

1. SUBJECT CLASSIFICATION	A. PRIMARY	TEMPORARY
	B. SECONDARY	

2. TITLE AND SUBTITLE
 Industry profile series: fruit and vegetable canning

3. AUTHOR(S)
 Park, Choon-yup

4. DOCUMENT DATE 1977	5. NUMBER OF PAGES 17p.	6. ARC NUMBER AHC
--------------------------	----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
 Ga. IT

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)
 (In Profile no.3)

9. ABSTRACT
 (Industrialization R&D)

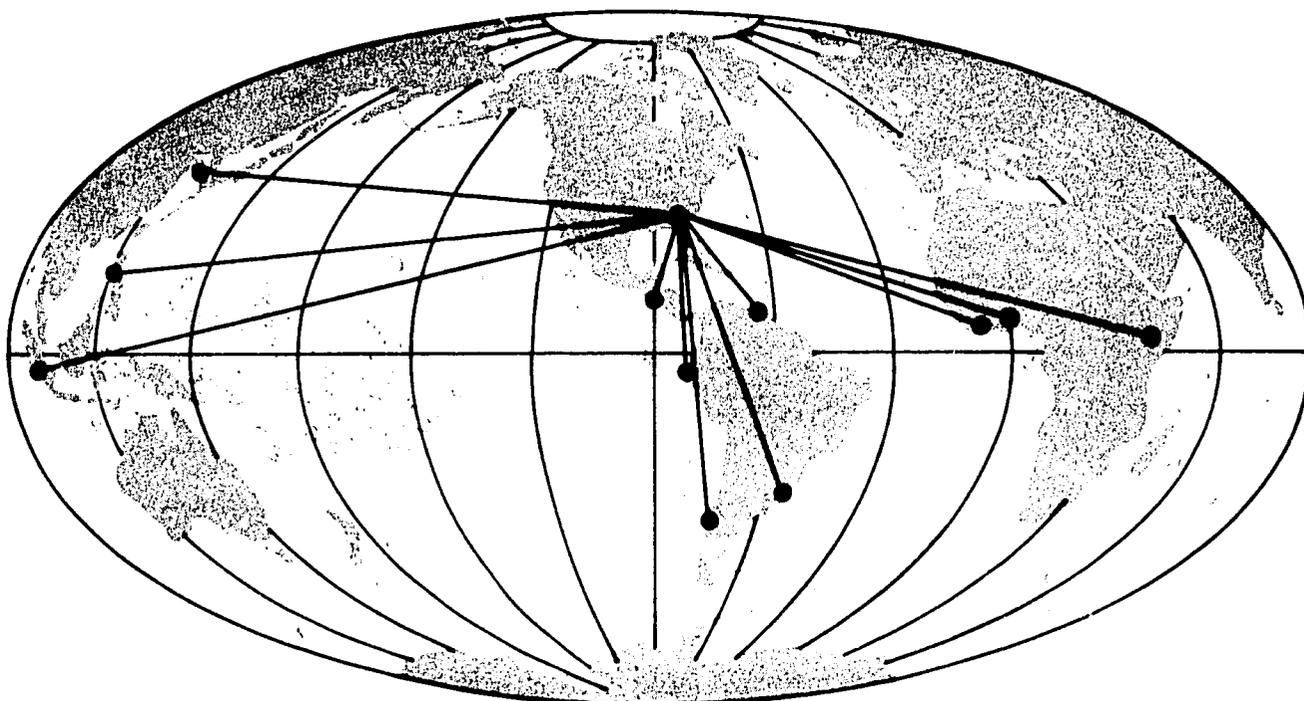
Since economic growth in the developing countries provides a favorable climate for the development of food processing industries, this profile gives basic information concerning the small scale canning of fruits and vegetables. The raw materials selected were on the basis of availability in Georgia, U.S.A. and neighboring states. Canned dried beans, snap beans, peaches, and tomatoes were used. The report includes a general process chart for each item, a plant layout, market potentials, production requirements, personnel requirements, capital requirements, annual costs and sales revenue, cash flow projections, and comments on cash flow. From this profile, a detailed feasibility study can be developed for a proposed operation in a specific location and market. The report is in four general sections: description of the products, plant, and operation; marketing; technical information; and financial information. Since the data apply to prevailing conditions in Georgia, U.S.A., it cannot be directly applied to most LDC's without significant revision and should be considered only as a guide to the basic principles involved.

