MASSEY UNIVERSITY

| 1.* | (a) | -I give permission for my thesis, entitled |
|---------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| | | |
| | | |
| | | to be made available to readers in the Library under the conditions determined by the Librarian. |
| | (b) | I agree to my thesis, if asked for by another institution, being sent away on temporary loan under conditions determined by the Librarian |
| | (c) | I also agree that my thesis may be copied for Library use. |
| 2. * | | I do not wish my thesis, entitled |
| | | INVESTMENT OPPORTUNITIES IN |
| | | KINIFRUIT PROCESSING |
| | | |
| | | to be made available to readers or to be sent to other institutions without my written consent within the next two years. |
| | | Signed D. A. Clouchler |
| - | | Signed A. Cloughley Date 03.10.85 |
| * | | Strike out the sentence or phrase which does not apply. |
| The I | Library | |
| V e | y Univer | |
| Palme | rston No | orth, N.Z. |
| -1 | | |
| me sp | opyright pace belo ment ado | of this thesis belongs to the author. Readers must sign their name in ow to show that they recognise this. They are asked to add their dress. |
| Name | and Ad | dress |
| | | |
| | | |
| · · · · · · · · · · · · · · · · · · · | | |
| | | |
| | | |
| | | |
| | | |

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

INVESTMENT OPPORTUNITIES IN KIWIFRUIT PROCESSING

A Case Study in Product Development
that Considers the Advisory Role of the
New Zealand Ministry of Agriculture and Fisheries

A Thesis Presented in Partial Fulfilment of the Requirements for the Degree of Master of Agricultural Science at Massey University

Brian Alexander Cloughley
1985

ABSTRACT

This thesis is set in the context of the Economic Section of the Advisory Services Division of the New Zealand Ministry of Agriculture and Fisheries (MAF). MAF provides management advice to farmers and horticulturalists on what and how to produce.

The direction for MAF services is taken from the national development strategy which has historically centred on expansion of traditional agriculture, but is now focusing on the development of non traditional agriculture. This shift in strategy, which involves the development of new food and fibre products, has caused MAF to adopt an industrywide market orientation that focuses on the needs of consumers rather than methods of production, so that marketing and production of both primary and processed products could be considered within the domain of MAF advisory activities.

The Economic Section of MAF's Advisory Services Division is responsible for economic evaluations of opportunities in agriculture. While the national development strategy has centred on expansion of traditional agriculture these evaluations have concentrated on opportunities to improve farm management. With the shift in both the national development strategy and MAF's orientation to its work,

the Economic Section must consider industrywide market orientated economic evaluations of both product and management opportunities.

This study therefore involves the development and evaluation of an analytical framework for consumer orientated economic evaluations of new product opportunities. The analytical framework that is developed is, in the broadest sense, one of strategic planning, and it is evaluated through its application to a case study in kiwifruit processing. The results of the case study show that the framework is a useful one that allows a systematic consideration of new alternatives given information on markets and the objectives and characteristics of the developing firm.

The second aim of the study was to evaluate and discuss MAF's industrywide market orientated approach to its advisory work. The study concludes that MAF should confine its advisory services to on-farm production, and that MAF should assume an industrywide but not a market orientated approach to its work. It is also concluded that the Economic Section of MAF's Advisory Services Division should assume responsibility for the divisions strategic planning and that this planning should involve an industrywide approach to the evaluation of farm production opportunities. To this end it is considered that a production orientated version of the analytical framework developed in this study is appropriate for use by the Economic Section.

ACKNOWLEDGEMENTS

The assistance of the following contributors to this study is gratefully acknowledged:

The Ministry of Agriculture and Fisheries for the study opportunity and their comprehensive financial support; Dr A D Meister for his supervision and guidance; Dr W R Schroder, Dr M D Earle and the members of Massey Universities Food Technology Research Centre for their advice; the Opotiki Fruitgrowers Co-operative and Epicurean Foods of New Zealand Ltd for the case study material; Mrs Deidre Maraki for her work in typing this thesis; finally, and above all, thanks to Christine for the motivation and support she provided throughout.

