

TECHNO-ECONOMIC GUIDE FOR THE ESTABLISHMENT OF A GROUNDNUT PASTE PRODUCTION PLANT

DANIEL BLAY AND L. D. ALLOTEY

Food Research Institute, P. O. Box M.20, Accra, Ghana

Summary

The guide is designed to facilitate investment decision making by already operating and potential entrepreneurs interested in the establishment of a groundnut paste production plant. The guide is modelled on the use of a rented factory building, market conditions prevailing in Accra and a processing plant with capacity of 600 kg of groundnuts a day. Factors affecting the location of the plant are considered. These include the availability of raw materials, power, water, labour, facilities for waste disposal, transport etc. The fixed capital outlay is estimated at €6,162,530.00 with a working capital of €17,505,260.00, thus giving a total investment capital of €23,667,790.00. Return on investment averaging 70 per cent can be registered within 5 years of operation. The venture shows an Internal Rate of Return (IRR) of 61 per cent after all financial obligation have been settle. The guide concludes that given the factor costs used and assumptions made, the selected model shows high financial returns/viability and, therefore, it is recommended for adoption.

Introduction

Groundnut production occupies an important position in the agricultural programmes of farmers in northern Ghana. It has many domestic and industrial uses. One major product from groundnut is the groundnut paste. The paste is used in the preparation of soups and stews and as breadspread.

The traditional preparation of groundnut paste involves an arduous process, hence households prefer to purchase the paste from the open market. However, groundnut paste sold on the open market is often adulterated with cheap flours and sometimes contaminated with sand and may be unsafe for consumption because it may contain high levels of mycotoxins, especially aflatoxins (Allotey & Dei-Tutu, 1993).

This techno-economic guide relates to a groundnut paste production plant which uses an improved and mechanized method in the roasting, dehulling and milling processes leading to a high quality product and increased production.

The objective of this guide is to introduce the improved method of groundnut paste production with its cost/benefit factors to the prospective

small-scale processor/entrepreneur in order to facilitate investment decision making.

Basic machinery requirements essential for the establishment and successful operation of the plant have been indicated in the guide. Also provided is a list of manufacturers and suppliers of the major machinery for the plant.

Although there has not been any econometric estimation of the market for the product, the guide assumes an indication of a good market potential. It is the optimism of the authors that this techno-economic guide will serve its purpose of providing valuable information to potential small-scale investors/entrepreneurs.

General aspects of groundnut paste production

Prerequisites for groundnut paste production plant

The establishment of groundnut paste production plant requires the existence of certain basic factors. Some of the major factors are as listed below:

- (a) adequate supply of raw materials,
- (b) a suitable site for the plant,

- (c) adequate supply of potable water,
- (d) constant and reliable supply of electricity and suitable fuel for the operation of the roaster,
- (e) sufficient and suitable labour for processing,
- (f) adequate transport facilities,
- (g) adequate facilities for waste disposal,
- (h) adequate area at plant site for initial needs including storage and possible future expansion,
- (i) technological expertise.

The most important of the above factors is the availability of suitable raw materials. To ensure this, the investor should ideally locate the plant within the growing areas. Close interaction between the plant and growers of the raw materials is also necessary to ensure successful operation (King, 1980). Equally important is the quality of raw material from the supply source. Where the plant is not located in the growing area, reliable raw material supply is very essential to the success of the project.

Process description

Fig. 1 shows a flow chart for the groundnut paste production. Groundnuts are sorted through picking and are roasted. The roasted groundnuts are cleaned, dehulled and milled. The resulting paste is allowed to cool (overnight) and packaged in appropriate polyethylene pouches or plastic cans. The yield is estimated at 67 per cent.

The plant model

The model under consideration uses a rented factory building which accommodates partially mechanized plant with daily processing capacity of 600 kg of raw materials. It is evaluated on the basis of a 1-shift, 8-h per day, 5-day per week and 48 weeks working regime. The remaining time is used for cleaning, maintenance and repairs of the plant and also for holidays. With materials recovery rate of 67 per cent the annual production capacity of 96.48 tonnes of groundnut paste is expected.

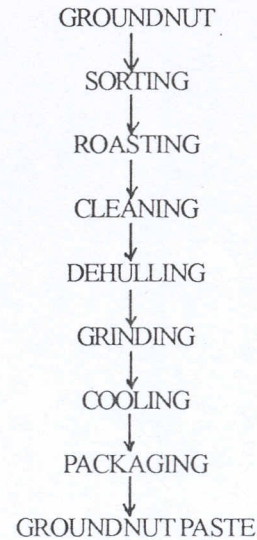


Fig.1. Groundnut paste production flow chart

Costing and evaluation

Costing in monetary values gives the prospective investor an idea of the magnitude of the cost which might be involved. The costing of the chosen model includes the real (physical) cost of the plant, labour, space requirement, services and materials required.

