustainability of 1.7 GHA for *all* countries? Is it possible to have infinite increase in per capita GNI for *all* countries with finite bio-capacity of the earth? What kind of trade-offs between per capita GNI and per capita GHA will be required to enable *all* countries to achieve High and Very High HDI levels and yet stay within the Low per capita GHA levels? Will *all* countries be able to achieve High and Very High HDI levels? Will *all* people in *all* countries be included in the High and Very High HDI levels? These are the type of questions, which will need to be addressed for achieving sustainability with inclusiveness, equity, and equality.

Figure 7 also has arrows drawn, which indicate the desired direction of movement of countries with various combinations of the three dimensions to move towards the sustainable zone of Very High/High HDI, Low per capita GHA, and Medium (part Upper Middle, part High) per capita GNI, as indicative pathways to sustainability.

Discussion

The data analysis attempted in this paper using the three dimensional framework of a cube can form the basis of identifying the pathways to sustainable growth and development, which calls for a design approach to enhance our understanding of sustainability.

Three Dimensional Frameworks as a Design Approach towards Sustainability

A design/designerly approach involves a creative and constructive way of looking at difficult problems by trying to understand problems and solutions together and by involving all the stakeholders (Cross, 2006).

People of a country are viewed as citizens and consumers, consistent with the economic and financial architecture of state and market institutions in economic theory. And a two dimensional framework is used to explain the effectiveness of these institutions as state and market failure/success to explain and address the issues of inclusiveness, equity, and equality in society. But people are more than just citizens and consumers. They are social beings and derive identity and meaning from belonging to groups and communities.

This third dimension of the role of people as communities is the missing dimension in economic theory.

Several works have drawn attention to this, some of which are briefly touched upon here.

Stephen Marglin (2008) has argued how economics as a discipline does not account for the role of communities and why it is important to do so. He refers to economics as a dismal science because of the way it has evolved as a discipline over the past few centuries to erode deep human and social ties of community and its consequences as experienced in present day reality.

Bill McKibben (2007) raises similar concerns in the context of sustainability and offers an alternative approach, building on the role of communities in society. He locates his argument in the basic premise that till now we have accepted that 'more' and 'better' in the socio-economic context are the same but the time has come to understand that 'more' and 'better' are not the same thing in addressing sustainability concerns.

R. A. Mashelkar (2008) has popularized the phrase 'More from Less for More' – MLM – through which he demonstrates the need for deriving *more* performance from *fewerless* resources for *more* people. It is done by comparing the innovations in the economically rich and poor countries in the context of meeting the needs of billions of people in the world who face wide ranging deprivation. He contends that high quality, high cost, and unsustainable pattern of innovation and production of goods and services will be replaced by high quality, frugality, and sustainability and that this process has already begun and will continue to spread to all parts of the world.

Usha Jumani (2008, 2010) has proposed that the roles of people as citizens, consumers, and communities need to be balanced and space has to be created for people's organizations to be in the mainstream of the economy and society.

M. S. Swaminathan (2011) discusses the need for conservation, cultivation, consumption, and commerce patterns to be reconfigured to the reality of modern times to maximize biohappiness for all, keeping in view the inequities and deprivations faced by large numbers of people.

Seen in the context of ecological sustainability and the glaring differences between the rich and poor countries, these arguments really add up to pose the following two questions:

– For how long, for how many people, and for what kind of goods/services/facilities/ wealth is it possible to accept that 'MORE' and 'BETTER' are the same?
– When or at what stage in the growth cycle do 'MORE' and 'BETTER' start to diverge and so it is itnot possible to accept that 'MORE' and 'BETTER' are the same for a given set of people?

The tangible resources of the earth and the intangible resources of humanity will need to be assessed on the touchstone of 'MORE' and 'BETTER', leading to choices which can be stated as:

- MORE IS MORE
- MORE IS LESS
- LESS IS MORE
- LESS IS LESS

Tangible resources of the earth such as air, water, and soil are subject to the laws of conservation of mass and energy. These resources cannot be increased infinitely

even after they undergo transformation. What do 'MORE' and 'BETTER' mean for the use of such tangible resources when we aspire for inclusiveness, equity, and equality in nurturing the potential of *all* people versus of *some* people as well as for the sustainability of life systems?

Intangible resources of humanity such as human capability, intellectual capacity, spiritual capacity, human happiness, and satisfaction are possible to increase continuously. What does 'MORE' and 'BETTER' mean for the use/promotion of such intangible resources when we aspire for inclusiveness, equity, and equality in nurturing the potential of *all* people versus of *some* people as well as for the sustainability of life systems??

The two dimensional framework to explain the effectiveness of state and market institutions as state and market failure/success has its limitations. The three dimensional framework of state, market, and people and success/failure for all the three components can make it possible to incorporate the roles of people as citizens, consumers, and communities simultaneously to explain the effectiveness of the three types of institutions. It will shed new light on the operationalisation of the truly sustainable zone as a design approach and also redefine the prevalent meaning of 'developed countries' and 'advanced economies'.

Limitations

The availability of data for comparable periods across countries to measure the three Ps of People, Planet, and Profits is a limitation, which is recognized by the author. Nevertheless, an attempt has been made to illustrate the value of a three dimensional framework for sustainability. Refinement and continuous updating of data will become very critical for rigorous application of this framework in comparing the performance of countries.

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Water Literacy: An Empirical Study with Special Reference to the Apartment Dwellers in Bengaluru

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Abstract

According to the press release by the Ministry of Water Resources, Government of India, the per capita availability of water in the country was 1545 cubic metres (2011 Census Report). The demand for water will grow annually by 2.8% to reach 1500 billion cubic metres by 2030 while current supply is only 744 billion cubic metres which clearly shows that India is going to face water stress. In addition to this, due to contamination of water sources and poor water treatment facility, it is often difficult to get safe drinking water. In this backdrop, the researchers have felt a need to find the water literacy level among the citizens in Bengaluru, specifically the respondents staying in high-rise apartments in Bengaluru.

The study is exploratory in nature, to know the awareness level among the respondents about the sources of water in their households and the potablility of the water. The respondents are chosen on the basis of convenience sampling. A sample size of 200 respondents is considered for the study. The data analysis will be done using SPSS and the researcher wants to analyze if there is any association between the demographic factors with respect to the water utilities among the respondents residing in the high-rise apartments in Bengaluru. The study also attempts to know the present status of availability of water in their areas and at large it helps us to create awareness among the people in the society regarding the judicious usage of water.

Keywords

Water Consumption, Awareness Level, Sources of Water, Demographic Factors

Sustainability:
Inspiration, Innovation
and Inclusion
pp. 152–161
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Introduction

Water is one of the basic survival requirements for every human being. It is available in various mediums like rivers, lakes, ocean and rain. Water covers 71% of the earths' surface; however, it is unevenly distributed across the world leading to scarcity in some regions of the planet. Water is also vital to humans and other forms of life as it is a day-to-day necessity. Since ancient times, humans have established their civilizations around water bodies to facilitate drinking, cooking, bathing, washing and other requirements.

Bangalore is a hub for IT and related activities and most of the population available is floating in nature. The climatic conditions, career opportunities and the friendly

atmosphere make the migrants find it convenient to settle down in the city. There are a lot of high-rise apartments in Bangalore catering to the requirements of the masses with all the modern amenities, which consume a lot of water in particular.

According to the press release by the Ministry of Water Resources, Government of India., per capita availability of water in the country was 1545 cubic metres as per 2011 census. The earlier statistics in this regard shows that the per capita water availability reduced from 5177 cubic metres in 1951 to 1, 654 cubic metres in 2007. By 2050, India's demand for water is going to increase by 32% (International Water Resource Management Institute).

The demand for water will grow annually by 2.8% to reach 1500 billion cubic metres by 2030 while current supply is only 744 billion cubic metres which clearly shows that India is going to face water stress.

Table 1: Estimated Growth in Population and Demand of Water by the BWSSB

Year	Population (lakhs)	Total Domestic Demand (MLD)	Gross Demand (MLD)
2010	50.52	1170	1556
2016	89.05	1336	1775
2020	97.40	1461	1986
2026	124.27	1864	2371
2030	133.44	2002	2545
2050	192.54	2888	3669

(www.iijnm.org/media uploads/thesoftcopy/2011 2012/summit)

The residents of the high- rise apartments are not conscious about the usage of water. Many of them are not even aware of the depleting plight of this resource. In this backdrop, the researchers have felt a need to find the water literacy level among the citizens.

Water literacy is having an understanding of where the water that we consume or use comes from and how we use it. Though it is a simple concept, the information about how long water is going to sustain is alarmingly necessary for all of us.

This research aims to know the awareness among people about the sources of water and the potability of the water. Through this research, the researchers aim at communicating and educating the residents about the water conservation.

Literature Review

Walsh (2015), in his paper states that 1.2 billion people, or nearly a sixth of the world's population, dwell in areas of water scarcity, which can increase to 1.8 billion by 2025. The world's population is expected to grow to 9 billion people or more by 2050—and they will all be thirsty.

Dumaine (2014) in his article in Fortune.com has discussed about how the adversity caused severe drought which hit the Central Valley in Cantua Creek, California since 2011 till date.

A thesis on Water Literacy and Citizenship (2014) has included three models that can be applied: the rational actor and social practices model as well as a model of citizenship and responsibility. It considers sustainable communities and reflects on water education,

including a history of the environmental education and Education for Sustainable Development (ESD) fields which has been used to produce a definition of water literacy.

Samir Saran et al. (2014) in their report have mentioned about how India, though having major rivers flowing across the country is still termed as water stressed with per capita availability of water at 1588 cubic metres per year against international standards of 1700 cubic metres per year.

Dasher et al. (2014), in their paper titled *Water sustainability: environmental attitude, drought attitude and motivation*; attempted to measure water/energy conscious consumption in drought-hit areas in the US. The researchers found that partial percentage of consumers are consciously making water/energy purchase decisions within a larger framework of reduced resource availability.

Murty et al. (2011), in their paper titled Water Pollution in India, have opined that 70% of surface water resources are contaminated with fatal toxic contents which are not safe for human consumption.

Mandorf (2010) states that 70–75% of the earth's surface is covered with water, which seems too abundant, but only 1% of earth's water is potable; 97% is salty and 2% is in the form of ice.

Hyland (2008) has opined that water supply infrastructure that was designed to meet the needs of the citizens is failing to provide the adequate supply of water for households and businesses.

World Business Council for Sustainable Development (WBCSD), states that everyone understands that water is essential to live. But many are now beginning to grasp how essential it is to everything in life like the food, energy, transportation, nature, leisure, identity, culture, social norms and virtually all the products used on a daily basis.

Senevirante (2007) in his book titled, Water conservation for commercial and industrial purposes, states that water is life and we realize the value of water and its role in our day to day activities. He also opines that the world's water is in a crisis and says that the water management is in a crisis rather than there being a water crisis.

Annan (2001) opines that access to safe water is a fundamental human need and, therefore, a basic human right. Contaminated water jeopardizes both the physical and social health of all people. It is an affront to human dignity.

Water Smart.com in its report Tapping into the Power of Behavioural Science, states how social norms help to create awareness on efficient water usage.

Barlow (1999) stated that, one of the major issues in the recent times which is felt and discussed across the globe is about the crisis of the Blue Gold called 'Water'.

Rationale of the Research

Water conservation can be achieved through internal consciousness and through communication strategy. The rationale for this research is to move the respondents from the position of wasting water to one of using it economically. The following strategies are considered as a reference for the study:

1. Ignorance of the need to reduce water use
2. Awareness of the need to reduce water use
3. Interest in reducing water use
4. Desire to take action to reduce water use
5. Action to reduce water use

(Source: Howarth et al.**)**

Initially majority of individuals will be ignorant of the actual need to reduce the usage of water. Some people will move through the stages rapidly while others will take months or even years. Also, individuals will be already at different stages of engagement; those already at interest or desire will not need much encouragement to move to action. Others will need a lot of persuading to move out of the 'ignorance' stage.

Research Methodology

This paper is an exploratory research in which data is collected from the respondents staying in apartments in Bengaluru. The data was collected from respondents across various locations of Bengaluru through questionnaires, depth interviews and expert surveys. A sample size of 200 respondents is taken for this study by applying convenience sampling. The data is analyzed using descriptive statistics, frequency, tables and cross-tabs. The hypothesis is tested by using Chi-square test in SPSS.16.

Objectives

1. To understand the awareness about the sources of water used by the respondents for various purposes.
2. To find out whether the respondents are aware of water potability.
3. To determine the association between gender and level of education with the concern for testing the potability of water.
4. To find out the various water utilities in the households
5. To understand the awareness level of the respondents on the underground water availability in their apartments.
6. To educate the citizens on the importance of water conservation using communication strategies.

Hypothesis

Ho: There is no association between the gender of the respondent and the awareness on the potability of water.
Ho: There is no association between the gender and education level of the respondent and the concern for testing the potability of water.
Ho: There is no association between the gender of the respondent and awareness on underground water supply in the dwelling area.

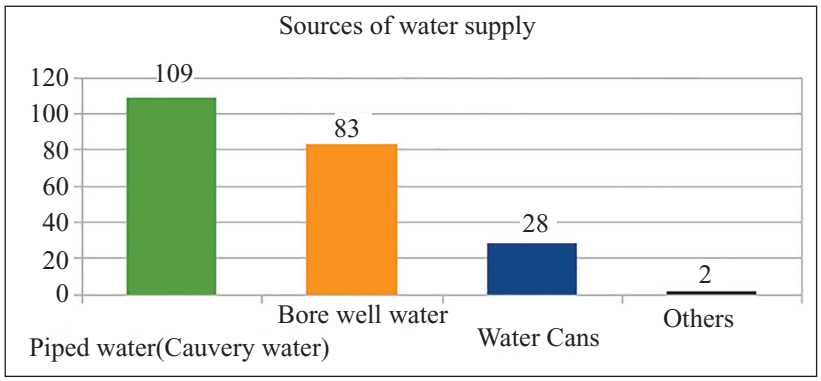
Data Analysis and Interpretation

I. Demographic variables

1. The number of male respondents was 122 and female respondents were 78.
2. Among the 200 respondents, 73 were graduates, 42 were postgraduates and 85 were diploma holders, under-graduates, etc.
3. Objective 1: To understand the awareness about the sources of water used by the respondents for various purposes.

Graph 1: Sources of Water Supply

Table 1: Sources of water supply	
Sources	**No. of Responses**
Piped water (cauvery water)	109
Bore well water	83
Water Cans	28
Others	2



Around 50% of the respondents in the city consume piped Cauvery water, 40% of the respondents use bore well water and 10% buy water cans.

4. Objective 2: To find out whether the respondents are aware of water potability.

Ho: There is no association between the gender of the respondent and the awareness about potability of water.

Table 2: Chi-Square Tests for Association between Gender of the respondent and Awareness about potability of Water

	value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.453[a]	4	0.074
Likelihood Ratio	11.95	4	0.018
Linear-by-Linear Association	0	1	0.989
N of Valid Cases	200		

a. 3 cells (30.0%) have expected count less than 5. The minimum expected count is 1.54.

This objective was tested using Chi-square test at 95% confidence level. At 5% the p value obtained was 0.074, which is greater than 0.05. The null hypothesis is accepted and hence we infer that gender and water potability are independent with each other. Male and female respondents are not aware of the potability of water.

5. Objective 3: To determine the association between gender and level of education with the concern for testing the potability of water.

Ho: There is no association between the gender and education level of the respondent and the concern for testing the potability of water.

Table 3: Chi-Square Tests for Association between Gender and Sample of drinking Water Sent to the Lab for Analysis

	value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.145[a]	2	0.93
Likelihood Ratio	0.145	2	0.93.
Linear-by-Linear Association	0.01	1	0.922
N of Valid Cases	200		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.58.

Table 4: Chi-Square Tests for Association between Education Level of Respondent and Sample of drinking Water Sent to the Lab for Analysis

	value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.519[a]	2	0.033
Likelihood Ratio	10.473	2	0.033
Linear-by-Linear Association	6.751	1	0.009
N of Valid Cases	200		

a. 1 cells (11.1%) have expected count less than 5. The minimum expected count is 4.92.

The hypothesis was tested using Chi square for testing the association between gender of the respondent and concern for testing the potability of water by sending a sample of water to the lab. The p value is 0.930, which exceeds the 5% level of significance. Hence, we accept the null hypothesis. Both male and female respondents have not sent a sample of drinking water to the lab for analysis which suggests low or lack of awareness about the quality of water consumed by either of the genders.

Whereas, the Chi square value, p = 0.033 for testing the association between education level of the respondent and concern for testing the potability of water by sending a sample of water to the lab is less than the 5% level of significance. We reject the null hypothesis. This shows that education of people can increase the water literacy among people.

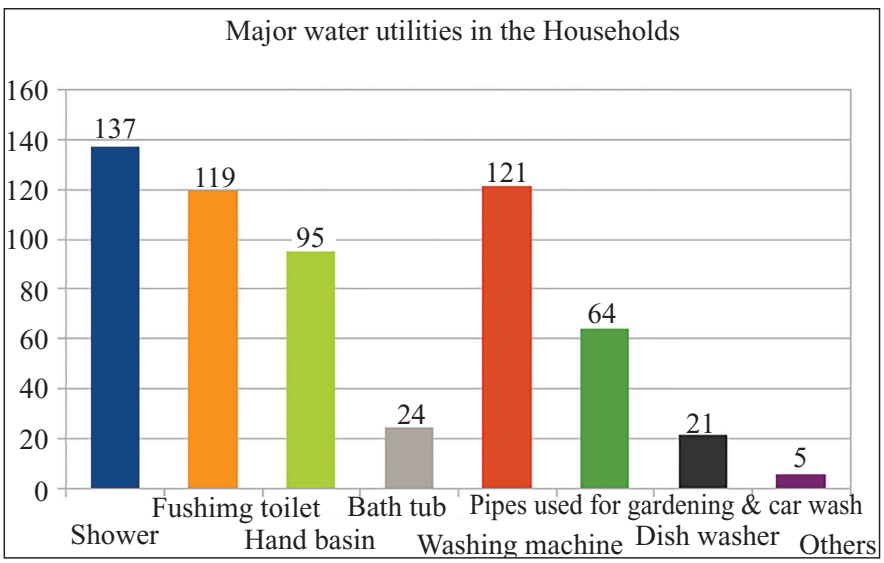
Majority of the respondents use water for taking shower; other two major purposes are flushing toilet and washing machine. Hand basin is also a considerable source of water usage, pipes used for gardening and car wash comes next while bath tub and dish water are least used utilities among the respondents.Objective 4: To find out the various water utilities in the households of the respondents.

6. Objective 4: To find out the various water utilities in the households of the respondents.

Table 5: Major water Utilities in the households
Major water Utilities in the households

	Utilities	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Shower	137	19.1	23.4	23.4
	Flushing toilet	119	16.6	20.3	43.7
	Hand basin	95	13.2	16.2	59.9
	Bath tub	24	3.3	4.1	64
	Washing machine	121	16.8	20.6	84.6
	Pipes used for gardening & car wash	64	8.9	10.9	95.6
	Dish Washer	21	2.9	3.6	99.1
	Others	5	0.7	0.9	100
	Total	586	81.5	100	

Graph 2: Major Water using Systems in your Household



7. Objective 5: To understand the awareness level of the respondents on the underground water availability in their apartments.

Ho: There is no association between the gender of the respondent and awareness level of the respondents on the underground water availability in their apartments.

Table 6: Chi-Square to Test the Association between Gender of the Respondent and Awareness level of the respondents on the underground water availability in their apartments.

	value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.199[a]	2	0.074
Likelihood Ratio	5.183	2	0.075
Linear-by-Linear Association	3.185	1	0.074
N of Valid Cases	200		

0 cells (.0%) have expected count less than 5. The minimum expected count is 14.43.

The Chi square value, $p = 0.074$ is exceeding the 5% level of significance. Hence we accept the null hypothesis. This suggests that gender and awareness on underground water supply in the dwelling area are independent. Majority of the male respondents have disagreed that there is shortage of water in their dwelling area; while majority of female respondents are not aware of level of water in the area.

Findings

Around 50% of the respondents in the city consume piped Cauvery water; 40% of the respondents consume bore well water and 10% of the respondents are dependent on water cans. The respondents have very less knowledge and awareness about potability of water they consume. Irrespective of the gender, the respondents have shown very little concern on sending the sample of the water they consume to the labs to check if it's safe for drinking. The study shows that educated citizens are showing some concern on testing the potability of water. The maximum number of respondents use water for bathing, using shower instead of using a bucket and mug, which leads to wastage of water, followed by flushing toilet ,washing machine for washing clothes, wash basins to wash hands under running water, pipe for gardening and car wash also consumes a lot of water and most of which goes wasted and unaccounted; while bath tub and dish water are the least used utilities for water usage. Most of the male respondents were aware of the underground water availability in their apartments.

Discussion

Rapid urbanization in and around Bengaluru has destroyed many wetlands areas (of the 51 lakes in the city in 1973, only 17 remain in 2007, which has also contributed to the decrease in the water table. The average annual rainfall in Karnataka is 1248 mm. But the estimated 20 lakh borewells in the state draw almost three-and-a-half times of the amount (rainfall) received to recharge the groundwater. Water tables in urban areas are depleting due to increasing population and expansion of piped drinking water and it is declining in rural areas because of the reduction in recharge areas as a result of lakes and ponds drying .There are also reviews that opine that Bengaluru will have to be evacuated by 2023, if the water crisis continues. This confirms that there is going to be water crisis in the city; since it is a vital resource, it is very important for all to be more sensitive towards this issue. The number of apartments in Bengaluru is increasing at a rapid pace and most of them provide all the high-end amenities, the maintenance of which consumes a lot of water. The high-end apartments also cater to the community living of 2000–3000 flats of different dimensions, which clearly indicates the volume

of water required and consumed by the dwellers on a day-to-day basis. It is very important that every apartment association actively involves in educating the residents on the conscious use of water and take preventive measures by investing on rain water harvesting system, ground water recharge techniques, playing videos on effective use of water, etc. There are few studies that have focused on the type of incentives that can be given to the residents in an apartment if they make a careful usage of water; which can be helpful in communicating the importance of water and also help in conserving water.

Limitations of the Current Research

The study was limited only to the apartment dwellers in Bengaluru and cannot be generalized to the entire population in Bengaluru. Out of the 200 sample size selected for the study, there may not be equal representation from all the four zones, i.e., Bengaluru North, South, East and West. The study only focuses on finding the awareness level of the respondents on the various sources of water and different water utilities in their respective flats.

Conclusion

Potable water is an integral part of life for any individual; the awareness of which will act as a precaution or safety for the individuals. From this paper, it is observed that most of the respondents are in the ignorance stage about the importance of water conservation and assume that water is a renewable resource and its scarcity is just a hype that is created by the environmentalists and the political parties.

In this research, the researchers have conducted interviews of the office bearers of the Apartment Owners Associations to find out their awareness level on the sources and supply of water in their apartments. It was alarming to note that most of the apartment associations were not conducting any programmes to educate the residents on the importance of water conservation.

Based on these observations, the researchers wish to create awareness among the residents on the importance of water conservation and also sensitize the residents of Bangalore through road shows, articles in newspapers, meeting the apartment dwellers to educate on the conscious use of water through feedback system, goal setting and commitment initiatives using apps and other software which tap water consumption and alerts the users on efficient usage of water.

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A Critical Analysis of National Voluntary Guidelines and Business Responsibility Report Framework

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Abstract

Business responsibility disclosure frameworks help in assessing the performance of any entity in relation to Environmental, Social and Governance (ESG). Assessing performance in ESG context can be a complex task as the results of these activities are long term, mildly visible and not mandatorily disclosed, making them difficult to compare with parameters. The introduction of 'Business Responsibility Reports' (BRR) is a needed addition to ESG reporting in India. The paper analyzes the background of widely used disclosure frameworks and guidelines, the 'National Voluntary Guidelines (NVGs) on social, environmental and economic responsibilities of business' and structure of BRR framework provided by Securities and Exchange Board of India (SEBI). Some of the disclosures suggested by NVGs and other methodologies that are not being considered in the mandatory framework by SEBI are identified. The analysis helps in the attempt to make suggestions for improving the disclosures obtained through BRR framework.

Keywords:

Business Responsibility Reports, Sustainability, Corporate Social Responsibility, Triple Bottom Line, National Voluntary Guidelines

Introduction

Business responsibility reporting (also known as non-financial disclosures, sustainability reporting, or environmental and social reporting) is a part of reporting practices that are growing in relevance all over the world, and this is majorly because of increasing knowledge about the role of ESG factors in the performance and credibility of businesses. ESG reporting has been followed by companies for more than the last 20 years through different frameworks and criterion. In a bigger picture, it forms part of sustainability assessment frameworks and the field of sustainability science that deals with measuring the capability of human and environmental systems to fulfil the needs of future generations along with accomplishing the needs of present generation (Singh et al., 2011). The basic premise for adopting sustainability assessment frameworks has been the rising concern about breaching the carrying capacity of ecological systems and ecosystem services and their snowballing effect on social conditions such as health, equity, security and wellbeing. Also, attempts have been made to assess sustainability at different levels in public and private policies by using varied methodologies. However, the availability of a fixed framework that can give future verifiable results still deludes us (Sala et al., 2015; Kates et al., 2001). It is being recognized that 'business

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responsibility reporting' should be at par with financial reporting, i.e. having a fixed framework for easy understandability to all the stakeholders. This paper studies the guidelines issued by the 'Ministry of Corporate Affairs' along with 'Indian Institute of Corporate Affairs' that provide an outline for adoption of ESG indicators in daily business management and also a set of elements and framework to report about their performance. The Business Responsibility Report (BRR) framework of SEBI has provided a fixed framework for companies to report their ESG performance, but does it do justice to the motive of responsibility disclosures? The BRR framework will be mandatorily used by 500 Indian listed companies to prepare their reports for 2015–16. BRR is the first such framework in India and would require revisions and upgradations in the future as the regular cycles of reporting take place. The three years of BRRs have brought to light some suggestions that will make the report more efficient and useful for the increasing number of companies under its purview.