10. CONTROL NUMBER <i>PN-AAD-629</i>	11. PRICE OF DOCUMENT
---	-----------------------

12. DESCRIPTORS	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/CM/ta-G-73-18 211(d)
	15. TYPE OF DOCUMENT

PN-AAD-629
AID/CM/ta-G-73-18
Ga.IT 211(d)

EMPLOYMENT GENERATION THROUGH STIMULATION OF SMALL INDUSTRIES



INDUSTRY PROFILE NO. 3 FRUIT AND VEGETABLE CANNING

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA 30332
U.S.A.

INDUSTRY PROFILE SERIES
FRUIT AND VEGETABLE CANNING

by
Choon Yup Park
Graduate Research Assistant
and
International Programs Division Staff

*This document was prepared under funding
provided by the U. S. Agency for
International Development under a 211(d) grant.*

International Programs Division
Economic Development Laboratory
Engineering Experiment Station
GEORGIA INSTITUTE OF TECHNOLOGY
Atlanta, Georgia
February 1977

Table of Contents

	<u>Page</u>
INTRODUCTION	1
PRODUCTS AND PROCESS	3
General Process Chart	4
Plant Layout	5
MARKET POTENTIALS	6
PRODUCTION REQUIREMENTS	8
PERSONNEL REQUIREMENTS	9
CAPITAL REQUIREMENTS	10
ANNUAL COSTS AND SALES REVENUE	11
CASH FLOW PROJECTIONS AND COMMENTS	12
REFERENCES	14

INTRODUCTION

The objective of this Profile is to provide entrepreneurs with a framework of basic information from which detailed feasibility studies can be developed for a proposed operation based upon costs and conditions for a specific location and market.

Most of the research work was performed by graduate students enrolled in the Master's Program with Emphasis on Industrialization of the School of Industrial and Systems Engineering at the Georgia Institute of Technology. This program is sponsored by the U. S. Agency for International Development as part of its 211(d) institutional grant to Georgia Tech. Compilation of the Profile was supervised by the staff of the International Programs Division (IPD).

Industry Profile No. 3 concerns the small-scale canning of fruits and vegetables. The Profile is arranged in four general sections: description of products, plant and operation; marketing information; technical information; financial information. A plant layout is included.

Cost information varies according to location, and persons using the figures in this Profile are cautioned to acquire cost figures for their specific location and operation. Cost figures in this Profile for raw materials, equipment, and personnel were generally based on prices prevailing in the state of Georgia, U.S.A., in 1975.

Since the data inputs for this Industry Profile apply to prevailing conditions in the United States, and Georgia in particular, the Profile cannot be directly applied to most of the less-developed countries (LDC) without significant revisions. Unlike the U. S., the LDCs depend on labor-intensive technology; therefore, assuming the same volume of production, an LDC enterprise would have a lower proportion of fixed capital requirements and a higher percentage of working capital requirements. Under the appropriate technology philosophy, one would substitute labor for machines whenever feasible. This would eliminate part or all of the material-handling equipment and perhaps result in the use of less expensive machinery. This reduction in total capital requirements could significantly alter the cash flow and payback figures.

Not only will the technical and financial analyses be different, the marketing strategy and analysis also will have to be revised. Because the environment, conditions, and circumstances under which an industry is set up in an LDC

differ from the U. S., users of this Industry Profile in LDCs should consider it only as a guide to the items to be considered and to the basic principles involved.

