

Economically study on possibility of making fluting paper from Bagasse in Khuzestan province

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ABSTRACT

This study has been investigated the possibility and the technical and economic point of view of making Fluting paper from bagasse in the Khuzestan province. According to The projects under the development of sugarcane agro-industry, and the south side of the industry, bagasse can be one of the best raw materials for production fluting pulp and paper. Production fluting pulp from bagasse was considered 1350 tons per year. The volume of total investment has been predicted over 6356.3 million rails. Technical and economic evaluation of projects economic indicators such as rates of return on investment return on investment period. The results indicate that the plant is of very good technical and economic justification.

Keywords: bagasse, fluting, pulp and paper, Rate of return on investment.

INTRODUCTION

Design and construction industry needs to understand the theoretical foundations and enjoyment of views and practical experiences with economic and cultural conditions prevailing in the community and technical in order to achieve production targets. Possibility of construction of units in terms of supplying raw materials, the investment rate, match the technology industry with expertise and skills of potential and actual rates in the country and economic coordination will require technical. Selecting appropriate methods, devices and equipments needed to produce each product can be selected based on the process, can be selected. Pulp and paper industry, paper products that meet the needs of human societies is critical in the development of cultural, social and economic nations will play a special and important role [1]. Pulp and paper products, about 2 percent of world trade and the 2.5 percent of world industrial production are accounted. during the past three decades, a variety of paper and cardboard consumption worldwide by about 3 times and The average annual growth rate of consumption, and while paper products in developing countries (5.8 percent) more than double the average annual growth rate of consumption in developed countries is (2.3 percent) [2]. In countries where forest resources are limited mainly pulp resources are produced. Reports of the FAO, every year, eleven million hectares of forests are destroyed worldwide. Therefore, in order to produce fibers for providing pulp and paper, researchers and experts have tried to use a good variety of wood plants. Among sources used, the cellulosic fibers bagasse has a special place, so that over 6 percent of total world resources pulp and paper is produced using bagasse [3]. In our country due to the large amounts of bagasse from sugar factories and paperboard production quality, the bagasse is used as raw material. According to the information in the past 10 years about 90 percent of wood raw material pulp Becker and only slightly more than 10 percent of the resources provided pulp. The annual growth rate of plants used to produce pulp is especially higher in developing countries [3]. Each year, more than a hundred hectares of forest and natural resources of the expected that much of the damage caused by the paper industry. Also, more than half a billion dollars of annual imports of paper and cardboard types [4].

Today pulp production of bagasse with different processes is possible, but one of the main factors in the selection process, the final product is. One of the most important paper production processes, the process is neutral sulfite semi-chemical the NSSC is called for short, which has a lot of mainly produce paper or cardboard making fluting, congress the middle layer in the packaging industry [5]. According to geographical location and climatic conditions for sugarcane belt of rich Khuzestan province on the world, be close to 800 thousand hectares of land under cultivation of sugarcane in Khuzestan province and the 6 million tons of sugar and about 3 million tons of pulp production [6]. However, based on available statistics in 2002, about 37 thousand hectares of this land is under cultivation [7]. Considering the large volume of bagasse from sugar factories are discarded, or to reach fuel, the use of these wastes in pulp and paper production units could reduce the country's dependence on imported pulp and paper. Potential for the province to provide raw material bagasse, special types of paper for one of the paper shows that fluting. The management of agricultural waste can also make high quality paper in order to help fluting Paper industry, the