TABLE OF CONTENTS

| | | | PAGE |
|-----------|-----------|------------------------------------------------------------------------|------|
| ABSTRACT | | | ii |
| ACKNOWLED | GEMENTS | | iv |
| TABLE OF | CONTENTS | | v |
| LIST OF T | ABLES AND | FIGURES | xi |
| | | | |
| CHAPTER 1 | | | |
| AN IN | TRODUCTIO | N | 1 |
| 1.1 | Study B | ackground | 1 |
| 1.2 | Thesis | Objectives | 8 |
| | | | |
| CHAPTER 2 | | | |
| | | EVELOPMENT STRATEGY AND THE ROLE Y SERVICES | 10 |
| 2.1 | New Zea | land National Development Strategy | 10 |
| | 2.1.1 | New Zealands Trade History | 10 |
| | 2.1.2 | Analysis of New Zealands Balance of Payments Problem | 12 |
| | 2.1.3 | Strategic Attempts to Close the Gap | 16 |
| | 2.1.4 | Future Gap Closing Strategies | 20 |
| 2.2 | | e of MAF's Advisory Services n Economic Section | 23 |
| | 2.2.1 | Objectives and Strategies of the Ministry of Agriculture and Fisheries | 23 |
| | 2.2.2 | Objectives and Strategies of Advisory Services Division | 26 |
| | 2.2.3 | The Economic Section of Advisory Services Division | 30 |
| 2.3 | Chapter | Summary and Conclusions | 33 |

| | | | vi |
|-----------|--------------------|------------------------------------------------|------|
| | | | PAGE |
| CHAPTER 3 | , | | |
| Δ FRΔ | MEWORK FO | R ANALYSIS | 35 |
| | | | |
| 3.1 | Method | of Investment Analysis | 36 |
| | 3.1.1 | Investment Criteria | 36 |
| | 3.1.2 | | 38 |
| | 3.1.3 | | 38 |
| | 3.1.4 | | 39 |
| | 3.1.5 | Forecasting Techniques | 39 |
| 3.2 | Investment Con | ent Analysis In a Product Develop- ntext | 39 |
| | 3.2.1 | The Need for New Products | 39 |
| | 3.2.2 | A Management Model for Product Innovation | 41 |
| | 3.2.3 | Investment Analysis and Product Development | 48 |
| 3.3 | Product Context | Development In a Strategic Planning | 48 |
| | 3.3.1 | The Concept of Strategy | 48 |
| | 3.3.2 | Components of Strategy | 50 |
| | 3.3.3 | Strategy Formulation | 58 |
| | 3.3.4 | Product Development and Strategic Planning | 63 |
| 3.5 | Summary | | 64 |
| CHAPTER 4 | | | |
| A REV | IEW OF TH | E NEW ZEALAND KIWIFRUIT INDUSTRY | 66 |
| 4.1 | The Fre | sh Fruit Industry | 66 |
| | 4.1.1 | Fruit Development | 66 |
| | 4.1.2 | | 68 |
| | 4.1.3 | Industry Development | 77 |
| 4.2 | The Kiw | ifruit Processing Industry | 80 |
| | 4.2.1 | Processed Kiwifruit Products | 81 |
| | 4.2.2 | Kiwifruit Processors | 82 |

