Establishment of Community Based Fish Factory Through Green Supply Chain Management Approaches

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Introduction

Post harvest loss is one of the main problems in Sri Lankan fish industry. According to Ministry of Fisheries and Aquatic Resources there is a 30% of post harvest loss in Sri Lankan marine fish industry. This may be due to lack of facilities and lack of knowledge of the fishermen. Under the greening concept the main idea is to increase the resource utilization by maximizing the output and reduce the environment impact. Therefore, by applying the greening concept the post harvest losses can be reduced and the environment effect could be minimized and maximum gain could be obtained from the existing resources. Establishment of a community based fish processing factory through green supply chain management approaches is tested here as an option to minimize the post harvest losses in Sri Lankan fish industry.

Methodology

As secondary data; type and quantity of fish production in each district, import quantity of the fishery products were collected from the data base of Ministry of Fisheries and Aquatic Resources (MoFAR), Ceylon Fisheries and Harbour Cooperation (CFHC) and customs reports.

As primary data; supply chain of the fish, Fishing gear, storing condition on boat, average experience in fishing, temperature after unloading, time period of fishing and total fish catch were collected by using structural interview method. The raw material flow and the material balance of the fish canning factory also were identified to get an idea about the type and the amount of waste and the environmental impact of those wastes. Then possible solutions were to minimize those effects under the green supply chain management approaches was established.

After identification of supply chain; regression model was designed to identify the factors affecting the fish quality. Fish quality was considered as the dependent variable because if the fish quality is high there may be fewer post harvest losses. Storing condition on boat, average experience in fishing, temperature after unloading, time period of fishing and total fish catch were considered as independent variables. Negombo, Beruwala, Dondra, Trincomalee and Kalpitiya harbours were selected by stratified sampling method, having highest number of multi-day boats. Those harbours were visited to collect fifty samples (ten samples from each harbour), as primary data and to get detail information on fishing methods and post harvest losses.

Then a proper site was selected and type of the fish was selected and assumed that the production will be 1500 cans per day. All other calculations were done according to this

assumption and the feasibility study was carried out finally to find out whether the project is feasible to be implemented.

Results and discussion

The first two stakeholders (fishermen and commission agent) were analyzed by developing a regression model.

Correlation Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	P
		B	Std. Error	Beta		
1	(Constant)	100.003	8.011		12.483	.000
	Fishing gear	-3.128	1.415	-.113	-2.211	.032
	Storing	-2.531	1.248	-.087	-2.029	.049
	Temperature	-3.389	.706	-.386	-4.798	.000
	Experience	1.530	.489	.203	3.131	.003
	Time Period	-.946	.202	-.349	-4.670	.000
	Total fish	-.004	.002	-.135	-1.804	.078

Dependent Variable: fish quality

According to the result fishing gear, storing condition in the boat, average experience in fishing, temperature after unloading, time period of fishing, are the factors which are significantly affect the fish quality ($P<0.05$).

According to the collected data, identified what will the best under greening concept. If the fish quality is higher than 75% considered that those fish are very good and can be use in processing. From collected data found out the average of the "Total fish catch, Time period of fishing and average fishing experience" and find out the highest frequency of "Fishing gear and storing method in the boat" and when considering temperature after unloading, it is obviously to have less than 4^0C, if not histamine formation will be high.

According to collected data identified that average fishing experience is about seven years. When experience is high they know how to catch the fish by avoiding damages and also how to store the fish with minimum damages. When consider about the time period of fishing, identified that 13 days are the best time period of fishing. So there will not be excess fish and there may be fewer damages to fish caught early. The best quantity of fish is estimated as 2700 kg. Pole and line method found to be the best fishing method. When considering fish storing method it is better to have racks so that there will not be excess fish and there may be fewer damages to early caught fish.

Then fish processors were evaluated by identifying and quantifying raw material flow to gain the knowledge on the amount of inputs and outputs from each step. Environment impacts from each step were found out and possible solutions were suggested.

According to the collected data Matara was selected as the best location for the factory having the highest fish production in Sri Lanka. Skip jack tuna (Balaya) was selected as the best species for processing. Canning industry was selected as the processing method by looking at the quantity of fish products imported. Proper factory layout was designed to minimize the waste and all necessary steps were taken to minimize the environment effect and finally to have safe and quality products to consumers. Finally feasibility of the project was studied under the greening concept. The Return On Investment (ROI) of the project is 83.42%. It indicates that the project is highly feasible to be implemented.

Conclusions

Establishment of a community based fish canning factory under green supply chain management approaches is a highly feasible project. According to the profitability statement the return on investment was 83.42% .indicating that the project is highly feasible. However, it is not possible to achieve 100% performance at the start. Therefore, it is proposed to achieve 60% performance in the first year, 80% in the second year and finally 100% performance in the third year. So the feasibility of the project is in first year is 50.05% and the second year is 66.73% and in the third year 83.42%. The figures indicate that the project is highly feasible.

Fish quality is taken as the main factor which is affecting to the greening of supply chain. That means if the quality of the fish is high there will be less waste generation and less environment impact and also can use the existing resources efficiently. So the factors; Fishing gear, Storing condition in the boat, Average experience in fishing, Temperature after unloading, Time period of fishing and Total fish catch were identified to be affecting the fish quality.

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