Sustainable Cheese Production: The Environmental Improvement Programme of "Marin French Cheese Company"

Executive Summary

Every human activity has a corresponding consequence upon the environment. Business is a great part of the economy and uses a lot of natural resources. Hence, it falls under the responsibility to contribute towards conservation of environmental resources. This paper studies how a German cheese making company addresses its environmental and social issues with the implementation of an Environmental Improvement Programme. With the accomplishment of various targets enshrined in the programme Bergader aims at reducing its emission of greenhouse gases and its amended business operation practices directed towards using less energy so that there is a profound impact not only the improvement in climatic conditions but also helps in saving more money for organisations increasing its profit margin.

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Introduction

Sustainability is the demand of the hour and has been the prime concern of all manufacturers doing business all over the world irrespective of their size of operation. Every human activity has a corresponding social and environmental consequence and this makes it all the more important to undertake certain measures which can make positive contribution towards human development. Manufacturing is one of the largest contributors towards environmental and social damage (Kluin, 2014). Hence, it is the greatest concern for them to address issues of sustainability. This has brought to light the relationship between manufacturing operations and natural environment and its influence over the decision-making among industrial communities. Managing business operation so that they are sustainable requires a balance between economic and environmental, societal goals. Such initiatives require policies and practices which can support its implementation (Rosen and Kishway, 2012).

Many dairy processors, farmers, cheese manufacturing company and consumers have expressed their concern regarding energy consumption by this sector and the issue of global sustainability with respect to milk and cheese production. The utilisation of energy is directly related to the cost of production, thus, affecting the profitability of the concerned firms. There has been a growing concern regarding within the consumers and purchasers regarding the environmental impact of the various dairy products that they are purchasing from the market. Now-a-days if an organisation is not transparent regarding their business operation or provides very little knowledge regarding the effect of their business operation upon environment and societies then it only degrades their reputation as a brand towards their target customer (Isik and Yasar, 2015). It is a fact that much of the energy consumption is associated with the production of green house gases. Hence, using less energy directly impacts not only the improvement in climatic conditions but also helps in saving more money for organisations increasing its profit margin.

Overview of Bergader

Bergader is one of the oldest Cheese manufacturing companies in Germany. The company is based in Bavaria and has been in the business since 1902 (Bergader, 2016). Basil Weixler had led the foundation of this company in the form of a small cheese dairy in his village. He had a

keen sense of popular tastes which he utilised in making high quality cheese. The vision statement of the company tells a lot about its passion for cheese which says that a good company reflects the characteristics of good cheese since with passage of time both attains maturity. However, the small cheese dairy took the shape of a company under Basil Weixler's daughter, Charlotte Steffel. Although the company has undergone many transformations Bergader Edelpilz, one of the many cheese qualities produced by the company has not been put for any modifications. It started manufacturing blue cheese in the year 1972 which became highly popular and changed the future of the company towards betterment. The company is also in the production of Rauchkäse, a variety of German smoked cheese under the name "Bruder Basil" (Bergader, 2016a).

Purpose of the project: This briefing report focuses on the environment and social issues that are to be addressed by Bergader and analyses cost and benefits of undertaking an environmental Improvement programme. Detailed account has been provided upon the various components of the concerned programme.

Environmental effects of Bergader

One of the main environmental concerns for cheese manufacturers is the emission of green house gases (GHG) and Bergader is no exception to this. Green house gases are responsible for ozone layer depletion which subsequently leads to global warming.

The process of cheese production and delivery of the manufactured cheese encompasses various sources of emission of greenhouse gases. The highest percentage of cheese GHG emission takes place at dairy farms during milk production and estimates have revealed the percentage to be as high as 90% (Opio, et al., 2013). Contemporary dairy practices have been estimated to produce about 1.2 kilogram (kg) of CO_2 equivalent to one kg of milk while Bergader with the help of modernised techniques the level of carbon dioxide emission is not much lower raising concerns in the management and consumer base. Bergader requires almost 10 pounds of milk to produce only one pound of cheese with its upgraded technology. While analysing various sources of greenhouse gases were found within the dairy practices of Bergader.