Background of ESG Reporting

The major regulations and guidelines in mobilizing businesses towards ESG reporting have been the as follows:

1. BellagioSTAMP: This set of 'Sustainability Assessment and Measurement Principles' first provided by IISD and Organization for Economic Co-operation and Development (OECD) is one of the first guidelines to draft or assess the sustainability of any public body or private organization. It gives eight points of consideration for sustainability assessment and what is to done to make a good sustainability report that can be assessed by the average individual and engage public opinion in sustainability science (Pinter et al., 2012; International Institute for Sustainable Development, 2009).
2. Global Reporting Initiative (GRI): GRI guidelines and framework are provided by the GRI itself, which is an organization based in The Netherlands, Amsterdam. The current set of guidelines in use is G4 while the previous levels of reporting, i.e. G3 and G3.1 are still applicable for reporting. The GRI does not have a fixed structure, but rather it requires companies to report on some of the questions and ensure imbibing sustainable business practices into the management of business activities. GRI has two kinds of disclosures, namely 'General Standard Disclosures' that apply to organizations, regardless of their attributes, and 'Specific Standard Disclosures' that are self-analyses of the company on its challenges and management approach to these (Global Reporting Initiative, 2015).
3. Companies Act 2013: This is the Act introduced in Article no. 135 for Corporate Social Responsibility (CSR). It is required for the companies that have a net worth of more than 500 crores, turnover of more than 1000 crores or a net profit after tax of more than 5 crores during any of the preceding financial years to spend 2% of their net profit on CSR activities and also to form a CSR committee of the company. The general areas where the CSR spending is supposed to be incurred are enumerated at the end of the document which includes poverty eradication, environmental sustainability, eradication of diseases, relief funds of government, skill development, education, gender equality, social business models, etc. (Ministry of Law and Justice, 2013).
4. NVGs: The NVGs give nine principles that business policies should include and also how businesses should implement these principles into their managerial practices. The principles define the general ESG responsibilities of all businesses and are designed with consideration of sustainability challenges in India. The NVGs also give a

framework suggestion for businesses to report on and cases for the perceived benefits of implementation of these principles on business management (Ministry of Corporate Affairs, 2011).

5. BRR by SEBI: The 'Business Responsibility Report' framework provided by SEBI has become the most widely accepted framework in responsibility reporting in India mainly because it has been included in the listing regulations of SEBI and is mandatorily applicable to prescribed number of listed entities. BRR acts as a tool in assessing the ESG responsibilities and their execution by companies. BRR builds upon the nine principles of NVGs and further provides a fixed set of questions relevant to each principle that the reporting company has to respond to (Securities and Exchange Board of India, 2012) (GIZ India and IICA, 2014).

Other than these, some other guidelines based on ESG parameters have been issued by international bodies, regulatory authorities and standards organizations. United Nations Global Compact's Ten Principles for corporates deal with Human Rights, Labour, Environment and Anti-Corruption (United Nations, 2000). OECD Guidelines for Multinational Enterprises are based on employment, human rights, environment, information disclosure, combating bribery, consumer interests, science and technology, competition and taxation (OECD, 2011). The 'Department of Public Enterprises' 'Guidelines on Corporate Social Responsibility and Sustainability for Central Public Sector Enterprises' give out mandatory responsibility guidelines for all Public Sector Undertakings (PSUs) in India. 'Reserve Bank of India' has also issued a notification to all 'Scheduled Commercial Banks' operating in India to make commitment towards environmental and social responsibilities of themselves and their portfolios too. International standardization organizations have also come up with relevant standards to make businesses more socially responsible and environmentally sustainable; these include ISO 14001, ISO 26000, OHSAS 18001, SA 8000, ISO 45001, AA 1000, ISO 50001, ISO 20400, IS 16001, etc.

Objectives of Study

The efficiency of BRRs is critical to establish sustainability practices in Indian businesses. This study assesses the BRR framework and its implementation by businesses with the following objectives:

1. Enable better understanding of sustainability practices in India
2. Improve effectiveness and efficiency of BRRs in making disclosures
3. Enable equitable assessment of all businesses

NVGs for Social, Environmental and Economic Responsibilities of Businesses

The NVGs were released by the 'Ministry of Corporate Affairs' (MCA) in July 2011, in a drafting process led by the 'Indian Institute of Corporate Affairs' and inputs from various experts in responsibility reporting. The NVGs are essentially a set of nine principles that revolve around the ESG responsibilities of businesses. Each principle statement is followed by a brief justification to its relevance in the present business world. Further, a set of 'core elements' to focus the related principle's policy is given (Ministry of Corporate Affairs, 2011). The 'core elements' are general dos and don'ts for the particular principle, the assessment of company's fulfillment for the

reporting framework are expected to be on the basis of these elements (Securities and Exchange Board of India, 2012). After the 'core elements', an anonymous case study showcasing the perceived benefits that may be delivered to the business is provided. The document, then, gives the steps and approaches to be adopted by businesses during the implementation of the principles; these are suggested by involving the business owner, embedding the core elements in business strategies, engaging stakeholders and disclosure of impact. Further, the document gives the nature of implementation of the principles at 'leadership level' and 'essential or compliance level', their application on Micro, Small and Medium Enterprises (MSMEs) and a suggested framework for business responsibility reporting. The guidelines provide that application of these principles on MSMEs in India, which is a challenge due to the realities and nature of these entities and their insensitivity towards ESG issues.

Table 1. Reporting Area out of ESG Parameters that are Majorly Discussed in each of the Nine Principles of NVGs

	Environmental	Social	Governance and Economic
Principle 1			Y
Principle 2	Y	Y	
Principle 3		Y	
Principle 4		Y	
Principle 5		Y	
Principle 6	Y		
Principle 7			Y
Principle 8		Y	
Principle 9		Y	Y

Business Responsibility Reporting Framework by SEBI

The BRR framework is relevant to sustainability disclosures in India because of the following advantages obtained from it:

1. It provides a relatively concise report.
2. The resultant reports are comparable with each other.
3. It gives a regular, periodic and cyclic assessment of ESG performance.
4. It is a standardized framework for sustainability assessment.
5. It is built with consideration of sustainability challenges specific to India.
6. It is mandatorily applicable to a prescribed number of listed companies.
7. It provides evidence for sustainability actions taken by companies.

On 24 November 2011, SEBI passed a board resolution to mandate the top 100 listed companies in India according to their market capitalization to report on the BRR framework provided by it. This resolution and amendments made in the SEBI (Listing Obligations and Disclosure Requirements) Regulations, 2015, make BRR a part of the annual reporting of companies and an important tool in responsibility assessments. The framework of BRR is based on the nine principles provided by NVGs and gives an evidence-based uptake of these principles; as the questions for performance assessment

on each principle and policy implementation related to each principle and is asked along with general industry-related questions. The listed regulations were further amended by SEBI on 24 December 2015, making top 500 listed companies in India come under the purview of mandatory BRR reporting. The framework is planned to cover all listed entities in India in a phased manner over years, as discussed in a memorandum by SEBI (Securities and Exchange Board of India, 2011)

Analysis of Disclosures and Suggestions for the Mandatory BRR Framework

For analyzing BRR framework and to reveal the scope for improvement, the following steps were taken:

1. Analyzing the 'core elements' of each principle as provided in NVGs.
2. Analyzing the 'Suggested Business Responsibility Report Framework' given in the NVG document of 2011.
3. Environmental indicators that are universally applicable to businesses and not present in the report were found.
4. Studying the implementation methodology adopted by SEBI.
5. BRRs of 78 companies for the year 2013–14 were studied to find the challenges faced in preparing the report.

On comparing the suggested framework provided by NVGs, its principle wise core elements and the BRR framework, we find the following important points are not being assessed through the SEBI framework:

1. Management's commitment statement to the ESG guidelines.
2. Significant risks that the business would like its stakeholders to know.
3. Any goals and targets that were set by the top management for improving their performance during the reporting period.
4. A brief report on any material and/or significant negative consequences of the operations of the business entity.
5. A brief report on goals and targets in the areas of ESG responsibilities that the business entity has set for itself for the next reporting period.
6. Whether the person or committee responsible for oversight review is independent from the executive authority or not. If yes, how? (Principle 1)
7. Statement of copyright issues in case of products that involve the use of traditional knowledge and geographical indicators. (Principle 2)
8. Cognizance towards the work-life balance of employees. (Principle 3)
9. The amount of least monthly wage paid to any skilled and unskilled employee. (Principle 3)
10. Number of incidents of delay in payment of remuneration during the reporting period. (Principle 3)
11. Percentage of materials used that are recycled input materials. (Principle 6) (Ministry of Corporate Affairs, 2011)
12. Total energy consumed by the business entity for its operations. (Principle 6)
13. Use of renewable energy as a percentage of total energy consumption. (Principle 6)
14. Statement on the quantum of emissions of greenhouse gas. (Principle 6)
15. Destination of disposal of waste. (Principle 6)
16. Details of efforts made for reconstruction of biodiversity. (Principle 6)

17. Reporting of environmental performance on various measurable parameters. (Principle 6)
18. Assessing and developing Environment Management Systems (EMS) and contingency plans to prevent environmental damages. (Principle 6)
19. All ESG causes for which public policy advocacy/lobbying was used. (Principle 7)
20. The impact of programmes/projects/initiatives in pursuit of policy related to inclusive growth and community development. (Principle 8)

Major Shortcomings of the BRR and Suggestions for Implementation

Major shortcomings of BRR and suggestions for its implementation have been discussed as follows:

1. Allowance for mapping of BRR report with sustainability report and non-compliance with the fixed framework:

Point no. 5a of the SEBI Circular, mandating the inclusion of BRR into the annual report of companies allows for those companies that are already submitting a separate sustainability report to only provide a mapping of the sustainability report with the BRR framework. The global reporting standards that these companies follow do not have a fixed structure; information is enumerated in paragraph form and has certain unnecessary and promotional descriptions which often adds to the size of the report leading to loss of conciseness, inability to engage a larger readership and absence of fixed structure. These features devoid the report from being popular, assessed by all stakeholders and comparable with each other. Besides this, many companies do not use the suggested format of BRR framework, provide excessive descriptive texts and avoid the use of statistics or numerals for responding which leads to dilution of data ABB India Limited, 2014; Partners in Change, n.d.; HCL, 2013–14).

2. MSMEs applicability of the report:

MSMEs form a big portion of Indian economic activity and by nature, they differ from the large-scale sector as majority of these enterprises are private limited, serve a limited market area and are sole proprietorship firms or micro-enterprises. These firms can be insensitive to ESG practices as they are not regulated with the same minuteness as large scale or listed companies and a single entity does not have visible impact on overall sustainability practices. Also, many of the disclosures have financial, manpower or time resource costs that are not affordable to these enterprises, such as disclosures regarding policy creation, consumption changes in resource use, EMS implementation, etc. The NVGs have been developed with consideration of large scale and listed enterprises, and it is expected to include MSMEs in responsibility practices through supply chain initiatives Mousiolis et al., 2014.

3. Communication of risks due to business' policy, operations, or products and services.

To show a trend in responsible business practices, a business should communicate its risks and present practices that assure mitigation or improvement. The risks associated with business' places of operations, products, services or any other material or significant negative consequence should be disclosed for general assessment and to showcase transparency and accountability. In the framework, measures that were taken by the business to prevent, punish or mitigate the occurrence of generalized events or

risks that may hamper ESG practices are asked, but the industry-specific or business-specific analyses of risks are not disclosed. To this effect, businesses need to conduct a Strengths, Weaknesses, Opportunities and Threats (SWOT) or other explanatory analysis from a sustainability point of view and present the results as a part of the report. ESG practices should be applied as continuous improvement measures just like quality and cost measures, and there should be set goals to achieve and regular improvement in the ESG practices. Business should present achievements for the reporting year along with their plans to achieve better results in the future (Du et al., 2010; Pinter et al., 2012).

4. Disclosure regarding fair remuneration and timely payment to employees.

The remuneration provided to skilled and unskilled employees is a necessary disclosure to know about fair treatment to employees of the business. The minimum wages provided can be compared with the minimum wages provided by the government for a similar level of skills or minimum suggested wages for any unskilled workers. Also, the timely payment of remuneration is a factor, businesses can report on the time and method of providing payment to all employees and a statement regarding any delays if so occurred. The time of payment to permanent, temporary, contractual and casual employees should be mentioned and established with standards.

5. Need for more quantifiable environmental parameters:

As suggested in the framework provided in NVGs, environmental performance or effects should be measured using some quantifiable parameters, e.g. quantity of greenhouse emissions, energy consumed, renewable or clean energy used. Environmental impact reduction measures should be more focused on mitigation of risks than compliance. Business should report on all products and services which help mitigate risks throughout their life cycle and not just in a particular part of life cycle. Some of the generally applicable environmental parameters would include the following (United Nations, 2007):

- The Quantity of Greenhouse Gases and Carbon Dioxide Emissions.
- Consumption of ozone depleting substances.
- Ambient concentration of pollutants in the surroundings.
- Biological hotspots or key ecosystems in the vicinity and steps towards their conservation or restoration.
- Steps towards restoring and safeguarding ecosystem services.
- Total water resources used.
- Total energy consumption in a common unit of measurement.
- Percentage of use of renewable and clean energy as part of total energy use.
- Destination and method of disposal of wastes.

6. Disclosure of impact from business' ESG initiatives.

Presently, the framework for BRR only covers the measures taken by businesses towards ESG concerns, but there are no disclosures to know the effects of measures taken. Disclosures should be made to bring forward the impacts of various projects and initiatives undertaken by the businesses on some of the following areas and possibly more:

- Impacts of CSR initiatives.
- Improvements over prior social condition.

- Effects of environmental restoration activities.
- Ambient social and environmental conditions of the area under projects.

7. Clubbing of multiple independent disclosures in single question and use of closed ranges:

In some questions, independent or mutually unrelated disclosures are asked in single point the causes for many companies to give a single answer for multiple questions which can be misleading and incomplete, e.g.

a. Section E, principle 2, question no. 4
b. Section E, principle 3, question no. 8
c. Section E, principle 6, question no. 2 and question no. 5
d. Section E, principle 8, question no. 1
e. Section E, principle 9, question no. 1

Also, in some questions, the reply is asked for in specified closed ranges, the reason for using such ranges and the importance of the particular intervals of difference are not provided,

a. Section C, question no 3
b. Section E, principle 2, question no. 5

8. Section E, Principle2, Question No. 2:

(The question is "For each product incorporating social and environmental concerns, provide the following details in respect of resource use (energy, water, raw material, etc.) per unit of product(optional): i. Reduction during sourcing/production/ distribution achieved since the previous year throughout the value chain? ii. Reduction during usage by consumers (energy, water) has been achieved since the previous year?")

This question has not been understood by many companies, the data required to answer is also not maintained by most systems, and the question focuses on only manufactured products from an incomplete Lifecycle Sustainability Assessment (LCSA) point-of-view. The question can be reframed, suggestively, according to LCSA framework Sala et al., 2012:

(LCSA = LCA (Lifecycle Assessment) + eLCC (environmental Lifecycle Costing) + sLCA (Social LCA)

9. Use of a harmonized term as common term of reference for the field of study and its sub-branches:

Currently, the literature and frameworks for such assessment use inconsistent terms for the major science under which they fall, i.e. sustainability science and sustainability assessment frameworks. The definitions and objectives of the different terms adopted for reference are mostly consistent with the Brundtland Commission's definition for sustainable development and sustainability *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCDE, 1987).

Conclusions

In the paper, there was a brief review of the NVGs and BRR, and other sustainability reporting and assessment guidelines that have been referred so as to provide the most feasible suggestions to be included in the BRR framework. The adopted framework

is efficient in many assessment areas and disclosures, and plays the important role of being an autonomous, standardized, comparable, periodic and guided framework for sustainability assessment. The areas of improvement are however:

- The frameworks limited application over all types of business entities
- Its misalignment with the NVGs of 2011
- The framing of certain questions
- Disclosures of risks posed by the business
- Disclosures of progress due to sustainability initiatives
- Measurable and quantifiable disclosures for environmental parameters

Studies under sustainability are still developing and constant improvement is required for better results. As the upgrades of the BRRs are being made and implemented and evaluations of BRR have been underway, the paper tries to make a contribution to the effort for further strengthening the effectiveness and efficiency of the framework.

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Annexure 1

SEBI Suggested Framework for BRR:

Section A: General Information about the Company

1. Corporate Identity Number (CIN) of the Company
2. Name of the Company
3. Registered address
4. Website
5. E-mail id
6. Financial Year reported
7. Sector(s) that the company is engaged in (industrial activity code-wise)
8. List three key products/services that the company manufactures/provides (as in balance sheet)
9. Total number of locations where business activity is undertaken by the company
   i. Number of international locations (provide details of major 5)
   ii. Number of national locations
10. Markets served by the company: Local/State/National/International

Section B: Financial Details of the Company

1. Paid up capital (INR)
2. Total turnover (INR)
3. Total profit after taxes (INR)
4. Total spending on CSR as the percentage of profit after tax (%)
5. List of activities in which expenditure in 4 above has been incurred:
   a.
   b.
   c.

Section C: Other Details

1. Does the company have any subsidiary company/companies?
2. Do the subsidiary company/companies participate in the BR initiatives of the parent company? If yes, then indicate the number of such subsidiary company(s).
3. Do any other entity/entities (e.g. suppliers, distributors, etc.) that the company does business with, participate in the BR initiatives of the company? If yes, then indicate the percentage of such entity/entities? [Less than 30%, 30-60%, More than 60%]

Section D: BR Information

1. Details of Director/Directors responsible for BR

a) Details of the Director/Director responsible for implementation of the BR policy/ policies

- DIN Number
- Name
- Designation

b) Details of the BR head

S. No.	Particulars	Details
1.	DIN number (if applicable)	
2.	Name	
3.	Designation	
4.	Telephone number	
5.	e-mail id	

2. Principle-wise (as per NVGs) BR Policy/policies (Reply in Y/N)

S. No.	Questions	P1	P2	P3	P4	P5	P6	P7	P8	P9
1.	Do you have a policy/policies for....									
2.	Has the policy being formulated in consultation with the relevant stakeholders?									
3.	Does the policy conform to any national/international standards? If yes, specify. (50 words)									
4.	Has the policy being approved by the Board? Is yes, has it been signed by MD/owner/CEO/appropriate Board of Director?									
5.	Does the company have a specified committee of the Board/Director/Official to oversee the implementation of the policy?									

6.	Indicate the link for the policy to be viewed online?	
7.	Has the policy been formally communicated to all relevant internal and external stakeholders?	
8.	Does the company have in-house structure to implement the policy/policies?	
9.	Does the company have a grievance redressal mechanism related to the policy/policies to address stakeholders' grievances related to the policy/policies?	
10.	Has the company carried out independent audit/evaluation of the working of this policy by an internal or external agency?	

2a. If answer to S. No. 1 against any principle, is 'No', please explain why: (Tick up to two options)

S no.	Questions	P1	P2	P3	P4	P5	P6	P7	P8	P9
1.	The company has not understood the Principles									
2.	The company is not at a stage where it finds itself in a position to formulate and implement the policies on specified principles									
3.	The company does not have financial or manpower resources available for the task									
4.	It is planned to be done within next 6 months									
5.	It is planned to be done within the next 1 year									
6.	Any other reason (please specify)									

Governance Related to BR

- Indicate the frequency with which the Board of Directors, Committee of the Board or CEO can assess the BR performance of the company. Within 3 months, 3–6 months, Annually, More than 1 year
- Does the company publish a BR or a Sustainability Report? What is the hyperlink for viewing this report? How frequently is it published?

Section E: Principle-wise Performance

Principle 1

1. Does the policy relating to ethics, bribery and corruption cover only the company? Yes/ No. Does it extend to the Group/Joint Ventures/Suppliers/Contractors/NGOs/Others?
2. How many stakeholder complaints have been received in the past financial year and what percentage was satisfactorily resolved by the management? *If so, provide details thereof, in about 50 words or so.*

Principle 2

1. List up to 3 of your products or services whose design has incorporated social or environmental concerns, risks and/or opportunities.
   i.
   ii.
   iii.
2. For each such product, provide the following details in respect of resource use (energy, water, raw material, etc.) per unit of product (optional):
   i. Reduction during sourcing/production/distribution achieved since the previous year throughout the value chainReduction during usage by consumers (energy, water) has been achieved since the previous yearDoes the company have procedures in place for sustainable sourcing (including transportation)?
   ii. If yes, what percentage of your inputs was sourced sustainably? *Also, provide details thereof, in about 50 words or so.*
4. Has the company taken any steps to procure goods and services from local and small producers, including communities surrounding their place of work?
   i. If yes, what steps have been taken to improve their capacity and capability of local and small vendors?
5. Does the company have a mechanism to recycle products and waste? If yes what is the percentage of recycling of products and waste (separately as <5%, 5–10%, >10%). Also, provide details thereof, in about 50 words or so.

Principle 3

1. Please indicate the total number of employees.
2. Please indicate the total number of employees hired on temporary/contractual/casual basis.
3. Please indicate the number of permanent women employees.
4. Please indicate the number of permanent employees with disabilities
5. Do you have an employee association that is recognized by management?
6. What percentage of your permanent employees is members of this recognized employee association?

7. Please indicate the number of complaints relating to child labour, forced labour, involuntary labour, sexual harassment in the last financial year and pending, as on the end of the financial year.

S. No.	Category	No of Complaints Filed during the Financial Year	No of Complaints Pending as on End of the Financial Year
1.	Child labour/forced labour/involuntary labour		
2.	Sexual harassment		
3.	Discriminatory employment		

8. What percentage of your under mentioned employees were given safety and skill upgradation training in the last year?

- Permanent employees
- Permanent women employees
- Casual/Temporary/Contractual Employees
- Employees with disabilities

Principle 4

1. Has the company mapped its internal and external stakeholders? Yes/No
2. Out of the above, has the company identified the disadvantaged, vulnerable and marginalized stakeholders?
3. Are there any special initiatives taken by the company to engage with the disadvantaged, vulnerable and marginalized stakeholders? If so, provide details thereof, in about 50 words or so.

Principle 5

1. Does the policy of the company on human rights cover only the company or extend to the Group/Joint Ventures/Suppliers/Contractors/NGOs/Others?
2. How many stakeholder complaints have been received in the past financial year and what per cent was satisfactorily resolved by the management?

Principle 6

1. Does the policy related to Principle 6 cover only the company or extends to the Group/ Joint Ventures/Suppliers/Contractors/NGOs/others?
2. Does the company have strategies/initiatives to address global environmental issues such as climate change, global warming, etc.? Y/N. If yes, please give hyperlink for webpage, etc.
3. Does the company identify and assess potential environmental risks? Y/N
4. Does the company have any project related to clean development mechanism? If so, provide details thereof in about 50 words or so. Also, if Yes, whether any environmental compliance report is filed?
5. Has the company undertaken any other initiatives on clean technology, energy efficiency, renewable energy, etc.? Y/N. If yes, please give hyperlink for web page, etc.
6. Are the emissions/waste generated by the company within the permissible limits given by CPCB/SPCB for the financial year being reported?

7. Number of show cause/legal notices received from CPCB/SPCB which are pending (i.e. not resolved to satisfaction) as on end of Financial Year.

Principle 7

1. Is your company a member of any trade and chamber or association? If Yes, name only those major ones that your business deals with:

a.
b.
c.
d.

2. Have you advocated/lobbied through above associations for the advancement or improvement of public good? Yes/No; if yes specify the broad areas (drop box: Governance and Administration, Economic Reforms, Inclusive Development Policies, Energy security, Water, Food Security, Sustainable Business Principles, Others)

Principle 8

1. Does the company have specified programmes/initiatives/projects in pursuit of the policy related to Principle 8? If yes details thereof.
2. Are the programmes/projects undertaken through in-house team/own foundation/ external NGO/government structures/any other organization?
3. Have you done any impact assessment of your initiative?
4. What is your company's direct contribution to community development projects—amount in INR and the details of the projects undertaken.
5. Have you taken steps to ensure that this community development initiative is successfully adopted by the community? Please explain in 50 words, or so.

Principle 9

1. What percentage of customer complaints/consumer cases are pending as on the end of financial year?
2. Does the company display product information on the product label, over and above, what is mandated as per local laws? Yes/No/N.A. /Remarks(additional information)
3. Is there any case filed by any stakeholder against the company regarding unfair trade practices, irresponsible advertising and/or anti-competitive behaviour during the last five years and pending as on end of financial year. If so, provide details thereof, in about 50 words or so.
4. Did your company carry out any consumer survey/ consumer satisfaction trends?