PRODUCTS AND PROCESS

Products

Canned dried beans, snap beans, peaches, and tomatoes. These products would be packed in No. 2 1/2 tin cans (diameter - 4 1/16 inches, height - 4 11/16 inches).

Production

The plant will operate one eight-hour shift per day, 252 days a year. Average daily production capacity is about 6,000 cans. The production schedule is as follows:

Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
← Dry Beans →			Snap Beans	→ Peaches ←	← Tomatoes →						

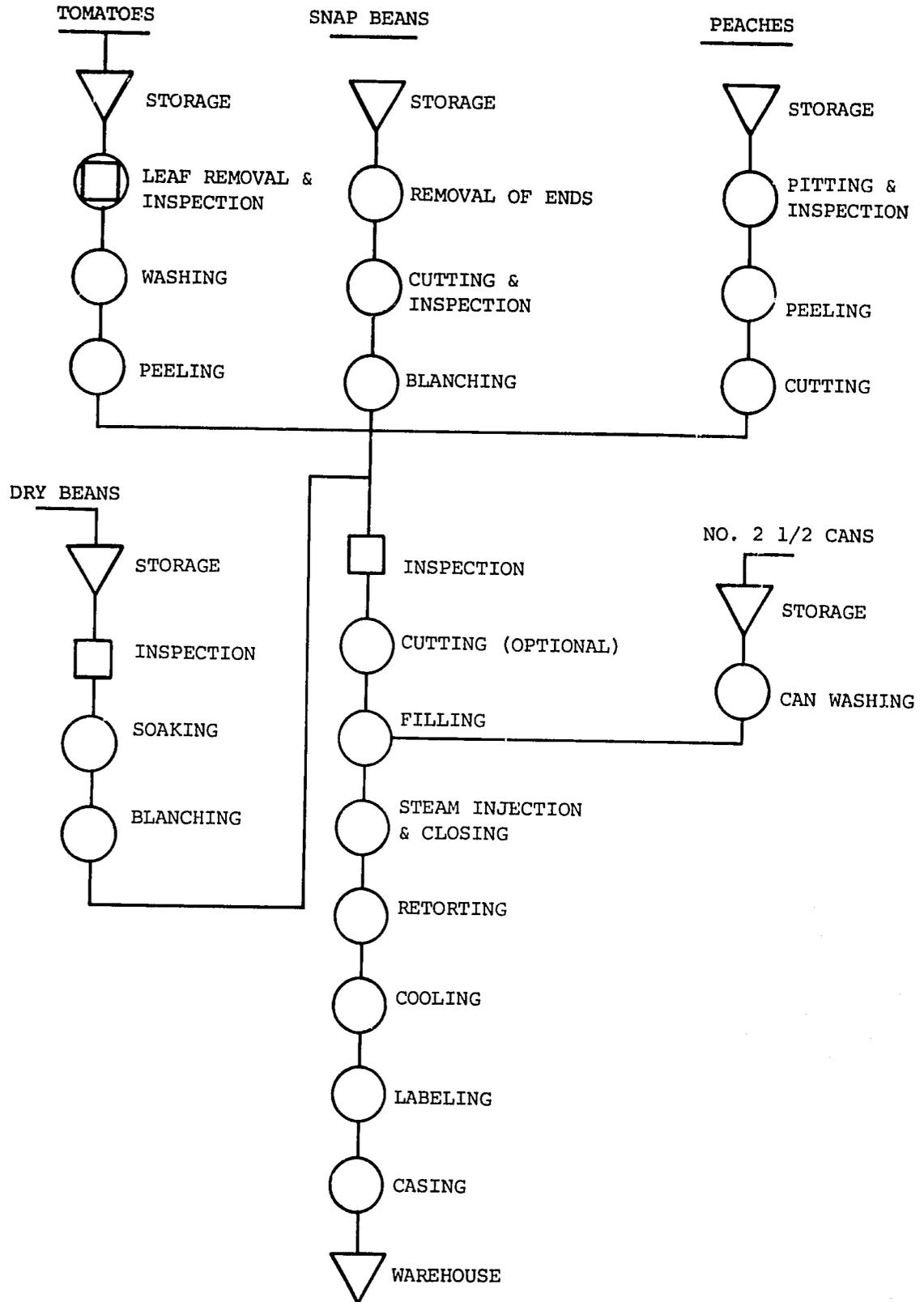
Rationale

The raw materials were selected on the basis of the fruits and vegetables available in Georgia and neighboring states in the U. S., and the production schedule was designed to conform to the most active harvesting dates for these products. Processing of dry beans was scheduled to keep the plant running when fresh raw products are not economically available.

Possible Modifications

The products can be varied to suit the availability and price of raw materials, machine utilization requirements, the consumption behavior of the markets, competition, and other economic considerations. Meat processing is possible with some modification of the plant. Different sizes of cans and bottles may be used, depending on products selected and market conditions. Due to the seasonality of agricultural products, it sometimes may be preferable to operate more than one eight-hour shift per day.