- When cows eat, microbes present in their rumen break down the food which results in the production of methane (commonly referred to as, enteric methane). This enteric methane is expelled as burp to the atmosphere and is regarded as the major source of greenhouse gas emissions.

- Nitrous oxide is another greenhouse gas which is released in the atmosphere when farmers apply fertilizers and manure to the fields as a part of rearing cattle.

- While producing hard cheese (one of the most common varieties) produces the second highest percentage of GHG, producing about 0.4 to 0.6 kg of CO_2 per kg of cheese.

- The next level of GHG emissions are added when deliveries of the manufactured cheese are made to the retailers due to the combustion of fossil fuel during transportation. The packaging, mostly made from plastics, is discarded after consumption adding to environmental pollution.

- When the wastage is dumped at landfill sites, its decomposition also releases CO_2 and methane.

Social effects of Bergader

Bergader is also engaged in cattle rearing which implies that the milk to produce cheese is obtained by the company from its farms employing local people. The local villagers who are employed in Bergader obtained their livelihood from their employment at the company but they are also at the end of maximum exposure of high level of GHG affecting their environment. The fertilizer run-offs to the nearby water bodies contaminate their natural resources of sustenance. The business operation has a high social cost as it degrades various valuable resources. Any changes in the business policies and strategies of Bergader affect the lives of the people of the village. The destruction of biodiversity is a direct cost to the society. The increasing consciousness towards environmental outlook of businesses has a direct relation to the operation of companies; any practices leading to deterioration of societal assets tarnish the image of an organisation. It is almost impossible for an organisation to remain in business with a bad reputation. Hence it is very important for a company to consider the cost society has to pay for its business practices.

This also renders the knowledge that Bergader can improve the livelihood and environmental condition with localised, biodiverse and incorporation of organic techniques in business operation (Steenbergen, 2013).

Overview of the Environment Improvement Programme (EIP 2016)

In order to improve its environmental outlook, Bergader's has decided to implement an Environment Improvement Programme. This contains the targets that the company wishes to achieve with the view to amend its impact upon environment and society.

The first and foremost target of this programme would be to reduce the emission of green house gases. The reason behind it is the harmful effect of GHGs upon the environment and improvement in its brand image. Bergader is concerned of the issues of sustainability and looks after the entire production process to improve its quality without adding further to the degradation of environment. This programme is directed towards the accomplishment of the said target. Bergader is a family farm which has been in the Cheese production for more than hundred years. Since, the company has attained its current height staring from a very modest level the management is well aware of the value of nature and has taken the initiative to come up with something good from its business operation (Bergader, 2016b).

Bergader aims at making its production process efficient and sustainable and this programme includes not only amendments in the operations but also making the employees and cattle rearers aware of sustainable farming practices with training with modern techniques to reduce harmful effects that they can generate upon environment. Great quality of milk comes from good quality milk and for this cows need the best care from the farmers and employees of the company. Even with the rise in demand for their different type cheese they need addition to their existing herd and they should include local suppliers this avoids them to undertake additional cost in installing infrastructure and also they can save from generation of more waste.

The company is already following the guidelines EC Eco-Management and Audit Scheme (EMAS) which is an organisation providing the rules for companies to follow while executing their business process and also keeps each organisation's record documented. This programme will integrate the standard set by EMAS while incorporating new practices to make the necessary improvement in achieving sustainability targets. The programme has been designed in such a

way that it does not drastic or damaging the inflow of profit for the company. Bergader looks to ensure long-term benefit for the company with the implementation of sustainable environmental standards. All the targets are set to be implemented within the next five years so that the age old company can continue to deliver exceptional quality of cheese with sustainable business operations.

Components of the Environment Improvement Programme

The main target of Bergader is to reduce carbon footprints.

Carbon footprint

Various activities associated with the business of Bergader such as manufacturing, packaging, transportation and maintenance of the herd releases significant amount of carbon dioxide, methane and other gases in the category of green house gases which has the potential of increasing the climatic temperature because these gases can re-emit solar radiations back to Earth's atmosphere.

