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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

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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.

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CHAPTER 1

1 AN INTRODUCTION

This chapter introduces the thesis and defines the study objectives.

1.1 Study Background

This study assumes the perspective of the Economic Section of the Advisory Services Division of the New Zealand Ministry of Agriculture and Fisheries (MAF). The Economic Section is primarily concerned with the economic appraisal of new opportunities in agriculture.

MAF provides farmers and horticulturalists with profit orientated research and advice on what and how to produce. These services are provided as public goods (ie goods which once provided are freely available to all). Historical justifications for providing these services are that:

- (i) private firms were insufficiently developed to provide farmers with the information services they needed to produce more efficiently
- (ii) private firms could not appropriate all the benefits of their work because of externalities that enabled free-riders to benefit from private research and advisory services

- (iii) primary producers were perceived as a socially disadvantaged group and MAF services were provided as a welfare service
- (iv) agricultural commodity producers lacked the market power to derive equitable market returns and MAF services were provided as a source of countervailing power
- (v) returns to primary export producers have been reduced by an overvalued exchange rate and free MAF services were provided to compensate for this and to balance assistance given to domestic producers in the form of protection from imports
- (vi) as principle earners of foreign exchange primary agricultural producers have political influence disproportionate to their numbers and MAF services were provided as a result of political pressure
- (vii) the information services provided by MAF promote economic growth in an area where New Zealand perceives comparative advantage
- (viii) as small scale producers farmers and horticulturalists cannot afford to individually generate the information they need to operate more profitably and MAF services avoid duplication of effort, achieve scale economies

in information generation, and a large number of small firms can benefit from MAF services in a non competitive manner.

In its historical role MAF has concentrated on providing farm management information to improve the profitability of primary agricultural producers, and the Economic Section of MAF's Advisory Services division has concentrated on evaluating farm management opportunities. However the long term profit success of any business depends on efficiency in three areas:

- (i) marketing efficiency (identifying and satisfying consumer needs)
- (ii) operational efficiency (minimising costs)
- (iii) efficiency in adapting to change (in technology and consumer needs).

To perform in these three business areas farmers, like any business firm, need to be able to monitor and control their activities. MAF services have provided information aimed at improving the operational efficiency of primary agricultural producers.

Marketing efficiency is indicated by consumer demand. Consumer demand in turn depends on the marketing mix of product, price, packaging, promotion, and place.

In the past market conditions for traditional agricultural commodities were such that whatever was produced was sold at satisfactory prices. Expansion of traditional agriculture was considered the appropriate strategy to improve farming profitability for economic growth.

More recently long term declines in real prices for traditional agricultural commodities, protectionism, and difficulties in selling traditional agricultural commodities have led to a reassessment of expansion of traditional agriculture as a strategy for economic growth.

Agricultural product development is one strategy that has assumed increased importance. In recent years primary agricultural producers have endeavoured to increase the profitability of their operations by commercialising a wide range of new commodity type products. These include:

- (i) meat - from deer, goats, and rabbits
- (ii) fibre - from possums, goats, fitch , rabbits, flowers, plants, seeds, and trees
- (iii) dairy products - from goats and sheep
- (iv) fruit - kiwifruit, avacados, blueberries, tamarillos, feijoas, passionfruit, blackcurrants, boysenberries, asian pears, walnuts and other nuts, persimmons, casanas, melons, babacos, pepinos, cherries

- (v) vegetables - asparagus, onions, squash, pumpkin, and processed peas and corn.

Not all of these new products have enjoyed market success, arguably, in part, because of failure to satisfy consumer needs. The chances of market success and the cost of commercialising new products can be improved with information on consumer needs. New Zealand producers are a long way from the foreign consumers of their products. Market channels for agricultural export products typically involve specialist producers, processors, exporters, importers, wholesalers, retailers, and end use consumers.

The small size of primary agricultural producers means that they cannot afford information on consumer needs. In the absence of this information primary agricultural producers can either assume the cost and risk of commercialising products that might not meet with market success, or avoid new products and continue producing traditional agricultural commodities. In both cases resources are wasted because of inefficiency in adapting to changes in consumer needs. In the first case because investment is made in the wrong products, and in the second case because no investment is made when consumer demand indicates that it should be.

