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Feasibility Study for Plastic Bottle Recycling in Lone Star College- North Harris Houston, TX

Introduction

The increasing use of plastic bottles in industrial and consumer applications, together with the high consumer awareness regarding solid waste recycling has resulted in an increased demand for recycled plastic products such as plastic packaging materials (flexible, rigid, and laminated packaging materials). Plastic bottles stand as one of the fastest growing types of plastic materials that usually get collected for recycling purposes (Franchetti 535). The feasibility study for the intended plastic bottle recycling project got initiated by increasing solid wastes transfer stations and landfills around Lone Star College and will capitalize on the opportunities created by the demand for various products of recycled plastic bottles, particularly plastic packaging materials (flexible, rigid, and laminated plastic packaging materials). Additionally, the feasibility study focuses on several issues relating to recycling of plastic bottles, including the possible amount of the available used plastic bottles within Lone Star College and its environs, as well as reviews of the disposal and recycling rates of waste plastic bottles in the area. The objective or aim of the feasibility study is to acquire the necessary information to make a correct and informed decision regarding whether or not to venture into plastic bottle recycling business. This paper, therefore, presents the feasibility study for plastic bottle recycling project in Lone Star College- North Harris Houston, TX.

Market Study and Determination of Plant Capacity

The aim of creating a plastic bottle recycling plant in Lone Star College is to produce various plastic packaging materials for local consumption and to substitute similar imported products by the local industries. The market share of the proposed project for flexible plastic packaging materials is expected to increase from about 10,000 tons in the year 2017 to about 50,000 tons by the year 2020 (Franchetti 538). Additionally, the market share is estimated to reach 110,000 tons by the year 2030. Also, the market share for the proposed project for rigid plastic packaging materials is expected to increase from about 4,000 tons in 2017 to about 15,000 tons and 90,000 tons by the years 2020 and 2030 respectively. Similarly, the market share of the proposed project for laminated plastic packaging materials is expected to increase from the current 300 tons to 800 tons and 3,000 tons by the years 2020 and 2030 respectively (Franchetti 539).

Raw materials and Inputs for the Project

Raw Materials

The primary raw material for the project will be waste plastic bottles. However, effective production of quality recycled packaging plastic materials will require the incorporation of various plastic materials such as HDPE, PP, PET and HDPE granules, as well as coloring pigments (Yuedong and Huadong 15). For the production of flexible packaging plastic materials, a broad range of plastic bottle resins will be used, including BOPP, CPP, BOPET, PVC, and LDPE resins. Other materials that will be utilized for effective production of the three categories of plastic packaging materials (flexible, rigid, and laminated packaging materials) will include slip agent, additives, as well as anti-static and anti-block agents (Yuedong and Huadong 17).

Inputs

The primary inputs in the project will include polythene sheets and cardboards (cartons), grease, oil, and consumables, all supplied from the local market (Dey 236). However, the proposed project will produce its own polythene sheets for packaging its recycled plastic bottle products for delivery. Besides, the recycling plant's annual utility consumption at full capacity operation is expected to be about \$ 9,000,000.

Project's Location and Site Selection

The selection of Lone Star College as the place and Site for the intended plastic bottle recycling project is as a result of its proximity to the source of raw materials, as well as its nearness to most consumers of the product. The area around Lone Star College- North Harris Houston is surrounded by many beverage and food production plants which will be the immediately targeted customers by the project.

Land Requirement for the Project

The total area required for the intended plastic bottle recycling plant is 2.5 hectares with a dimension of 250 meters by 100 meters. The building area of the plant will include an office block a conversion block, BOPP stretching block, injection block, BOPET stretching block, as well as a block for PVC, CPP, and LDPE blowing.

Product Mix

The plastic bottle recycling plant is intended to produce three different products, which include rigid plastic packaging materials, flexible plastic packaging materials, and laminated plastic packaging materials.

Plant's Production Capacity

The recycling plant will use the corrugated paper board technology in the plastic bottle recycling process. The economic scale of such a technology ranges from 2500-300 tons per year for small scale production, 6000-6500 tons per year for medium scale, and 10,000-11000 tons per year for large scale production (Curlee 195).

Engineering and Technology

The integrated plastic packaging materials machinery and the process will include casting technology (for the production of CPP), and linear motor simultaneous stretching technology (for the production of BOPP and BOPET). Others will be multi-layer blowing technology (for the production of LDPE film), and film blowing process for the production of PVC film (Curlee 197). Additionally, the plant will use both wet lamination and gravure printing technologies for semi-converting processes like lamination and printing. Also, the production of rigid plastic packaging materials and their caps will utilize injection and compression molding technologies respectively (Curlee 209). The costs of investment in the plant machinery and related equipment are approximated to be \$5,000,000.

Human Resource Requirement

Once implemented, the plastic bottle recycling project will create job opportunities for over 100 employees. Some of the areas that will attract jobs once the project is complete include the managerial position, market, and sales, executive secretary, administration and finance, quality control and assurance, production department, planning department, as well as financial and property management.

Financial and Economic Analysis

Financial Analysis

The project's total investment cost is estimated at \$9,000,000, and the primary source of the financial requirements will be a bank loan, which is expected to account for 70 percent of the total cost, and equity, which will contribute the remaining 30 percent. The total annual production cost and revenue collection at 100 percent capacity utilization (year five) are estimated to be \$8,900,000 and \$9,100,000 respectively (Dey 239). Additionally, the annual net profit after taxation will rise from \$7,900,000 during the first year of operation to above \$8,500,000 in the subsequent years. Also, the projected cash flow of the proposed project indicates that the business would generate positive net cash flow right from its first year of operation if proper management is emphasized (Dey 242). Moreover, the Internal rate of return (IRR) of the business is computed to be 20.95 percent, which indicates the project's viability. The project's net present value at 10 percent discount rate is calculated to be \$8.9 million, which is acceptable. Also, based on the predicted cash flow, the payback period will be seven years, which is a reasonably short time (Dey 245).

The Project's Economic Impact

The plastic bottle recycling project will create job opportunities for over 100 people and will generate an average of \$5.6 million per year as corporate tax, as well as make other tax contributions in the form of payroll tax. Besides, the resulting plastic packaging materials will significantly reduce the importation of similar products (Brown and Milke 25). The project will also create connections with the country's manufacturing sector by supplying the industries with packaging materials. Moreover, the business will create a conducive environment fast growth of

both trade and service industries around the project's site, which would, in turn, create job opportunities for several people (Brown and Milke 29).

Environmental Impact Assessment

All the wastewater from the recycling plant will be collected and recycled. The water for cooling will undergo a continuous recycling, while that for sanitation and cleaning will get collected in sewage tanks and disposed of according to regulations set by the North Harris Houston municipality. Besides, waste water will be handled appropriately to prevent it from seeping into the ground aquifer. Also, the generated solid wastes will be collected properly and damaged accordingly to avoid possible retrieval. Additionally, the liquid wastes will be collected and appropriately treated before being discharged, and an effective hearing conservation program will be implemented as a means of noise protection for the manufacturing unit.

Conclusions

The plastic bottle recycling project is a feasible venture in Lone Star College- North Harris Houston, TX since the total tonnage of waste plastic bottles are sufficient to initiate and maintain a plastic recycling program. Additionally, the markets are stable and reliable, which makes the project to have predictable future. The revenues collected will also cover the costs required to initiate and run the plastic bottle recycling project. Therefore, the plastic bottle recycling project will net the region a huge return, and will adequately cover its expenditures at full operational capacity.

Works Cited

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