Carbon footprint is the actual measure of the overall level of CO_2 and emissions of other greenhouse gases from the production of a particular product. This is a quantifiable measure which uses various indicators like, Global Warming Potential (GWP); and the ultimate result is the evaluation of the relative effect of greenhouse gas on the deterioration of climate in due course of time (Flysjo, 2012).

Bergader needs to measure its total emission levels of CO_2 and more importantly methane because the latter is more harmful (almost 25 times) rather the first. Methane is produced more in the entire process of cheese making the other GHGs. There are certain practices that need to be incorporated in the Environmental Improvement Programme so that the objective of sustainability is accomplished.

Practices to be included in the EIP

- Bergader needs to increase its production of soft cheese, i.e., higher moisture contained cheese like, Monterey Jack which requires less amount of energy in production of each pound rather than other drier variety such as Cheddar which needs fairly higher amount

of energy for aging. Vat optimisation is another step that needs to be taken in order to lower GHG emissions.

- The company needs to adopt the optimum length and type of aging process. Cheese produced in the company which requires low temperature storages has been observed to need more energy against those that can withstand storage at relatively high temperature. Refrigeration also produces significant greenhouse gases so Bergader needs to make amendments in its refrigeration as well by replacing old refrigeration with refrigerators which do not emit GHGs.

- Bergader can also think of diversifying its product line implying that the company indulges itself in co-production of other dairy products such as, whey cream or butter. The introduction of new product lines will help in lowering the emission of GHG from its primary product which will result in distributing the total impact on all of the products produced in the company.

- The company will be amending its production so that they can recover energy from permeate reducing emission of GHGs. The required heat and electricity will be generated from the transformation of permeate into a digester which will produce biogas.

- Energy is the main contributor to the emission levels which is released during processing and transportation stages. Bergader needs to consider installation of solar panels in order to produce electricity. Although the initial cost of installation of Solar panel is higher but in the long-run the average cost of producing electricity dramatically reduces increasing efficiency. The production process will involve in producing minimum carbon dioxide. Besides, solar energy there are other forms of non-conventional energy sources which can be utilised by the company such as wind energy. The mountain valley of Bavaria is ideal for harnessing wind energy. This will lower the carbon footprint level for the company. However, in order to incorporate such huge infrastructural change the company can seek governmental support as the change will not only benefit the company but also the entire industrial sector located in the area.

- The transportation of cheese from the factory site to the retail stores all over Germany involves the rest of the emission of CO_2 for which they can opt for electric or battery cars for the retail stores located in the vicinity.

- The passage of time has brought about other sources of milk rather than using cow milk in manufacturing cheese. For example soy milk has gained popularity over the years as another source of cheese. Cow milk has approximately three times higher carbon footprint than soy milk. So the company should also consider incorporating the method of producing cheese from soy milk.

- Recycling is another very simple step of reducing carbon footprint from the production of cheese. Firstly, milk gallons use blow-mould plastic and if this plastic is recycled to produce other plastic products such as doormats and other re-usable containers then it not only saves energy required for making those products but also saves the disposal of those moulds in the land-fill sites reducing environmental pollution. Burning and other methods of decomposing plastic creates high amount of methane in the atmosphere.

- The EIP plans to conduct a half yearly audit with respect to cleaning and pasteurization energy. This will help in identifying and eventually reduction of energy usage and its wastage in transmission losses.

- Use of bio-degradable packaging will also reduce the generation of waste and thus pollution levels.

- The incorporation of local farmers and cattle rearers will reduce wastage and methane emission but it needs to be clarified to the farmers to use organic farming, like use of manure instead of using chemical and synthetic fertilizers. However, manure should be generated in such a manner that there is no emission of methane and other GHGs. In this case Bergader needs to educate the suppliers and employees of the benefit of organic farming for which training will also be provided.

