

Achieving Sustainability through Product Responsibility- A Case Study of Selected Fertilizer Companies

Abstract

Indian economy is primarily an agriculture based economy and fertilizers play a vital role for increasing agricultural production. It is inevitable to use fertilizers effectively & efficiently and fertilizer companies can help in this by their responsible behaviour. This responsible behaviour has various aspects and product responsibility is one of them. Product responsibility of fertilizer companies includes various life cycle stages of their product having health and safety impacts on human beings; applying various codes for health and safety during production; impart knowledge about product's content, its usage, risk associated with it; marketing communication etc. This study is an attempt to know and analyse the responsible behaviour of selected fertilizer companies. It also helps to know about how companies are achieving sustainability through product responsibility. For this, PRDI of selected companies has been calculated according to the product responsibility parameters given by Global Reporting Initiatives for three years i.e. 2012-13, 2013-14 & 2014-15 & Anova has been used for inferential analysis of this study. This study concludes that all selected companies are responsible enough. They all are publishing sustainability reports and achieving sustainability through their products responsibility but there is a significant difference of product responsibility of selected companies.

Keywords: Agriculture, Fertilizer Industry, Global Reporting Initiatives, Product, Product Responsibility, Sustainability.

Introduction

Introduction of Sustainability and Product Responsibility

Sustainability means to create and maintain such conditions in which human beings and nature can exist in productive synchronization for the maintenance of present and future generations. In simple words it is an ability to sustain/ maintain the basic quality of life. Now a day, it becomes an important issue. All firms which are operating in domestic as well as at global level are well aware of the sustainability issues and their involvement in companies' decision making process.

Product responsibility is among one of the parameters which depicts the responsible behaviour of a company. It includes various life cycle stages of a product having health and safety impacts on human beings; applying various codes for health and safety during production; impart knowledge about product's content, its usage, risk associated with it; marketing communication etc.

Sustainability has following 3 components:

1. **Environmental Sustainability** : We directly and indirectly depend on natural environment and it is degraded by the human activities as we are consuming so much and so quickly that our earth's capacity is unable to support us which results problem of deprivation of life supporting resources, global warming, climate change etc. So, environment sustainability is the ability to maintain renewable and non- renewable resources for indefinite period of time and make this earth a better place for present as well as future generations.
2. **Social Sustainability**: There is a system of thinking which requires the consideration of human and labour rights, community development and risks associated with it in the process of income and livelihood generation. So, social sustainability is the ability to maintain

Babita

Assistant Professor,
Deptt.of Commerce,
Govt. College Meham,
Rohtak, Haryana

a defined social system which is for the well - being of society for indefinite period of time.

3. **Economic Sustainability:** It is the ability to support the defined level of economic activity and production for indefinite period of time.

Sustainable business practices incorporate environmental concerns with social and economic concern with the help of employees as well as customers. Sustainability issues may depend on company size, type of industry, the style of production and marketing etc. A company has to face many questions which need to be tackled before manufacturing a sustainable product such as

1. Will the new product satisfy the customer's needs?
2. Has the company analysed the sustainable effect of its business activities?
3. Has any research be conducted to know the possible impact of these activities on environment and social sustainability?
4. Is new innovation required to tackle sustainable issues/ problems?
5. Can the company modify the existing products for sustainable consideration?
6. What specific alteration can be done to make the existing product more sustainable?

Review of Literature

There are various studies on sustainability such as Crowther, Seifi & Moyeen (2018) have discussed the terms responsibility, corporate governance and sustainability and these terms can be used together interchangeably. Kundu (2015) has discussed the product responsibility concept in relation to marketing strategy. Companies are using this concept for sustainable development and for taking advantage of competitive environment. The report prepared by Technology and Action for Rural Advancement- A Social Enterprise of Development Alternatives Group (2015) has discussed the ways and prepared a report on sustainable development goals in India and the financial requirement and gaps to achieve these 15 goals. Phole & Hittner (2008) has discussed about the sustainable growth through corporate social responsibility. It is the way by which a company can create positive impact on society. 250 business leaders has been surveyed and found that 68% are utilizing CSR as a platform for growth. Daily & Huang (2001) has explained about sustainability with human factors in environment management. This paper has proposed a conceptual model of EMS-HR factors to help in environmental management program. Shrivastava (1995) has examined the role of corporations in achieving ecological sustainability through the concepts of total quality environmental management, ecologically sustainable competitive strategies, technology etc. This article expressed various ways by which companies can contribute to ecological sustainability. All these studies related to sustainability and have become the base for present study.