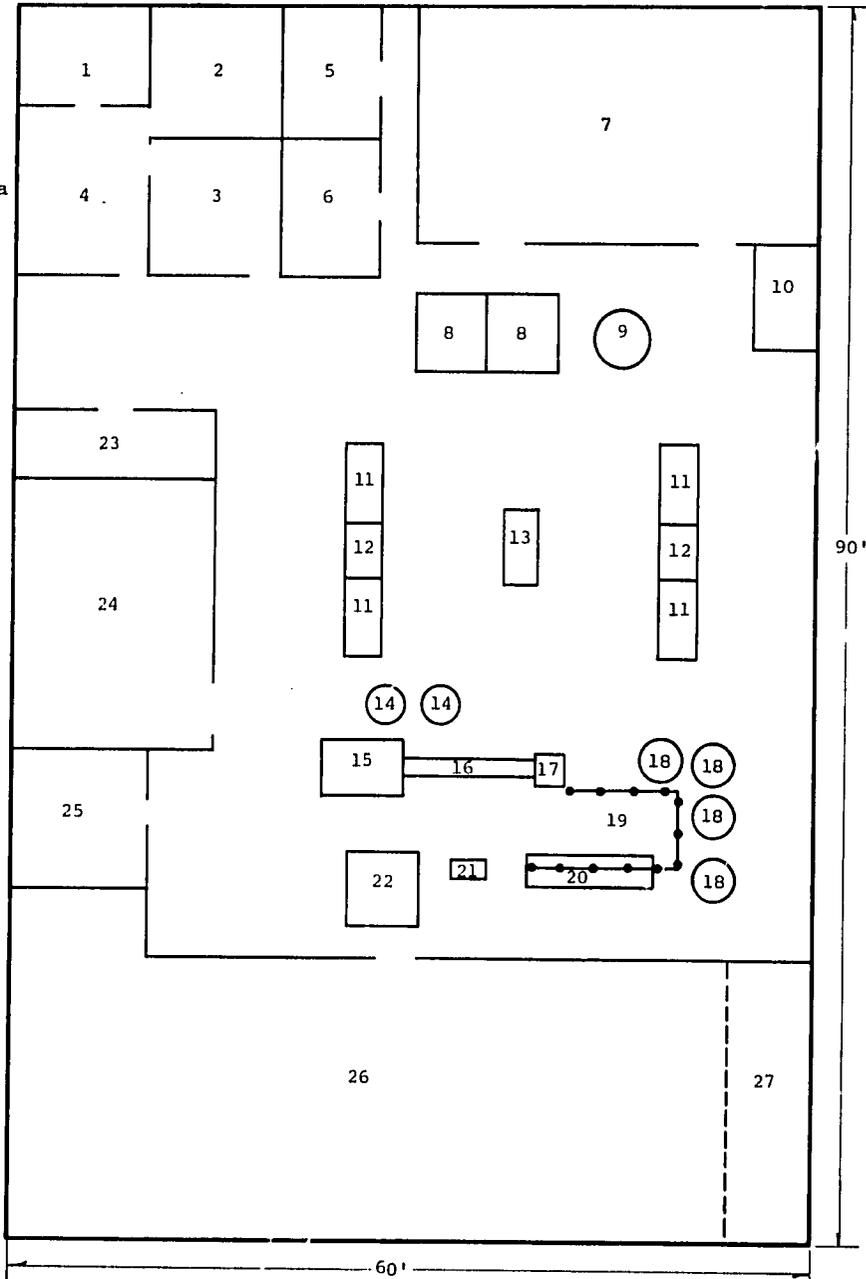
GENERAL PROCESS CHART



PLANT LAYOUT

Legend

- 1. Sales representative's office
- 2. General manager's office
- 3. Plant supervisor
- 4. Secretarial and reception area
- 5. Rest room (female)
- 6. Rest room (male)
- 7. Raw material storage
- 8. Lye peeler
- 9. Washer
- 10. Soaking tank
- 11. Table
- 12. Sink
- 13. Blancher
- 14. Kettle
- 15. Filler
- 16. Exhauster
- 17. Sealer
- 18. Retort
- 19. Overhead conveyor
- 20. Cooling tank
- 21. Labeler
- 22. Casing table
- 23. Supplies room
- 24. Empty cans and cases storage
- 25. Boiler, air compressor room
- 26. Finished goods warehouse
- 27. Pallet storage



Scale 1:120

MARKET POTENTIALS

Users

Households, restaurants, military services, institutions of various kinds.

Sales Channels and Methods

Sales are generally made to wholesalers and the larger retail establishments. Some sales may be made directly to large users, e.g., the military services.

Geographical Extent of Market

Domestic. Since canned and boxed products are easy to handle and their value is fairly high in relation to their weight, they can enjoy a broad market. Distribution may be feasible on a national scale.

Export. The particular products selected for this Profile are not very suitable for export. However, the rarer and more expensive canned products are in international trade and the quantity has been increasing.

Competition

Fresh produce would be a major source of competition. Technological developments in the cultivation and preservation of fresh fruits and vegetables have extended the dates of their availability. Frozen fruits and vegetables also are considered to be a source of competition.

Changes in the transportation system can affect the competitive market situation by altering the raw material procuring system and distribution cost of the products.

Market Needed for Plant Described