Cost- Benefit Analysis of the Environmental Improvement Programme of Bergader

Cost: This is a long-term project which will definitely entail certain infrastructural cost but the benefit that will accrue is greater than the cost undertaken. The installation cost of solar panel alone amounts to $20,000 which will be producing 4kW (Kilo-Watt) of energy while the establishment and harnessing of wind energy requires longer period of time to become fully functional. It is costlier because of the heavy installation of its infrastructure, almost $420 per kW. The cost of building necessary framework for building the digester within the premise of Bergader is around $62000. Beside that there is certain construction is required to make the company premise ready to incorporate the amendments in order to transform the production process more compliant to environmental standards. The firm will also require fresh employees and engineer who would be able to operate those new infrastructural amendments. Besides, there will also be training cost incorporated so that the existing staff is well versed with the changes and understands the values of sustainable production techniques.

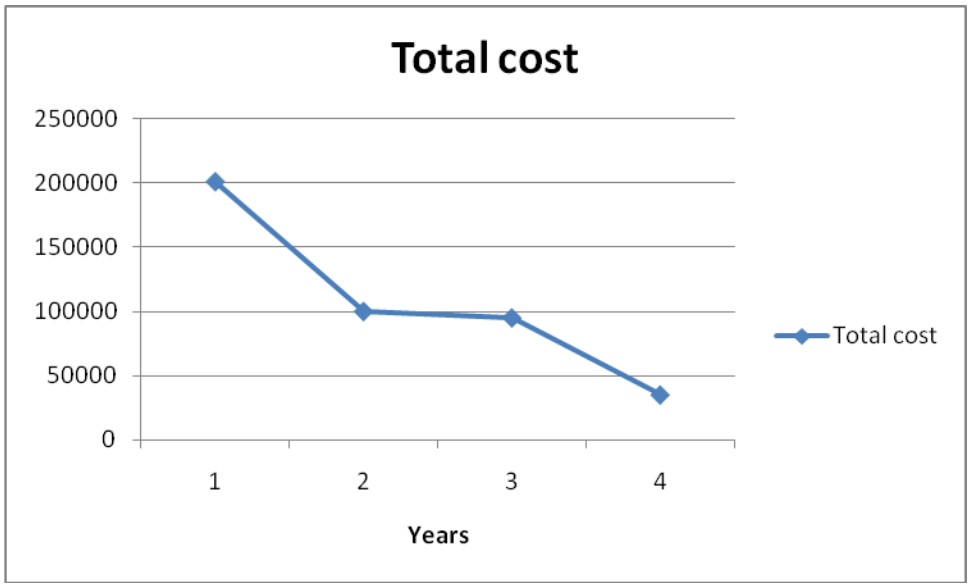
If Bergader decides to introduce production of butter or any other dairy product it will clearly require further investment in building required technological support which approximately costs another $89,000. However, the adoption of soy milk in the production of cheese will also need support, in terms of installing mechanical support which is estimated as $32,000. However, all these changes within the operation will need additional skilled man power. The company will have to hire fresh employees and will also require training existing and new employees. This creates uncertainties whether these significant changes in the operation will result in lowering their profit margin by increasing their cost of production.

Figure 1: Cost of Implementing EIP 2016

	Cost to the company (in $)				
Factors	Cost in first year	Cost in second year	Cost in third year	Cost in Fourth year	Total cost of implementing EIP 2016
Installation of solar energy	100000				
Installation of wind energy		50000	50000		
Infrastructural cost for new production line	25000	15000			
Cost of recycling	30000	10000	20000	10000	
Operation Cost	20000	10000	10000	10000	
Maintenance Cost	12000	5000	5000	5000	
Cost on hiring and training employees	9000	5000	5000	5000	
Cost of inding new and reliable suppliers	5000	5000	5000	5000	
Total cost	201000	100000	95000	35000	431000

(Source: Author's creation)

Figure 2: Falling Cost Curve



(Source: Author's creation)

Benefits: The incorporation of new and improved technologically advanced production techniques has two significant benefits; firstly, lowering of emission of green house gases and secondly, improvement of brand value for the company.