Fixed capital cost

Fixed capital cost for the venture is estimated at €6,162,580.00. This includes the production plant acquisition, installation and commissioning (Table 1).

Operation Cost

Operating cost in the first year is estimated at €70,021,040.00. This includes cost of raw materials, packaging materials, utilities, factory rent, etc. It must be noted that cost factors used here are based on Accra conditions (Table 2).

Investment capital

The initial investment capital needed for the venture to take off is estimated at €23,667,790.00 which

TABLE 1
Fixed capital cost

| <i>Plant equipment and machinery</i> | <i>Quantity</i> | <i>Unit cost</i> ¢ | <i>Cost</i> (¢000) |
|-------------------------------------------|-----------------|-----------------------|-----------------------|
| a. Mechanical roaster | 1 | 1200.00 | 1200.00 |
| b. Dehuller | 1 | 550.00 | 550.00 |
| c. Attrition mill | 1 | 950.00 | 950.00 |
| d. Platform scale (210 kg) | 1 | 850.00 | 850.00 |
| e. Heat sealer | 2 | 70.00 | 140.00 |
| f. Weighing scale (10 kg) | 2 | 20.00 | 40.00 |
| g. Aluminium pan | 40 | 10.00 | 400.00 |
| h. Aluminium tray | 20 | 10.00 | 200.00 |
| i. Industrial gas burner with accessories | | | 300.00 |
| j. Ancillaries 10 per cent (a-i) | | | 463.00 |
| k. Contingency 10 per cent (a-j) | | | 509.30 |
| l. Subtotal | | | 5602.30 |
| m. Handling, installation, 10 % of (l) | | | 560.23 |
| Total | | | 6162.53 |

is the sum of fixed and working capitals.

Revenue

With the ex-factory price of groundnut paste fixed at ¢1,000.00 per kg and an annual production target of 96,480 kg of groundnut paste, expected revenue in the first year is ¢96,480,000.00

Financial analysis

Financial analysis carried out on this operation covers a period of 5 years. Assumptions made include 10 per cent increase in cost of labour, operating supplies and selling price (ex-factory price) of product annually.

Income and expenditure statement

Table 3 shows the proforma income and expenditure statement of the operation of the project. The statement shows an increase in expenditure from

¢72,097,720.00 in the 1st year to ¢104,998,050.00 in the 5th year. This increase is a result of anticipated inflationary trends in the country. Income after tax is, expected to increase from ¢13,410,260.00 to ¢19,998,050 and return on investment from 57 per cent to 84 per cent over the same period.

Cash flow statement

The cash flow statement presented in Table 4 indicates a net cash flow increasing from ¢14,086,510.00 to ¢20,674,300.00 within 5 years of operation and cumulative net cash flow of ¢86,109,570.00 by the end of the 5th year.

Discounted cash flow statement

The internal rate of return (IRR) has been used to assess the financial performance of the venture. The IRR is the discount rate which equates

TABLE 2
Recurrent cost

| <i>Equipment</i> | <i>Quantity</i> | <i>Unit cost</i> <i>¢</i> | <i>Cost</i> <i>(¢'000)</i> |
|------------------------------------------------------------------------|-----------------|------------------------------|-------------------------------|
| A. OPERATING SUPPLIES | | | |
| a. Raw material (144 tonnes at ¢300,000 per metric tonne) | | | 43,200.00 |
| b. Packaging material | | | 6,552.00 |
| c. Water | | | 200.00 |
| d. Electricity | | | 1,000.00 |
| e. Gas | | | 921.60 |
| f. Laboratory services | | | 600.00 |
| g. Repair and maintainance (4 per cent of cost of plant and building) | | | 48.82 |
| h. Factory annual rent | | | 1,200.00 |
| i. Contingency 5 per cent (a-h) | | | 2,686.12 |
| Total | | | 56,408.54 |
| B. HUMAN RESOURCE | | | |
| | <i>Number</i> | | <i>Annual salary</i> |
| Manager | 1.00 | | 1,440.00 |
| Production Supervisor | 1.00 | | 960.00 |
| Storekeeper (purchase and supply) | 1.00 | | 840.00 |
| Semi-skilled labour | 6.00 | | 3,240.00 |
| Skilled labour | 4.00 | | 2,880.00 |
| Security Officer | 1.00 | | 540.00 |
| Social Security Fund, 12.5 per cent total salary | 1.00 | | 1,230.50 |
| Perquisites, 25 per cent total salary | | | 2,475.00 |
| Total | | | 13,612.50 |
| Total annual operating cost | | | 70,021.04 |
| Working capital, 25 per cent operating cost | | | 17,505.26 |
| Overheads, 2 per cent operating cost | | | 1,400.42 |
| Investment capital | | | 23,667.79 |