| | | | vii |
|-----------|-----------|--------------------------------------------------------|------|
| | | | PAGE |
| | 4.2.3 | Commercial Processing Development | 85 |
| | 4.2.4 | Processing Industry Development | 91 |
| 4.3 | Summary | | 92 |
| | | | |
| CHAPTER 5 | | • | |
| A STRA | ATEGIC EV | ALUATION OF THE DEVELOPING FIRM | 94 |
| 5.1 | Charact | eristics of the Developing Firm | 94 |
| | 5.1.1 | General Features of Co-operative Firms | 94 |
| | 5.1.2 | A Service at Cost Objective | 95 |
| | 5.1.3 | Subordinate Role of Capital | 96 |
| | 5.1.4 | Open Membership | 97 |
| | 5.1.5 | Democratic Control | 97 |
| 5.2 | The Opo | tiki Fruitgrowers Co-operative | 98 |
| | 5.2.1 | OFC Service at Cost Objectives | 99 |
| | 5.2.2 | OFC and the Subordinate Role of Capital | 102 |
| | 5.2.3 | OFC and the Principle of Open Membership | 110 |
| | 5.2.4 | OFC and the Principle of Democratic Control | 112 |
| 5.3 | | elopment Strategy of the Opotiki owers Co-operative | 123 |
| | 5.3.1 | Strategic Development Objective | 123 |
| | 5.3.2 | Product/Market Scope | 125 |
| | 5.3.3 | Growth Vector | 128 |
| | 5.3.4 | Competitive Advantage | 128 |
| | 5.3.5 | Synergy | 133 |
| | 5.3.6 | Distinctive Competence | 135 |
| 5 4 | Chanter | Summary | 135 |

| | | | viii |
|-----------|---------------------|-------------------------------------------|------------|
| | | | PAGE |
| CHAPTER 6 | | | |
| IDEA S | SEARCH AN | D PRELIMINARY EVALUATION | 137 |
| 6.1 | Idea Se | arch | 137 |
| 6.2 | Prelimi | nary Evaluation | 139 |
| | 6.2.1 6.2.2 | 0 | 139 153 |
| 6.3 | Chapter | Summary | 159 |
| CHAPTER 7 | | | |
| ECONOM | IIC APPRA | ISAL | 161 |
| 7.1 | Method | of Investment Appraisal | 161 |
| 7.2 | Schedul | e of Common Budget Assumptions | 163 |
| | 7.2.1 $7.2.2$ | General Assumptions Financial Assumptions | 163 166 |
| | 7.2.3 | Income Assumptions | 170 |
| | 7.2.4 | Direct Cost Assumptions | 172 |
| | 7.2.5 | - | 177 |
| 7.3 | Calcula Paramate | tion and Schedule of Common Budget ers | 179 |
| | 7.3.1 | Sales Revenue | 180 |
| | 7.3.2 | Transport | 181 |
| | 7.3.3 | Labour | 181 |
| | 7.3.4 | Administration | 182 |
| | 7.3.5 | Product Development and Marketing | 182 |
| | 7.3.6 | Standing Changes | 183 |
| | 7.3.7 | Inflation | 183 |
| | 7.3.8 | Cost of Capital | 185 |
| | 7.3.9 | Schedule of Common Budge Parameters | 185 |
| 7.4 | Investme | ent Appraisal - Kiwifruit Sauce | 186 |
| | 7.4.1 | Product Details | 186 |
| | 7.4.2 | Budget Inputs | 188 |
| | 7.4.3 | Investment Appraisal Result | 189 |

| | | | ix |
|-----------|--------------------|-------------------------------------------------------------------------------|------|
| | | | PAGE |
| 7.5 | | ent Appraisal - Kiwifruit Chutney | 195 |
| | 7.5.1 | | 195 |
| | | Budget Inputs | 197 |
| | 7.5.3 | Investment Appraisal Results | 198 |
| 7.6 | Investme | ent Appraisal - Kiwifruit Marinade | 203 |
| | 7.6.1 | Product Details | 203 |
| | 7.6.2 | Budget Inputs | 205 |
| | 7.6.3 | Investment Appraisal Results | 206 |
| 7.7 | Investme Slices | ent Appraisal - Pickled Kiwifruit | 212 |
| | 7.7.1 | Product Details | 212 |
| | 7.7.2 | Budget Inputs | 214 |
| | 7.7.3 | | 215 |
| 7.8 | Investme | ent Appraisal - Product Line | 220 |
| | 7.8.1 | Budget Inputs | 220 |
| | 7.8.2 | Investment Appraisal Results | 221 |
| 7.9 | Chapter | Summary | 226 |
| OHADMED O | v | | |
| CHAPTER 8 | | | |
| DISCU | SSION AND | CONCLUSIONS | 227 |
| 8.1 | The Anal | lytical Framework | 227 |
| | 8.1.1 | Strategic Planning | 227 |
| | 8.1.2 | Product Development | 229 |
| | 8.1.3 | Economic Appraisal | 230 |
| 8.2 | Further | ed Kiwifruit Products Worthy of Development by the Opotiki owers Co-operative | 234 |