The conservation of energy and reduction in the level of GHGs improves the quality of environment and makes precious natural resources to be available for the future generations. Business houses form a substantial part of economy and uses high amount of natural resources in order to produce final products to the consumers. The pollution caused at the landfill sites if reduced will improve the aestheticism of the local environment ultimately reducing the harm caused to the local population. Sustainability is the need of the hour and since the company's production techniques harms the environment it falls under the responsibility of Bergader to undertake steps for minimising the impacts of its activities. If Bergader continues to deplete the environmental resources without check then there would soon be a time when there will be no market to continue its business.

The increase in brand value has benefits as it makes the company's image more popular to the customers raising its sales. Hence, it ensures that the products sold by Bergader grabs greater market share than its competitors in the market which will eventually lead to steady rise in the profit of the company.

Effect of Bergader's Environment programme on its business

The effect on the business of Bergader is sure to generate positive returns for the company within the next five years. The consumer all over the world have become more conscious regarding their purchases and has been observed to report that they are willing to pay higher price for products which are made from organic ingredients and are complaint with the environmental standards. They prefer to consume better quality products which are natural rather than synthetically produced products. Medical science has also revealed the harmful effect of consuming products containing high amount of chemicals. Hence it is evident that customers will be ready to pay extra if they are convinced that that the products consumed by them have high nutrient values along with assurance that those products are produced in a sustainable production process.

The incorporation of sustainable business operation will also require new employee creating more employment for the economy. This will provide more people to earn and hence raising the standard of living thus creating new consumer for the products subsequently creating new sources of revenue for the company. Bergader will be the first company in the market to implement such a detailed programme thus, making the brand more attractive to the consumers to understand that they are working towards improving environment by reducing its GHG emission levels.

The incorporation of non-conventional energy sources may be cost intensive while its establishment and installation levels but the operation cost of generating electricity reduces with the passage of time. Currently, the company has to incur a total of $ 25,000 on the electricity and energy consumption and with the incorporation of sustainable energy sources like, wind beside solar energy Bergader will be able to reduce its cost substantially estimated as 47% which the company can employ in training purposes. The use of recycled products lowers the cost of making new products.

The new suppliers will be bound to the company with long-term contracts ensuring their loyalty to Bergader and getting the best deal reducing production cost for the company.

On the whole Bergader will be able to reap the following benefits in terms of its business operation:

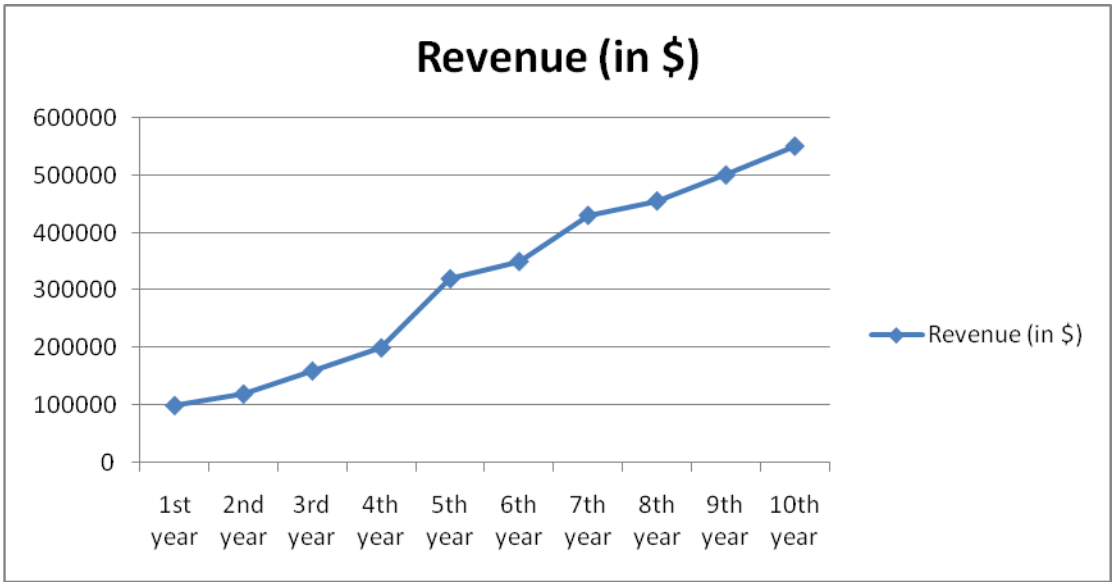
- Strong brand value
- Expanded market because of increased brand value.
- Reduction in the cost of energy consumption and recyclable products.
- Raised standard of living for the people correspondingly increasing its customer base.
- Rise in revenue outweighing the cost undertaken.