Enhancing Economic Sustainability through Microcredit: An Analysis over Different Activities

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Abstract

The present research evaluates the economic sustainability of economically deprived households through microcredit over different activities. The research involves collection of data from 476 households over three blocks of three different districts of Odisha by distributing a structured close-ended questionnaire. Through microcredit, the household in Odisha can generate additional employment. The change in asset and loan moves in the same direction. The highest change in income, savings and assets creation is respectively found in microenterprise, 'others' and animal husbandry. This research domain is spread over only three blocks of three districts of Odisha.

Keywords:

Microcredit, Asset Creation and Employment Generation, Savings Accumulation

Introduction

Odisha's economy is characterized by the paradox of poverty and backwardness in spite of the availability of the abundance of natural resources. Even after six decades of Indian planning, Odisha continues to remain as one of the poorest states of India. The rural condition is more wretched than the urban area. The heavy concentration of backward population and the predominance of agriculture in the rural area are two main retarding factors on its rapid socio-economic transformation. A high percentage of the population of Odisha who depend on agriculture is either small farmers or marginal farmers. Most of the women in rural Odisha belong to small or marginal farmers' family who assist their husbands or work on daily wages to provide economic support to the family. These categories of people are deprived of all direct financial support from financial institutions. At this juncture, the present research tries to identify the impact of microcredit through WSHGs on economic growth of rural Odisha through economic sustainability of the households.

Literature Review

Microcredit has its origin from Bangladesh. Credit comes from the Latin word *credo* meaning 'to believe or to trust'. Hence, 'credit' entails the lender to believe or trust, the borrower with funds to be used by the borrower for his/her purpose, to be paid back to the fund provider with interest at a later stage on mutually agreed terms and conditions. Microcredit is the distribution of small loans (microloans) to those in poverty designed to spur entrepreneurship. These individuals lack permanent, steady employment and a

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verifiable credit history, and therefore, cannot meet even the minimal requirement of access to traditional credit. Microcredit is a part of microfinance, which is the provision of a larger range of financial services to the very poor. Microcredit programmes extend small loans to poorest people for self-employment projects that generate additional income, allowing the beneficiaries to care for themselves and their families. Microcredit is based on a separate set of norms, which distinguish it from general financing or credit. Microcredit gives importance to build the capacity of a microentrepreneur employment generation, trust building and to help the microentrepreneur on initiation and during hard times. Microcredit is a tool for socio-economic development. The United Nation's former Secretary General Koffi Annan comments "Microcredit is a critical anti-poverty tool-a wise investment in human capital. When the poorest women receive credit, they become economic actors with power, power to improve not only their lives but in a widening circle of impact, the lives of their family, their communities and their nations."Hossain (1984) conducted a study on credit for the rural poor through Grameen Bank in Bangladesh. The study focuses sustainability of the rural borrowers in term of socio-economic development. His findings indicate that the Grameen Bank in Bangladesh has made an affirmative contribution to the alleviation of poverty as well as socio- economic development of deprived people in the area of its operation. Further, in 1988, he pointed out that the Grameen Banks in Bangladesh were able to increase the income of the borrowers.

Rehman (1987) assessed the impact of the Grameen Bank on the prevalent rural power structure of Bangladesh and concluded that the Grameen Bank members being conscious of their status. The members developed a countervailing to make certain their participation in the economic development process provided by the financial instructions.

Wahid (1994) has pointed out that the Grameen Bank of Bangladesh has introduced a mechanism to provide credit assistance without any collateral to the poorest of the poor on a group liability basis. This principle leads to the sustainability of banks as well as the WSHG group members. He has identified that the bank has been successfully operating with a record loan recovery rate near about 95% at the end of year 2000, where 24 lakh members were benefited. Out of 24 lakh microcredit beneficiaries, near about 23 lakhs were women, with $2.25 billion outstanding loan.

Khandker (1998) pointed out that the sustainability of microenterprise and poverty alleviation is a function of appropriateness of microcredit and locality in which the credit is disbursed. Such credit facilities have created a large number of clients with small amounts of resources. Microfinance generates more benefit for poor women who are able to use loan for the productive purpose.

Ravicz (1998) concluded that subsidies can play a vital role in the supply and suitability of microfinance. The early year subsidies in interest rate encourage the borrower to avail the loan and repay it in proper time. The volume of subsidies is vital in developing approaches, scale, and staff and client experience necessary to move towards the sustainability of the enterprise.

Joanne and Tripathy (1998) identified that the government banks and the microcredit institutions work with a safe target group—not the real poorest. The cause of targeting safe group is because of funding accountability concerns. Government-sponsored microcredit programmes and their staff tend to be both paternalistic and distrustful of the poorest, and identifying and reaching the beneficiaries who are poorest is extremely time-consuming. Seibel (2002) concluded that SHG linking banking was profitable for both. For the lending organization, in rural area, as compared to other products, the microcredit is

more profitable. Further, they identified that non-performing assets to SHGs were 0% which simply reflects the effectiveness of group lending.

Crépon et al. (2015) concluded that microcredit access led to a significant rise in investment in assets of household used for self-employment activities and increase in profitability, but reduction in income.

Nader (2008) concluded that microcredit has a positive impact on socio-economic wellbeing of women in Cairo. He argued that this small credit has become a vital element to alleviate poverty and to improve their families' wellbeing, and the results also confirmed that microcredit strongly affects children's education, income generation and asset creation. Microfinance has contributed a lot in women empowerment and has also increased the inclination of women towards education of their children.

A study was conducted in Bangladesh by Rahman et al. (2009) to identify the factors that influence women's empowerment as a microcredit borrower. They identified that "age, education levels of women and levels of income are highly significant factors that influence women empowerment."

Rehman et al. (2015) have found that microcredit has increased the awareness among women for education. Women beneficiaries mostly use their income for the education of their children. In addition to that, they also took loan to meet the educational expenses of their children.

Mayoux (2001) concluded that the poverty alleviation changes and the financial self-sustainability presume that socio-political empowerment is possible without specific embroil to change gender relations at the household. By contrast, the women empowerment model advises specific strategies for supporting women's ability to protect their individual and collective gender interests in the society.

Kumar et al. (2015) concluded that microcredit is a catalyst in women's socio-economic development and influences all aspects of their life. Grameen Bank is involved in microcredit operation by providing credit assistance for various purposes to the women. The primary objective of credit assistance is empowerment of the poor rural women in Bangladesh. Most of the members which are about 85% were able to take part in decision-making process after joining in the microcredit activities from GB, generating a better monthly income from the sources of income.

Alhasan and Akudugu (2012) have studied the impact of microcredit activities based on four indicators which have an unambiguous relationship with the capacities of beneficiary women to generate income to finance their welfare outcomes such as security of food, healthcare and education, among others. The results revealed that women's perception of the impact of microcredit on their capacity to generate income from Income-generating Activities (IGAs) and personal lives is positive. Near about 90% of the beneficiary women included in the study indicated that microcredit has had a positive impact on them. Some of the women agreed that they were not involved in any IGA before receiving microcredit. It revealed that access to microcredit has changed all these dynamics, with beneficiaries now engaging in IGAs to generate income.

Women beneficiaries indicated that their asset position has improved since acquiring microcredit. They revealed that they were now capable of making purchases they could never afford previously, such as buying household utensils, sewing machines, clothing and jewellery, among others. They also revealed that they had some control on how their loans were utilized as well as had freedom to decide to join a group to avail credit. The study also revealed that some women are still unable to acquire assets of high value like land and houses that could change and add the family wealth.

Hossain (2014) has found that microcredit programmes have minimized the problems of unemployment and increased the sources and level of income and standard of living of people of Bangladesh.

Kane (2013) has shown that microcredit programmes of Grameen Bank aimed at strengthening social capital and contribute to female empowerment. When income-earning wives in the community pay for school fees and medicines for their children (what are usually husbands' responsibilities), their standing within the family changes and they enjoy greater freedom and influence. Here, microcredit increases the social capital of female borrowers when they reinvest their business profits into the household and help their husbands financially.

Hossain et al. (2013) indicate that household income would increase as the value of asset increases. Formal credit facilities would create an opportunity for the poor household who invest on IGAs properly yielding higher production and returns. Moreover, credit facilities assist the poor to face risk and uncertainties.

Gap

Extant literature has discussed the influence of microcredit on employment and income generation, savings accumulation and assets creation. But there is a dearth of research regarding the most preferred activity to utilize the microcredit amount, especially by women and their individual influence on employment, income, savings and assets. This study has identified the above gap and tried to research upon the same in the case of women SHG.

Objectives

The following objectives have been set to meet the gaps discussed above:

- To find out the most preferred activity of microcredit by women SHG
- To investigate the effect of microcredit activities on employment, income, savings and assets

Hypothesis

$H_0$1: There is no difference in the proportion of beneficiaries preferred for different activities.

$H_0$2: There is no difference in the proportion of employment generated from different activities.

$H_0$3: There is no difference in income generated, asset created and savings of household participation in MCPs of different banks.

$H_0$4: There is no association between participation in MCPs and asset position, income and savings of household.

$H_0$5: There is no difference between change in assets, savings and income across various activities.

Methodology

In research methodology, the author has defined the activities of research, how to proceed, how to measure progress and what constitutes success. The current investigation is an exploratory and a non-experimental research which was used to explore the impact of microcredit on the economic status of the beneficiary in rural Odisha. For the above purpose, the researcher has relied upon the primary data.

- **Universe:** Women microcredit borrowers were from any bank of Odisha having experience of more than one year in SHG activities.
- **Sample Domain:** It was not possible to collect data throughout Odisha. To avoid this limitation, a sample domain was formed. Three districts, namely Puri, Jagatsinghpur and Denkanal selected for data collection. One block from each district was selected purposively. Pipili block from Puri district, Balikuda from Jagatsinghpur and Kamakshya Nagar Denkanal were selected.
- **Sample Description:** For this survey, the respondents were the active women microcredit borrowers of the above three blocks. To measure the economic impact, the respondents were considered as a household.
- **Sample Size:** Sample of 476 respondents was taken for the study. The respondents selected dis-proportionately from three clusters, 176 from Pipili block, 160 from Balikuda and rest 140 from Kamakshya Nagar.
- **Sample Units:** The women microcredit borrowers having more than one year experience were considered as respondents. To measure the economic impact, they are converted into households.

The response of respondents was collected with the help of close-ended questionnaire in two rounds, with a gap of one year to measure the impact of microcredit. 176 questionnaires were distributed in every block over 44 WSHGs. From each, four members were selected randomly.

In the 1st round (May 2014 to July 2014), 528 questionnaires are administrated, out of which only 476 questionnaires found completed. In the 2nd round (May 2015 to August 2015), the researcher collected the response of 476 households from whom in the 1st round, the data was collected. 2nd round data collection was completed in four months, whereas the 1st round data collection finished in only two months. Descriptive as well as inferential statistics used to analyze the data.

Result and Discussion

Table 1: Demographic Details of Respondents

Categories	Details	No. of Respondents	Percentage
Habitation	Rural	346	72.69
	Semi-urban	130	27.31
	Total	**476**	100.00
Age	< 25 years	18	3.78
	25–40 years	326	68.49
	41–55 years	111	23.66732
	>55 years	21	4.41
	Total	**476**	100.00
Caste	General	133	27.94
	SEBC/OBC	192	40.34
	ST	59	12.39
	SC	92	19.33
	Total	**476**	100.00
Education	Under metric	332	69.75
	Metric and Intermediate	113	23.74
	Graduate and above	31	6.51
	Total	**476**	100.00

Table 2: Computation of Employment Generated due to SHG Activity

No. of Members	Total No. of Working Members of a Household		No. of Working Members Engaged in Primary Activity				SHG Employment
Engaged	**Frequency**	**Percentage**	**Total**	**Frequency**	**Percentage**	**Total**	
1	51	10.71	51	133	27.94	133	
2	191	40.13	382	243	51.05	486	
3	159	33.40	477	51	10.71	153	
4	36	7.56	144	10	2.10	40	
5	28	5.88	140	28	5.88	140	
6	11	2.31	66	11	2.31	66	
Total	**476**	**100.00**	**1260**	**476**	**100.00**	**1018**	**242**

It is clear from Table 2 that the total employed member in 476 households is 1260, whereas employment due to primary activity is 1018. The difference was considered as the employment generated due to SHG activity which is 242 additional employment.

Table 3: Details of Economic Activity Undertaken due to SHG Participation

Activities	No. of Respondents	Percentage
Agriculture	318	66.81
Animal Husbandry	64	13.45
Artisan	17	3.57
Petty shop	37	7.77
Microenterprise (Manufacturing)	40	8.40
Total	**476**	**100.00**

The opinion of 446 respondents was collected on the economic activity they had undertaken due to microcredit assistance. Out of 476 respondents, 318 (near about 67%) respondents had invested their loan amount in agriculture. 13.45% respondents preferred to utilize the microcredit in animal husbandry. 8.4% of respondents disclosed that they had invested the loan amount in micro-manufacturing enterprise.

Table 4: Details of Activity Undertaken under Agriculture and Animal Husbandry due to Microcredit

Activities	No. of Respondents	Percentage
Floriculture	174	36.55
Mushrooming	107	22.48
Horticulture	31	6.51
Sericulture	6	1.26
Total of Agriculture Activity	**318**	
Fishery	7	1.47
Poultry	15	3.15
Goatery	28	5.88
Piggery	3	0.63
Diary	11	2.31
Total of Animal Husbandry Activity	**64**	

More than 80% of respondents had invested the amount of loan together in agriculture and animal husbandry. In animal husbandry, the most favourable activity in which the loan amount was invested was goatery, followed by poultry; whereas, in agriculture activity, it was floriculture, followed by mushrooming.

Table 5: Employment Generation under Different Activities

Details of Activity	No. of Respondents (Household)	Pre-SHG Employment	Post-SHG Employment	SHG Employment
Agriculture	318	798	938	140
Animal Husbandry	64	126	178	52
Microenterprise (Manufacturing)	40	0	40	40
Others	54	94	104	10
Total	**476**	**1018**	**1260**	**242**

For the computational purpose, the activity artisan and petty shop were merged and renamed as 'other'. Before microcredit assistance, employment under microenterprise was zero, and it increased to 40 after the assistance. Highest employment was generated by agricultural activity followed by animal husbandry.

Table 6: Descriptive Statistics of the Approximate Value of Assets Including Business (Except Land and House) of the Respondents

Details	Before SHG Activity	After SHG Activity
N	476	476
Minimum	5500.00	10000.00
Maximum	200000.00	220000.00
Mean	74092.44	80435.50
Std. Deviation	51286.95	55501.48

Source: Primary data

The minimum value of asset owned by a household in the 1st round is ₹5500, and the maximum value of asset owned by a household is ₹2,00,000. This huge difference indicates the unequal distribution of wealth in the economy. The lower limit increased to ₹10,000 in the 2nd round, and the higher limit increased to ₹2,20,000. Though the rate of growth of lower limit is higher than the higher limit, but it was unable to reduce the gap. The average value of asset owned by household in the 1st and 2nd rounds is ₹74092.44 and ₹80435.50, respectively.

The highest average value of assets was after microcredit activity found in the case of 'Others', whereas the lowest asset value was found in the case of 'Microenterprise'. But considering the change, it was observed that due to animal husbandry, the beneficiaries can add the highest amount of assets. The respondents that depended on agriculture added the lowest amount of assets over the period of study.

Table 7: Descriptive Statistics of the Approximate Value of Assets Including Business (Except Land and House) of the Respondents in Different Activity

Details	Agriculture		Animal Husbandry		Microenterprise		Others	
	Pre-MC	**Post-MC**	**Pre-MC**	**Post-MC**	**Pre-MC**	**Post-MC**	**Pre-MC**	**Post-MC**
N	318	318	64	64	54	54	40	40
Min.	5500.00	10,000.00	5500.00	10,000.00	6000.00	10,000.00	15,500.00	18,000.00
Max.	2,00,000.00	2,20,000.00	2,00,000.00	2,20,000.00	2,00,000.00	2,20,000.00	2,00,000.00	2,20,000.00
Mean	71,781.45	77,431.76	80,281.25	89,703.13	64,888.89	72,685.19	94,987.50	99,950.00
SD	51,813.87	55,647.02	54,653.01	60,068.13	43,903.48	48,861.69	45,811.83	50,860.27
Diff	**5650.31**		**9421.88**		**7796.30**		**4962.50**	

Table 8: Descriptive Statics of Amount of Savings

Details	Round 1	Round 2
N	476	476
Minimum	60.00	150.00
Maximum	600.00	600.00
Mean	229.54	282.96
Std. Deviation	89.34	83.45

Source: Primary data

A higher limit of monthly savings is ₹600 per month in both the rounds. The minimum amount of monthly saving in the 1st round is ₹60 which increased to ₹150 in the 2nd round. The increase in the lower limit by ₹100 and no change in upper limit reduced the range. The average monthly saving in the 1st round is ₹229.54, and in the 2nd round it is ₹282.96. The increase in monthly savings may consider as an indicator of economic development of SHG members.

Table 9 contains 'the amount of savings under different activities'. The highest average value of savings in 1st and 2nd rounds was found in the case of 'microenterprise', whereas lowest average savings were found in the case of animal husbandry. But considering (the difference between 1st and 2nd rounds) the change, it was observed that the beneficiaries of 'others' activity were able to save more, whereas beneficiaries from microenterprise were at minimum side.

Source: Primary data

The lower side of income from the main source of earning is ₹4500, whereas the higher side is ₹25,000. The average income from the main source of earning is ₹9961.13. In 2nd round, the lower side of income is ₹6000 and the higher side remains the same. The average income from the main source of earnings in the 2nd round is ₹11,542.65.

The average of total income of the household for 1st and 2nd rounds is ₹12,245.8 and ₹14,252.73, respectively. The difference between the average value of total income of the household and income from the main source of the earning job is considered as the income from SHG activity.

The average income of respondents before joining SHG activity was ₹9,998.43 from agriculture activity which increased to ₹11,841.19 after SHG activity. The increase in income was ₹1842.77 because of SHG activity. Likewise, the increase in income due to animal husbandry, microenterprise and other was ₹1730.16, ₹1756.10 and ₹250.00. The highest change in income was recorded for agriculture activity, whereas lowest change in income was recorded for others.

After joining SGH with an approximate gape of one year, the information related to income of respondents was shown in Table 12. The changes among the respondents for microenterprise was ₹2935.19 which was highest among all the activities, whereas the change in income due to other activity was lowest.

It was clear from Table 13 that the difference between 1st round and 2nd round income of respondents belongs to microenterprise activity, which was highest whereas lowest in case of others. 66.8% respondents have preferred agriculture to invest their loan amount. But excluding agriculture, the preference for rest three activities was very close to each other. A similar situation was also identified in employment generated, excluding 'Others'.

The test was carried out among the beneficiaries who had invested in the microenterprise, animal husbandry and others. The null hypothesis was rejected for the pair animal husbandry and microenterprise was rejected at 95% confidence, whereas for rest two pairs, the hypothesis was accepted.

Table 9: Descriptive Statics of Amount of Savings Made in each Monthly as the Group Member in Different Activities

Details	Agriculture		Animal Husbandry		Microenterprise		Others	
	1st Round	**2nd Round**	**1st Round**	**2nd Round**	**1st Round**	**2nd Round**	**1st Round**	**2nd Round**
N	318	318	64	64	54	54	40	40
Min	60.00	150.00	150.00	200.00	60.00	240.00	150.00	150.00
Max	600.00	600.00	450.00	500.00	600.00	600.00	500.00	500.00
Mean	227.04	277.70	210.16	261.56	272.41	311.11	222.50	321.00
SD	87.90	84.68	55.76	48.77	116.88	96.05	81st 6.93	81.20
Diff.	50.66		51.41		38.70		98.50	

Table 10: Descriptive Statics of Amount of Income Received Monthly from Different Income-generating Activities

Details	**Income from Main Source Of Earning**		**Total Income of Household**	
	Before SHG Activity	**1st Year After**	**After SHG Activity**	**1st Year After**
N	476.00	476.00	476.00	476.00
Min	4,500.00	6,000.00	6,000.00	7,000.00
Max	25,000.00	28,000.00	25,000.00	28,800.00
Mean	9,961.13	12,245.80	11,542.65	14,252.73
SD	5,257.48	5,355.52	4,906.86	5,274.59

Table 11: Activity-wise Comparison of Income before SHG Activity and after SHG Activity

	Agriculture		Animal Husbandry		Microenterprise		Others	
	Before MC	After MC	Before MC	After MC	Before MC	After MC	Before MC	After MC
N	318	318	64	64	54	54	40	40
Min	4,500.00	6,000.00	5,000.00	6,000.00	4,500.00	6,000.00	6,000.00	7,000.00
Max	25,000.00	28,000.00	20,000.00	22,000.00	25,000.00	28,000.00	20,000.00	20,000.00
Mean	9,993.71	12,404.09	9,726.56	12,257.81	9,759.26	12,111.11	10,350.00	11,150.00
SD	5,436.32	5,502.60	4,302.94	4,487.19	5,713.89	5,930.15	4,674.26	4,630.17
Diff	2410.38		2531.25		2351.85		800.00	

Table 12: Activity-wise Comparison of Income after SHG Activity

	Agriculture		Animal Husbandry		Microenterprise		Others	
	Not including SHG	Including SHG	Not including SHG	Including SHG	Not including SHG	Including SHG	Not including SHG	Including SHG
N	318	318	64	64	54	54	40	40
Min	6,000.00	7,000.00	7,000.00	7,000.00	6,000.00	7,800.00	7,000.00	8,000.00
Max	25,000.00	28,800.00	20,000.00	28,800.00	25,000.00	28,000.00	20,000.00	21,800.00
Mean	11,596.86	14,467.92	11,375.00	14,281.25	11,351.85	14,287.04	11,637.50	12,450.00
SD	5,026.67	5,331.51	4,190.31	4,856.54	5,340.16	5,751.03	4,541.25	4,587.33
Diff	2,871.07		2,906.25		2,935.19		812.50	

Table 13: Activity-wise Comparison of Income after SHG Activity over a Gap of One Year

	Agriculture		Animal Husbandry		Microenterprise		Others	
	Before MC	**After MC**	**Before MC**	**After MC**	**Before MC**	**After MC**	**Before MC**	**After MC**
N	318	318	64	64	54	54	40	40
Min	6,000.00	7,000.00	6,000.00	7,000.00	6,000.00	7,800.00	7,000.00	8,000.00
Max	28,000.00	28,800.00	22,000.00	28,800.00	28,000.00	28,000.00	20,000.00	21,800.00
Mean	12,404.09	14,467.92	12,257.81	14,281.25	12,111.11	14,287.04	11,150.00	12,450.00
SD	5,502.60	5,331.51	4,487.19	4,856.54	5,930.15	5,751.03	4,630.17	4,587.33
Diff	2,063.84		2,023.44		2,175.93		1,300.00	

Table 14: Proportionate Summary of Activity Opted and Employment Generated

Activity	**Respondents Opted**	**Proportionate**	**Additional Employment**	**Proportionate**
Agriculture	318	0.668	140	0.294
Animal Husbandry	64	0.134	52	0.109
Microenterprise	40	0.084	40	0.084
Others	54	0.113	10	0.021

H_{03}1: ***There is no difference in the proportion of beneficiaries preferred for different activities.***

$H_0$2: ***There is no difference in the proportion of employment generated from different activities.***

In employment generation, the test was carried out among agriculture, microenterprise and animal husbandry. The null hypothesis was accepted for the pair animal husbandry and microenterprise, whereas rest two were rejected at 95% confidence.

$H_0$3: ***There is no difference in income generated, asset created and savings of household participation in MCPs of different banks.***

Source: Computed from Primary data

There is an increase in average value of loan received, savings made, assets created and income generated from SHG activity over 1st Round in 2nd Round. The loan size is increased by ₹1012.4, whereas savings increased by only ₹53.42. The income increased by ₹2006.93 and the value of assets increased by ₹2006.93.

Source: Computed from Primary data

The '*t*' value of four variables, namely loan received, assets created, savings made and income generated is –33.92, –19.235, –27.19 and –31.10, respectively, at 475 df. At 95% confidence level, the '*P*-value' is 0.0001. As the '*P*-value' is less than 0.05, the null hypothesis that there is no vulnerable change in all these variables is rejected.

$H_0$4: ***There is no association between participation in MCPs and asset position, income and savings of household.***

Source: Computed from primary data

The correlation between microcredit and savings as well as microcredit and income due to SHG activity is negative, whereas between microcredit and assets created, it is positive. The correlation is significant at the 5% level for microcredit and income, whereas rest two correlations are not significant at 5% level as well as very small, which indicates a relationship between two variables and not the degree of relationship. So, on the basis of paired '*t*' test result and correlation result, the null hypothesis participation in MCPs of the bank has no effect on the changes of vulnerability with respect to asset position, income and savings of household rejected.

$H_0$5: ***There is no difference between change in assets, savings and income across various activities.***

Table 20 contains Analysis of Variance (ANOVA) summary of the change in assets, savings and income across various activities. The *P*-value of asset, savings and income across various activities supported by microcredit was <0.05, leading to rejection of the null hypothesis. So, the null hypothesis (*There is no difference between the change in assets, savings and income across various activities*) was to be rejected with 95% confidence.