8.2.1

8.2.2

Summary

Recommendations

235

235

| | | | X |
|------------|---------|----------------------------------------------------------------------------------|------|
| | | | PAGE |
| 8.3 | MAF Adv | visory Services | 238 |
| | 8.3.1 | The Scope of MAF Advisory Services | 239 |
| | 8.3.2 | An Industrywide Approach | 243 |
| | 8.3.3 | A Market Orientation | 244 |
| | 8.3.4 | Economic Evaluations by the Economic Section of MAF's Advisory Services Division | 245 |
| APPENDICES | | | 247 |
| BIBLIOGRAP | НҮ | | 295 |

LIST OF TABLES AND FIGURES

| | | | | PAGE |
|-------|-----|---|--------------------------------------------------------------------------------------------------------------------------|------|
| Table | 4.1 | | Kiwifruit Production Trends | 73 |
| Table | 4.2 | _ | Projected NZ Kiwifruit Production | 76 |
| Table | 4.3 | _ | New Zealand Kiwifruit Production | 86 |
| Table | 4.4 | - | Processed Kiwifruit by Country of Destination | 87 |
| Table | 4.5 | - | Estimated National Kiwifruit Production Available for Processing/Home Market | 90 |
| Table | 5.1 | _ | Opotiki Fruitgrowers Co-operative Physical Asset Summary | 100 |
| Table | 5.2 | | Opotiki Fruitgrowers Co-operative Financial Summary | 103 |
| Table | 5.3 | - | Opotiki Fruitgrowers Co-operative Realistic Forecast of Minimum Coolstore/ Packhouse Facilities | 111 |
| Table | 5.4 | _ | Opotiki Fruitgrowers Co-operative Realistic Forecast of Coolstore/ Packhouse Buildings Available for Processing | 131 |
| Table | 5.5 | _ | Forecast of Minimum Quantities of Processing Grade Kiwifruit From Shareholders and Required Coolstore Capacity | 132 |
| Table | 5.6 | • | OFC Competence Profile | 134 |
| Table | 6.1 | _ | Ideas for Processed Kiwifruit Products | 138 |
| Table | 6.2 | | Potential Marketing Partners for Investments in Kiwifruit Processing | 142 |
| Table | 6.3 | | Processed Kiwifruit Product Alternatives With a Marketing Partner Adjunct to them | 153 |
| Table | 6.4 | _ | Multi-attribute Feasibility Analysis of Processed Kiwifruit Product Alternatives | 157 |
| Table | 7.1 | | Plant Cost Estimates | 167 |
| Table | 7.2 | _ | Debt Servicing Terms | 168 |
| Table | 7.3 | _ | Cost of Debts, Equity Capital | 170 |