Figure 3: Revenue for the company (in $)

	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year
Revenue	100000	120000	160000	200000	320000	350000	430000	455000	500000	550000

(Source: Author's creation)

Figure 4: Revenue Curve



(Author's creation)

Key milestone in its implementation

This will be 5-year plan programme which aims at improving its wastage and reduction of its contribution to environmental degradation.

Target for first year:

- To install solar panel to shift its energy source
- Installation of digester
- Finding dependable cattle rearers to increase its supply of milk.

Target for second year:

- Including more employees and engineers.
- Initiating the process of establishing infrastructure for wind energy.
- Training of the staff.
- Building infrastructure for new product lines.

Target for the third year:

- Completing the installation of wind energy as the other source of energy
- Reduced wastage by 50%.

Target for the fourth year:

- Complete recycle of plastic products
- Introduction of Bergader' butters.

Fifth year:

Working with sustainable production process and reduced operation cost.

Conclusion

This paper shows how the German cheese manufacturing company, Bergader addresses its main environmental and social issues. The company can adopt an Environmental Improvement Programme which will be directed towards reducing the emission of GHGs. There will be audits to evaluate the progress and success of the programme's targets. Although the programme is expected to undertake substantial capital investment in order to make the production process sustainable yet the expected benefit has the potential to outweigh its costs. The increased employment opportunity is expected to raise the living standard of the local workforce. Bergader with the help of EIP 2016 can make significant changes in its environmental outlook making it more attractive to the customers. Thus, the business prospects also look promising with more capital investment for implementation of the various components of the programme.

Reference List

Bergader, 2016a. *Bergader's history*. [online] Available at: < http://www.bergader.com/about-bergader/our-history/> [Accessed 30 July 2016].

Bergader, 2016b. *Bergader takes over responsibility: Product quality and environmental protection are tightly entwined* [online] Available at: < http://www.bergader.com/about-bergader/quality-environment/> [Accessed 30 July 2016].

Flysjo, A., 2012. *Greenhouse gas emissions in milk and dairy product chains*. [PDF] Avaialble at: < http://pure.au.dk/portal/files/45485022/anna_20flusj_.pdf > [Accessed 30 July 2016].

Isik, A. and Yasar, M.F., 2015. Effects of Brand on Consumer Preferences: A study in Turkmenistan. *Eurasian Journal of Business and Economics 2015*, 8(16), 139-150.

Kluin, D., 2014. *Environmental Crime and its Victims: Perspectives within Green Criminology*. London: Ashgate Publishing.

Opio, C., Gerber, P., Mottet, A., Falcucci, A., Tempio, G., MacLeod, M., Vellinga, T., Henderson, B. and Steinfeld, H., 2013. *Greenhouse gas emissions from ruminant supply chains–A global life cycle assessment*. [PDF] Available at: < http://www.fao.org/docrep/018/i3461e/i3461e.pdf> [Accessed 30 July 2016].

Rosen, M.A. and Kishway, H. A., 2012. Sustainable Manufacturing and Design: Concepts, Practices and Needs. *Sustainability*, 4, pp. 154-174.

Steenbergen, H., 2013. Is Cheese Sustainable? A Multi-scale Exploration of Botton Gouda. *Journal of Sustainability*, 1(1), p.15.