The market needed to support a canning plant will depend on the products manufactured in the plant. Based on the annual per capita consumption in the U. S. in 1974, the market size needed to absorb the output of this plant is about 50,000 population for snap beans and peaches and 200,000 for tomatoes (whole). The market size required for dry beans is not quantifiable but is assumed to be greater than the one for tomatoes.

Market Trends

Processed vegetable consumption has been increasing in the U. S.: consumption of snap beans grew by 36% and that for tomatoes by 27% during the period from 1960 to 1974. Statistics on per capita canned fruit consumption during the same period do not indicate any increase in the near future; however, juice consumption has been increasing for both canned and frozen products. The increase in frozen juice consumption is particularly noticeable.

Perspective on Developing Countries

Economic growth in the developing countries brings with it higher standards of living and a desire for improved nutrition. Thus, the economic climate is favorable in many developing countries for a new emphasis on the food processing industries.

Some of the problems faced by these industries are poor quality, irregular supply, lack of appropriate technology, and sometimes the high cost of raw materials. The food canning industry is considered to be least affected by these difficulties. Low labor cost is one of the most favorable factors for the industry.

The fruit and vegetable canning industry may not become of great importance for local consumption in the near future, but urbanization will accelerate the consumption of canned fruits and vegetables in the long run. In the semi-industrialized countries, the food canning industry can make a contribution to export earnings. However, to compete effectively with existing producers in the developed world, high-grade, steady, and competitively priced supplies must be ensured.