The move towards non traditional agriculture has caused MAF to reassess the scope of its activities and seek involvement in improving marketing efficiency.

If MAF ignores marketing efficiency and continues to confine its activities to promoting improved operational efficiency, then it runs the risk of reducing overall efficiency by promoting production of products that will fail in the marketplace.

MAF must also consider whether it confines its information services to primary agricultural producers. Traditionally primary agricultural producers have assumed channel leadership and processors and exporters have acted as intermediary specialists. There is however no reason why producers must assume channel leadership and a strategy of product development should favour leadership by processors and exporters. Exporters are closer to foreign consumers and have marketing experience, although arguably only as commodity traders.

The potential for product development exists at primary and processors levels. For primary producers product development is largely confined to commercialisation of different plants and animals. For processors development can involve turning primary products into the sophisticated food and fibre products being demanded by the traditional consumers of New Zealand products.

In this study investment analysis, strategic planning, and product development techniques are used to develop an analytical framework for the evaluation of new product alternatives. In the framework that is developed, product

development is positioned as the main focus of a broader strategic planning framework, and investment analysis is positioned as the main focus of product development.

The framework that is developed is illustrated through its application, up to the stage of physical development, in a case study of kiwifruit processing opportunities for the Opotiki Fruitgrowers Co-operative (OFC). In the wider view the analytical framework that is outlined and applied to the OFC case study is assessed as a tool for use by the Economic Section of MAF's Advisory Services Division when making economic appraisals of new opportunities in agriculture.

OFC is a fruithandling co-operative of kiwifruit growers which is looking to expand its activities into processing the low grade fruit supplied by its members. OFC's decision to explore opportunities in kiwifruit processing is motivated by a desire to maintain returns for members low grade fruit and to utilise more fully its fruithandling resources. In the past OFC's low grade fruit has been sold fresh in local market auctions, and to processors in Hastings and Tauranga who can or pulp the fruit for export. OFC is concerned that as the volumes of process grade fruit increase the price they receive for their fruit will decline to the point where transport costs will make it unprofitable to sell to these distant processors, or that the processors, faced with an oversupply of fruit, will elect to support growers in their own localities and stop buying fruit from OFC.

1.2 Thesis Objectives

The specific objectives of this thesis are to:

- (i) develop and evaluate an analytical framework for consumer orientated economic evaluations of new product opportunities
- (ii) identify, using the framework that is developed, processed kiwifruit alternatives worthy of further development by the Opotiki Fruitgrowers Co-operative
- (iii) evaluate and discuss MAF's industrywide market orientated approach to its advisory work, with particular regard to the implications for economic evaluations performed by the Economic Section of MAF's Advisory Services Division.

Chapter two of this thesis establishes the importance of non traditional agriculture as a strategic development alternative for economic growth, and shows how MAF and the Economic Section of MAF's Advisory Services Division have positioned themselves within the national development strategy.

Chapter three develops an analytical framework for evaluating new product alternatives.

Chapter four backgrounds the case study with a review of the New Zealand kiwifruit industry.

Chapters five to seven document the case study, and conclusions are summarised in the final chapter.

CHAPTER 2

2 THE NATIONAL DEVELOPMENT STRATEGY AND THE ROLE OF MAF ADVISORY SERVICES

This chapter parallels the development of the national development strategy with the objectives and functions of MAF, its Advisory Services Division, and the Economic Section of MAF's Advisory Services Division.

2.1 New Zealand's National Development Strategy

Foreign trade has been a key feature of New Zealand's development and the evolving national development strategy has been strongly influenced by foreign trade imbalances.

2.1.1 New Zealand's Trade History

New Zealand trades because it has specialised in primary production where it perceives comparative advantage, and because it lacks the skills and resources to economically produce all the manufactured consumer and industrial goods required by its citizens. These it must import and pay for in foreign currency.

Historically manufactured imports have been paid for with receipts from the export of land based raw materials and foodstuffs.