Table 15: Summary of z Proportion Test over Preference for Activity

	Animal Husbandry	Microenterprise	Difference	Interpretation
Sample proportion	0.134	0.084	0.05	Reject null hypothesis
95% CI (asymptotic)	0.1034 – 0.1646	0.0591 – 0.1089	0.0104 – 0.0896	
z-value		2.5		
P-value		0.0133		
	Microenterprise	Others	Difference	
Sample proportion	0.084	0.113	0.029	Accept null hypothesis
95% CI (asymptotic)	0.0591 – 0.1089	0.0846 – 0.1414	–0.0758	
z-value		1.5		
P-value		0.1333		
	Animal Husbandry	Others	Difference	
Sample proportion	0.134	0.113	0.021	Accept null hypothesis
95% CI (asymptotic)	0.1034 – 0.1646	0.0846 – 0.1414	–0.0836	
z-value		1		
P-value		0.3248		

Table 16: Summary of *z* Proportion Test over Employment Generated from Different Activities

	Agriculture	Microenterprise	Difference	Interpretation
Sample proportion	0.294	0.084	0.21	Reject null hypothesis
95% CI (asymptotic)	0.2531 – 0.3349	0.0591 – 0.1089	0.1603 – 0.2597	
z-value		8.3		
P-value		<0.0001		
	Agriculture	Animal Husbandry	Difference	
Sample proportion	0.294	0.109	0.185	Reject null hypothesis
95% CI (asymptotic)	0.2531 – 0.3349	0.081 – 0.137	0.134 – 0.236	
z-value		7.1		
P-value	<0.0001			
	Animal Husbandry	Microenterprise	Difference	
Sample proportion	0.109	0.084	0.025	Accept null hypothesis
95% CI (asymptotic)	0.081 – 0.137	0.0591 – 0.1089	–0.075	
z-value		1.3		
P-value		0.1915		

Table 17: Average Value of Loan Received, Savings, Assets and Income

	Loan Received		Savings		Assets		Income	
	1st Round	2nd Round	1st Round	2nd Round	1st Round	2nd Round	1st Round	2nd Round
Mean	9898.76	10,911.16	229.54	282.96	74,092.44	80,435.50	12,245.80	14,252.73
Difference	1012.4		53.42		6343.06		2006.93	
Cor	.724		.994		.879		.965	
Sign	.000		.000		.000		.000	

Table 18: Paired '*t*' Test Summary of Loan, Savings, Assets and Income over Study Period

Details	Paired Differences					*t*	df	Sig. (2-tailed)
	Mean	Std. Devi	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Loan	–1012.40	464.34	29.85	–1071.19	–953.60	–33.92	475	.000
Assets	–6343.07	7194.63	329.77	–6991.05	–5695.09	–19.235	475	.000
Asset	–53.42	42.87	1.96	–57.29	–49.56	–27.19	475	.000
Income	–2006.93	1407.73	64.52	–2133.72	–1880.15	–31.10	475	.000

Table 19: Correlation Summary of Loans with Savings, Asset and Income

		Loan	Savings	Asset	Income
Loan	Pearson Correlation	1	**–.076**	**.027**	**–.178***
	Sig. (2-tailed)		**.196**	**.788**	**.020**
	N	475	**242**	**242**	**242**

*Correlation is significant at the 0.05 level (2-tailed).

Table 20: ANOVA Summary of Change in Assets, Savings and Income

		Sum of Squares	Df	Mean Square	*F*	Sig.
Assets	Between Groups	949549769.036	3	316516589.679	6.320	.000
	Within Groups	23637717352.813	472	50079909.646		
	Total	24587267121.849	475			
Savings	Between Groups	95664.260	3	31888.087	19.365	.000
	Within Groups	777254.018	472	1646.725		
	Total	872918.277	475			
Income	Between Groups	22579454.898	3	7526484.966	3.867	.009
	Within Groups	918727666.951	472	1946456.922		
	Total	941307121.849	475			

Findings and Discussion

The objective of the research was to identify the most preferred activity for investing the amount of microcredit as well as the impact of household financial position. The major findings are:

- The total employment generated due to microcredit was 242. Out of which agriculture activity was able to generate the highest employment followed by animal husbandry. This is because the respondents believe that agriculture was the most reliable activity for them, and in rural Odisha, keeping *livestock* is a tradition. The increase in employment generation and self-employment was confirmed by Hossain (2014) and Crépon et al. (2015).
- The most preferred activity for the investment of the amount of microcredit was agriculture followed by animal husbandry. Microenterprise individually stood at third place.
- The economic impact of microcredit was measured considering the respondents as a household. The economic impact was measured in terms of asset created, savings accumulated and income generated. The average changes in asset created, savings accumulated and income generated were ₹6343.06, ₹53.42 and ₹2006.93 over one year. These changes were considered as growth in the economic condition of the household. This is supported by Nader (2008), Hossain (2014) and Hossain (2013) who concluded that microcredit becomes an imperative element to alleviate poverty and confirmed that microcredit strongly affects income generation and asset creation as well as a source of generating a good monthly income (Kumar et al., 2015).
- In establishing the relationship between change in microcredit and different parameters of households' economic growth, it was observed that the correlation between microcredit and savings accumulated is negative and microcredit and income generated

is also negative, whereas microcredit and assets creation is positive. This represents increase in the loan amount (microcredit), increase in the assets of household, and with increase in microcredit, decrease in the income. This finding is supported by the findings of Crépon et al. (2015). They concluded that increased microcredit access led to a significant rise in investment in assets of household used for self-employment activities, and the increase in profitability, but the reduction in income, but contradict (Alhasan and Akudugu, 2012) who have concluded the positive relation between microcredit and income.

- The average change in income of agriculture, animal husbandry, microenterprise and others over a period of study was ₹2,063.84, ₹2,023.44, ₹2,175.93 and ₹1,300.00. The highest change in income was found in microenterprise activity, whereas the lowest was in 'Others' activity.
- Similarly, in savings accumulation, the highest change in savings was found in 'Others' activity, whereas the lowest change in savings was found in microenterprise.
- In assets creation, the maximum change was observed in animal husbandry, whereas the minimum change was observed in 'Others' activity.

Conclusion

Microcredit is a powerful and effective tool to alleviate poverty. Microcredit refers to lending small amounts to the economically backward people for self-employment and self-sustainability. The governing agencies support microcredit to minimize credit constrain for economically deprived people with the intention of allowing households to engage in income-generating activities either through self-employment or through generating additional employment in the household. Despite its growing popularity, little to no empirical evidence supports the effectiveness of microcredit at reducing poverty over different activities. In this context, the current research estimates the impact of utilization of credit amount in the different activities for generation of employment, income and others. The study findings highlight that the microcredit programmes have identical impact on increase in income, savings and assets of the household of WSHG members, and the change in income, savings and assets over different activities differs from each other.

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Measuring Financial Sustainability of Microfinance Institutions in India

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Abstract

As sustenance of Microfinance Institutions (MFIs) is dependent on the financial sustainability, this paper attempts to study the determinants and indicators that affect the long-term viability of an MFI which is measured in terms of two parameters, namely operational sufficiency and financial self-sufficiency. 30 MFIs operating in India have been selected for the purpose of this study. The data source used is Microfinance Information Exchange (MIX) and the period under consideration is from 2005 to 2013, which is a reasonable period for an economic cycle to be completed. Statistical tools like *F*-test, Hausman test and, finally, Panel data regression model (i.e. fixed effect test v/s random effect test) have been applied to study trends. To find the factors affecting financial sustainability, a Multiple Linear Regression analysis was used and found that the capital/asset ratio, operating expenses/loan portfolio and portfolio at risk >30 days were the main factors, which affect the sustainability of microfinance institutions. The Paper concludes that the Most of the firms do have a long-term positive trend in Operational Self-Sufficiency (OSS). On the same hand, it was found that the selected determinants of the selected MFIs have a significant impact on ROA and, hence, financial sustainability.

Keywords:

Financial Sustenance, Micro-finance Institutions, Operational Sustainability, Financially Self-sufficient

1. Introduction

Throughout the world, there are success stories attributed to the role of microfinance in providing access to financial services to the people living at the bottom of the economic pyramid, living in rural areas and women. But the sustainability of MFIs is often questioned. MFIs need to be economically viable and sustainable in the long-run; however, economic implications of long-term sustainability are not being considered (Srinivasan et al., 2006). Many researches have been carried to measure the social performance of the MFIs, but very few researchers have focused on the financial sustainability of the MFIs. It has been said that the "Unsustainable MFIs might help the poor now but not help the poor later as they will be gone" (Schreiner, 2000, p. 425). Ganka (2010) even says that it is better not to have MFIs than having unsustainable ones. The financial sustainability of MFIs is a necessary condition for institutional sustainability (Hollis & Sweetman, 1998). The above literature emphasizes on the importance of sustainability of the MFIs for long-term existence and, thus, contributing to poverty reduction.

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Financial sustainability of MFIs is an important dimension for their sustenance. It refers to the ability of MFIs to cover all its costs from its generated income from operations (Thapa et al., 1992) without depending on external support or subsidy. Dunford (2003) also defines financial sustainability as the ability to keep on moving towards microfinance objective without continued donor support. These definitions imply that the MFIs should reach a point of self-sustenance. It is possible to measure self-sustenance by two things, namely: operational sustainability and financial self-sufficiency. According to Meyer (2002), operational sustainability refers to the ability of the MFI to cover its operational costs from its operating income, regardless of whether it receives subsidy or not. On the other hand, MFIs are financially self-sufficient when they can cover long-term investments from self-generated income, both operating and financing costs and another form of subsidy valued at market prices. The above definitions of financial sustainability imply that a loss-making MFI (with poor financial performance) is classified as financially sustainable. Also, a profit-making MFI, whose profitability is determined after covering some of the operating costs by subsidized resources or funds, will also not be considered as financially sustainable.

Microfinance became a topic of key discussion in India after 2010 when the Andhra Pradesh crisis happened due to high-interest rates charged by MFIs from the poor due to lack of mortgage, and as a result of which, there was an increase in the default rate. The inability to repay led to suicides of farmers. The cause of the situation was the lack of regulations which still has not firmed up in India and the challenges faced by MFIs to sustain the business.

As sustenance of MFIs is dependent on the financial sustainability, in our research, we propose to study and identify the determinants affecting the financial sustainability. Further, we propose to study the long-term trends in the financial performance of the MFIs. The paper has been organized as follows: Section 2 addresses the literature review followed by objectives in section 3. Section 4 discusses the methodology, section 5 talks about the data analysis and interpretation and section 6 concludes the paper.

Literature Review

Literature studied on MFIs in India shows scattered and scanty research. The themes majorly touched upon can be classified under operational sustainability, Financial sustainability and, lastly, study of determinants which affect the sustenance of MFIs in India.

Literature reviewed on operational sustainability highlights that outreach is important to the sustainability of MFIs. Kaur (2014), in her study of comparing Indian MFIs to other south Asian countries, finds that the women customers have been the highest both in the pre- and post-Andhra crisis. This implies that that breadth of outreach has been maintained in India, but while considering the depth of outreach, i.e. average loan balance per borrower, it is lowest in India across the countries in South Asia. Poorer the borrower, smaller the size of loan; thus, in India, borrowers are relatively poor. Secondly, default rate in the repayment of loan has increased for India, whereas it is found to be declining in the other countries. Thus, Indian MFIs need to deepen the outreach. It is also seen that till recent past, MFIs were considered only for offering credit to the poor but research shows that MFIs need to widen the basket of products like adding savings, insurance, etc. Tiwari and Fahad (2004) in their paper MFIs in India discuss conceptual framework of an MFI in India. The successes and failures of various MFIs around the world have been evaluated and lessons learnt have been incorporated in a model. The

study states that the poor repay their loans and are willing to pay for higher interest rates than commercial banks provided that access to credit is provided. The second point made in the study is that the poor save money and, hence, MFIs should provide both savings and loan facilities. These points imply that banking for the poor can be a profitable business. However, making it financially viable and sustainable is the major challenge. To expand outreach, MFIs need to mobilize deposits which will lead to expansion of outreach and, hence, leveraging equity. To be sustainable, microfinance lending should be grounded on market principles because large-scale lending cannot be accomplished through subsidies.

Secondly, research shows that there are models to measure the social performance and outreach of the MFIs, but there is no working model to measure the financial performance of the MFIs and, hence, no formal method to comment on the long-term financial sustainability of the MFIs (Sinha and Aggarwal, 2010). Arsyad (2005) reveals that methods to measure financial sustainability are few, and those available are hybrid models which use both qualitative and quantitative data. The lack of available models to measure financial sustainability in India is due to the perception of MFIs' existence for a social cause and being considered not for profit organizations.

To achieve sustenance of MFIs, Rai and Kanwal (2011) did a comparative study of Banks vs. Non-banking Financial Companies (NBFCs). They have suggested that so far, researchers and agencies have tried to define the term financial sustainability in limited ways. Thus, they have proposed a model for financial sustainability based on important significant financial indicators like portfolio at risk, loan loss, borrowers per credit officers, etc. and assigning weights depending on the agencies using it to rank MFIs and, thus, deriving a financial sustainability score. The study lacks the comparison among the various MFIs.

The other dimension discussed in the literature is identifying the determinants which aid in sustainability of an MFI. Mahajan and Nagasri (1999) have made an attempt to study the factors which contribute to the sustainability of the MFIs, the dimensions mentioned are ownership, mission, legal and regulatory framework, demand, governance, and human resources and financial sustainability.

Jorgensen (2011) connects profitability to the yield on the gross portfolio. He states that it can be seen that from donor-driven NGO, MFIs are moving towards capital market. The paper has attempted to measure profitability using outreach, financing structure, expenses, revenue, efficiency, quality of portfolio and the peer group comparisons of deposit taking, age, legal status and profit. Due to large variances in the microfinance industry, the author faced challenges to explain patterns but showed that profitability is positively correlated to capital asset ratio, age and the gross loan portfolio. Factors that had a negative influence were legal status (credit union) and cost per borrower. The paper highlights that currently, there no clear set of best practices are define for an MFI to be profitable as the industry is diverse and still young. Another aspect which the researchers have studied is the impact of Capital Structure on Profitability of Microfinance Institutions. Kar (2011) empirically proved that an increase in leverage raises profit-efficiency in MFIs. The study also finds that cost-efficiency deteriorates with decreasing leverage, and there is a negative significant impact of leverage on the depth of outreach. Study also concludes that capital structure does not have any visible impact on the breadth of outreach, and neither is it significantly related to women's participation as loan clients.

A study was conducted by Sekabira (2013) in Uganda to find out the role of capital structure on the performance of MFIs by using panel data from 14 MFIs. He concluded that debt and grants were negatively correlated to operational and financial sustainability and in fact have a damaging consequence on the performance of MFIs; hence, they should resort to accumulating share capital for long-term sustainability than keeping dependent on debts and grants. In a very intensive study of many parts of the world, including Africa, East Asia, Eastern Europe, Latin America, the Middle East and South Asia for the years 2003 to 2006, was conducted by Bogan (2009), who found that an increased use of grants by MFIs decreases their financial sustainability and concluded that external aid could hamper the development of MFIs.

Review of literature shows that researchers have worked on the financial sustainability conceptual framework and found the indicators that influence it. But, the tool to measure the same has been found to be missing. Thus, after the review of the literature, we have found that researchers have proposed diverse determinants and indicators contributing to the sustainability of MFIs, but have not been able to consolidate, hence, this study.

Research Objectives

As sustenance of MFIs is dependent on the financial sustainability, in our research, we propose to study the financial sustainability of selected MFIs in India and the factors affecting it.

The following are precise objectives of the study:

1. To study the trend of financial sustainability of MFIs in India
2. To study the impact of different measures of financial performance on the financial sustainability of selected MFIs in India
3. To examine determinants which affect the financial sustainability of Indian MFIs

Research Methodology

This paper studies the long-term trend in the financial performance of the MFIs. This paper also makes an effort to identify the determinants affecting the financial sustainability. For such kind of study, a descriptive research design is suitable.

Hypothesis

The objective of the study can be achieved using the following hypothesis:

Ho1: There is no significant long-term trend in the financial performance of MFIs.

Ho2: There exists no significant impact of different measures of financial performance on the financial sustainability of selected MFIs in India.

Data Descriptions

For the purpose of the study, yearly data of MFIs operating in India is being considered which has been taken from MIX Market database. The sample period considered for the study is 1 April 2004 to 31 March 2013. The data is secondary in nature and collected from the website of MIX market www.mixmarket.org.

Statistical and Econometric Tools

Analysis of the panel data has been done using the statistical and econometric tools such as fixed and random effect panel data regression models. For that purpose, Microsoft Excel, SPSS and EViews have been used.

Data Analysis and Interpretation

This study considers ROA and OSS as the measure of the financial sustainability of the selected MFIs. The long-term trend is calculated with the help of regression analysis.

Trends in ROA

In the study, the long-term trend of ROA of all the individual firms is analyzed with the help of regression analysis. The bivariate regression model is applied considering ROA as a dependent variable. Mathematically, the regression model can be expressed as

$$ROA = \alpha + \beta * Time\ (in\ years) + \epsilon_t$$

Where α is the intercept and β is the slope coefficient, which indicates the long-term trend per year. The null hypothesis assumed in the regression analysis is mentioned below:

H_o = *There exist no significant trend of ROA in the selected MFIs for financial sustainability*The result of the trend analysis using regression model is shown in Table 5.1.

The result indicates that the probability value of eight MFIs, out of the selected 30 MFIs, is found to be less than 5% level of significance. Hence, with 95% confidence level, we cannot accept the null hypothesis that there is no significant trend in the behaviour of ROA. Thus, it can be concluded that these eight MFIs have significant long-term trend in the behaviour of ROA. Out of these eight MFIs, six are having a significant positive trend and two are having negative. In remaining 22 MFIs, the probability value of *t* statistic is found to be more than 5% level of significance; hence, it can be concluded that there exists no significant trend of ROA.

The selected MFIs can be categorized by estimated trends in three categories shown in Table 5.2 and Figure 5.1. The results indicate that out of 30 selected MFIs, 15 are found to have negative ROA and 15 are found to have a positive long-term ROA. Out of the 15 having a positive trend, two firms have a trend more than 2%. The above sample shows that trend of ROA from 2005–13 for 50% of the MFIs has been negative and only 50% shows a marginal positive trend. ROA and ROE are said to be dependent on the scale of operations and operation expense ratio. Higher scale of operation leads to higher ROA. Also, lower operating expense ratio contributes to higher ROE. SaDhan Microfinance Report 2014 states that MFIs with very large scale of operations tend to have higher returns and, hence, high ROA.

Table 5.1. Long-term Trend in ROA for Selected MFIs

Company	Trend Coefficient	*t* stat (*P*-value)	*F*-test (*P*-value)	*R* Square
Adhikar	–0.005	–1.622 (0.148)	2.631 (0.149)	27.32%
Asmitha	–0.037	–1.828 (0.110)	3.343 (0.110)	32.32%
Asomi	–0.001	–0.392 (0.706)	0.153 (0.707)	2.14%
Bandhan	0.001	0.168 (0.877)	0.028 (0.871)	0.40%
BSFL	–0.068	**–2.935 (0.022)** **	8.614 (0.022)	55.17%
BSS	–0.012	**–3.150 (0.016)** **	9.923 (0.016)	58.64%
BWDA	–0.001	–0.315 (0.762)	0.099 (0.762)	1.40%
Cashpor	0.014	**3.529 (0.010)** **	12.455 (0.010)	64.02%

ESAF	0.002	2.086 (0.076)	4.349 (0.075)	38.32%
GKFSPL	–0.001	–0.363 (0.725)	0.132 (0.727)	1.85%
Grama Vidiyal	–0.001	–0.425 (–1.189)	0.181 (683)	2.52%
GU Financial	–0.004	0.682 (–0.804)	1.414 (0.273)	16.80%
Janalakshmi	0.002	0.274 (0.448)	0.645 (0.448)	8.44%
KBSLAB	0.002	**3.816 (0.007)** **	14.563 (0.007)	67.54%
Madura	0.001	0.583 (0.584)	0.340 (0.578)	4.64%
Mahasemam	0.001	0.464 (0.663)	0.215 (0.657)	2.98%
Mahashakti	–0.001	–0.529 (0.612)	0.280 (0.613)	3.84%
RGVN	0.007	1.792 (0.117)	3.210 (0.116)	31.44%
Sanghamithra	0.005	**7.607 (0.000)** **	57.861 (0.000)	89.21%
Sarvodaya Nano	0.002	0.674 (0.522)	0.454 (0.522)	6.09%
Satin	0.000	0.712 (0.505)	0.506 (0.500)	6.75%
Sewa Bank	0.000	1.062 (0.329)	1.128 (0.324)	13.88%
Share	–0.033	–1.691 (0.135)	2.858 (0.135)	28.99%
SKDRDP	0.005	**9.387 (0.000)** **	88.109 (0.000)	92.64%
SKS	–0.025	–1.151 (0.288)	1.325 (0.288)	15.91%
Sonata	0.010	1.763 (0.121)	3.107 (0.121)	30.74%
Spandana	–0.031	–1.463 (0.187)	2.142 (0.187)	23.43%
Swadhaar	0.162	**6.887 (0.000)** **	47.424 (0.000)	87.14%
Ujjivan	0.039	**4.448 (0.003)** **	19.783 (0.003)	73.86%
Village Financial	–0.008	–2.307 (0.054)	5.320 (0.054)	43.18%

Figure 5.1: Trend Analysis ROA of Selected Firms

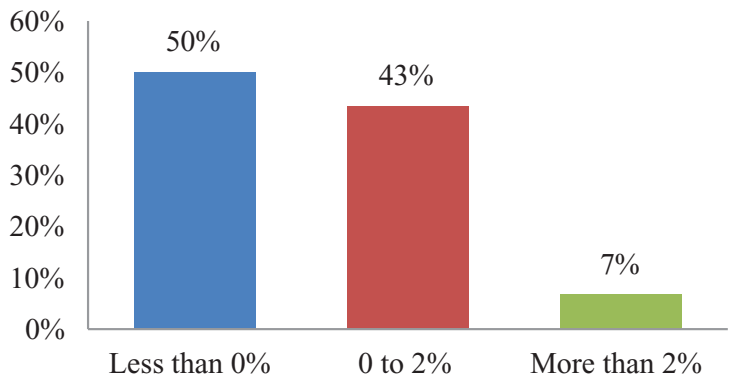
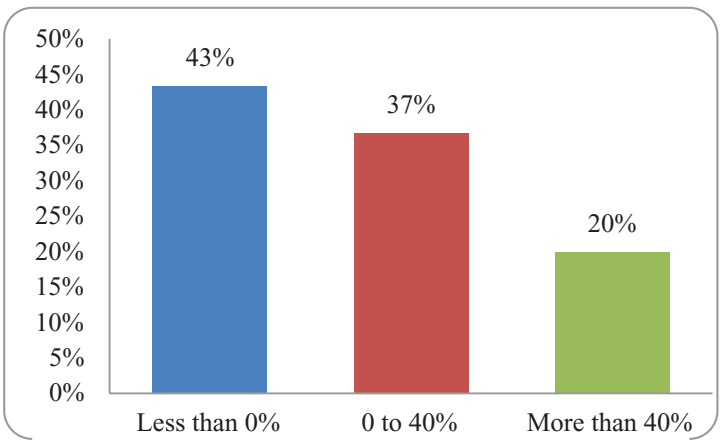


Table 5.2. Trend Analysis ROA of Selected Firms

	Frequency	Per cent
Less than 0%	15	50%
0 to 2%	13	43%
More than 2%	2	7%
Total	30	100%

Figure 5.2. Trend Analysis of OSS of selected Firms



Long-term Trend of OSS

In the study, the long-term trend of OSS of the individual firms is analyzed with the help of regression analysis. Bivariate regression model is applied considering OSS as a dependent variable and time in years as an independent variable. Mathematically, the regression model can be expressed as:

$$OSS = \alpha + \beta * Time\ (in\ years) + \epsilon_t$$

Where α is the intercept and β is the slope coefficient, which indicates the long-term trend per year. The null hypothesis assumed in the regression analysis is mentioned below:

H_o = *There exists no significant trend of OSS in the selected MFIs for financial sustainability*The result of the trend analysis using regression model is shown in Table 5.3. The result indicates that the probability value of 12 MFIs, out of the selected 30 MFIs, is found to be less than 5% level of significance. Hence, with 95% confidence level, the null hypothesis of no significant trend in the behaviour of OSS cannot be accepted. Thus, it can be concluded that these 12 MFIs have significant long-term trend in the behaviour of OSS. Out of these 12 MFIs, 10 are having a significant positive trend and two are having negative. In remaining 18 MFIs, the probability value of *t* statistic is found to be more than 5% level of significance; hence, it can be concluded that there exists no significant trend of OSS.