Objective of the study

1. To study the sustainability aspect and its achievement with product responsibility parameters.

2. To comparative evaluate the product responsibility of selected fertiliser companies on the basis of PRDI.

Research Methodology

Sample Size

3 leading Indian fertilizer companies having a dominant share in fertilizer industry in India. These companies are

1. Chambal Fertilisers & Chemicals Ltd.(CFCL)
2. Rastriya Chemicals & Fertilizers Ltd. (RCFL)
3. Tata Chemicals Ltd.(TCL)

Data Collection

Three years data i.e. 2012-13, 2013-14 and 2014-15 has been collected from annual reports, business responsibility reports, and sustainability reports of selected companies to achieve the above stated objectives.

Hypothesis

H₀₁

There is no significant difference of product responsibility of selected fertilizer companies on the basis of PRDI.

Analysis and interpretation

This section has two parts: The first part has explained how sustainability can be achieved through product responsibility and the second part has descriptive and inferential analysis.

(1) Ways to Achieve Sustainability Through Product Responsibility

The process of achieving sustainability starts from the idea generations about the product and continues till its consumption & disposal. It consists of sustainable product design & its development, sustainable production process, sustainable distribution, sustainable consumption, sustainable disposal etc. A company uses renewable as well as non - renewable resources for production and generating income. It results degradation of environment. So, it the responsibility of the company to mitigate the harmful effect of the product on environment and product responsibility plays a vital role in this. Product responsibility is related to develop and provide safe products; having no or less harmful effects on environment; use resources, materials & energy efficiently; recyclable, reusable and safe disposal of product etc. Sustainability can be achieved through products and services after considering impact of products at different stages of product life cycle. These impacts may be positive as well as negative. Negative impacts can be removed by providing sustainable solutions which are related to consumption, production and distribution of products/ services. A company can use LCA (life cycle analysis) for evaluating the impacts of products. LCA is a tool for environmental analysis which measures the environmental effect during various stages of product life cycle.

A company can achieve sustainability through its products and services by applying following ways:

1. Increase focus on research & development: To achieve sustainable growth, company should ensure continuous up gradation in Product development process through research & development.

2. Maintenance of proper record of waste management and necessary steps should be taken for its minimisation.
3. Active application of pollution prevention and controlling measures and explain about the methods which are used for pollution control.
4. Develop cost saving process and innovative design which may help to reduce energy consumption, material consumption, pollution and wastage etc. associated with product.
5. Explain about recycling process and recycled materials.
6. Check new and existing suppliers from sustainable mirror.
7. Examine the process and working conditions of suppliers to check whether they are using improved and environment friendly technologies or not.
8. Find out the more sustainable material with the help of local supplier.
9. Conduct a scientific research on key issues which effect the firm's performance so that necessary information and advices can be collected for creating sustainable value of the product.

Sustainable product

A sustainable product has various features such as Design which fulfils customer's need, Safe & not harmful for human health, Greener throughout its life cycle, Non-polluting and energy efficient, Recyclable, reusable and easily repairable, Produced from renewable resources available locally, No use of any child labour, forced labour in its manufacturing, Having sufficient information on its label about contents, usage, risks etc.

This study is based on various product responsibility related parameters given in National voluntary guidelines (NVGs) and Global Reporting Initiatives (GRI). PRDI (Product responsibility disclosure index) has been prepared on the basis of product responsibility parameters given in GRI 3.1 guidelines. These parameters are shown in annexure 1.

Product Responsibility of Chambal Fertilizers & Chemicals Ltd. (CFCL)

CFCL provides Fertilizer, textile and shipping. In Fertilizer, speciality products are seeds, insecticides, weedicides, and fungicides under the brand 'Uttam' such as Uttam Veer Urea, Sampurna etc.

Sustainable Product of CFCL

Neem coated urea. It is 35% of its production.