TABLE 3
Projected income statement

| <i>A. Expenditure</i> | <i>Year 1</i> | <i>Year 2</i> | <i>Year 3</i> | <i>Year 4</i> | <i>Year 5</i> |
|---------------------------------|------------------|------------------|------------------|------------------|-------------------|
| Operating cost | 70,021.04 | 77,023.15 | 84,725.46 | 93,198.01 | 102,517.81 |
| Overhead cost | 1,400.42 | 1,470.44 | 1,543.96 | 1,621.16 | 1,702.22 |
| Depreciation | 676.25 | 676.25 | 676.25 | 676.25 | 676.25 |
| Total expenditure | 72,097.71 | 79,169.84 | 86,945.67 | 95,495.42 | 104,896.28 |
| <i>B. Income</i> | | | | | |
| Revenue | 96,480.00 | 106,128.00 | 116,740.80 | 128,414.88 | 141,256.37 |
| Net income before tax | 24,382.29 | 26,958.16 | 29,795.13 | 32,919.46 | 36,360.04 |
| Income tax, 45 per cent | 10,972.03 | 12,131.17 | 13,407.81 | 14,813.76 | 16,362.04 |
| Income after tax | 13,410.26 | 14,826.99 | 16,387.32 | 18,105.70 | 19,998.05 |
| Return on investment | 56.66 | 62.65 | 69.24 | 76.50 | 84.49 |
| Average return on investment, % | 69.91 | | | | |

Notes:

Depreciation 10 per cent of plant cost; 5 per cent of building cost

Overheads include cost of stationery, postage, insurance, etc.

Expected quantity of product per annum, kg

96,480.00

Selling price of product per kg, (Cedis)

1,000.00

Revenue increases by 10 per cent annually

TABLE 4
Projected cash flow statement

| <i>Item</i> | <i>Year 0</i> | <i>Year 1</i> | <i>Year 2</i> | <i>Year 3</i> | <i>Year 4</i> | <i>Year 5</i> |
|---------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Cash inflow | | | | | | |
| Capital investment | 23,667.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Income before tax | 0.00 | 24,382.29 | 26,958.16 | 29,795.13 | 32,919.46 | 36,360.09 |
| Depreciation | 0.00 | 676.25 | 676.25 | 676.25 | 676.25 | 676.25 |
| Total cash inflow | 23,667.79 | 25,058.54 | 27,634.41 | 30,471.38 | 33,595.71 | 37,036.34 |
| Cash outflow | | | | | | |
| Capital investment | 23,667.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Income tax | 0.00 | 10,972.03 | 12,131.17 | 13,407.81 | 14,813.76 | 16,362.04 |
| Total cash outflow | 23,667.79 | 10,972.03 | 12,131.17 | 13,407.81 | 14,813.76 | 16,362.04 |
| Net cash flow | 0.00 | 14,086.51 | 15,503.24 | 17,063.57 | 18,781.95 | 20,674.30 |
| Cumulative net cash flow | 0.00 | 14,086.51 | 29,589.75 | 46,653.32 | 65,435.27 | 86,109.57 |
| Net present value | 32,923.27 | | | | | |
| Internal Rate of Return | 61.00 % | | | | | |

the cash inflows and outflows over a period of time and provides an estimate of return to capital investment after recovery of that investment. An IRR of 61 per cent was obtained for the venture as shown in Table 5. This value is higher than the current average interest rate (or opportunity cost of capital) which stands at about 30 per cent. This clearly shows that the venture is financially profitable.

Conclusion

The total capital investment required to establish the plant is ₵23,667,790.00 (exchange rate in January, 1994 being US\$1 = ₵900). An IRR of 61 per cent is expected from the operations of the project. On the assumptions made in this guide, it can be concluded that the venture is technically feasible and financially viable.

Recommendations

It must be emphasized here that this report is

only a guide to the economics of a groundnut paste production plant.

It is of utmost importance that the investor carries out a full-scale technical and economic feasibility study into the proposed venture, taking into account the use of factor and other costs relevant to existing situations, types of machinery to be used, choice of pricing, etc.

The Food Research Institute can be of great assistance in this regard to any prospective investor who intends to venture into not only groundnut paste production but also processing of other food commodities.

References

- ALLOTEY, L. D. & DEI-TUTU, J. (1993) *Directory of project profiles on production units of some Ghanaian foods*, FRI Technical Report.
- KING, PATRICIA. (1980) *A guide to the economics of dehydration of vegetables in developing countries*. Report Tropical Products Institute. G131, vi+28 pp.