Table 5.3. Long-term trend in OSS for selected MFIs

Company	Trend Coefficient	*t* statistic (*P*-value)	*F*-test (*P*-value)	*R* Square
Adhikar	–0.022	–1.368 (0.203)	1.871 (0.214)	21.09%
Asmitha	–0.110	**–2.608 (0.034)** **	6.804 (0.035)	49.29%
Asomi	0.020	0.649 (0.547)	0.422 (0.537)	5.68%
Bandhan	0.038	1.598 (0.161)	2.553 (0.154)	26.73%
BSFL	–0.129	**–3.388 (0.011)** **	11.476 (0.012)	62.11%
BSS	–0.051	–2.249 (0.057)	5.058 (0.059)	41.95%
BWDA	–0.013	–0.430 (0.668)	0.185 (0.680)	2.57%
Cashpor	0.057	**4.073 (0.005)** **	16.593 (0.005)	70.33%
ESAF	0.014	**3.223 (0.017)** **	10.387 (0.015)	59.74%
GKFSPL	0.003	0.213 (0.866)	0.045 (0.837)	0.64%
Grama Vidiyal	–0.019	–1.000 (0.337)	1.001 (0.350)	12.51%
GU Financial	–0.024	–1.556 (0.157)	2.421 (0.164)	25.70%
Janalakshmi	0.013	0.847 (0.434)	0.718 (0.425)	9.31%
KBSLAB	0.012	**3.422 (0.014)** **	11.710 (0.011)	62.59%
Madura	–0.092	–1.980 (0.086)	3.921 (0.088)	35.90%
Mahasemam	0.010	**2.859 (0.031)** **	8.174 (0.024)	53.87%
Mahashakti	–0.005	–0.733 (0.447)	0.537 (0.487)	7.13%
RGVN	0.045	**2.418 (0.048)** **	5.848 (0.046)	45.52%
Sanghamithra	0.034	**6.402 (0.000)** **	40.989 (0.000)	85.41%
Sarvodaya Nano	0.015	0.897 (0.415)	0.805 (0.400)	10.31%
Satin	0.054	1.202 (0.272)	1.443 (0.269)	17.10%
Sewa Bank	0.003	0.925 (0.485)	0.855 (0.386)	10.89%
Share	–0.099	–2.021 (0.082)	4.086 (0.083)	36.86%
SKDRDP	0.037	**6.709 (0.000)** **	45.017 (0.000)	86.54%
SKS	–0.066	–1.436 (0.191)	2.063 (0.194)	22.77%
Sonata	0.110	**2.727 (0.030)** **	7.437 (0.029)	51.51%
Spandana	–0.104	–1.645 (0.142)	2.705 (0.144)	27.87%
Swadhaar	0.147	**10.733 (0.000)** **	115.187 (0.000)	94.27%
Ujjivan	0.134	**5.842 (0.001)** **	34.131 (0.001)	82.98%
Village Financial	–0.035	–2.28 (0.053)	5.207 (0.056)	42.66%

In the study, it is observed that some of the MFIs have significant positive trend with respect to OSS. Most of the firms do have a long-term trend of OSS. This indicates that the OSS is available for most of the MFIs. The result indicates that out of 30 MFIs selected, 13 are found to have a negative OSS and the remaining 17 have a positive

long-term trend. Out of the 17 MFIs, six are found to have an OSS increasing on an average of 40% over 2005–13.

Table 5.4. Trend Analysis of OSS of selected Firms

Trend	Frequency	Per cent
Less than 0%	13	43%
0–40%	11	37%
More than 40%	6	20%
Total	30	100%

Determinants of Financial Sustainability (ROA and OSS)

Meyer (2002) indicated that measuring financial sustainability requires that MFIs maintain good financial accounts and follow recognized accounting practices that provide full transparency for income, expenses, loan recovery and potential losses. The financial performance of MFIs is often studied by the profits, the MFI earns as a percentage of assets (return on assets (ROA)). Rai and Rai (2012) have used ROA, as possible descriptive factors to determine financial sustainability of MFIs (as measured by OSS). Roy (2011) examined the delivery process and profitability of MFIs. Profitability was analyzed using ROA and ROE. This study used simple correlation and descriptive analysis technique and found that MFIs of Assam had high profitability.

Thus, keeping in view both long-term and operational sustainability of MFIs, both ROA and OSS have been taken as a dependent variable to measure the financial sustainability of the MFIs in India. It is seen that the autocorrelation between the two independent variables chosen is 1.020 (Durban-Watson).

Determinants of ROA

Return on Assets (ROA): An indicator of how profitable a company is in relation to its total assets. ROA gives an idea as to how efficient management is at using its assets to generate earnings.

ROA is displayed as a percentage and calculated as

$$\text{ROA} = \frac{\text{Net Inocme}}{\text{Total Net Assets}}$$

To identify the determinants of ROA of different selected MFIs, the panel regression model is applied. In the study, *F*-test as well as Hausman test is applied in order to identify the most suitable panel data regression model (i.e. fixed effect test vs. random effect test). The results of *F*-test and Hausman test are shown below in Table 5.5.

The results indicate that the *p*-value of Hausman test for all the considered determinants is found to be more than 5% level of significance. Hence, the null hypothesis that the effects are random can be accepted. Thus, it is decided to apply random effect model in order to understand the impact of different variables to be considered as determinants on ROA. The result of Random regression model is shown below in Table 5.6.

The results of random effect model indicate that the probability value of *t* statistic of slope coefficient of the independent variables (OSS, CAR, OELP and PAR) is also

Table 5.5. Test on ROA as a dependent Variable

Variable	*F*-test (Fixed Effect)			Hausman test (Random Effects)			Remarks
	Test	Statistics	*P*-value	Test	Statistics	*P*-value	
Operational Self-sufficiency	Cross-section F	3.914	0.000	Cross section random	0.458	0.498	**Random**
	Cross-section Chi-square	104.906	0.000				
Portfolio at Risk >30	Cross-section F	5.072	0.000	Cross section random	1.463	0.2264	**Random**
	Cross-section Chi-square	129.451	0.000				
Operating Expense to Loan Portfolio Ratio	Cross-section F	2.945	0.000	Cross section random	3.809	0.0510	**Random**
	Cross-section Chi-square	82.496	0.000				
Capital Asset Ratio	Cross-section F	5.481	0.000	Cross section random	3.837	0.050	**Random**
	Cross-section Chi-square	137.595	0.000				

Table 5.6. Fixed/Random Effect Model Indicating the Impact on ROA

Effect	Independent Variable	Regression Coefficients		*T*-statistics (*p*-value)	*F*-statistics (*p*-value)	*R* Square
Random	Operational Self-sufficiency	Intercept (α)	–0.351	–15.060 (0.000)	261.287 (0.000)	49.46%
		Beta (β)	0.312	16.147 (0.000)		
Random	Capital Asset Ratio	Intercept (α)	–0.052	–3.090 (0.002)	30.967 (0.000)	10.39%
		Beta (β)	0.240	5.593 (0.000)		
Random	Operating Expense to Loan portfolio Ratio	Intercept (α)	0.083	8.003 (0.002)	299.495 (0.000)	52.87%
		Beta (β)	–0.886	–17.395(0.000)		
Random	Portfolio at Risk >30	Intercept (α)	0.008	0.500 (0.618)	44.61 (0.000)	14.32%
		Beta (β)	–0.421	–6.683 (0.000)		

found to be less than 5% level of significance. Hence, with 95% confidence level, the null hypothesis that there is no significant effect of selected determinants on ROA is rejected. Thus, it can be concluded that the selected determinants of the selected MFIs have a significant impact on ROA.

Rai and Rai (2012) studied about the factor affecting financial sustainability of microfinance institution. They applied Multiple Linear Regression to find the factors affecting financial sustainability, and found that the capital/asset ratio, operating expenses/loan portfolio and portfolio at risk >30 days were the main factors, which affect the sustainability of microfinance institutions. Pathneja et al. (2015) attempted to measure the determinants of performance of Indian financial sector- banks and MFIs. They concluded that the performance is affected mainly by two variables, i.e. size and spread to total assets. All other variables are either negative or insignificant or both to the performance of banks and microfinance institutions. The same has been found in the above paper which has been supported by literature too. In this study, we have tried to assess the impact of OSS too which has not been done in the previous literature and found that OSS also impacts the ROA.

Combined Effect of Determinants on ROA

To identify the determinants of ROA taken together for different selected MFIs, the panel regression model is applied. In the study, *F*-test as well as Hausman test are applied in order to identify the most suitable panel data regression model (i.e. fixed effect test vs. random effect test). The results of *F*-test and Hausman test are shown in Table 5.7.The results of random effect model considering all the determinants indicate that the probability value of *t* statistic of slope coefficient of all the independent variables (OSS, CAR, OEA and PAR) is also found to be less than 5% level of significance. Hence, with 95% confidence level, it can be concluded that the selected determinants of the selected MFIs have a significant impact on their ROA. The *p*-value of *F* statistics in case of random effect model is found to be less than 5% level of significance which indicates that the random effect model is statistically fit, and *R* square value of 84.7 percent indicates that all selected factors affect the financial sustainability very strongly (Table 5.8).

Determinants of OSS

OSS: Operating self-sufficiency is a percentage (%), which indicates whether or not enough revenue has been earned to cover the Microfinance Institution's (MFI's) total costs—operational expenses, loan loss provisions and financial costs.
OSS is expressed as:

$$OSS = \frac{\text{Operating Income (Loan + Investments)}}{\text{Operating Costs} + \text{Loan Loss Provisions} + \text{Financing Costs}}$$

To identify the determinants of OSS of different selected MFIs, the panel regression model is applied. In the study, *F*-test as well as Hausman test is applied in order to identify the most suitable panel data regression model (i.e. fixed effect test vs. random effect test). The results of *F*-test and Hausman test are shown below in Table 5.9.
The results indicate that the *p*-value of Hausman test for all the considered determinants is found to be more than 5% level of significance except for PAR > 30. Hence, the null

Table 5.7. Combined Effect of Determinants on ROA

Variable	*F*-test (Fixed Effect)			Hausman Test (Random Effects)			Remarks
	Test	**Statistics**	***P*-value**	**Test**	**Statistics**	***P*-value**	
	Cross-section F	3.733	0.000	Cross section random	10.323	0.0353	**Fixed**
	Cross-section Chi-square	101.912	0.000				

Table 5.8.

Independent Variable	Coefficient	*T*-statistic (*P*-value)	*F*-value (*P*-value)	*R* Square
Intercept	–0.114	–4.946 (0.000)	39.431 (0.000)	**84.70%**
Operational Self-sufficiency	0.184076	10.100 (0.000)		
Capital Asset Ratio	0.132624	5.377 (0.000)		
Operating Expense to Loan Portfolio Ratio	–0.689228	–14.43 (0.000)		
Portfolio at Risk >30	–0.123418	–2.756 (0.006)		

hypothesis that the effects are random can be accepted. It is decided to apply random effect model in three variables, to understand the impact of different variables on OSS. The result of fixed/random regression model is shown below in Table 5.10.

The results of fixed/random effect model indicate that the probability value of *t* statistic of slope coefficient of the independent variables (ROA, OEA, PAR and TEA) is found to be less than 5% level of significance. Hence, with 95% confidence level, the null hypothesis that there is no significant effect of selected determinants on OSS is rejected. Thus, it can be concluded that the selected determinants of the selected MFIs have a significant impact on OSS.

Combined Effect of Determinants on OSS

To identify the determinants of OSS taken together for different selected MFIs, the panel regression model is applied. In the study, *F*-test as well as Hausman test is applied in order to identify the most suitable panel data regression model (i.e. fixed effect test vs. random effect test). The results of *F*-test and Hausman test are shown below in Table 5.11.

The results of random effect model considering all the determinants indicate that the probability value of *t* statistic of slope coefficient of all the independent variables (ROA, PAR, OEA and TEA) is also found to be less than 5% level of significance. Hence, with 95% confidence level, it can be concluded that the selected determinants of the selected MFIs have a significant impact on their OSS. The *p*-value of *F* statistics in case of random effect model is found to be less than 5% level of significance for ROA and PAR, but for OEA and TEA, the level of significance is found to be more than 5% which indicates that these selected determinants have significant effect on the financial sustainability of selected MFIs (Table 5.12).

Conclusion

It can be concluded in the study that many of the selected MFIs have significant positive and long-term trend behaviour in terms of OSS. It means that OSS is good for most of the selected MFIs under study. This paper has significant contribution in terms of explaining the impact of OSS on financial sustainability of MFIs as it is measured for the first time and has not been done in the existing literature. In addition to this, the OSS of the selected MFIs is found to have a significant impact on ROA. Further, it can be concluded that the capital/asset ratio, operating expenses/loan portfolio and portfolio at risk >30 days are the main factors, which affect the sustainability of microfinance institutions. Pathneja et al. (2015) attempted to measure the determinants of performance of Indian financial sector banks and MFIs. They concluded that the performance mainly rotates around two variables, i.e. size and spread to total assets. All other variables are either negative or insignificant or both to the performance of banks and microfinance institutions. The results of this study also conform to the exiting literature in this regard.

Table 5.9. Test on OSS as a Dependent Variable

Variable	*F*-test (Fixed Effect)			Hausman Test (Random Effects)			Remarks
	Test	Statistics	*P*-value	Test	Statistics	*P*-value	
Return on Assets	Cross-section F	3.309	0.000	Cross-section random	0.0167	0.897	**Random**
	Cross-section Chi-square	91.122	0.000				
Portfolio at Risk >30	Cross-section F	5.658	0.000	Cross-section random	5.821	0.016	**Fixed**
	Cross-section Chi-square	141.061	0.000				
Operating Expense to Assets Ratio	Cross-section F	2.682	0.000	Cross-section random	.0038	0.9510	**Random**
	Cross-section Chi-square	76.072	0.000				
Total Expense to Asset Ratio	Cross-section F	3.271	0.000	Cross-section random	0.697	0.404	**Random**
	Cross-section Chi-square	90.237	0.000				

Table 5.10. Fixed/Random Effect Model Indicating the Impact on OSS

Effect	Independent Variable	Regression Coefficients		*t*-statistic (*p*-value)	*F* Statistics (*p*-value)	R Square
Random	Return on Assets	Intercept (α)	1.096	49.269 (0.000)	262.17 (0.000)	49.54%
		Beta (β)	1.581	16.161 (0.000)		
Fixed	Portfolio at Risk >30	Intercept (α)	1.148	70.313 (0.000)	8.013 (0.000)	50.25%
		Beta (β)	–1.351	–9.554 (0.000)		
Random	Operating Expenses to Assets	Intercept (α)	1.202	38.962 (0.000)	59.548 (0.000)	18.24%
		Beta (β)	–1.166	–7.701 (0.000)		
Random	Total Expenses to Assets Ratio	Intercept (α)	1.349	39.207 (0.000)	137.952 (0.000)	34.07%
		Beta (β)	–1.310	–11.737 (0.000)		

Table 5.11. Combined Effects of Determinants on OSS

Variable	*F*-test (Fixed Effect)			Hausman Test (Random Effects)			Remarks
	Test	**Statistics**	***P*-value**	**Test**	**Statistics**	***P*-value**	
	Cross-section F	4.708	0.000	Cross-section random	8.560	0.0731	**Random**
	Cross-section Chi-square	123.216	0.000				

Table 5.12.

Independent Variable	Coefficient	T-statistic (*P*-value)	F-value (*P*-value)	R Square
Intercept	1.037	20.832 (0.000)	83.696 (0.000)	**55.91%**
Return on Assets	1.773674	8.058 (0.000)		
Portfolio at Risk>30	–0.634389	–5.215 (0.000)		
Operating Expenses to Asset Ratio	–0.087023	–0.3797 (0.705)		
Total Expenses to Asset Ratio	0.511185	1.892 (0.059)		

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Preserving Arctic and Antarctic Ice: Ideas about Artificial Processes

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Abstract

Catastrophic ice loss from the Arctic and Antarctic may lead to large-scale changes in both weather and climate. From a human perspective, the worst case resulting would be changes to weather circulation such that rain patterns would be disrupted significantly. The impact on global agriculture is worth studying. Preliminary thoughts related to modelling this question will be presented as a part of ongoing research. Also, methods and estimates related to artificially thickening ice at the poles perhaps to prevent such a loss will also be presented in a preliminary form.

Keywords:

Climate Change, Geoengineering, Polar Research, Sea Ice, Ice Sheet

Preliminary Thoughts

Ice is melting from the Arctic and Antarctic. Humans are ingenious enough to put people on the moon, genetically engineer crops, create sex reassignment surgery for those who want it, and a host of other things—ranging from trivial to significant. Keeping ice at the Earth's poles artificially would probably be a significant accomplishment. Medals would be minted and celebrations would mark the accomplishment. Humanity could breathe a small sigh of relief as it moves on to tackle some other challenge.

At its simplest, artificially adding ice to the Arctic and Antarctic is a two-stage challenge: (1) get water to the right place; and (2) let it freeze. Perhaps an optimal solution to the first part is to try and use the closest water possible, maybe seawater that is there. The second part is complicated by the means of transport. Water should not freeze before it is where it needs to be. Any technique to promote transport cannot do so at the expense of freezing once it has arrived.

Global Functions of Arctic and Antarctic Ice

The polar ice serves three significant functions related to the climate. First, it increases albedo (Wang & Zender, 2011). Sunlight reflects better from ice than from sea or bare or treed land surfaces. This reflection helps send incident solar radiation back into space. A very cloudy atmosphere does something similar, and it is unclear whether the loss of sea ice at the poles from atmospheric heating will produce a net change in albedo (Goldner et al. 2013). If the ice melts, more water will then reside in the

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atmosphere, and from that there will be greater cloud cover. Notwithstanding, albedo is one significant function of polar ice.

Second, ice sequesters water (Shepherd et al. 2012). Water trapped as the polar ice on land prevents the oceans from rising (Meyssignac & Cazenave, 2012; Raymo & Mitrovica, 2012). Polar ice, along with other glaciers and ice caps, consists of approximately 1.715% of the water in the hydrological cycle (Shiklomanov, 1993). Here is a simple model: If each reservoir in the hydrologic system were to receive an even share of this water—as ice melts and ocean surface area increases—H2O in the atmosphere would increase by about 1–2% of its current level.

H_2O is a greenhouse gas, and increased water vapour in the polar atmosphere could lead to increased greenhouse warming. Because of precipitation, tropospheric water has a short atmospheric residence time (about 10 days), but its presence could amplify the effects of other greenhouse gases by a factor of 2 or 3 (Held & Soden, 2000). Thus, the ice trapped at the poles works to mitigate the effects of other greenhouse gases.

The polar ice has a further likely function of import, a third function. It stabilizes the weather in the polar circulation cell. If there were no ice at the poles, the air near the ocean surface would be warmer than the ice cover is now—as incident sunlight warms it. That warm air would fuel convection, and, in short, there would be increased convection in the troposphere in the polar regions. A model suggests that this is what occurred during the late Cretaceous and early Paleogene, a period of equable climate globally (Abbot & Tziperman, 2008). In this scenario, the shift from one climate regime to another is prevented by the presence of the polar ice. The ice is seen as a stopgap between climate regimes. Preventing the transition from one climate regime to another includes preventing extreme weather events associated with the transition.

If the ice melts wholesale, there is a further issue with convection. The presence of so much freshwater (from the ice melt) would lower the salinity of surface waters, and, hence, their density. Downwelling, which is driven by a density gradient, would slow (Aagaard & Carmack, 1989). The transfer of heat from equatorial oceans to high-latitude oceans is driven in part by the ability of this downwelling to make space for incoming surface waters. If there is less downwelling at high latitudes, heat transfer from equator to high latitudes in the ocean surface waters will be diminished. Extra heat at the equator will fuel stronger storms there. Thus, melting polar ice in volume has the potential to disrupt ocean circulation and make changes to weather.

The converse of the above is also interesting. With thicker polar ice, surface waters are cooled and downwelling increases. Also, since surface waters are enriched in dissolved carbon dioxide from the atmosphere, increased downwelling serves to sequester atmospheric carbon to a certain extent (Zhou & Flynn, 2005). Thicker ice would mean more carbon sequestration. Thus, the polar ice is seen to influence the carbon cycle via its effect on oceanic circulation. The above has highlighted three effects that the polar ice has on convection: (a) limiting atmospheric circulation at the poles; (b) promoting global oceanic circulation to draw heat from the equatorial regions; and (c) promoting carbon sequestration. In summary, this section has highlighted three overall functions of polar ice: (1) increasing albedo; (2) storing water; and (3) stabilizing the climate via convective processes.

Global Agriculture

Climate change implies a disruption of rainfall patterns, which in turn impacts global agriculture. At its most basic, domesticated crops have water requirements that are

largely met by rainfall or irrigation based on water discharge (indirectly based on rainfall and snow and ice melt). Fluctuations in rainfall patterns on decadal timescales could reasonably be expected to cause global agricultural disruption. The food supply of humans is thus vulnerable to disruption in the coming decades. Disruption to global climate could have catastrophic consequences for human civilization. Stable city life depends upon stable supplies of agricultural products, as it has for millennia. In response, Wratt et al. (2006) and others are working to provide farmers with up to date information about rainfall, frost, and soil-type patterns, to reduce economic risk in the industry. Uncertainty is significant in crop models, especially related to temperature variations (Lobell & Burke, 2008).

Unfortunately, low-probability, high-impact catastrophes from climate change scenarios are not possible to mitigate effectively (Weitzman, 2009). Could the loss of major ice sheets occur on a decadal timescale? Such a loss may be a point of no return, as the natural re-growth of ice sheets would occur on millennial timescales.

Anatomy of Polar Ice

Sea ice, ice shelf, and ice sheet thicknesses are different from each other, and also different depending on whether they are Arctic or Antarctic. See Table 1. The annual mean Arctic sea ice thicknesses vary from 3.6 m (in 1980) to 2.4 m (in 2000) (Vaughan et al. 2013). The long-term mean Antarctic sea ice thickness is 0.87 m (1981 to 2005; standard deviation 0.91 m) (Worby et al. 2008).

The mean thickness of the Antarctic ice shelves is 440 m (1950 to 2000, 150 surveys, root-mean-square error from about 20 m to about 100 m for different ice shelves) (Lythe & Vaughan, 2001) and that of Antarctic sheet ice is 1856 m, combining both East Antarctic (2146 m) and West Antarctic (1048 m) means, and the distribution has a large peak (or mode) around 2800 m (*Ibid.*). The mean thickness of the Greenland sheet ice is approximately 1600 m (Bamber et al. 2013).

Table 1. Mean Thicknesses of Arctic and Antarctic Sea Ice, Antarctic Ice Shelves, and Antarctic Greenland Sheet Ice

Ice Type	Mean Thickness	Mean Type
Arctic sea ice	2.4–3.6 m	Annual
Antarctic sea ice	0.87 m	Long term
Antarctic shelf ice	440 m	
Antarctic sheet ice	1856 m	
Greenland sheet ice	1600 m	

The extent area of sea ice varies with the seasons, but the Antarctic ice shelves vary more according to patterns in underlying ocean temperature (Vaughan et al. 2013). See Table 2. The Arctic sea ice extent varies from 6.2 to 14 million km2 seasonally, with a volume of 13.0–16.5 thousand km3 (*Ibid.*). The Antarctic sea ice extent varies from 2.9 to 19 million km2 seasonally, with a volume of 3.4–11.1 thousand km3 (*Ibid.*). The Antarctic ice shelf extent is 1.6 million km2, with a volume of 380 thousand km3 (*Ibid.*). The Antarctic sheet ice extent is 8.3% of the global land area, or 12.3 million km2 (*Ibid.*), with a volume of 24.7 million km3, excluding the shelf ice (Lythe & Vaughan, 2001). The Greenland ice sheet extent is 1.2% of the global land area, or 1.8 million km2 (Vaughan et al. 2013), with a volume of 3.0 million km3 (Bamber et al. 2013).

Table 2. Extent and Volume of Arctic and Antarctic Sea Ice, of Antarctic Shelf Ice, and of Antarctic and Greenland Sheet Ice

Ice Type	Area (km^2)	Volume (km^3)
Arctic sea ice	6.2 to 14 million	13.0 to 16.5 thousand
Antarctic sea ice	2.9 to 19 million	3.4 to 11.1 thousand
Antarctic shelf ice	1.6 million	380 thousand
Antarctic sheet ice	12.3 million	24.7 million
Greenland sheet ice	1.8 million	3.0 million

Neither sea ice nor ice shelves melt wholesale. They both calve along zones of weakness, called *leads*, and these leads determine the geometry of the resulting ice loss. The sea ice deforms and fractures in response to stress and strain from (1) wind (a primary force, compressive), (2) ocean currents (a secondary force, mostly compressive), (3) Coriolis forcing (almost negligible), and (4) thermal conditions (important in fracture, tensile), with (1) predominating in deformation and fracturing (Weiss, 2003). Near-surface wind and temperature govern the formation, accretion, movement, and the melting of sea ice (Henderson, Barrett & Lafleur, 2014). In contrast, the calving of ice sheets (and glacial crevasse formation) is mainly a tensile process, related to the velocity of glacier advance or retreat. The main control is in spatially distributed variations in velocity. That is, shelf and sheet ice deformation is controlled by variations in ice velocity (Layberry & Bamber, 2001). Secondary controls are those related to the ice margin itself (e.g., local stress imbalances, melting at or below the waterline or ground, and strain at the junction of grounded and buoyant sections of shelf ice) (Benn, Warren & Mottram, 2007). See Table 3.

Table 3. Predominant Conditions Responsible for Fracture of Sea Ice, Shelf Ice, and Sheet Ice

Ice Type	Condition
Sea Ice	Wind
	Near-Surface Temperature
Shelf Ice/Sheet Ice	Variations in ice velocity
	Stress, strain and melting at the margins

The fracture of both the sea ice and the shelf ice (approximately) follow a cubic scaling law (Weiss, 2003). That is, there are about one-eighth as many ice floes of double a given diameter. The sea ice lead spacing is clustered, with a power law of about 2: There is about one-fourth of the number of spaced leads as the given spacing width is doubled, based on the observation (Weiss, 2003). Glacial crevasses and ice sheet fractures are not clustered; rather, they are evenly distributed, with at least one report of 20–80 m distributions for crevasses (Weiss, 2003).