Chambal fertilizers & chemicals Ltd. gives importance to soil and emphasis on protection of its fertility. CFCL is fulfilling product responsibility through promoting sustainable agriculture practices for increasing crop production through soil testing; farmers' training and education; way of Uttam Bandhan-agriculture & community outreach programme; Uttam Krishi Salakhar for interface between company & farmers; collecting soil and water sample for analysis; organising farmers meetings, crop seminars; product demonstration, distribution of quarterly farmers' magazine (Chambal Ki Chitthi); farmer's website uttamkrishi.com for useful and latest information on crops free of cost; maintaining soil health through agricultural development laboratories; measuring satisfaction through survey & hello Uttam helpline which is started from 2012-13. Farmers' comments collected by this are compiled for improvement. For managing waste efficiently, CFCL has adopted

1. a measure 'at source' treatment of effluents and recycling of treated effluents back into the process through effluent treatment plant (ETP) and sewage treatment plant (STP)
2. 3R concept used for waste management. 100% condensate is recycled back to the system
3. Waste is categorised as hazardous and non-hazardous
4. Hazardous combustible and non-combustible waste sent to authorized recyclers/p rocessors/ disposal sites while non-combustible, biodegradable, domestic waste, sludge used as composting.
5. Energy efficiency initiatives: installation of dual drive, variable frequency drive, addition cooling tower

In 2014-15, CFCL has used various initiatives such as "Save paper, save trees" campaign by which 10.17% paper consumption is reduced; Fiber reinforced polymer (FRP) boxes has been used as pots for plantation; use of de-dusting system in bagging plant; efficient prill bucket used for reducing urea dust; Use of water curtains; natural drift prilling tower.

For responsible communication, products are labelled according to the guidelines of The Fertilizer (control) order 1985 & Legal Metrology Act 2009. Product label consists name, % of various nutrients, Gross & net weight (in kg.), Max. Retail price, Month & year of manufacture, Contact details of manufacturer, Address of manufacturer, Handling precautions, and Toll free helpline number. Table 1 gives the overview and trend of product responsibility of CFCL for 3 years.

Table1. Product responsibility of CFCL

PR elements	2012-13	2013-14	2014-15	Trend
Direct energy consumption (in million Gcal)	4.66	4.35	4.07	decreasing
Indirect energy consumption (in thousand Gcal)	3.907	4.21	4.705	increasing
Specific water consumption (m ³ per tonne)	4.96	4.93	5.03	fluctuating
Process water consumption (million m ³)	10.37	9.57	9.32	decreasing
Waste water recycled	-	-	70%	
Neem oil (Litre)	5,72,673	4,59,468	5,41,284	fluctuating
Natural Gas (000 M ³)	8,33,844	7,72,998	7,46,726	decreasing
Total soil test till date	-	-	8,32,656	
UttamBandhan Activities				

Soil sample testing days	64,045	58,021	32,236	decreasing
Farmers meetings & seminars	2,283	116	59	decreasing
Fairs and exhibitions	53	3,887	2,086	fluctuating
Training programme	196	895	573	fluctuating
Dealers' meetings	50	47	59	fluctuating
Hello Uttam queries	45,695	50,740	54,818	increasing

Source: Author's compilation from sustainability reports of CFCL

Product Responsibility of Rastriya Chemicals & Fertilizers Ltd. (RCFL)

RCFL provides Urea, complex fertilizer, Bio fertilizer, Micro nutrients fertilizer, 100% water soluble fertilizer, industrial chemical etc. under Ujjwala & Suphala brand.

Sustainable product of RCFL

Bio fertilizer, Micro nutrients fertilizer, 100% water soluble fertilizer.

RCFL is applying various measures for sustainability in product life cycle in which some are as follows:

1. At product development stage research & development department gives priority to health & safety issues. Various standards have been followed in procuring raw material.
2. During production process, strict control has been imposed on negative impacts of products. During distribution, company tries to carry out safe transfer & storage of fertilizer. Distribution is done by bulkers & tankers which follows certain standards & guidelines for safety.
3. At the time of usage, proper guidelines & training is provided to farmers to ensure sustainable use of fertilizers.
4. RCFL has conducted various demonstrations in the fields with sample collection and soil testing; various meeting with farmers & dealers to discuss

the balance use of fertilizers, proper way of application of fertilizers & crop protection. It has 2 farmers training centres in Maharashtra.