PRODUCTION REQUIREMENTS
(Cost figures in U. S. dollars)

1. EQUIPMENT

<u>Manufacturing</u>	<u>Number of Workers</u>	<u>Dimensions (feet)</u>	<u>Area (sq. ft.)</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
Air Compressor		4 x 3	12	1		
Boiler		3 (dia.)	7	1	\$ 625	\$ 625
Peeler	1	6 x 6	36	2	7,000	7,000
Blancher		4 x 6	24	1	540	1,080
Washer		3.5 x 1.5	5	1	840	840
Table	8	3 x 6	18	6	2,100	2,100
Sink	4	1.5 x 4.5	7	4	445	2,670
Filler	1	6 x 4	24	1	500	2,000
Exhauster		10 x 1	10	1	2,500	2,500
Sealer		2 x 2	4	1	1,300	1,300
Retort	1	2 (dia.)	3	4	600	600
Kettle	1	1.2 (dia.)	1	2	1,050	4,200
Water Pump	1	2 x 2	4	1	900	1,800
Labeler		3 x 1	3	1	200	200
Subtotal					1,500	1,500
						\$ 28,415
<u>Materials Handling</u>						
Truck				1	\$ 6,000	\$ 6,000
Lift Truck (including unloading)				1	14,000	14,000
Pallets				150	5	750
Blanching Baskets				6	26	156
Crates				20	60	1,200
Overhead Conveyor System		35 ft. long		1	6,000	6,000
Hand Trucks				6	100	600
Stock Pots				10	70	700
Miscellaneous						200
Subtotal						\$ 29,606
<u>Office</u>						
Typewriter	1			1	\$ 200	\$ 200
Calculator				1	90	90
Desk and Cabinet		4 x 7	28	4	500	2,000
Other						50
Subtotal						\$ 2,340
<u>Maintenance and Other</u>						\$ 400
Total Equipment						\$ 60,761

2. DIRECT MATERIALS

<u>Raw Materials</u>	<u>Number of Cans/Year</u>	<u>Raw Material/Year (tons)</u>	<u>Annual Cost</u>
Dry Beans	378,000	227	\$ 49,450
Snap Beans	192,000	138	20,424
Peaches	192,000	139	36,752
Tomatoes	750,000	563	34,512
Cans	1,512,000 cans x \$105.81/1,000 cans		159,985
Cartons	(1,512,000/24) cartons x \$0.22/carton		13,860
Labels	1,512,000 x \$4.30/1,000 labels		6,501
Additives			5,000
Total			\$326,484

3. UTILITIES AND SUPPLIES

Electricity	\$ 1,500
Gas	2,500
Water	2,100
Lye	2,500
Office Supplies	400
Total	\$ 9,000

PERSONNEL REQUIREMENTS
(Based on one shift per day, 252 working days per year)

1. DIRECT LABOR

<u>Category</u>	<u>No.</u>	<u>Hourly Wage Rate</u>	<u>Annual Wage Rate</u>	<u>Total Annual Wages</u>
Semiskilled Workers	3	\$4.00	\$ 8,064	\$ 24,192
Unskilled Workers				
Full-Time	6	3.00	6,048	36,288
Part-Time (9 mos.)	8	2.80	4,234	33,870
Packer	<u>1</u>	3.00	6,048	<u>6,048</u>
Total	18			\$100,398

2. INDIRECT LABOR

<u>Title</u>	<u>No.</u>	<u>Monthly Salary Rate</u>	<u>Annual Salary Rate</u>	<u>Total Annual Salary</u>
General Manager	1	\$1,500	\$18,000	\$ 18,000
Plant Supervisor	1	1,200	14,400	14,400
Sales Representative	1	1,000	12,000	12,000
Office	1	600	7,200	7,200
Inspector	1	1,000	12,000	12,000
Truck Driver	1	1,000	12,000	12,000
Materials Handling	2	500	6,000	12,000
Lift Truck Driver	1	800	9,600	9,600
Janitor	<u>1</u>	500	6,000	<u>6,000</u>
Total	10			\$103,200

