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Maximizing sustainability of value added coconut sector with respect to the activated carbon industry in Sri Lanka

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Abstract

Coconut sector serves the local consumption through its produce and also forms the giant supply base for numerous industries. The highly demanded value added coconut products have potential for bringing in high export earnings to the country. This potential of coconut products must be exploited fully in order to sustain the value chain of coconut, which would otherwise be replaced eventually with some less value adding sector. Activated carbon, which is a bi-product of coconut, in the value chain of coconut sector has high value adding capability to the coconut shell. The research explores whether the full potential for activated carbon industry is utilized, by analyzing the current status of activated carbon industry in Sri Lanka and the gaps perceived in the social, environmental and economic domains. These gaps have been brought to light as economic values starting from the macroeconomic level to the grass root functioning level. The analysis was carried out separately under the two key areas of utilization of coconut shells and processing of coconut shells into activated carbon. These are the critical areas of concern in the industry. Thereafter, an integrated model of social, economic and environmental factors is proposed which incorporates solutions to fill the identified gaps, and cascade down to four action levels, namely, Strategic, Managerial, Operational and Functional levels.

Primary data was collected using purposive sampling using questionnaires for carbon manufacturers and Coconut Development Authority (Coconut Development Authority) and field visits to gather qualitative data, basically to gain access to qualitative data. Secondary data was gathered through the monthly reports, records and publications of the Coconut Development Authority and Coconut Research Institute, Company annual reports, Sustainability reports, Research articles, and websites.

The findings indicated that the activated carbon industry in Sri Lanka does not utilize its full potential in resource consumption and bi-product processing and hence the sustainability is threatened. The proposed recommendations to ensure sustainability include strengthening the supplier-manufacturer links, economical usage of shells through improved networks and regional processing of shells to charcoal, being farmer-centric by offering reasonable prices and sharing the economic benefit with the community.

Keywords: Activated carbon, Coconut shells, Sustainability, Value added coconut products

Introduction

The export potential of value added coconut sector was elaborated in the beginning of the research. Along with the statistical information obtained from various sources, it was shown that the coconut value chain is not operating in full potential and thus the sustainability of the sector is threatened. The significance of the study is that it sheds light on the sustainability of coconut sector, The purpose of the research is to propose a sustainability model to the sector by focusing on activated carbon industry. The rationale behind selecting activated carbon among value added coconut products is that it is relatively a high value adding product among other products which is in high demand and is manufactured from coconut shells which is a bi-product of coconut which is freely available and greatly underutilized. There exists a vast research gap in the value addition of coconut and sustainability and that this gap could be bridged by the research. The scope of the research lies in the social, economic, and environmental domains.

In a study of literature, it was identified that there is a dearth of literature relating to value added coconut sector and its sustainability, especially in activated carbon industry. The research studies are mostly confined to scientific areas which basically pertain to the production processes and technical details about them and not in macro economical and strategic perspectives. Moreover, existing literature on value added coconut sector concentrated on either one of social or environmental or economic aspects, and not collectively in all three domains. Therefore, the research focuses on a relatively novel integrated field of interest.

METHODOLOGY

The methodology of the research includes identifying the potential of the activated carbon industry in terms of coconut shell utilization and value addition to this bi-product. The key performance indicators suggested include domestic wastage (%), usage of shells in industry boilers (%), carbon credits earning potential (%), low value added shell exports (%), purchasing price of coconut shells, electricity generation capacity utilization and surface utilization indicators. The surface utilization indicators are further subdivided into the exported quantity of activated carbon as a % of total potential, potential activated carbon exports as a % of coconut exports and potential industry demand that could be met as a %. The domestic wastage % is calculated as a % of domestic consumption as well as a % of industry requirement. The usage percentage of shells in industry boilers is calculated as coconut shells used in boilers as a percentage of industry shell production and coconut shells used in boilers as a % of industry requirement. All these indicators quantify the potential of the industry in terms of economic sustainability.

Data related to coconut shell utilization was gathered from Annual reports of Coconut Development Authority, Sri Lanka coconut statistic book 2016, Central bank reports, Economic and Social Statistics of Sri Lanka, Annual reports of Export Development Board, and monthly and annual reports of Coconut Research Institute. Data related to the bi-product utilization in the manufacture of activated carbon was collected from structured interviews with the manufacturers of activated carbon and coconut development authority officials, company annual reports, sustainability reports, research articles, and websites. Data was analyzed for cost benefit analysis for coconut shell utilization and bi-product utilization in the manufacture of activated carbon.

RECOMMENDATIONS

The inter-relating social, economic and environmental recommendations will be discussed under the following four-fold sustainability framework.

A. Financial-Strategic perspective

- Encouraging the usage of alternative sources of energy (by bringing in national level policy regulations needed if possible) such as Gliricidia rather than using coconut shells as domestic and boiler fuel in industries, and using the shells from those industries directly in the manufacture of activated carbon.

- Expanding the value added industries from bi-products of activated carbon manufacture such as charcoal briquettes manufacture and carbon pellets manufacture. Government can invest and share the technical expertise needed.

- Coconut shell liquid smoke commercial production is still not carried out in Sri Lanka mainly due to a lack of an identified market within the country. However, since it is a potential food preservative and could also be used to control paddy pests, it has a market potential for export as well as locally. Thus, campaigns and market research must be carried out to exploit the potential benefits.