5. Energy utilisation reduced due to the introduction of new advanced process control, new improved high pressure feed water heater, lamp fitting replaced with LED.
6. Various water management techniques such as Sewage treatment plant (STP) which treated 22.75 million litres per day and sludge of this is used as fertilizer, STP RO rejected water is used for washing, cleaning, mixing with gypsum for making slurry etc.
7. Treated effluent discharged and explained about hazardous and non-hazardous waste e.g. Bio-medical waste, used catalyst, sulphur sludge, used oil, chemical sludge from effluent treatment plant (ETP) etc.
8. Fertilizer plants are now using natural gas as main raw material.
9. Phosphoric acid is used in complex fertilizer & in this process gypsum is produced as by product which is used in construction industry by adopting rapid wall technology. Impact assessment of operations on community and prevention & mitigation measures has been taken by the company. Table 2 gives the overview and trend of product responsibility of RCFL for 3 years.

Table2. Product Responsibility of RCFL

PR Elements	2012-13	2013-14	2014-15	Trend
Direct and indirect energy consumption (000GJ)	41,883	40,495	40,888	fluctuating
Specific energy consumption Gcal/MT	13.657	13.653	13.101	decreasing
Energy saved due to energy efficiency, process modification , retrofitting (GJ)	11,60,354	10,70,466	3,62,455	fluctuating
Water produced in STP (m ³)	47,98,760	52,13,690	53,10,130	increasing
Water recycled as % of total water	15.8%	14.2%	16.9%	fluctuating
Treated effluent discharged(million kl)	3.36	2.61	2.88	fluctuating
Farmers' meetings (in no.)	457	446	446	decreasing
Training programs (in no.)	76	40	40	decreasing
Soil testing days (in no.)	192	208	208	decreasing
Soil sample analysed (in no.)	1,00,581	1,10,155	1,43,219	increasing
Method demonstrations (in no.)	33	114	62	fluctuating
Product demonstrations (in no.)	256	292	390	increasing

Source: Author's compilation from sustainability reports of RCFL

Product responsibility of Tata Chemicals (TCL)

TCL works in the field of The living essential products such as Tata Salt and its variants (Tata Salt Lite, Tata Salt Flavoritz), I -Shakti salt, Tata Swach (water purifier) and Tata I shakti unpolished dals. The industry essential products such as Soda Ash, Sodium Bicarbonate, Chlor-Caustic and other marine chemicals and The farm essential products include Tata Paras (Urea, DAP, NPK) and other agri services under brand name "Tata".

Sustainable Products of TCL are

1. Customized Fertilizer "ParasFarmoola"- Ek Mein Sab
2. For Safe drinking water- Tata Swach
3. Agri solution services such as one stop farmer's solution shop- Tata KisanSansar & Relationship initiative – Tata KisanParivar
4. Iodized Tata salt targeting social concern of anemia
5. Tata I-shakti pulses-hygienic, unpolished, reliable quality.

Remarking An Analisation

Tata chemicals is achieving sustainability through Product responsibility by providing product information, marketing communication, product stewardship, supplier sustainability assessment tool having criteria of governance, health, safety & assess its impacts on environment & society etc. Product safety which is related to safe handling, storing & using the materials starts from the selection of safe raw material.

- For sustainable sourcing company is following various codes & principles. It has also made various arrangements for sustainable transportation such as Supplier sustainability code, Definite Vendor selection process, Tata code of conduct, ISO certification, Global Reporting Initiative, Social Accountability-8000, United Nations Global Compact etc., Efficient fleet access, Full load based transportation, Reuse of packaging material, Bulker movement etc.
- Steps taken to procure goods and services from local and small producers as well as improve the capacity and capability of these.

- Vendor development programs
 - Provide opportunities to local contractors and service providers
 - Skills and livelihood development programs
 - Apprentice training centre trained 100 apprentices every year.
- Mechanism to recycle waste & products
 - Reuse plastic drums by sending back to the supplier.
 - Hazardous waste recycled through Ministry of Environment and forests (MoEF) approved recyclers.
 - Life Cycle assessment, carbon foot- printing assessment and water foot-printing for key products and for all sites.
 - Clean development mechanism project for reduction of greenhouse gases.
 - Soda ash filter system
 - Effluent solids filter used to make cement

Table 3 gives the overview and trend of product responsibility of TCL for 3 years.