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country will flourish. In addition, using semi-chemical bagasse pulp strength properties can be produced from recycled waste paper and paper applications improved. From the perspective of infrastructure, development of sugarcane and other industries in 1990 and the first law of economic, social and cultural development of Iran were established and the development plan was responsible for sugarcane and other industries [8]. Since then the appropriate expansion of sugarcane plantations in the south of the country, bagasse, which is considered sugarcane products factory in order to feed the pulp and paper industry is available in abundance. Development plans and feasibility studies related to the sugarcane industry in 1987 and the fund study effects of sugarcane and related industries were developed. In this study the construction of two pulp and paper mill producing printing and writing with a total capacity of 350 thousand tons was considered [9]. A later study by the consulting engineers was to design, produce 531,000 tons of printing and writing paper in the form of four different options, examined [10]. The Economic Research Institute of Tehran University in 1992 had a study on the economic development of sugarcane and other industries [4]. Pakzad in 1996, the report specifically for construction projects, production of sugar cane pulp and paper and wrote the company developed three different options examined [11]. Hemmasi in 1382, the feasibility of producing pulp and paper and wrote plant using bagasse as the raw material. The results of the economic indicators such as the IRR, the return on investment, the net value of domestic savings and foreign exchange indicate that the plant is of very good economic and financial justification [1]. Khasipoor (2002), the use of bagasse in the mazandaran province conducted a survey using the NSSC process [12]. Samariha (2005), research into methods to produce semi-chemical sulfite pulp, bagasse was neutral. Use of bagasse paper mill located in the Khuzestan province was barking. Neutral sulfite semi-chemical preparation of bagasse to make homemade paper included: temperature at 170 °C, the amount of chemicals 10 and 20 percent and 30 and 40 minutes cooking time. Then the pulp, hand sheet paper was prepared 127g m⁻² [13]. This study investigated the possibility of making fluting paper from bagasse in the province of the technical and economic perspective.

EXPERIMENTAL

Decision to invest in an industrial project is based on technical and financial studies, thus in this study, factors that are associated with the production fluting paper, is identified. Technical studies of the industry, a series of studies on the nature of materials and products, identifying the different production processes and existing technologies, equipment and machinery is required. These studies in order to produce quality products are increasing. Indicators of economic and financial studies to determine the profitability of engineering is required. Accordingly, in order to provide raw data for the financial evaluation of projects fluting pulp, especially in the case of fixed investment costs, the statistics released and similar feasibility was studied by the small industries. Also, the current cost of production, cost items to price and production units within the same country were cited. Financial investigations are including the estimated cost (total investment costs, costs of raw materials supply, maintenance, depreciation, etc.). According to the estimates of the accounting principles of each of the cases of fixed and circulating capital, fixed and variable costs of the project, and anticipated project cost is estimated the annual profit. During the first two years, plans have no income and an expense is invested. Revenues from the third year of the project begin. Capital project funds from shareholders (the partners) and will provide financial facilities available from banks. After collecting data using industry accounting principles [14], economic indicators for design engineering, including internal rate of return, the return on investment and the cost, local value of the head to head and head to head at the point of sale is calculated. Preliminary calculations, assuming constant prices during the construction and operation of two years is estimated that this project was undertaken.

RESULTS

The production fluting pulp is 1350 tons per year and the nominal capacity of production line machinery and the need for this material, and considering 50% of lesions in the brain during de Cooking and washing, the project required 2,700 tons of bagasse is. Since bagasse conversion ratio of approximately 2.5 is [7], the amount of bagasse is required to provide 1,080 hectares sugarcane. In addition the volume of sugar production, the needed raw material to supply the plant with a capacity for producing, 1350 tons fluting paper per year will be available. The investment in this sector, causing about 70 people directly involved will be provided. Accounting and financial investigations unit has performance criteria which will summarize the information in Table 1.

Table 1. Performance of production units fluting.

| production | Unit | Annual capacity | Wholesale price per unit (thousand rial) [1384] | The total annual production value of the nominal capacity (million rials) |
|-------------------------|------|-----------------|---|---|
| Cardboard Fluting | ton | 1350* | 4400.4 | 5940.0 |
| Total annual Production | | | | 5940.0 |

*The number of working days in the unit 270 days a year, in two shifts working 7.5 hours

Raw material prices are determined according to quotations from reputable local companies and wholesale markets. Details of material (the capacity) are estimated in Table 2.