Artificial Processes

If the polar ice ought to be protected, then technological processes provide one option. A protective process is one that would help to counter the typical fracture of sea ice, the calving of ice shelves, and help to prevent the melting of sheet ice.

One protocol that might be undertaken is the monitoring of shelf and sheet ice for strain. Satellite data showing differential strain in landmasses have been used extensively in earthquake observations (Jet Propulsion Laboratory, 2013). This can be applied to the Antarctic ice shelves (Goldstein et al. 1993). New satellite emplacement may not be required. Strain data may help to plan for the locations of ice weakness and subsequent loss.

In addition to the above, summer melt increases ice porosity (lowering strength) and decreases salinity through flushing, thereby lowering electromagnetic sensitivity: Fresh water is less conductive than saline (Vaughan et al. 2013). Thus, remote electromagnetic sensing may be a mode of gathering data to determine strategic locations for mitigation. In the previous section, it was mentioned that melting on the margins of sheet ice, and notably in the lower margin, is a secondary control on fracture formation. It is conceivable that artificial ice dams might retard the outflow of sheet ice meltwater and thereby retard the melting.

This is the first of three goals that seem relevant: (1) artificial sea ice to prevent meltwater outflow. The other two are (2) new artificial sea ice to prevent loss of sea ice generally; and (3) artificially thickened sea ice. Zhou and Flynn (2005) discuss various options for increasing the downwelling of ocean currents. One of their proposed solutions (and the most cost-effective one examined) is ice sheet thickening. The technique they describe involves a set of unmanned stations that are powered by wind generators. Each has pump and sprayer with high pressure—high enough so that water sprayed to altitude will form small ice crystals. These then fall to the ocean surface, eventually after several cycles forming a layer of ice where none had been before. Each station also has a pump and a sprayer with low pressure, to spray water on already extent ice. The water freezes and the ice is thickened.

They estimate a cost (in year 2000 US Dollars) of $45 billion for the initial set up and an ongoing cost of $1.3 billion annually to install and run 8100 of these stations. That number is what they estimate it would take to create enough ice in the Arctic to increase downwelling by 1 million cubic meters per second as the surface water is cooled, with the goal of sequestering surface water carbon into the deep oceans from this process. See Tables 4 and 5.

A second method of artificially thickening sea ice is suggested in popular media reports for places where ice overlays water. For example, a planned attempt may have occurred at the Tuul River in Ulan Batur, Mongolia (Watts, 2011). Holes were to be drilled in the ice cover of the river during late fall or early winter. Water was to be pumped up through the holes. The water was to be sprayed on top of the ice cover. The idea is the same as with Zhou and Flynn (2005): The water spray freezes, and the ice is thickened, thereby allowing it to withstand melting. It is not clear whether the Mongolian experiment actually took place, and if it did, what the outcome was. Also, this method is likely to be more expensive than what Zhou and Flynn (2005) present, since it involves (1) the additional step of drilling through sea ice, and (2) personnel for the daily running of the operation.

Table 4. Capital Costs for Wind-Powered Polar Sea Ice Generators (adapted from Zhou & Flynn, 2005)

Category	Element	No. of units	Unit cost w/o learning factor ($ k)	Learning factor	Overall cost ($ M)
		Direct Costs			
Barges	Material	8100	1900	0.8	28000
	Labour ($50 hr–1)	8100	1100		
	Overhead and profit	8100	1300		
Wind power	Installed wind power system	8100	450	0.8	3500
	Battery bank	8100	90		
Pumping	Low volume pump	8100	30	0.8	3500
	High volume pump	16200	200		
	Heat tracing and insulation	8100	120		
Transportation	Helicopter	32	1000	1	32
Land-based construction	Control centre and instrumentation	1	70000	1	990
	Harbour and harbour machinery	4	100000		
	Air base	4	130000		
		Indirect Costs			
Engineering and supervision	5% of direct costs	1	1700	1	1700
Contingency	20% of direct costs	1	6900	1	6900
Total					45000

Table 5. Operating and Maintenance Costs (adapted from Zhou & Flynn, 2005)

Category	Element	No. of units	Estimate basis	Unit cost ($ k yr^{-1})	Overall cost ($ M yr^{-1})
Barges	Tug rent	8100	$300 hr^{-1}	20	730
			Deployment and retrieval: 1440 hrs		
			1 tugboat per 20 barges		
	Maintenance	8100	1% of direct costs	40	
	Insurance	8100	1% of total costs (barge, wind power and pumping system)	30	
Wind power	Wind turbine and battery O & M	8100	$0.015 kW–1h–1	15	200
	Battery replacement	8100	10 years lifespan	10	
Pumping	Pump O & M	8100	3% of capital costs	10	240
	Heat tracing O & M	8100	20% of capital costs	20	
Transportation	Helicopter maintenance	32	15% of capital costs	150	26
	Fuel consumption	32	$0.2 litre–1	70	
			230 liters per flight hour		
	Labor and overhead	32		580	
Land-based construction	Control center	1	Building and equipment maintenance: 5% of capital costs	5100	99
			Total personhrs ($75 hr-1): 5400 yr^{-1}		

Category	Element	No. of units	Estimate basis	Unit cost ($ k yr^{-1})	Overall cost ($ M yr^{-1})
	Harbor	4	Docks and machinery maintenance: 5% of capital costs	17000	
			Total personhrs ($75 hr^{-1}): 151200 yr^{-1} per harbor		
	Air base	4	Runway, control tower, and machinery maintenance: 5% of capital costs	6500	
			Total personhrs ($75 hr^{-1}): 3240 yr^{-1} per base		
Total					1300

Concluding Remarks

This paper has given a brief sketch of a possible area of investment to counter climate change related to the loss of polar ice. The ideas herein are in the public domain. The articles cited are public knowledge. Perhaps a reader will decide that there is some business opportunity here that will have the primary benefit of humanity's greater good. More work needs to be done.

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Evolving a Holistic Model for Sustainability: A Case Study of Walmart

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Abstract

Sustainability has developed, from Sustain Ability to a multi-dimensional concept that articulates profit with preservation in both production and manufacturing field. The term Sustainability is not confinedto green, eco-friendly products but has reached a compelling level of discussion of intergenerational equity, profit maximisation through triple bottom line approach, stakeholder perspectives and so on. Hence this paper intends to evolve a holistic model for sustainability through theme wise literature review, along with reviewing major theories of sustainable development. Further, based on identified factors from literature review and annual sustainability report of Walmart, Total Interpretive Structural Modelling (TISM) will be used for developing a holistic model of sustainability. This holistic model could explain multiple perspectives of sustainability that focus on both profit and preservation.

Keywords

Sustainability, profit and preservation, multidimensional approach, vitality

Introduction

Market turbulence, volatility and resource depletion has been a new phase of globalization. The instability and non-traditional approaches continue to remain a constant in the globalization era. The rise of customer demand and new pattern of non-traditional consumption will continue to facilitate new business models and changes in business approaches. Under these given circumstances companies need to be more flexible in order to maintain their agility, the flexible organization could be a sustainable one. Sustainability is not a multi-dimensional opportunity but it's a one dimensional nuisance (Hart and Milstein, 2003), such attitude will only distract the organizational agility. Evolving from triple bottom line perspectives, sustainability is amplified to stakeholder perspectives that contribute to constant growth and profit of the organization. Finding a balance between economic prosperity, environmental quality and the element which business has tended to overlook- social justice, moves organizations towards an absolute state of sustainability (Elkington, 1994).

The perspectives of sustainability introduce many potential complications in the simple definition of economic development. Despite complications, triple bottom

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line is widely accepted as resonance with sustainability. Triple bottom line (TBL) was first coined by John Elkington in 1994. Triple bottom line attempts to evaluate the socio-environmental impact of firm's economic activities along with financial returns. The concept focuses on fair employment opportunity, social investments through sponsorships, grants and investments common good and welfare. In terms of ecological impact, the environment is considered as natural capital to attain long term sustainability through refraining toxic items even as vestigial output. The profit aspect in TBL is both the means and end needed to be honest in earning profit. The profit should be earned in harmony with other two principles of triple bottom line, i.e. people and planet. Triple bottom line insists on organizational responsible profit making along with non-financial activities, that generate human capital and natural capital for sustainable growth of an enterprise.

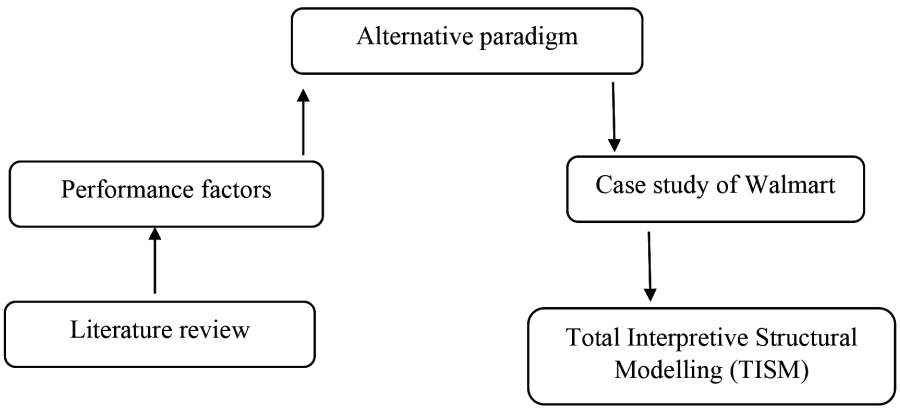
Recent global turbulence, volatility and other issues like land accusation from tribal community made us to think of a new paradigm for sustainability, that accommodates the locals and their resources for economic development. In order to get a holistic sustainable paradigm, a shift from from flexibility to organizational agility is considered as multiple perspectives. The performance of an enterprise not only relies on financial returns, but also depends on the other stakeholders' satisfaction. Sustaining profit is mandatory for business in the long run, it is achieved through efficient use of natural resources or raw materials. Efficient resource allocation is not a new concept in economics, whereas stakeholder satisfaction along with resource allocation is something that needs to be pondered upon. Hence our holistic model for sustainability will journey from need for change to organizational vitality, that sustains the enterprise's profit, resource utilization and human development of local community where the enterprise heavily relies on every resource. Therefore an agile organization is a sustainable enterprise,research conducted at Massachusetts institute of technology (MIT) suggests that agile firm grow revenue 37% faster and generate 30% higher profits than non-agile companies (EIU, 2009).

Methodology

The study follows stepwise methodology in order to support the objectives of paper as shown in figure1. The major theories of development that facilitate multi-dimensional approach towards sustainability and literature on triple bottom line had been reviewed and the research gaps have been identified. The review provides wider understanding of perspectives and conceptual components by various scholars. Emphasis is on holistic studies of sustainable enterprise.

Having identified the factors from case study annual sustainability reports and literature, an extensive case study will be done on Walmart regarding their sustainability activities. Finally using Total Interpretive Structural Modelling (TISM), a holistic model shall be evolved. Sushil (2009) this is not only useful in making the structural model fully interpretive, but will also contribute in creating a knowledge base of the interpretive logic of all the relations. This will also be helpful in linking the structural model with knowledge management, thus, making it dynamic to be upgraded further. The application of TISM can be extended to articulate and interpret many additional complex issues in decision making, culture and policy formulation.

Figure: 1 Step wise Methodology for the Study



Literature Review

According to various literature sources the need for stakeholders and various actors' interactions become important in the decision making and particularly in, strategic formulation and problem solving. Over three decades, Sustainability has definitely been differentiated from sustainable development, corporate social responsibility,corporate social performance and so on. Corporate management is faced with the task described by the Brundtland Commission of effectively satisfying ecological and social needs, integrating their management in conventional economic management and thereby establishing sustainability management. (BMU/BDI, 2002). In order to implement sustainability practices, companies need concepts and instruments that facilitate evolving sustainable enterprise. The intent this of study is to briefly review theories and sustainable enterprise in terms of triple bottom line, so that alternative candidate could be proposed as original contribution towards holistic sustainable entries.

Theories of Sustainable Development

Although development theories are considered as vague concepts in terms of profit maximization and financial returns in business institutions in general, it gained momentum after Second World War (1945-49) The key issues in discussion were the underdeveloped countries and colonial rule. Over a time a sub- discipline called development theory evolved. It included nation building and construction of stable institutions as well as dealing with pressing problems like economic development, human development. The concept of neo-liberalism emphasized that developmentally, the state's role should be downgraded –while that of private capitalist and entrepreneurs should be upgraded and augmented. (Haynes, 2005). To put it in nutshell, Developmental emphasis was placed on improving economic management and allowing market forces to play to a greater extent through submissive state role in the market.

Adam Smith classical view on free market

Adam Smith advocates unregulated market, his defense on the same explains that private property and unregulated market could produce greater benefit than any

regulation could do. His views do not favor state intervention. Adam Smith believed that the market itself allocates resources efficiently on a day to day basis through the pricing mechanism. The system of competitive markets allocates resources efficiently among the various industries of a society. (Smith, 1776). Because society comprises of individuals and they are in self-love, where we could not talk about ourselves but their advantages. The profit, price of goods and labor itself regulate market, hence the economic utility of societies members are maximized by free market and private property, but not through state intervention. Economists like Ludwig von Mises supplemented Adam Smith's market theory explaining that free market not only allocates resource efficiently, it is also impossible for government and human beings to allocate resources with the same efficiency. (Mises, 1965).

Adam Smith first wrote on ethics in his Theory of Moral Sentiments (1759) he spoke of self-interest, sympathy and benevolence. In his work he judged individuals both with intentions and the results they realized. Smith assumed that both buyers and sellers know their wants, the social structure acts as an invisible hand where the pursuit of individual satisfactions takes place. In self-regulatory market, all participants are rewarded through rent, wages and profit. However (Preston, 1996) it is not very clear how the proposed ethics fit in with the proposed economics. The whole we may briefly regard as the political ideology of the rising Scottish bourgeoisie, presented as if it were general to mankind. (Pollard, 1971). It is the ethics of practical action in the material world which is guided by more or less the enlightened appreciation attained by individuals of the natural laws governing human life. It is an ethic of the modest actions and modest aspirations of the respectable Scottish bourgeoisie presented as a general model. (MacIntyre, 1988).

Neo-liberal theory

The notion of trickle down comes in neo-liberal school of thought where they see economic growth as essential for social well-being, but profit may not be evenly distributed. According to Harris (2003) in neo-classical view there is no special reason to conserve natural capital, Sustainability could be defined in terms of maximization of welfare over time. For free marketers, economic globalization is an opportunity to rationalize the use of resources, and restrictions on trade would merely lead to economic decline which could in turn devastate environments, societies. (Eadie and Pettiford, 2005).

Institutional development theory

Institutional economics offers distinctive way of grasping the issues of development. Institutionalists argue that the market is within the social system. Hodgson (1988) argues that the manifest deficiencies of the neo-classical orthodoxy place the approach beyond repair and necessitate a rigorous development of the comparatively neglected tradition of institutionalism. Neo-classical approach survives only through an intrinsic commitment towards market liberalism. Institutionalists view economies through a complex social phenomenon using the materials of sociology, politics, anthropology, history and so on. Once the problem is analyzed, institutionalists go for model building that is an orthodox and richly detailed exposition of actual dynamics of economies or societies.

Institutional analyst Myrdal (1958) offers a central idea called circular cumulative causation. Myrdal has a particular view of social system changes and argues that

once a direction of change is set in, the social system adjusts to reinforce the changed direction. In Myrdal's work, the economic system is no longer seen as a self-regulating one and instead, it has to be seen as an element of a complex social system. (Preston, 1996). Myrdal's conclusion on development is that the third world must struggle with broad terms of social, political, economic and cultural reforms, so that socio-economic system moves on upward path of development.

Stakeholder theory

Management theory and practices are continuously trying to evolve the best methods of value –added utilization of resources. Therefore, the process of business requires interaction with a number of entities who become stakeholders. (Chatterji, 2011). A reasonable understanding of the tussle between individual entity growth and collective shared growth needs to be enhanced for stakeholder analysis. Stakeholders are individuals or groups who are at the receiving end of corporation activities that could be both positive and negative. Freeman (1984) describes stakeholder as any group or individual who can affect, or is affected by, the organization's purpose, because that group may prevent our accomplishment. Stakeholders are not to be a dependent on enterprise activities, whereas they could move to the extent of strategic change and formulation of a particular Corporation. Clarkson (1995) explains stakeholders are those who have or claim ownership, rights, or interest in a corporation and its activities. Hence, stakeholder relationships and interactions are important for long term stable business. Duran and Sanchez (1999) explain, Modern business is moving more towards partnership-based approaches, emphasizing on a long-term relationship based on mutual trust and collaboration with core supply firms. Hence, stakeholder interaction is becoming inevitable to resolve the tussle between profit maximization and efficient resource allocation.

Despite practical short comings of stakeholder theory, Jenson (2006) made a framework for trade-off. According to him, stakeholder theory directs corporate managers to serve many masters that might lead to confusion, conflict and even complete failure. Therefore, value maximization is not just the value of equity, but all financial claims on the firm. He also cautions that interest groups might disguise as stakeholders for their own vested interests. However, management must keep relationships amongst stakeholders in balance. (Freeman, 2001).

Sustainable enterprise: A triple bottom line approach

Sustainability requires the maintenance of appropriate economic, social and environmental conditions through time to ensure that the wellbeing of future generations is not compromised by the activities of the current generations. (Intergenerational Report, 2003). If Sustainability is a contested concept, then what obligations does it impose on us? What exactly are those obligations? Most systems of morality insist that we have a negative duty to avoid harming others, people disagree with harm from the moral point of view. But most people would probably include activities that that threaten the life, health and basic rights of others. Clearly how we answer these questions will directly impactthe sort of fiscal and policy measures that can be required in the name of intergenerational sustainability. (Thomson, 2003). Ricardo (1817) wrote on the indestructible powers of land and"on the abundance of

nature's free gift". "The brewer, the distiller, the dyer make incessant use of their air and water for the production of their commodities but as the supply is boundless, they bear no price." In the time span of two centuries of Ricardo's articulation, China is selling oxygen bags and water has been completely commercialized all around the world. Evidently, now that not merely continental fresh waters, but also the high seas fisheries and global atmospheric systems are the object of international agreements on pollution emissions controls, it is no longer remotely plausible to treat raw materials and services furnished by nature as indestructible or non-scarce. (O'Connor, 2000). Hence, sustainability is not a contested concept, it could synergize and maximize multi-stakeholder perspectives that enhances firm activities through long term basis.

World development report (2003) mentions altering the pattern of preferences, resource intensity of technologies or relevant time horizon for different decision as some of the changing courses towards sustainability, however none of these concepts remain constant over time. Hence, defining sustainability in a broader sense still remains difficult. The most commonly used definition is the one provided by the World Commission on Environment and development (Brundtland Commission, 1987) - "progress that meets the needs of the present without compromising the ability of future generations to meet their own needs."

During the Industrial Revolution period, focus was on coal as a major source of energy. The most influential publication in this regard was W. Stanley Jevons' (1866) coal question, in which he concluded, that English coal reserve would be depleted in a hundred years. England would lose her dominant industrial position, if the wasteful consumption of coal continues and remains unchanged. Therefore (Asif, 2011) the business case for sustainability is often used to provide an impetus for integrating aspects of sustainability into the business process. The dozens of study that examine the social and environmental practices and financial performances show mixed responses. On an average, the environmentally and socially sustainable businesses are more profitable. (Nguyen and Slater, 2010). If sustainable development is to be achieved, organizations will have to re-engineer their current activities so the environmental and equity of shareholders are achieved. (Bansal, 2005).

According to Robert and Cohen (2002), if we consider sustainable development as a trade-off between environmental, social, and economic values over the use of economic, social and natural capital then it is conceptually possible to plot these values on axes to create what we might call the triangular plane of sustainability. If we seek equilibrium solution for sustainable development, this may require a reduction in economic expectations to achieve greater environmental and social outcomes. Sustainability is not something that remains in sacrifice motive, it is on a new paradigm where we strategize for long term sustained profit through stakeholder interactions. Hence, (Nguyen and Slater, 2010) it is important to develop some framework for sustainability initiatives comprised of leadership, strategy, activity analysis and performance assessment.

Sustainable Enterprise: An Alternative Paradigm

According to Thomas Kuhn (1962) a scientific community cannot practice its trade without some set of received beliefs. These beliefs form the foundation of the educational initiation that prepares and licenses the student for professional practice. The absence of competing paradigms that question each other's aims and standards makes the progress of a normal-scientific community far easier to see.

The acceptance of a paradigm frees the community from the need to constantly re-examine its first principles and foundational assumptions. When a crisis occurs in any existing paradigm., in response to these crises, scientists generally do not renounce the paradigm that has led them into the crisis. Rather, they usually devise numerous articulations and modifications of their theory in order to eliminate any conflict that come up. In order to uproot the emerged conflict, new paradigm could evolve and that paradigm could become invalid, only if an alternative paradigm is available to its place. Hence, our study proposes the existence of an alternative paradigm that could answer crisis in evolving framework of sustainability.

Cartesian paradigm travels between humans and non-human systems; assuming both are independent and have fixed values. Cartesian mechanistic model views the body as an automation machine, where it has nothing to do with the mind. He explains that the body and mind are separate entities and have fundamental differences. The Cartesian paradigm has made extraordinary contributions to human affairs in the flourishing of Western culture, scientific endeavor and material well-being. But it has also brought with it human alienation, ecological devastation, social injustice and spiritual impoverishment. (Smith et al, 2011). On the whole, Cartesian paradigm explains that two different entities such as the body and mind cannot exist together, they are different by the nature of law, which is governed by exact mathematical laws. Hence, anything that is not governed by exact mathematical laws cannot fit in the Cartesian paradigm.

The second famous paradigm is new environmental paradigm created by Catton and Dunlap (1978). Philosophers like Plato, Aristotle, Augustine and Thomas Aquinas tend to focus on an ideal society. They neither spoke on complexity in society, nor the existing reality. The society transformed from industrial society to information society and the economy moved from a labor intensive economy to knowledge intensive economy. This leads to the fragmentation of communities and knowledge base. Environmental problems and constraints contributed to the general uneasiness in American society, brought about by events in the sixties. Hence, the new environmental paradigm is implicit in environmental sociology and is of course, only one among several current candidates to replace or amend the increasingly obsolescent set of domain assumptions, which have defined the nature of social reality for most sociologists. (Catton and Dunlap, 1978). The study is explicitly about discussing the acceptance of environmental variables as a meaningful for social investigation. The interaction between society and environment could no longer be considered negligible by sociologists in the new environmental paradigm.

The need for an alternative paradigm comes due to multi stakeholder interactions, the earlier paradigm spoke of environment and societal interaction. The alternative candidate could talk of holistic sustainable enterprise that could ultimately lead to organizational vitality. The strategy and managing team cannot neglect sustainability, if the firm aspires for long term profit making through sustaining both its resources and stakeholders. Bretschger (1998) sustainability is more than a concept concerning the preservation of nature; its primary focus is the long-term development of undiscounted individual welfare. The term sustainability was used in the CGIAR's mission statement in 1989 to mean, successful management of resources for agriculture to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources. (TAC/CGIAR, 1989). Sustainability is a concept that talks of effective resource utilization without challenging the future generation's needs for wellbeing. However, sustainable enterprise is a goal or a mission for strategist and policy makers to sustain the firm's long term growth

through stakeholder's interactions,that ultimately leads to organizational vitality. The American Management Association (AMA, 2007) team defines sustainable enterprise as one that adopts a long-term, collaborative, holistic or system-oriented mindset. It integrates sustainable development into its core business strategy, and its activities result in the generation or regeneration of the planet's capital stocks; that is natural, social, financial, human and manufactured capital.

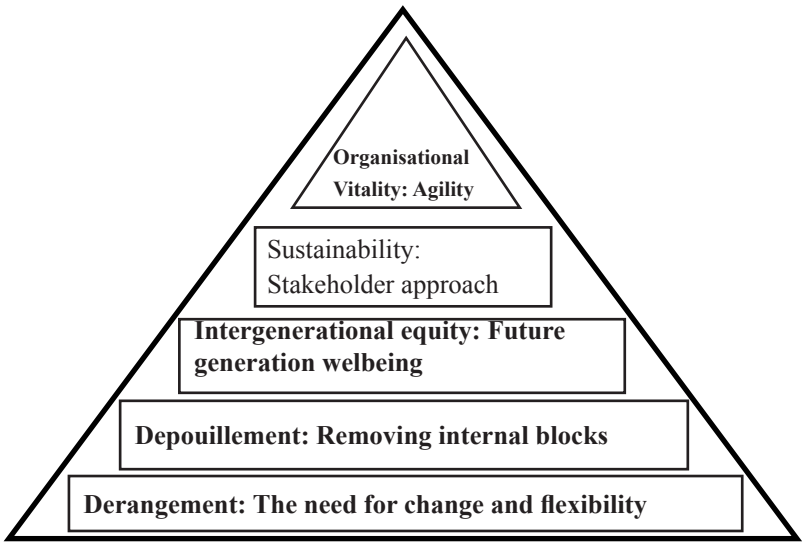
There are two existing paradigms concerned with sustainable enterprise. One is a triple bottom line (TBL), which measures economic, environmental and social values indicating the firm's sustainability. Another existing paradigm is five capital model, which categorizes the world in terms of five capitals, they are natural, social, human, manufactured and financial. Another aspect in sustainability is advocated by Edward (2006), who calls 3 "Es" as a core of contemporary sustainability. He also argues that a fourth E—education—is a powerful force in driving the sustainability movement forward (Edwards, 2006). However, triple bottom line remains the best known paradigm in sustainable enterprise. But there are stakeholders other than society and environment, which strongly influence the sustainable enterprise. Schuftan (2003) talks of a new paradigm for sustainable development that must have actors who influence, what is permissible and fair, who raise political consciousness through guiding people's rights and de-facto entitlements. The complexity and the interdisciplinary approaches in sustainable enterprise are only increasing. In the interdisciplinary discussion among economists, ecologists and ethicists on sustainability, recent methods and results of macro dynamic analysis have not been fully integrated yet. (Bretschger, 1998). From a perspective of the Panarchy theory, there is now a great need to free ourselves from the structures that block innovation, from our attempts to stabilize those structures, and encourage small-scale experiments, which from a complex systems' perspective, can trigger large scale changes which can lead to a socially just and ecologically sustainable future. (Smith, et al, 2011).