- The collection of coconut shells is a cumbersome process and incurs high transportation costs. Therefore, it is a less costly option to carry out charcoaling in specific regions of the coconut triangle and the companies to buy charcoal directly from them. Thus, the farmers will also be engaged in value addition, employment would be provided and it would be an additional source of income for them. This is already practised by a company in association with CEA with the introduction of eco-friendly kilns given the technical expertise required.

- Semi-automatic copra drying could be practiced in regional charcoaling centres to achieve gains from both charcoaling and copra production. The annual net profit generated by this is calculated as Rs. 1.6 million . If government supports these through investments, the local farmer will have numerous benefits.

- Earning carbon credits through emission reduction of proposed regional charcoaling power plants.

- Implementing strict legal policies on coconut land fragmentation, encouraging domestic coconut cultivation by providing seedlings and considering the lifespan of trees when developing high yielding varieties through research for a sustainable coconut cultivation.

- Developing a database to keep track of coconut shell and charcoal utilization and collection networks island wide.

B. Customer-Managerial perspective

- Positioning the brand image of Sri Lankan activated carbon as of superior quality, green manufacturing and fair trade certified in order to obtain greater demand in the world market and obtain premium price advantages over the competitors.

- Minimizing the import and value addition to imported coconut shell charcoal and activated carbon since it degrades the quality of Sri Lankan activated carbon and then the carbon products would be unable to deliver the brand promise to the customers.

- Creating brand visibility to customers by sponsoring national and international level events. Eg:-Dilmah tea sponsoring Sri Lankan cricket sportswear.

C. Internal business- Operational perspective

- Backward vertical integration of coconut shell kernel processing industries with the activated carbon manufacturers to obtain coconut shells.

- Backward vertical integration of coconut shell kernel processing industries with the *Gliricidia* suppliers to obtain bulk amounts of dried *Gliricidia* sticks at reasonable prices.

- Enhancing the collection network by appointing coconut estate owners and vendors with the regional coconut shell collection responsibility for a reasonable fee. They could make the household consumers aware of the collection and request them to communicate with a medium such as short message (SMS) when their collections are ready. The collectors can reach to these homes and using their distribution network only for available homes and collect the shells at once.

- Establishing collection centres in hotels, camps, schools and universities.

- The calculated economic value of 1kg of coconut shells is Rs.32 for activated carbon. Nevertheless, the price indicated by Coconut Development Authority in the website is from Rs.14-16. Therefore, the average price would be around Rs.15 per 1kg. 1kg of coconut shells usually consists about 6 shells, of which the nuts equivalent is 3. The average production cost per coconut from all types of lands is approximately Rs.15 as calculated from data of coconut statistics of Coconut Research Institute.

- Thus, it is clear that the retail price of a coconut shell is not reasonable and the economic benefit could be shared furthermore with the farmer by increasing the coconut shell price reasonably.

- Coconut shells are destroyed as a result of dengue threat and the unawareness of the economic value of coconut shells. Awareness campaigns about the value creation and coconut shell collections could be jointly mediated through the dengue awareness programs with the assistance of the health officers.

- Coconut Development Authority and Ceylon Electricity Board could jointly promote electricity generation projects from the eco-friendly regional charcoaling process. This would be a solution for the power crisis in Sri Lanka, by having regional power plants.

- To minimize the disturbance to social life by the aforesaid projects, their participation could be encouraged by providing employment, loans and investments needed for the projects to become successful. By this way, monopoly in the industry could be reduced and Small and Medium Enterprises too would be empowered.

D. Learning and Growth-Functional perspective

- Minimizing the export of shell powder, shell pieces and shell charcoal as they could be converted to activated carbon by further value addition.

- Currently, different types of activated carbon are manufactured for different purposes. Further product diversification and value addition is possible to manufacture high end products even in small product quantities with greater profit margins. Eg:-Super capacitors.

- Encouraging the coconut farmers to cultivate and dry Gliricidia in the coconut estates as an additional source of income.

- Minus eight (A bi-product of the initial charcoaling process) could be developed as a fertilizer for coconuts or in horticulture.

Conclusion

On Comparing the potential economic value gain if the whole supply of coconut shells in the country is used for activated carbon vis-a-vis the economic value gain achieved at present, it was found that the potential that is untapped is about 5 times more than what is exported currently, This means indicated that Sri Lanka is not utilizing the full potential in activated carbon industry.

The cost-benefit analysis of coconut shell utilization and processing of bi-products was carried out under several pre-identified indicators representing both coconut shell utilization in activated carbon industry and value addition to bi-products during the production process of activated carbon. These indicator percentages revealed that there are gaps and there are untapped areas and hence, the sustainability of activated carbon industry could be maximized individually by filling the indicator gaps which will maximize the coconut shell utilization and value addition during the production process.

The comparison of economic gain of activated carbon among the other value added coconut products at present vs. the economic gain of activated carbon among the value added coconut products, when the whole supply of coconut shells is used indicated that the potential is approximately 3 times the present value. This proves that activated carbon has the highest potential available from value added coconut for sustainable coconut industry.

The recommendations are proposed under the next heading in order to reduce the domestic wastage , reduce the usage of shells in industry boilers , increase the carbon credits earning potential , decrease the low value added shell exports , decrease the purchasing price of coconut shells, increase the electricity generation capacity utilization, increase the exported quantity of activated carbon as a % of total potential, increase the potential activated carbon exports as a % of coconut exports and increase the potential industry demand that could be met as a %.

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