Application of Green Supply Chain Management Approach for a Community Based Dairy Factory

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Introduction

This paper provides an overview of Green Supply Chain Management (GSCM) approaches for a community based dairy factory. GSCM is an emerging field that out of the traditional supply chain perspective. Greening the supply chain is one such innovative idea that is fast gaining attention in the industry. Today green supply chain is at the heart of the concept of sustainable development.

This concept highly concerns about the environment. Eco-efficiency and remanufacturing processes are now important assets to achieve best practice (Srivastava, 2007). This concept is simply to produce more quality (environment friendly) output from less input. Reducing waste and pollution, and using less energy and material resources, are obviously good for the environment and evidently, are the best for supply chain because they cut the operational cost. Waste minimization is being considered as an important strategy towards attaining a green supply chain. Milk supply chain is more concerned with controlling the milk quality and supply fluctuations which are unique to this sector. Here, traditional supply chain is upgraded to highly effective value system that creates more value to all the partners in the supply chain. The Sri Lankan supply chain for milk and milk products is affected by wastage and poor handling. Wastage occurs due to presence of multiple points of handling. Contamination of milk can lead to huge economical losses. Contamination occurs at different levels: at farm level, during collection and storage, and at processing centers. Shortage of cold storage facilities and refrigerated transport equipments lead to inefficiencies in handling milk and milk products. Thus there is a compelling requirement for appropriate infrastructure facilities for temperature controlled warehouses, bowsers, wholesale and retail shops, etc. where storage and transportation activities are taking place. By practicing improved supply chain management practices, there will be a significant reduction in the wastages of milk and milk products which in turn will benefit both the farmers as well as the consumers by means of increased returns and decrease in prices respectively.

Methodology

In this project, firstly secondary data were collected to get an idea about the dairy industry in Sri Lanka. Secondary data were obtained from Ministry of Livestock Development, Central bank, Department of Census and Statistics, Department of Animal Production and Health Livestock statistics, Mahinda Chinthana, Sri Lanka customs, National cleaner production center (NCPC), publications of Central Environmental Authority and Sri Lanka Standard Code of hygienic practice for dairy industrie, etc. According to the secondary data obtained, there were no doubts about the huge potential for the expansion of the dairy industry in Nuwara Eliya district in the

view of its favoured climate, labour, green pastures and the demand for milk from the other districts. Therefore, this community based dairy industry has been planned to be established based on the "Kotagala farm" which is located closer to the IDB Industrial Estate in Kotagala. Further, there are possibilities to increase the capacity of the dairy unit as it has been planned to locate in an area where there are plenty of small scale dairy farmers who sell their milk through intermediary salesmen. Designed community based dairy factory is planned to carry out the processing operations based on GMPs. Arrangements have been made to ensure hygienic conditions in milk processing by considering each and every aspect of milk processing starting from establishment designing, equipment purchasing and maintenance, control of operations, cleaning and sanitation, personal hygiene, transportation, staff training, pest control, waste management up to packaging and labeling. In here, greening the dairy supply chain, starting from farm level to distribution of finished products was studied. It includes raw material extraction, transportation, manufacturing process, wholesaler or retailer and consumer. Raw materials and energy wastage, underutilization of resources, environmental impacts and public health risks associated with each step in dairy supply chain was identified using primary and secondary data. Primary data collection was carried out using Observational method, Staff interviews and the Check lists were used to identify pollutes and impact of each pollute. Secondary data were obtained from the publications of Central Environmental Authority, National cleaner production center (NCPC) and research publications were used to identify the types of effluents discharged by the dairies and to find out the ways of maximizing overall environmental performance of a community based dairy industry. Overall cost effectiveness was determined by using a feasibility study.

Results and discussion

In manufacturing process, the processing factories can apply green concepts by several methods to reduce energy and resource consumption. This is where the reuse and recycling have to be concerned. Some practices include reducing energy consumption, recycling and reuse, using biodegradable and non-toxic materials, minimizing harmful emissions and minimizing or eliminating waste.

The dairy farm produces the milk and it is collected by a collecting point thereafter bowser which delivers it to the dairy factory. At the dairy factory the milk is processed into a variety of dairy products and packaged for the consumer. After that they are delivered to the retail shops where the products are displayed for consumers on a refrigerator shelf or in a cold room for selling. A dairy item purchased by a consumer is transported to the household and stored in the refrigerator before the final consumption. Each of these activities in the milk chain causes environmental impact. When consider the dairy chain waste products, those may occur as liquid waste, solid material, volatile compounds or gasses that are discharged into the air. If this waste is not managed properly, it will directly affect the environment. Water pollution, soil pollution, air pollution are major environmental impacts in the supply chain. The major environmental impact associated with dairy supply chain is the pollution of surface and ground water. This would contribute to the organic load of the effluent stream (milk solids, detergents, sanitizers and milk wastes). Discharge of waste water to surface waters affects the water quality in three ways: 1.The discharge of biodegradable organic compounds (BOC's) may cause a strong reduction of the amount of dissolved oxygen, which in turn may lead to reduced levels of activity or even death of aquatic life. 2. Macro-nutrients (N, P) may cause eutrophication of the receiving water bodies. 3. Agro-

industrial effluents may contain compounds that are directly toxic to aquatic life (e.g. un-ionized ammonia). Milk losses occur as a result of overflowing, spillage, foaming, leakage, and also during processing and cleaning. The majority of milk wastage occurs due to residual milk in storage tanks, pasteurizer, homogenizer, pipelines etc, and improper handling /usage of milk & other raw materials in dairy factory leads to resource waste. Refrigerant loss in milk cooling was identified as the major way of energy loss in dairy supply chain. Poor personal hygiene in the factory level is responsible for the food poisoning outbreaks which is the major public health significance in dairy supply chain. Financial evaluation of this project indicates a return on investment (ROI) of 57.14%. This Community based dairy factory will create employment directly to 21 persons and indirect employment to around 15 -20 farmers.

Conclusions

Application of green supply chain management approaches in dairy industry helps to achieve environmental friendly operations through resource conservation and waste management whilst achieving economic benefits. At the same time, this would help to ensure the quality and safety of the final products. There is a good market potential for the dairy products in Sri Lanka. This opportunity can be utilized to set up a profitable community based dairy factory in Kotagala area.

References

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