CAPITAL REQUIREMENTS

1. FIXED CAPITAL

Land (0.5 acre at \$18,000/acre)		\$ 9,000
Building (one story, 60' x 90')		92,000
Manufacturing Equipment		28,415
Materials-Handling Equipment		29,606
Office Equipment		2,340
Maintenance Equipment		400
Total		\$161,761

2. WORKING CAPITAL

	<u>Time Span*</u>		
Cash and Contingencies	-		\$ 5,000
Direct Materials**	5 days		6,500
Finished Goods Inventory**	1 month		50,000
Accounts Receivable**	1 month		50,000
Expendable Supplies**	1 month		208
Prepaid Expenses			11,772
Sales Expenses	2 months	\$1,500	
Office Supplies	2 months	67	
Fees	1 year	1,200	
Insurance	1 year	6,360	
Fringe Benefits	3 months	2,545	
Total			\$123,480

TOTAL CAPITAL REQUIREMENTS

\$285,241

* Days indicated are working days.

** Average level.

ANNUAL COSTS AND SALES REVENUE

Annual Costs

Direct Materials		\$326,484
Direct Labor		100,398
Manufacturing Overhead		154,383
Utilities and Supplies	\$ 9,000	
Indirect Labor	103,200	
Fringe Benefits	10,180	
Insurance and Fees	7,560	
Interest (10% of borrowed capital)	15,300	
Depreciation	9,143	
Building (30 years)		
Equipment (10 years)		
General and Administrative Expense		1,200
Sales Expenses		9,600
Contingencies		<u>5,000</u>
Total Annual Cost		\$597,065

Annual Sales Revenue

Dry Beans		\$157,500
Snap Beans		80,000
Peaches		96,000
Tomatoes		<u>312,500</u>
Total		\$646,000
Profit before Income Taxes		\$ 48,935

CASH FLOW PROJECTIONS

Month	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>
Opening Balance	\$ 50,000	40,239	5,478	7,072	8,666	8,286	10,331	12,094	24,401	33,294	42,187	48,535	57,428	66,321
<u>Cash Receipts</u>														
Collections of Receivables	-	24,934	51,184	51,184	51,583	57,067	62,400	56,740	50,781	50,781	50,781	50,781	50,781	50,975
Short-Term Borrowing	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Long-Term Borrowing	153,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Receipts	\$203,000	65,173	56,662	58,256	60,249	65,353	72,731	68,834	75,182	84,075	92,968	99,316	108,209	117,296
<u>Cash Disbursements</u>														
Direct Materials	-	31,929	31,929	31,929	29,061	34,500	39,947	21,198	21,198	21,198	21,198	21,198	21,198	31,929
Salaries and Wages	-	14,144	14,144	14,144	17,907	17,907	17,907	17,907	17,907	17,907	17,907	17,907	17,907	14,144
Utilities and Supplies	-	542	542	542	542	707	875	875	875	875	875	875	875	542
Selling Expense	-	1,600	1,600	1,600	533	533	533	533	533	533	533	533	533	800
General and Administrative Expense	-	100	100	100	100	100	100	100	100	100	100	100	100	100
Insurance and Fees	-	7,560	-	-	-	-	-	-	-	-	-	-	-	-
Payments for Fixed Assets	\$161,761	-	-	-	-	-	-	-	-	-	-	-	-	7,560
Interest Payments	-	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	1,275	-
Loan Repayments	-	-	-	-	-	-	-	-	-	-	-	-	-	1,242
Fringe Benefits	-	2,545	-	-	2,545	-	-	2,545	-	-	2,545	-	-	7,068
Venture Initiation Cost	1,000	-	-	-	-	-	-	-	-	-	-	-	-	2,545
Income Tax	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-
Total Disbursements	\$162,761	59,695	49,590	49,590	51,963	55,022	60,637	44,433	41,888	41,888	44,433	41,888	41,888	65,930
End Balance	\$ 40,239	5,478	7,07	8,666	8,286	10,331	12,094	24,401	33,294	42,187	48,535	57,428	66,321	51,366

NA - Not available.