| | | | | | X11 |
|-------|------|---|------------------------------------------------------------------------------------------|--------|------|
| | | | | | PAGE |
| Table | 7.4 | | Middleman Margins | | 171 |
| Table | 7.5 | - | Raw Material Costs | | 172 |
| Table | 7.6 | | Power Consumption Rates | | 173 |
| Table | 7.7 | - | Labour Award Rates | | 174 |
| Table | 7.8 | - | Transport Charges | | 175 |
| Table | 7.9 | - | Tariff Charges | | 176 |
| Table | 7.10 | - | Administration Salaries | | 177 |
| Table | 7.11 | - | Vehicle Expenditures | | 178 |
| Table | 7.12 | - | Debt Service Charges | | 179 |
| Table | 7.13 | | Values of Common Budget Parameters Pessimistic Realistic and Optimistic Situations | | 185 |
| Table | 7.14 | | Kiwifruit Sauce Direct Cost Summar | У | 188 |
| Table | 7.15 | | Kiwifruit Sauce Budget Input Data Summary | | 188 |
| Table | 7.16 | _ | Kiwifruit Sauce NPV Profit Vs Prod | uction | 189 |
| Table | 7.17 | _ | Kiwifruit Sauce Breakeven Volumes | | 189 |
| Table | 7.18 | - | Kiwifruit Sauce Profit Sensitivity | | 193 |
| Table | 7.19 | _ | Kiwifruit Chutney Direct Cost Summa | ry | 197 |
| Table | 7.20 | - | Kiwifruit Chutney - Input Data Summa | ary | 197 |
| Table | 7.21 | - | Kiwifruit Chutney NPV Profit Vs Production | | 198 |
| Table | 7.22 | _ | Kiwifruit Chutney - Breakeven Volume | es | 198 |
| Table | 7.23 | _ | Kiwifruit Chutney - Profit Sensitiv | ity | 201 |
| Table | 7.24 | _ | Kiwifruit Marinade - Direct Cost Sur | nmary | 205 |
| Table | 7.25 | _ | Kiwifruit Marinade - Input Data Summ | nary | 206 |
| Table | 7.26 | | Kiwifruit Marinade NPV Profit Vs Production | | 206 |
| Table | 7.27 | _ | Kiwifruit Marinade - Breakdown Volum | nes | 207 |
| Table | 7.28 | | Kiwifruit Marinade - Profit Sensitis | zitv | 209 |

| | xiii |
|-----------------------------------------------------------------------------------------------------|------|
| | PAGE |
| Table 7.29 - Kiwifruit Pickled Slices - Direct Cost Summary | 214 |
| Table 7.30 - Pickled Slices - Input Data Summary | 214 |
| Table 7.31 - Pickled Slices - NPV Profit Vs Production | 215 |
| Table 7.32 - Pickled Slices - Breakeven Volumes | 215 |
| Table 7.33 - Pickled Kiwifruit Slices - Profit Sensitivity | 218 |
| Table 7.34 - Product Line - Input Data Summary | 220 |
| Table 7.35 - Product Line NPV Profit Vs Production | 221 |
| Table 7.36 - Product Line - Breakeven Volumes | 222 |
| Table 7.37 - Product Line - Profit Sensitivity | 223 |
| Table 7.38 - Product Line - Realistic Cashflow Forecast at Expected Demand | 224 |
| Figure 3.1 - Schema Showing a Simplified Version of the Analytical Framework that is Developed | 35 |
| Figure 3.2 - Schema Showing the Classical Product Life Cycle | 40 |
| Figure 3.3 - Schematic Representation of the Classical Management Model of Product Development | 43 |
| Figure 3.4 - The Classical Pattern of Product Idea Elimination During New Product Development | 43 |
| Figure 3.5 - Growth Vectors Expressed in Terms of Ansoff's (1976) Product-market Matrix | 51 |
| Figure 3.6 - Ansoff's (1976) Growth Vectors in Diversification | 53 |
| Figure 3.7 - Schema Showing a Basic Model of Strategic Planning | 59 |
| Figure 6.1 - USA Population Trends by Age Groups | 147 |
| Figure 7.1 - Kiwifruit Sauce Production Vs NPV Profit | 194 |
| Figure 7.2 - Kiwifruit Chutney - Profit Summary | 202 |

| | | xiv |
|----------------------------------------------------|-------------------|------|
| | | PAGE |
| Figure 7.3 - Kiwifruit Marinade - | Profit Summary | 211 |
| Figure 7.4 - Pickled Kiwifruit Sl Vs NPV Profit | ices - Production | 219 |
| Figure 7.5 - Product Line - Profi | t Summary | 225 |

.