Table 2 - Estimated cost of raw materials supply

| The material Used | Annual consumption | | Value (rial) [1384] | Annual value (million rials) |
|--|--------------------|------|---------------------|------------------------------|
| | Amount | Unit | | |
| Bagasse | 2700 | ton | 280000 | 756.0 |
| Sodium sulfite | 10800 | kg | 1520 | 16.4 |
| Sodium carbonate | 5400 | kg | 520 | 2.8 |
| Plastic Packaging | 44400 | m | 650 | 28.9 |
| Other ingredients except the 3.5 percent | | | | 28.3 |
| Total annual value of raw materials | | | | 832.4 |

The working capital, calculated based on material and energy needs and rights of employees are summarized in Table 3.

Table 3. Total working capital items

| Description | The number of working days | Total value (million rials) |
|------------------------------------|----------------------------|-----------------------------|
| Supply of local raw materials | 45 | 138.7 |
| Rights and benefits (68 employees) | 68 | 363.1 |
| Types of energy needed | 65 | 26.5 |
| Selling costs (0.5%) | | 2.2 |
| Other current expenses (5%) | | 36.3 |
| Total working capital | | 761.8 |

Components of fixed capital are presented in Table 4. In this study the capabilities of all machinery and equipment, has produced in industrial factories of the country.

Table 4. Components and conclusion of fixed capital

| Description | Total value (million rials) |
|---------------------------------|-----------------------------|
| Machinery and equipment | 2043.9 |
| Equipment and public facilities | 711.4 |
| Vehicles | 289.0 |
| Land | 515.0 |
| Building & Enclosure | 1712.5 |
| Office furniture and equipment | 20.0 |
| Unforeseen costs (3.5%) | 185.2 |
| Operating costs before | 117.50 |
| Total fixed investment | 5594.5 |

The values of fixed and circulating capital is calculated, the total investment for this project is estimated according to Table 5. It is equivalent to 60 percent of fixed investment 15% 5-year term loan with interest and 80 per cent of working capital through short-term loan will provide a 22 percent interest annually.. The total investment amount More than 2390.1 million rials the capital shares (the partners) and the remaining capital requirement of about 3966.1 million rials the facility will supply was received from the bank.

Table 5. Estimated investment

| Description | Total value (million rials) |
|----------------------|-----------------------------|
| Fixed capital | 5594.5 |
| Working capital | 761.8 |
| The total investment | 6356.3 |

Produce any additional investment required to construct and operate the unit and annual costs should also be made during the course of the unit. These costs include fixed and variable costs are costs that these items are summarized in Table 6. Fixed costs, costs that vary with production levels, do not change. Some items of cost are not completely fixed, but are somewhat fixed in nature. Central office staff salaries and administrative costs such as production rate do not depend on the unit. Also, minor changes in production value, production costs, and staff salaries are also fixed. 85% of the cost of staff salaries as fixed costs is carried. The percentage of these costs as fixed costs is considered. Variable costs are the costs of items that with changes in production levels will be changed. For example, how much more production, more material is needed. Some items in this part of the capacity changes, but it not on 100%. For example, increasing or decreasing the production of low-cost, staff salaries will not change but if increased production, resulting in overtime, the cost of increased.

Table 6. Estimates of fixed and variable costs

| Description | Percent (fixed / total) | Total value (Million rials) | Percent (Variable / total) | Total value (million rials) |
|---|-------------------------|-----------------------------|----------------------------|-----------------------------|
| Rights and benefits | 85 | 1234.5 | 15 | 217.8 |
| Raw materials and components | 0 | 0 | 100 | 832.4 |
| Energy types | 20 | 184.0 | 80 | 736.0 |
| Maintenance | 10 | 24.8 | 90 | 223.0 |
| Costs Unforeseen costs of production (3.5%) | | 65.8 | | 70.5 |
| Operating costs | 15 | 9.7 | 85 | 54.7 |
| Insurance company (0.2%) | | 11.2 | | |
| Facilities fees received | 100 | 134.2 | | |
| Production cost | | | | 31.0 |
| Depreciation | 100 | 436.1 | | |
| Total fixed and variable costs | | 2100.3 | | 2165.4 |

* Percentages listed according to the Ministry of Industries and Mines, the industry is small.

With fixed and variable costs of the project, total project costs in accordance with Table 7 are the conclusion.