COMMENTS ON CASH FLOW

Collection of Receivables: One half of the receivables are collected in the current month of sales, with the remainder to be paid in the following month. Five percent is deducted to allow for discounts and bad debts.

Long-Term Borrowing will be repaid by means of equal monthly payments over a two-year period, beginning with the 13th month. Short-term borrowing may be necessary later on.

Ratios:

Return on Investment (before Income Tax)	22.10%
(Return on investment is obtained on the assumption that the capital is owner's equity.)	
Payback Period	4.52 years
Sales/Working Capital	5.23
Sales/Fixed Capital	3.99

REFERENCES

Books and Reports

1. Desrosier, Norman W. The Technology of Food Preservation. Westport, Connecticut: AVI Publishing Co., Inc., 1970.
2. Georgia Department of Agriculture. Georgia Agricultural Facts. Athens, Georgia: Georgia Crop Reporting Service, 1976.
3. Hammond, Leigh H., et al. The Feasibility of Producing and Processing Certain Vegetables in Southeastern North Carolina. Raleigh, N. C.: North Carolina State University, 1967.
4. Hoare, W. E. Tinplate Handbook. Greenford, England: Tin Research Institute, 1957.
5. International Bank for Reconstruction and Development. Problems of Food Processing Industries in Developing Countries (Report No. EC - 169). Washington, D. C., 1969.
6. Jaramillo, Jaime. Analysis of the Economic Feasibility Study for a Vegetable Canning Plant. Atlanta, Georgia: Georgia Institute of Technology, 1975.
7. Judge, James J. and Daniel P. The Almanac of the Canning, Freezing, Preserving Industries. Westminster, Maryland: Edward E. Judge & Sons, Inc., 1976.
8. Laboratory Manual for Food Cannerys and Processors, 2nd ed. Westport, Connecticut: AVI Publishing Co., Inc., 1968.
9. Mayer, K. D., and Goldstein, S. The First Two Years: Problems of Small Firm Growth and Survival. Washington, D. C.: Government Printing Office, 1961.
10. Mercer, W. A., and Rose, W. W. Waste Reduction in Food Canning Operations. Berkeley, California: National Cannerys Association, 1970.
11. United Nations Food and Agriculture Organization. Processed Fruit and Vegetables (FAO Commodity Bulletin, Series No. 47). Rome, 1970.
12. United Nations Industrial Development Organization. Industrial Processing of Citrus Fruit (UNIDO Sales No. 69. II. B.9). Vienna, 1969.
13. _____. Information Sources on the Canning Industry (UNIDO Guides to Information Sources No. 19). New York, 1975.
14. U. S. Department of Agriculture. Agricultural Statistics, 1975. Washington, D. C.: U. S. Government Printing Office, 1969.
15. _____. 1975 Handbook of Agricultural Charts, Agricultural Handbook No. 491. Washington, D. C.: U. S. Government Printing Office, 1976.

16. U. S. Department of State. Small Canning Facilities. Washington, D. C.: U. S. Agency for International Development, 1972.

Periodicals

17. Canner: Packer (covers U. S.). Published by: Food Marketing Inc., P. O. Box 664, Barrington, Illinois 60010, U.S.A.
18. Food Manufacture (worldwide). Published by: Morgan-Grampion, Ltd., 30 Calderwood Street, Woolwich, London SE18 6QH, England.

Directories

19. Canning Machinery Directory. Published by: Canning Machinery and Supplies Association, 7758 Wisconsin Avenue, N. W., Washington, D. C. 20014, U.S.A.