Table 3 Product Responsibility of TCL

PR elements	2012-13	2013-14	2014-15	Trend
Total energy consumed (Terra joule)	34259	36455	58094	increasing
Water recycled and reused (KL)	89984009	89226636	98939204	fluctuating
% of total water recycled and reused	85.24	87.05	82.49	fluctuating
Treated effluent discharged(million kl)				
Specific energy reduction	-	-	5.5%	
Specific water reduction	-	-	1.3%	
Recycled input materials				
Lime stone replaced	69.63%	73.39%	73.54%	increasing
Sulphur Sludge	12.57%	12.28%	100%	increasing
Customer complaints pending (%)	10.78%	1.3%	0.3%	decreasing

Source: Author's compilation from sustainability reports of TCL

Table4. Waste treatment and environmental expenditure

Type of Expenditure	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15	2012-13	2013-14	2014-15
	CFCL			RCFL			TCL		
Waste disposal, emissions treatment and remediation costs (Rs. in millions)	1.06	1.46	3.45	49.67	41.24	35.00	-	-	-
Prevention and environmental management costs (millions)	0.97	3.96	2.63	20.58	19.30	13.7	-	-	-
Total environmental expenditure (Rs. in millions)	2.03	5.42	6.08	70.25	60.54	48.70	65.4	73.7	94.3

Source: Author's compilation from sustainability reports of selected companies

Table 4 shows the expenditure related to waste treatment and environment management. Among all selected companies, TCL is spending maximum amount in this head.

Calculation of PRDI

PRDI has been calculated for 3 years of selected companies according to the parameters given in Annexure1. '1' is assigned for full disclosing; '0.5' for partial disclosing and '0' for not disclosing about the product responsibility activities in annual

report or sustainability report of selected companies. The following data has been calculated for 3 years for selected companies. ANOVA has been applied for hypothesis testing.

Table5. Calculation of PRDI for 3 Years

	CFCL	RCFL	TCL
PR1	3	1.5	3
PR2	0	0	3
PR3	3	1.5	3
PR4	0	0	3

Remarking An Analisation

PR5	3	3	3
PR6	3	3	3
PR7	3	3	3
PR8	0	0	2
PR9	3	0	3
Total	18	12	26
Mean	0.67	0.44	0.96

Source: Author's compilation from sustainability reports of selected companies

On the basis of PRDI mean values, Tata Chemicals is having maximum mean value which means that TCL is disclosing maximum product responsibility parameters as per GRI.

Hypothesis Testing

H₀₁

There is no significant difference of product responsibility of selected fertilizer companies on the basis of PRDI.

Table6.Hypothesis testing by Anova

ANOVA						
Source of Variation	SS	d f	MS	F	P-value	F criteria
Between Groups	10.962	2	5.481	3.825	0.036	3.40
Within Groups	34.388	24	1.432			
Total	45.352	26				

Source: Author's compilation

Interpretation of Table 6

Table value of F at 5% significant level at given degree of freedom (2, 24) is 3.40. Calculated F value is 3.82. Calculated F is more than F-criteria (3.82>3.40). P- Value is also less than 0.05 which shows that null hypothesis is rejected. So, there is a significant difference among selected companies on the basis of product responsibility disclosure index.

Conclusion

All selected companies are having sustainability policy for building a sustainable enterprise for present & future generation. They have considered sustainability as an integral part of their business strategy & efforts have been made to achieve more revenue & profit by implementing these strategies. From sustainability reports of selected companies, it is studied that by utilisation of solid waste & fly ash; by selling these waste and by introduction of sustainable and innovative products, companies are creating revenue and adding their profit. Raw material, water & energy are the main issues for fertilizer industry. All selected companies are aware about optimization of these resources. More optimum consumption of these resources results more sustainable operations.

For fulfilling customer value related responsibility, all selected companies have provided product information related to its physical dimensions & chemical compositions with companies' website and customer care number, ISI and FSSAI certification etc. At the end, we can say that sustainability is the core of all activities of selected companies and vision of these companies clearly states this.

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