The bottom –up pyramid explains the alternative candidate (paradigm) for holistic sustainable enterprise. Because paradigm shifts are generally viewed not as revolutions, but as additions to scientific knowledge. (Kuhn, 1962). An ordinary enterprise cannot practice sustainability despite the chances of profit maximization. The strategy and policy coined for a particular organization, may not allow the structure to go for change or be flexible. Because the existing paradigm may not provide the choice to take strategy implications that are sustainable in nature, to some extend the policies and the managing team might afford for CSR (Corporate Social Responsibility) or environmental clearances. Here, societal values and environmental values can in no way be articulated as important elements for TBL (Triple Bottom Line), if at all the state directives of law enforce certain elements of sustainability. Hence, other than triple bottom line, the role of state in directing the firms (Directives of Law) remains another strong factor that pushes the firm towards sustainability. The consumers' awareness regarding environment- friendly products could also be the push factor for sustainable practices. The media could also differentiate organic and in-organic products and so on. Hence, the need for change or flexible strategy is a foremost element for sustainable enterprise.

Sustainability generally falls in long term goals of any organization, Some executives might argue that it is inculcated in their practices such as- taking care of employee rights, health and good interaction with the local communities. Hitchcock and Willard (2006) maintain that regardless of whether the organization is in the service sector or manufacturing sector, sustainable operations and practices can be implemented

by managers. Although top management's support and deeply embedded values are most likely necessary to create a sustainable organization, they are also insufficient for sustained, coherent action, unless sustainability becomes central to an enterprise's strategy. There's a correlation between the degree to which firms implement sustainability strategies and the degree to which they see measurable benefits from sustainability initiatives. That is, the more firms implement such strategies, the greater the extent to which they see measurable benefits. (AMA, 2007).

Figure 2: Alternative Paradigm for Holistic Sustainable Enterprise



Developing champions (Knowledge Managers) into an organization culture still remain rare, such activity could form strong community network. However (Loewe, 2006) among 550 large companies only 19 percent said their Companies ''walked the talk'' on innovation, and a majority rated their company's innovation effectiveness below average. Removing the obstacles in a firm doesn't mean challenging the conventional wisdom, it is another way of encouraging the employees and customers to put forth their view and acceptability, as Virgin and Google practicing it. Eli Goldratt (1990) defines a constraint as, anything that limits a system from achieving higher performance verses its goal. Knowledge managers should not only be experts, teachers or executives, but they should also be able to monitor and manage the workforce, and educate them whenever required. Furthermore it is also important to diagnose, identify, and remove constraining factors that often prove to be real obstacles and unconstructively affect the firm's performance level. (Chatterjee, 2014). No corporate culture, including developing champions, (Knowledge Managers) could be transformed overnight. There needs to be a safe-zone to put forth views regarding obstacles and other hardships that block the progress and transformation of the firm.

Intergenerational equity is an alternative approach that differs from traditional economies. It puts forth two views, 1. Our relationship with the future generation, and the future generation's relationship with the present existing species. 2. Human kind is a part of the natural system, hence, he is linked with other parts of the natural system as well. Any activity of human kind that affects one actor, will also affect the others because intergenerational equity is more leaning towards different actor's interaction in the system

According to Kaufmann and Carter (2007) sustainability in firms' emerging economy operations can be defined as engaging in environmentally and socially responsible activities beyond mere compliance. Employing high standards regarding environment friendly and energy efficient input factors, supportive working conditions, attractive staff benefits as well as development programs. Most profitable firms have clearly higher commitments towards community development activities and environmental activities. The challenge that continues to remain for sustainability is integrating the stakeholders. Since economic profit is a motive for any firm, they aspire to minimize operating cost and increase profit value. Focusing on environmental values and other community developments is beyond their scope. However, strategists and executives have to remember that society and environment are at the center of their economic activities. For over 70% of large companies and more than a third of all companies in Germany, for example, the vision of sustainable development is already an important issue that is being actively addressed. What is more, the businesses characterized as "sustainability oriented" can boast more favorable results than those classified as "passive" or even "environmental management oriented". Surveys indicate that one reason for this could lie in the growing integration of environmental and social aspects with corporate strategy as well as management considerations oriented to business success. (BMU/BDI, 2002).

Organizational vitality is directly proportional to systemic stress. Stress is an outcome of long run efficiency, work load and cultures too contribute towards stress. Organizations too have systemic stress, and where the employees are under scrutiny, will tend to remain in stress. Employee's interaction and opportunity for anonymous feedback could help to de-stress. Agile organizations are those that are able to identify and adapt quickly to changing circumstances in the environment. It is not only possible, but essential to plan for agility. To keep an organization focused on its strategic goals, agility must be supported by structure, infrastructure, organizational culture and management to provide the framework in which to operate. Agility is often a by-product of other strategic initiatives, new technology may have primary goals whose secondary benefits link to improved organizational agility, due to better access to information or increased efficiencies. Agility is vital to not only to surviving turbulent conditions, but also to increasing revenue and succeeding in the long run. An organization must be agile to adapt and respond quickly to both challenges and opportunity. (Chandler Macleod, 2011).

Background of Study

Global Sustainability Report (2010) When I became CEO last year, I said that we would "broaden and accelerate" our commitment to sustainability at Walmart. Sustainability continues to make Walmart a better company by reducing waste, lowering costs, driving innovation, increasing productivity and helping us fulfill our mission of saving people's money so they can livebetter. Said Michael T. Duke CEO of Walmart. Walmart follows sustainability's 360 approach, where every activity of retail is focused towards the sustainability approach. One interesting aspect in Walmart is other that than customers, they are valuing suppliers as stakeholders. As we discussed earlier, stakeholders could be any number that comes under firm's activities. Walmart also developed sustainability leaders' shop, where the customers could purchase the products directly from suppliers, which is exactly like what Tamil Nadu state government has initiated as "Farmers market". In thelike sustainability leaders' shop, the farmers produce and sell directly to consumers at prices fixed by producer itself. Since Walmart considers suppliers as their potential stakeholders for sustainability, sustainable leaders' shop is a good initiative.

There is an open door policy in Walmart, where customers and associates could convey their needs and hardships to the management. Walmart focuses its engagement towards US-India, US- China and US-Africa. where organic products productions are mainly concentrated. Hence, their governance policies are transparent and they have Political Action Committee for Responsible Government (WALPAC). Through these vehicles, they are operating in 27 countries with a motto of saving money and living better. Walmart also engages in community development such as job creation for the locals, women economic empowerment and fighting hunger. Since 1962 Walmart's vision continues to remain the same as cost reduction throughout supply chain and bringing quality products to consumers.

Application of TISM

The total interpretive structural model (TISM) can be used to interpret direct and undirected binary or fuzzy relations between factors. The model also explains the links between the factors. The total interpretive structural model is done in a stepwise process. The factors are identified with case studies and literature reviews, that are prompt to our study. Following the factors identification, the contextual relationships between factors are identified. For example- the eco-systems' health has a transitive link towards strategic centrality, i.e. if at all the strategic core is towards ecology, then eco-systems' health could be taken care of by the enterprise. Similarly, sustainable supply chains lead to achieve holistic sustainable enterprise,. where these kinds of interpretations of transitive links are possible in TISM. The pair wise comparisons of factors are translated into reachability and transitivity check. The meaning full interpretation is substantiated with proper logic from the case study and review. Then the level partition is carried out similar to ISM to understand placement of factors in a level-wise format. Based on the level interaction matrix and total interpretive, structural models are derived. The identified factors are from sustainable and global responsible report of Walmart as well as from case literature and management reports relating to strategic intent are explained Table: 1

Table 1. Showing Contextual Relationship

Element No.	Factors	Contextual Relationship	Interpretation
HSE 1	Holistic Sustainable Enterprise	A B means A will help achieve B	
HSE 2	Agility of Firm		
HSE 3	Work Force Engagement		
HSE 4	Organizational Culture		
HSE 5	Social Forestry		
HSE 6	Eco-Systems Health		
HSE 7	Sustainable Supply Chains		
HSE 8	Community Job Creation		
HSE 9	Government Policies		
HSE 10	Strategic Centrality		

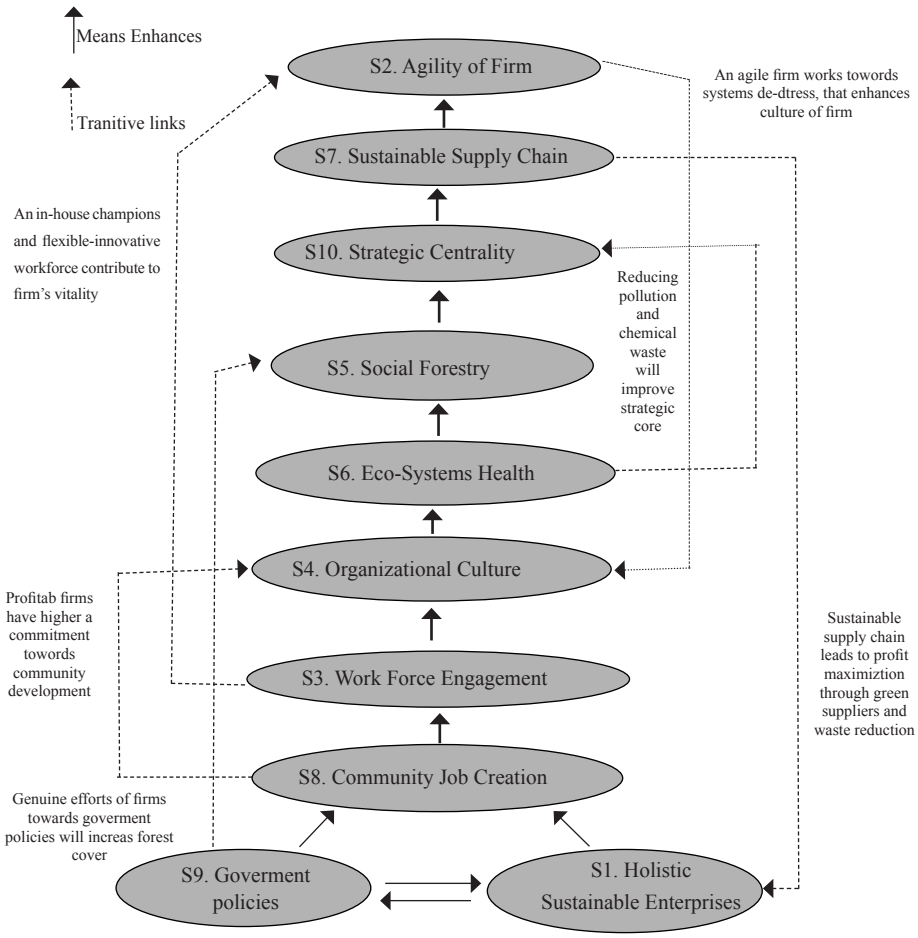
Table 2. Transitivity and Reachability Matrices

	HSE1	HSE2	HSE3	HSE4	HSE5	HSE6	HSE7	HSE8	HSE9	HSE10
HSE1	1	1	1	1	1	1	1	1	1	1
HSE2	1	1	0	1	1	0	1	0	0	1
HSE3	0	1	1	1	0	1	0	1	0	1
HSE4	1	1	0	1	1	1	1	0	0	1
HSE5	1	1	0	1	1	1	1	0	1	1
HSE6	1	1	0	0	1	1	0	0	1	1
HSE7	1	1	0	1	0	0	1	0	0	1
HSE8	0	1	1	1	0	0	1	1	0	1
HSE9	1	0	0	1	1	1	0	1	1	1
HSE10	1	1	0	1	1	0	1	0	1	1

*1. Transitive links

Figure 3. Interpretive Structural Model (ISM) of Holistic Sustainable Enterprise

Figure 4. Total Interpretive Structural Model (TISM) of Holistic Sustainable Enterprise



Walmart: A Path towards Agile and Sustainable Organization- Case Study

The performance factors of Walmart and case literature gave an insight Walmart could be an agile firm, if it focuses on sustainable supply chain management and sustainability strategic centrality. Walmart already has 4.5 acres of social forestry, however, space needs to be expanded if they want to focus on green suppliers and sustainable supply chains. Driving forces of Walmart could be their mission as sustainability 360, where every activity of the organization focuses on sustainability. They also have a strong political institution called WALPAC (Political action committee) for responsible governance grown to the extend lobbying. Organizations need to have such institutions to be agile and sustainable. As our model explains,, genuine concern over government policies could help organization and firms to have long run swiftness.

The next high intensive factor in our model is sustainable supply chains that ultimately contribute to organizational agility and as our literature and reports justified, a sustainable organization is an agile organization. A sustainable supply

chain is a supply chain that is not only optimal for the organization, but also relatively reduces environmental impact. Environmental issues are generally considered as thorny issues that come through compliances and enforcement. Such 'elephant in the room' attitude not only affects the organization's credibility, but also government perks and considerations. This is clearly visible in our model (government policies are having transitive link towards organization culture) that government policies affect organization culture both in a positive and negative way. Because an organization must align with the stakeholders and the sustainability principles that could be the future of sustainability (AMA, 2007), it is not easy to have green suppliers or sustainable suppliers such as Walmart faced a confrontation with giant suppliers in China. Such confrontation could be good or bad, but when it comes by following government norms and policies, it has its own merits. Where the confronting suppliers could move out and pave way for helpful suppliers. Hence, Walmart's bold move in China is again a positive aspect as per our model. A strong lenience towards polices and norms will strengthen the organizational culture.

In 2009, Walmart sent a questionnaire to its 100,000 suppliers asking "Have you set publicly available waste reduction targets?" As a part of sustainability goals, Walmart insist upon its suppliers for zeroing waste, using 100% renewable energy and producing sustainable products. Though these are difficult for suppliers and sort of enforcing activity, Walmart could manage to achieve green supplier's policy through cutting waste not in outlet, but at the production point itself. Walmart insists its suppliers to reduce packaging waste, that is one way or another helping the suppliers to minimize overall. Walmart changed its policy from (Walmart wanted three things from its suppliers) price, price, price motive to long term contracts for organic farmers. Such policies will enhance Walmart's sustainable supply chain management, which is explained in our model, as sustainable supply chains will help to achieve holistic sustainable organization.

Despite taking care of employee's health and hostel facilities, Walmart employees are stakeholders of its respective organization. They need to be involved in idea generation and discussions that could contribute to alter positively the strategic centrality of sustainability 360. Providing soft skills and developing positive communication will enhance work force and production flow. Because employees are the one who are in direct contact with customers and suppliers, the sustainable values of Walmart have to be incorporated in employee- customer relationships along with genuine women participation in economic development activities, that will lead to local community development.

Walmart has to move from sustainability organization to an agile organization, where the organization is flexible, accepts policy changes for progress and takes care of local communities, that will ultimately make Walmart a holistic sustainable organization.

Learning and Suggestions

When a choice between profit and preservation is set on the negotiation table, organizations like Walmart must opt for preservation along with profit making, because mere profit motive could scar the sustainability effort of organizations. Employee health and women participation in economic development activities will help in achieving community development. Long term goals like extending organic farmers contract will enhance sustainable supply chains of an organization. Involving

local communities will help in ameliorating positive organizational culture. Flexibility and agility of an organization is valued as an important element for sustained long term profit maximization and preservation of natural capital.

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Service Quality: A measure of Sustainability of the Hotel Industry

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Abstract

Service quality is one means of retaining customers and thus, establishing competitive advantage and sustainability of the hotel industry. The current study aims to evaluate the sustainability of the hotel industry on the basis of service quality and also, to investigate the differences in Service Quality Gap of Economy, Mid-priced and Luxury Hotels. It was found that the gap was highest for responsiveness and the lowest for tangibility, from the five dimensions of service quality. It was found that the service quality of low priced hotels was low among all three categories of hotels in Odisha.

Keywords:

Service quality, SERVQUAL, Sustainability, Customer expectation, Customer perception

Introduction

Hotel industry is an evergreen sector, as people need to travel for work or leisure and require spending the night in a safe place away from their residence. A customer who visits a hotel seek an accommodation facility that can provide service exceeding his/her expectations. Thus, value added advantage and sustainability of the hotel industry is of vital importance, because the hotel sector is one of the biggest segments in the Hospitality and Tourism industry. Each hotel, regardless of its classification, contributes to the overall performance of the local and national hospitality and tourism industry. The most important aspect of the hotel and other such service industries is sustainable development. Sustainable development (SD) is a mode of human development in which resource use aims to meet human needs, while preserving the environment, so that these needs can be met for both the present and future generations (Mishra and Dash, 2014). In service sector, the maintenance of quality and retaining customers lead to customer satisfaction, which is essential for its sustainability. Service quality has a direct relationship with the users, as it is the comparison of customers' perception and expectations regarding a particular service. Measurement of service quality is not an easy task because the characteristics of services are heterogeneous, inseparable, and intangible (Frochot & Hughes, 2000; Yusof et al., 2014). Service quality is defined as the degree and direction of incongruity between consumers' perceptions and expectations regarding different, but relatively important dimensions of service quality, which affect their future behaviour (Zeithaml et al., 1988). The abstract nature

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of service quality makes it difficult to measure, but research has found out various methods and models for its assessment.

Literature Review

The review of the extant literature by researchers on service quality assessment and evaluation is discussed in this section.

Chileshe and Musaba (2014) assess employee perceptions of service quality in the Namibian hotel industry. Employee perceptions of service quality in the hotels were inferior to their expectations. The largest gap scores (-1.84 to -1.70) pointed to the presence of service gaps relating to fair treatment and care of employees; employees as a valued resource; employee empowerment to act in response to customers without consulting managers; and employees trained and inducted for efficiency and effectiveness.

Sharma (2014) tries to identify the level of customer's satisfaction in third category hotels of India and particularly in Ujjain city. The SERVQUAL model is applied to measure customer satisfaction and to trace the gap between their expectations and perceptions.

Findings of Motlagh, et.al, (2013) indicated that the level of satisfaction of customers in the hotel industry was significantly affected by the service quality factors, including Tangibles, Reliability, Responsiveness and perceived value. However, results did not support the significant effect of Assurance and Empathy on the customer's satisfaction.

Abu Khalifeh & Som (2012) studied hotel service quality with the help of SERVQUAL and established that when customers perceive a higher service quality; they will ultimately turn into a loyal guest.

Omanukwue (2011) concluded that the perception of service quality is best reflected by the perception of staff behavior. Moreover, customer loyalty is a direct result of customer satisfaction. Finally, customer satisfaction is best reflected by the perception of the overall service quality.

Kumar, Banga & Thapar (2011) suggested hotels to focus more on tangibles. They advised hotels to give importance to modern technology like- introducing wi-fi facility, which is a necessity today as well as enhanced luxury through the addition of tangibles like- swimming pool, health club, more entertainment facilities, well trained and reliable staff, etc.

Humnekar and Phadtare (2011) made a study on reliability of SERVQUAL in the hotel sector of Pune City. They concluded that both the overall scale as well as each of the five dimensions of SERVQUAL were not reliable.

Shahin and Dabestani (2010) evaluated the service quality in a four-star hotel in Isfahan. They concluded that all the variables of the service quality gaps are positive and "price" as a service quality dimension has the highest positive value. "Communication" also has the highest correlation with other service quality dimensions.

Markovic & Raspor (2010) revealed that among the five dimensions, reliability has emerged as the important predictor of perceived service quality. In the hospitality industry, this dimension refers to solving guests' problems, performing error-free service at the promised time, providing prompt service, and convenient opening hours of hotel facilities.

Rahman, et.al. (2010) attempted to map effectiveness of SERVQUAL in their research named Effectiveness of SERVQUAL. They concluded that identification of the perceptions of customers, the dimensions of service quality, and their relative

importance for each of customers' segments of the hotel industry would help managers in the challenge of increasing customer satisfaction.

Karunaratne and Jayawardena (2010) in their study focused on customer satisfaction of a five-star hotel in Kandy district. SERVQUAL model is employed in the assessment of customer satisfaction of the hotel to examine the level of customer satisfaction and major factors contributing to the same in a five-star hotel. They concluded that majority of the customers are satisfied with the overall service they received from the hotel, especially regarding Tangibility, Responsiveness and Assurance. The hotel had not fulfilled the customers' satisfaction with regards tp Reliability and Empathy.

Fan Chen (2008) discusses the satisfaction in degree measurement about medium and small sized hotels based on the SERVQUAL. He concludes that in China's hotel industry, especially for medium and small sized hotels, the management methods are sluggish and their service quality is relatively lower, so many problems exist in this industry.

Prudhomme and Raymond (2013) have found that sustainable development practices in the hospitality industry have a positive effect on the satisfaction of customers. This satisfaction level varied in customers according to the hotel size- small, medium and large.

Lacap (2014) has studied that high quality of service, service responsiveness, service failure preventions and service recovery influence organisational excellence and business performance leading to environmental sustainability.

Research Gap

Extant literature has considered different time periods and various dimensions of service quality, by considering hotels at different places throughout the globe. Taking above-mentioned facts, it is observed that no attempt has been made to study the service quality gap between the expected sustainable service and the actual service provided by the service holders as well as growth of tourism & hotel industry in Odisha. Moreover, there is a lack of research on the comparison of service quality between different grades of hotel- economy, mid-priced and luxury.

Objective of the Study

The present study on tourism and hospitality industry attempted to analyze service quality gap of the hotels in the state. In this backdrop, the following objective has been designed

- To evaluate the sustainability of the hotel industry through service quality.
- To find out thevariance in Service Quality Gap of differently priced hotels in Odisha.

Hypothesis

To achieve the above objectives, the following hypotheses have been proposed based on the literature reviewed and tested for authenticity.

H01: There is no significant difference in the level of expectation of visitors on different attributes.

H02: There is no significant difference in the level of experience of visitors on the different attributes.

H03: There is no significant difference in the level of expectation and experience of visitors on different attributes.

H04: There is no significant difference in Service Quality Gap of Economy, Mid-priced and Luxury Hotels on different Dimensions.

Research Methodology

The structure of the present study for data collection includes primary and secondary. Local and other state visitors who had stayed (at least overnight) in the hotels at selected tourist clusters, during the months of October 2014 to January 2015, was the population for the study. 448 respondents were selected randomly as the sample respondents. The data collected from 3 popular tourist hubs in Odisha namely; Puri, Bhubaneswar and Gopalpur. Questionnaires were collected disproportionately through convenience sampling. The data collection tool was a questionnaire, developed using a seven-point (1 to 7) Likert scale, elaborating upon 22 variables based on the five dimensions of SERVQUAL model as suggested by Parasuraman et.al.

Results and Discussions

The alpha value of expectation and experience were respectively 0.713 and 0.687 and accepted as shown in Table 1.

Table 1: Result of Cronbach's Alpha

Measures	Alpha Value	Compare with Standard	Remarks
Expectation	0.713	Nunnally and Salvucci and et. al,	Accepted
Experience	0.687	Nunnally and Salvucci and et. al,	Accepted

Source: Computed Data

Table 2: Demographic Details of Respondents

Demographic Details		% of Respondent
Gender	Male	57.14
	Female	42.86
	Total	**100.00**
Age(in years)	Less than 30	34.82
	30-39	30.36
	40-49	22.32
	50 & Above	12.50
	Total	**100.00**
Education	Under Graduate	11.61
	Graduate	29.46
	Post Graduate	41.07
	Above PG	17.86
	Total	**100.00**

Occupation	Professional	72.32
	Entrepreneurs	21.43
	Management Executives	6.25
	Total	**100.00**
Place of Residency	Rural	6.25
	Semi urban	38.39
	Urban	55.36
	Total	**100.00**
State of Residency	Odisha	44.64
	Other	55.36
	Total	**100.00**

Table 1 shows the demographic profile of the respondents in terms of percentage.

Table 3: Details of Sample Hotel

Hotel Details		% of Respondent
Type of Hotel	Economy (less than Rs.1000)	20.54
	Mid Price (Rs.1000-Rs.3000)	35.71
	Luxury (Rs.3000 and above)	43.75
	Total	**100.00**

The distribution of hotels across three different type, viz., economy, mid-priced and luxury, is summarised in the 1st part of Table 2. The data suggests that majority of the respondents are staying in luxury hotels in Odisha.