Table 7. Estimated total annual costs

| Description | Total value (million rials) |
|--------------------|-----------------------------|
| Fixed cost | 2100.3 |
| Variable costs | 2165.4 |
| Total annual costs | 4265.7 |

The nominal capacity of the unit, cost per unit is equal

Cost = total annual cost / nominal capacity

Price per ton of finished product = 3159778 Rials

After collecting data using industry accounting principles [14], analysis of the head to head, net profits, internal rate of return of capital and return on investment was calculated. Preliminary calculations, assuming constant prices during the construction and operation of the project is estimated to be equivalent to two years was done. The sales price per ton of pulp 4400000 rials (price based on the average market price in 2005) is calculated.

- Total sales per year (million rials) = capacity * Sale Price
- Total sales per year (million rials) = 1350 * 4400 (thousand rials) = 5,940 million rials
- Percentage point over the head = fixed costs / (total sales - variable costs) * 100
- Percentage point over the head = 2100.3 / (2165.4 - 5940) * 100 = 55.64 percent
- Head to head sales at the point = fixed costs / 1 - (variable cost / total sales)
- Sales in the head to head = 2100.3 / 1 - (2165.4 / 5940) = 3305.2
- Margin (million rials) = total sales - costs
- Margin (million rials) = 5940 - 4265.7 = 1674.3
- Operating profit (million rials) = margin - operating costs
- Operating costs = (non-personnel costs, costs of sales office + (0.5%) + shipping costs (0.5%) = 64.4 million rials
- Operating profit (million rials) = 1674.3 - 64.4 = 1609.9
- Net profit (million rials) = Operating profit - costs
- Non-operational costs = (depreciation costs + operating costs before financial facilities for long-term and short term) = 380.34 / million rials
- Net profit (million rials) = 1609.9 - 380.34 = 1229.56
- The internal rate of return = (net profit / total investment) * 100
- IRR = the project (1229.56) / (6356.3) * 100 = 19.34 percent
- Return of capital = (total investment / profit)
- Term return on investment = (6356.3) / (1229.56) = 62 months (5 years 2 months)

RESULTS AND CONCLUSION

Studies and calculations indicate that the total volume of annual costs with a nominal capacity of 1350 tons per year in fluting pulp factory, about 4270.4 million rials is predicted. The total investment cost of about 2100.3 million rials fixed costs of the project and about 761.8 million rials in the form of working capital the calculation of the feasibility of plans for economic summary the main results of the study design economy fluting pulp factory in the Khuzestan province are listed in Table 8.

Table 8. Summary results of the economy study in fluting pulp factory in the Khuzestan province

| No | Description | Amount |
|----|---------------------------------------|------------------------|
| 1 | Project IRR | 19.34 % |
| 2 | percent Of the head to head | 55.64 |
| 3 | The value of sales in the local Wreck | 3305.3 (Million rials) |
| 4 | Return of capital | 62 months |

Overall, the results of this study indicate that the annual production of 1,350 tones of fluting pulp bagasse in Khuzestan province, the supply of suitable material, and engineering economic indicators, and the explanation is satisfactory. IRR of total investment is 19.34 percent. The range is acceptable international norm for the pulp and paper industries. Return of capital from the perspective of the project (total investment) is 5 years and 2 months. Finally, with regard to the production of paper and cardboard in the Projects in Iran, according to Ministry of Industries and Mines, a major investment projects in paper production in Iran, Not observed until 1390, Therefore be integrated to produce years with nominal capacity of 85,000 tons in Mazandaran pulp and paper, and the remaining amount needed to rely on imports can be provided through [15]. Considering the high level of imports in this sector is, if the import operation of the scheme can be reduced. And because fluting paper consumption is a commodity, even if you can easily find a good market to be issued. Considering that the sugar produced from sugarcane bagasse in a side-product of It is available in abundance in the south of the country, resistance in laboratory studies conducted in the paper that the minimum resistance is further defined Fluting paper [13], can be considered suitable raw material for paper making and fluting paper. For this purpose, and to prevent the importation of foreign ownership of the plan recommended

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