Table 4: Expectation of Visitors on sustainability of service quality attributes from the Hotels in Odisha

Services	N	Mean	Std Dev	Skewness	Kurtosis	Rank
Clean physical environment	448	6.8929	.30964	-2.549	4.517	1
Sophistication of hotel rooms	448	6.8393	.36768	-1.854	1.443	2
Knowledge to answer queries	448	6.8393	.56050	-6.157	4.976	3
Properly dressed employees	448	6.8214	.40609	-2.079	3.415	4
Politeness of employees	448	6.8036	.41964	-1.892	2.553	5
Appealing facilities	448	6.7946	.40441	-1.464	.143	6
Keeping Promises	448	6.7946	.40441	-1.464	.143	7
Tourists' best interests at heart	448	6.7946	.40441	-1.464	.143	8

Prompt service	448	6.7768	.41687	-1.334	-.222	9
Ensuring privacy of tourists	448	6.7589	.48688	-1.890	2.786	10
Sincere interest in solving problems	448	6.7589	.48688	-1.890	2.786	11
Providing services at the promised time	448	6.7589	.44862	-1.510	1.045	12
Understanding specific needs	448	6.7411	.47761	-1.589	1.564	13
Willingness to help	448	6.7054	.45639	-.904	-1.188	14
Commutation of information	448	6.6875	.51867	-1.379	.936	15
Responding to requests	448	6.6875	.48293	-1.049	-.315	16
Behavior of employees	448	6.6696	.50745	-1.131	.139	17
Performing service right the first time	448	6.6607	.49251	-.905	-.637	18
Individual attention	448	6.6250	.55361	-1.142	.315	19
Accurate Record Keeping	448	6.6071	.52426	-.812	-.566	20
Convenient operating hours	448	6.5893	.57624	-1.058	.127	21
Personal services	448	6.5625	.60986	-1.073	.113	22

From the above table, it is clear that the average value of all variables varies in the range of 6.8929 to 6.5625. The visitors have the highest expectation on 'clean physical environment of the hotel', followed by 'sophistication of hotel rooms' whereas the 3rd highest expectation is about 'knowledge to answer queries'. The standard deviation of 22 variables varies in a range of 0.30964 to 0.60986. The smallest standard deviation and the highest average score recorded for the 'clean physical environment'. The skewness score of all the variables is negative whereas, skewness score of 'willingness to help', 'performing service right the first time' and 'accurate record keeping' is less than -1. Except, 'willingness to help', 'performing service right the first time' and 'accurate record keeping' for all other variables, the skewness is substantial, and the distribution is far from symmetrical. All these statics scores divulge that the expectation level of tourist is too high for the services.

Table 5: Experience of visitors on sustainability of services rendered by hotels of Odisha

Details	N	Mean	Std. Dev.	Ske	Kurt	Rank
Sophistication of hotel rooms	448	5.5536	1.02618	-0.419	-0.658	1
Properly dressed Employee	448	5.5446	0.97291	-0.331	-0.441	2
Clean physical environment	448	5.4375	0.99016	-0.298	-0.667	3
Appealing facilities	448	5.4286	0.92409	-0.541	-0.427	4

Ensuring privacy of tourists	448	5.3482	1.27414	-0.257	-0.956	5
Politeness of employees	448	5.3393	1.17051	-0.618	0.306	6
Behaviur of the employees	448	5.2679	1.32423	-0.571	-0.256	7
Keeping Promises	448	5.2679	1.08669	-0.085	-0.603	8
Convenient operating hours	448	5.2232	1.18688	-0.213	-0.739	9
Performing service right the first time	448	5.2143	1.06545	-0.525	0.114	10
Sincere interest in solving problems	448	5.2143	1.0226	-0.036	-0.456	11
Accurate Record Keeping	448	5.1964	1.14957	-0.035	-0.89	12
Providing service at the promise time	448	5.1875	1.07467	-0.292	-0.464	13
Knowledge to answer queries	448	5.1875	1.348	-0.653	0.104	14
Individual attention	448	5.1518	1.12096	-0.225	-0.257	15
Willingness to help	448	5.125	1.29099	-0.334	-0.609	16
Prompt service	448	5.1161	1.13315	-0.081	-0.537	17
Tourists' best interests at heart	448	5.0625	1.30585	-0.261	-0.816	18
Commutation of information	448	5.0536	1.20283	-0.196	-0.371	19
Personal services	448	5.0268	1.18499	-0.376	0.051	20
Understanding specific needs	448	5.0089	1.30046	-0.409	-0.736	21
Responding to requests	448	4.9464	1.17269	-0.197	-0.547	22

From the above table, it is clear that the highest mean value is 5.5536, and the lowest mean value is 4.9464. The visitors' experience is rated the highest on 'sophistication of hotel rooms' followed by 'dress of employee' whereas the 3rd and 4th best-experienced service are 'clean physical environment' and 'appealing facilities of the hotels'. The top four experienced services belong to the tangibility dimension of the hotels.

The standard deviation of 22 variables varies in a range of 0.92409 to 0.1.32423. The smallest standard deviation is recorded for 'appealing facilities' whereas highest score recorded for 'behaviur of the employee'. At the same time, skewness is negative and also, low. All these scores divulge that the experience level of tourists is not too high.

Table 6: Customers' Expectations and Experience gap of sustainable Service in Hotels of Odisha

Services	N	Mean Expectation	Mean Experience	Gap	Difference (S_p-S_s)
Responding to requests	448	6.6875	4.9464	-1.7411	-0.009
Tourists' best interests at heart	448	6.7946	5.0625	-1.7321	0
Understanding specific needs	448	6.7411	5.0089	-1.7321	-0.0714
Prompt service	448	6.7768	5.1161	-1.6607	-0.0089

Knowledge to answer queries	448	6.8393	5.1875	-1.6518	-0.0179
Commutation of information	448	6.6875	5.0536	-1.6339	-0.0535
Willingness to help	448	6.7054	5.125	-1.5804	-0.009
Providing service at promised time	448	6.7589	5.1875	-1.5714	-0.0268
Sincere interest in solving problems	448	6.7589	5.2143	-1.5446	-0.0089
Personal services	448	6.5625	5.0268	-1.5357	-0.0089
Keeping Promises	448	6.7946	5.2679	-1.5268	-0.0536
Individual attention	448	6.625	5.1518	-1.4732	-0.0089
Politeness of employees	448	6.8036	5.3393	-1.4643	-0.0089
Clean physical environment	448	6.8929	5.4375	-1.4554	-0.009
Performing service right the first time	448	6.6607	5.2143	-1.4464	-0.0357
Accurate Record Keeping	448	6.6071	5.1964	-1.4107	0
Ensuring privacy of tourist	448	6.7589	5.3482	-1.4107	-0.0089
Behaviur of the employees	448	6.6696	5.2679	-1.4018	-0.0357
Appealing facilities	448	6.7946	5.4286	-1.3661	0
Convenient operating hours	448	6.5893	5.2232	-1.3661	-0.0804
Sophistication of hotel rooms	448	6.8393	5.5536	-1.2857	-0.0089
Properly dressed Employees	448	6.8214	5.5446	-1.2768	
Total Gap					-0.4643

The difference between expectation and experience with regards to each dimension is shown in Table 5. Highest difference is observed for the dimension 'responding to requests' and the lowest difference is observed for the dimension 'dress of the employees'. The difference between the highest and lowest value is -0.4643. Out of the 21 differences in case of 3 pair comparisons (Preceding Vs succeeding) namely between the attribute 2-3, 15-16 and 18-19 are 0. The highest difference is observed for the attribute pair 20 Vs 21.

Table 7: Details of SERVQUAL Gap of Hotels in Odisha

Factors	Expectation	Experience	Service Quality Gap
Tangibility	6.837	5.491	-1.346
Reliability	6.716	5.216	-1.500
Responsiveness	6.714	5.060	-1.654
Assurance	6.768	5.286	-1.482
Empathy	6.663	5.095	-1.568

Guests had the highest expectations on Tangibility, (6.837) followed by Assurance and Reliability, whereas the lowest expectations were with context to Empathy. The mean score of all determinants varies in the range of 6.837 to 6.663. Experience on Tangibility is highest (5.491) followed by Reliability, whereas lowest experience about Responsiveness (5.060). The SERVQUAL gap of determinants Tangibility, Reliability, Responsiveness, Assurance and Empathy is -1.346, -1.5, -1.654, - 1.482 and -1.568. The gap is the highest in Responsiveness. Total SERVQUAL gap is -1.51. SERVQUAL gap for determinant Responsive and Empathy are above average, whereas gap of other determinants is below average.

The results also make it explicitly clear that all hotels fall below the expectations of their respective customers as their scores are in the negative. In case of the economy hotels, the mean of SERVQUAL scores on all dimensions was -2.218. The dimension-wise analysis reveals, in economy hotels, SERVQUAL gap of dimension Empathy is higher than the overall score, whereas SERVQUAL gap of dimension Tangibility is lowest among all. In mid-priced hotels, SERVQUAL gap of dimension Tangibility is less than the mean of SERVQUAL scores on all other dimensions. For the luxury hotels, the mean of SERVQUAL scores on all dimensions was -1.269. A detailed analysis of each dimension discloses that SERVQUAL gap of Tangibility is least among five dimensions, whereas SERVQUAL gap of Responsiveness is the least. Comparing the SERVQUAL gap of each dimension with the overall SERVQUAL gap of all dimensions of luxury hotels, it is identified that the SERVQUAL gap in Responsiveness and Empathy are higher than the overall score.

Table 8 contains information on service quality gap of Economy, Mid-priced and Luxury Hotels on different Dimensions. It is noticed from the table that the service quality gap between economy and luxury hotel is highest for the dimensions like Tangibility, Reliability, Assurance and Empathy; whereas minimum between mid-priced hotel and luxury hotels. The range of difference in service quality on dimensions like Tangibility, Reliability, Responsiveness, Assurance and Empathy is -0.195 to -1.171, -0.197 to -0.985, -0.053 to-0.697 -0.254 to -1.012 and -0.054 to -0.908 respectively.

$H_0$1: There is no difference in the level of expectation of visitors on different attribute

Table 8: Details of Service Gap of different categories of Hotels in Odisha

Details		Tangibility	Reliability	Responsiveness	Assurance	Empathy	Overall
ECONOMY HOTELS	**Expectation**	6.739	6.757	6.663	6.685	6.617	6.692
	Experience	4.533	4.565	4.478	4.489	4.304	4.474
	S Q Gap	-2.207	-2.191	-2.185	-2.196	-2.313	-2.218
MID PRICED HOTELS	**Expectation**	6.794	6.67	6.688	6.794	6.54	6.697
	Experience	5.563	5.24	5.2	5.356	5.135	5.299
	S Q Gap	-1.231	-1.43	-1.488	-1.438	-1.405	-1.398
LUXURY HOTELS	**Expectation**	6.918	6.735	6.76	6.786	6.784	6.797
	Experience	5.883	5.502	5.219	5.602	5.433	5.528
	S Q Gap	-1.036	-1.233	-1.541	-1.184	-1.351	-1.269

Table 9: Comparison of S Quality Gap of Economy, Mid-priced and Luxury Hotels on different Dimensions

Details	Tangibility	Reliability	Responsiveness	Assurance	Empathy
Economy	-2.207	-2.191	-2.185	-2.196	-2.313
Mid-priced	-1.231	-1.43	-1.488	-1.438	-1.405
Luxury	-1.036	-1.233	-1.541	-1.184	-1.351
Economy Vs. Mid-priced	-0.976	-0.761	-0.697	-0.758	-0.908
Mid-priced Vs Luxury	-0.195	-0.197	-0.053	-0.254	-0.054
Economy Vs Luxury	-1.171	-0.958	-0.644	-1.012	-0.962

Table 10: ANOVA Summary Expectation on different Attributes

Expectation on different Attributes	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	75.099	21	3.576	15.894	.000
Within Groups	2212.679	9834	.225		
Total	2287.778	9855			

ANOVA was applied for testing the statistical significance, in presence of different attributes, and the results are presented in Table 10. The obtained value of 'F' for expectation level of the visitor on different attributes, was 15.894 indicating that the numerator of F ratio is greater than the denominator. The calculated value F was obtained at 21(n1) and 9834(n2) degrees of freedom at 95% confidence. The significance value is 0.000 which is less than 0.05. Since the p-value < significance level (0.05), the expectation of visitors on different attributes is statistically and significantly different. So the null hypothesis (There is no significant difference in the level of expectation of visitors on different attribute) is rejected with 95% confidence.

$H_0$2: There is no significant difference in the level of experience of visitors on different attribute

Table 11: ANOVA Summary Experience on different Attributes

Experience on different Attributes	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	259.391	21	12.352	9.219	.000
Within Groups	13175.321	9834	1.340		
Total	13434.713	9855			

Table 11 contains ANOVA summary experience on different attributes. The obtained value of 'F' for different attributes was 9.219. The calculated value F was obtain at 21(n1) and 9834(n2) degrees of freedom at 95% confidence level. The significance value is 0.000 which is less than 0.05. Since the p value < significance level (0.05), the expectation of visitors on different attributes is statistically significantly different. So the null hypothesis (There is no significant difference among the level of experience of visitors on different attribute) is rejected with 95% confidence.

$H_0$3: There is no significant difference in the level of expectation and experience of visitors on 22 attributes

Independent 't- test' was carried out between the expectation and experience of the visitors on 22 different services under this study. The result of the test was presented in Table-5. At 95% confidence level, the value of $p< 0.05$ for (n-2), i.e., 894 degrees of freedom leading for all the 22 attributes. This result leads towards rejection of null hypothesis (There is no significant difference in the level of expectation and experience of visitors on 22 attributes). It may be safe to settle at 95% level of confidence, where there is a significant difference between the expectation and experience of visitors on different attributes in the hotels of Odisha.

Table 12: Independent 't- test' Summary of the Expectation and Experience of visitors on different Attributes

Details	F	Levene's Test for Equality of Variances		t-test for Equality of Means						
		Sig.	T	df	Sig. (2-t)	MD	Std. ED	95% Confidence Interval of Difference		
								Lower	Upper	
S1	EVA	465.395	.000	24.965	894	.000	1.28571	.05150	1.18464	1.38679
	EVnA			24.965	559.908	.000	1.28571	.05150	1.18456	1.38687
S2	EVA	358.082	.000	28.665	894	.000	1.36607	.04766	1.27254	1.45960
	EVnA			28.665	612.163	.000	1.36607	.04766	1.27248	1.45966
S3	EVA	368.520	.000	25.634	894	.000	1.27679	.04981	1.17903	1.37454
	EVnA			25.634	598.166	.000	1.27679	.04981	1.17896	1.37461
S4	EVA	630.209	.000	29.692	894	.000	1.45536	.04901	1.35916	1.55155
	EVnA			29.692	533.597	.000	1.45536	.04901	1.35907	1.55164
S5	EVA	325.330	.000	27.871	894	.000	1.52679	.05478	1.41927	1.63430
	EVnA			27.871	568.487	.000	1.52679	.05478	1.41919	1.63438
S6	EVA	189.684	.000	28.867	894	.000	1.54464	.05351	1.43962	1.64966
	EVnA			28.867	639.760	.000	1.54464	.05351	1.43957	1.64972
S7	EVA	141.175	.000	26.083	894	.000	1.44643	.05546	1.33759	1.55527
	EVnA			26.083	629.690	.000	1.44643	.05546	1.33753	1.55533
S8	EVA	231.799	.000	28.561	894	.000	1.57143	.05502	1.46345	1.67941
	EVnA			28.561	598.201	.000	1.57143	.05502	1.46337	1.67948
S9	EVA	235.986	.000	23.633	894	.000	1.41071	.05969	1.29356	1.52787
	EVnA			23.633	625.225	.000	1.41071	.05969	1.29349	1.52794
S10	EVA	140.395	.000	26.402	894	.000	1.63393	.06189	1.51247	1.75539
	EVnA			26.402	607.675	.000	1.63393	.06189	1.51239	1.75547

S11	EVA	208.581	.000	29.113	894	.000	1.66071	.05704	1.54876	1.77267
	EVnA			29.113	565.815	.000	1.66071	.05704	1.54867	1.77276
S12	EVA	255.636	.000	24.429	894	.000	1.58036	.06469	1.45339	1.70732
	EVnA			24.429	557.010	.000	1.58036	.06469	1.45329	1.70743
S13	EVA	153.881	.000	29.057	894	.000	1.74107	.05992	1.62347	1.85867
	EVnA			29.057	594.376	.000	1.74107	.05992	1.62339	1.85875
S14	EVA	423.051	.000	21.891	894	.000	1.41071	.06444	1.28424	1.53719
	EVnA			21.891	574.817	.000	1.41071	.06444	1.28414	1.53729
S15	EVA	263.207	.000	20.922	894	.000	1.40179	.06700	1.27029	1.53328
	EVnA			20.922	575.510	.000	1.40179	.06700	1.27019	1.53338
S16	EVA	323.294	.000	24.925	894	.000	1.46429	.05875	1.34899	1.57959
	EVnA			24.925	560.037	.000	1.46429	.05875	1.34889	1.57968
S17	EVA	322.488	.000	23.948	894	.000	1.65179	.06897	1.51642	1.78715
	EVnA			23.948	597.076	.000	1.65179	.06897	1.51633	1.78725
S18	EVA	113.482	.000	24.941	894	.000	1.47321	.05907	1.35729	1.58914
	EVnA			24.941	652.813	.000	1.47321	.05907	1.35723	1.58920
S19	EVA	176.726	.000	21.915	894	.000	1.36607	.06233	1.24373	1.48841
	EVnA			21.915	646.642	.000	1.36607	.06233	1.24367	1.48847
S20	EVA	90.595	.000	24.390	894	.000	1.53571	.06296	1.41214	1.65929
	EVnA			24.390	668.267	.000	1.53571	.06296	1.41208	1.65935
S21	EVA	409.497	.000	26.819	894	.000	1.73214	.06459	1.60538	1.85890
	EVnA			26.819	531.962	.000	1.73214	.06459	1.60527	1.85902
S22	EVA	319.442	.000	26.464	894	.000	1.73214	.06545	1.60368	1.86060
	EVnA			26.464	565.428	.000	1.73214	.06545	1.60358	1.86070

$H_0$4: There is no significant difference in Service Quality Gap of Economy, Mid-priced and Luxury Hotels on different Dimensions

Table 13: ANOVA Summary for Comparison of S Quality Gap of Economy, Mid-priced and Luxury Hotels on different Dimensions

		Sum of Squares	df	Mean Square	F	Sig.
Tangibility	Between Groups	3.147	2	1.573	142.480	.000
	Within Groups	.099	9	.011		
	Total	3.246	11			
Reliability	Between Groups	2.563	2	1.281	113.516	.000
	Within Groups	.135	12	.011		
	Total	2.698	14			
Responsiveness	Between Groups	1.205	2	.602	64.424	.000
	Within Groups	.084	9	.009		
	Total	1.289	11			
Assurance	Between Groups	2.218	2	1.109	53.420	.000
	Within Groups	.187	9	.021		
	Total	2.405	11			
Empathy	Between Groups	2.922	2	1.461	31.687	.000
	Within Groups	.553	12	.046		
	Total	3.475	14			

The result of ANOVA is presented in Table 12**.** The obtained value of 'F' for difference of S quality on dimensions Tangibility, Reliability, Responsiveness, Assurance and Empathy is (=142.480, =113.516, =64.424, =53.420 and =31.687, < .05), indicating that the numerator of F ratio is greater than the denominator. The test carried out at 2 (n1) and 9 (n2) degrees of freedom at 95% confidence level for the dimensions like; Tangibility, Responsiveness, Assurance; whereas for the dimension Reliability and Empathy the test was carried out at 2 (n1) and 12 (n2) degrees of freedom. The significance value is 0.000 , which is less than 0.05 for all dimensions. Since the p-value < significance level (0.05), the S quality gap among different hotels is statistically and significantly different. So the null hypothesis (There is no significant difference in Service Quality Gap of Economy, Mid-priced and Luxury Hotels on different Dimensions) is rejected with 95% confidence.

Further, an attempt has been made to identify whether the difference observed at individual level for each dimension on each pair of hotels is significant or not. Multiple Comparisons are made applying LSD in post hoc test at the 0.05 level. The summary is presented in Table 14.

Table 14: Summary of Multiple Comparisons applying LSD in Post Hoc Test

Dependent Variable			Mean Difference (I-J)	Std. Error Lower Bound	Sig. Upper Bound	95% Confidence Interval	
Tangibility	Economy	Mid-priced	-.9752717*	0.074	.000	-1.143368	-.807175
		Luxury	-1.1708075*	0.074	.000	-1.338904	-1.002711
	Mid priced	Economy	.9752717*	0.074	.000	.807175	1.143368
		Luxury	-.1955357*	0.074	.027	-.363632	-.027439
	Luxury	Economy	1.1708075*	0.074	.000	1.002711	1.338904
		Mid-priced	.1955357*	0.074	.027	.027439	.363632
Reliability	Economy	Mid-priced	-.7613043*	0.067	.000	-.907705	-.614903
		Luxury	-.9586513*	0.067	.000	-1.105052	-.812250
	Mid priced	Economy	.7613043*	0.067	.000	.614903	.907705
		Luxury	-.1973469*	0.067	.012	-.343748	-.050946
	Luxury	Economy	.9586513*	0.067	.000	.812250	1.105052
		Mid-priced	.1973469*	0.067	.012	.050946	.343748
Responsiveness	Economy	Mid-priced	-.6972826*	0.068	.000	-.851972	-.542593
		Luxury	-.6439663*	0.068	.000	-.798655	-.489277
	Mid priced	Economy	.6972826*	0.068	.000	.542593	.851972
		Luxury	.0533163	0.068	.456	-.101373	.208005
	Luxury	Economy	.6439663*	0.068	.000	.489277	.798655
		Mid-priced	-.0533163	0.068	.456	-.208005	.101373
Assurance	Economy	Mid-priced	-.7581522*	0.102	.000	-.988614	-.527690
		Luxury	-1.0119787*	0.102	.000	-1.242441	-.781517
	Mid priced	Economy	.7581522*	0.102	.000	.527690	.988614
		Luxury	-.2538265*	0.102	.034	-.484289	-.023365
	Luxury	Economy	1.0119787*	0.102	.000	.781517	1.242441
		Mid-priced	.2538265*	0.102	.034	.023365	.484289

Dependent Variable			Mean Difference (I-J)	Std. Error Lower Bound	Sig. Upper Bound	95% Confidence Interval	
Empathy	Economy	Mid-priced	-.9080435*	0.136	.000	-1.203913	-.612174
		Luxury	-.9620231*	0.136	.000	-1.257893	-.666153
	Mid priced	Economy	.9080435*	0.136	.000	.612174	1.203913
		Luxury	-.0539796	0.136	.698	-.349849	.241890
	Luxury	Economy	.9620231*	0.136	.000	.666153	1.257893
		Mid-priced	.0539796	0.136	.698	-.241890	.349849

*. The mean difference is significant at the 0.05 level.

It is observed from the table that the significance value is 0.000 for all the pairs in the dimensions Tangibility, Reliability and Assurance. Further, the significance value is 0.456 in the dimension Responsiveness for service quality gap of mid-priced and luxury hotels; whereas in Empathy, the significance value is 0.698 for service quality gap of mid-priced and luxury hotels. Besides, all the significance value is 0.000 for all the pairs. Excluding the service quality gap in dimensions Empathy and Responsiveness for mid-priced and luxury hotels all the pairs are significantly different.

Comparing the expectation of visitors on 22 services, a significant difference was observed on expectation level of customers on each service. On this basis, top three expected services contributing to the sustainability of hotel industry are clean physical environment, sophistication of hotel rooms and knowledge to answer queries. Sophistication of hotel rooms, well dressed employees and clean physical environment are three best services, experienced by the visitors. The expectation and experience of the visitor on all 22 attributes are compared and it is found that the experience of visitors did not match with the expectation level for all 22 attributes. Analysis of 22 attributes under SERVQUAL model discloses, the services quality gap of all five dimensions was negative. It was found; the gap was highest for Responsiveness and lowest for Tangibility, which differs from the findings of Chin et al., 2013, who found that it was Reliability followed by Empathy. Comparison was made between service quality of high priced, mid priced and low priced hotels. Service quality of the luxury hotels is high, whereas the service quality of economy hotels is comparatively lower. Service quality of mid-priced hotels is between the two extremes. The largest gap was found in Empathy for economy hotels and Responsiveness for both mid-priced and luxury hotels, whereas the lowest gap was found in Responsiveness for economy hotels and Tangibility for both mid-priced and luxury hotels. This showed that there were no significant differences between the gaps of the dimensions of service quality for mid-priced and luxury hotels. Comparison between economy and mid-priced hotel service quality revealed the highest gap for Tangibility and lowest in Responsiveness. The gap was largest for Assurance in case of the mid-priced and luxury hotel and lowest for Empathy. In the case of economy and luxury hotels, highest gap was for Tangibility and lowest for Responsiveness. The expectation-experience gap for sustainability of hotel industry was contributed mostly by the attributes response to the request of Responsiveness dimension, followed by tourists' best interests at heart and understanding specified need of customers of Empathy dimension.

Conclusion

Service quality is perhaps the most important factor in the sustainability of hotel industry. Sustaining the service quality as per the expectations of the customers is a difficult task due to the abstract nature of service. Hoteliers should pay more attention to the Empathy dimension in economy class hotels. The mid-priced and luxury hotels lack in the Responsive dimension, which is an augmented service expected by the customers who pay more for their accommodation. The areas such as- responding to customers' requirements, understanding their needs and tourists' best intentions at heart should be taken utmost care of. As the spending capacity of people is increasing, so is their want for going out on holidays as well as increase in travelling by professionals. Overnight stay has become an essential requirement of these people, which has in turn increased the demand for hotels. Innovative strategies should be formulated to maintain the sustainability of the service quality provided by hoteliers.

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