Early exports of non renewable resources of gold and sealskins were later replaced by wheat, wool, and (with the advent of refrigeration) meat and dairy products. Meat, wool, and dairy products have persisted to this day as New Zealand's main exports.

Consumption of cheap primary products from New Zealand complemented the rapidly growing industrial economy of 19th century Britain.

The New Zealand effort was production orientated and Britain operated a free trade policy that absorbed and marketed all that was produced. This policy of free trade ended with the economic depression of the early 1930's when limiting quotas were introduced. The effects of these quotas were masked by recovery from the depression, and then the second world war and the introduction of back to back government bulk purchase agreements. There was still a market for everything New Zealand could produce.

From the mid 1950's onwards New Zealand attempted to diversify both markets and products. These attempts were occasioned by several factors, notably:

- (1) Deteriorating terms of trade.
- (2) A surplus of European farm commodities (as a result of agricultural subsidies).
- (3) Awareness of Britain's intentions to join the E.E.C.
- (4) The tremendous growth in world trade encouraged by G.A.T.T., the I.M.F., and O.E.E.C.

Britain's share of New Zealand's exports has fallen from a level of 70-80% before the second world war to 14.2% by 1980.

Exports of meat, wool, and dairy products that generated more than 90% of New Zealand's foreign exchange in 1950 accounted for slightly more than 60% by 1980.

2.1.2 Analysis of New Zealand's Balance of Payments Problem

From the inception of trading in the mid 19th century New Zealand has suffered a balance of payment problem. Current account import expenditure has frequently exceeded current account export revenue. Prior to 1935 a balance of payments imbalance was allowed to persist to the extent that the nation's development needs could not be met from current account income.

Foreign borrowing was engaged by government as a means of financing purchases of capital equipment and raw materials for natural resource development. Borrowing was production orientated. Imports of non productive consumer goods were limited by the ability of current account export revenue, or foreign reserves, to pay for them.

Fluctuations in export receipts caused by variations in the economic growth of our trading partners (mainly Britain) made for lean years and good years. When export revenue was up imports rose. When exports fell the level of imports, and hence the capacity for economic growth, fell too. The economic hardship associated with the great depression of the 1930's was caused by a prolonged and severe downturn in the level of export receipts.

As a consequence of the 1930's depression the government of 1935 adopted "insulation" policies designed to pursue general goals of economic growth, full employment, and improved social welfare.

Insulation policies were aimed at broadening the base of the New Zealand economy and offsetting fluctuations in export receipts by borrowing in low foreign income years and repaying in high foreign

income years. Deficit spending was engaged as a means of maintaining full employment, developing domestic (export or import substituting) industry, and encouraging agricultural export production.

Borrowing became production and consumption orientated as a consequence of full employment. Imports of consumer goods and raw materials and capital equipment for import substituting local industries were no longer limited by the ability of current account export revenue or foreign reserves to pay for them.

The insulation policies removed the economic constraint imposed by the need to balance current account imports and exports. In the absence of this check New Zealand's balance of payments problem has tended to persist. The surplus revenue of the good years has not offset the deficits of the bad years and New Zealand has remained in debt.

The balance of payments problem has become more pronounced since the oil shocks of 1973 and 1979 when the terms of trade declined rapidly. De Bruin (1983) asserts that the oil shocks of the 1970's have only served to compound a long term decline in New Zealand's terms of trade, a slow down in the growth of world trade, and rising protectionism.

Indebtedness has increased rapidly since the early 1970's reflecting a continuation of the insulation policy of borrowing to cover an external current account imbalance.

Since the oil shock increased effort has been aimed at further increasing exports and substituting imports, particularly of oil, and much of the borrowing has ostensibly been to cover the cost of this capital development. De Bruin (1983) concludes however that an increasing proportion of the newly acquired debt has been used for consumption, rather than investments that will improve the balance of payment situation.

The massive increase in foreign debt of recent years has increased pressure on the external current account as the level of invisibles has risen, mainly because of interest costs of servicing official debt.

The servicing of foreign debt has now become a significant part of New Zealand's widening current account deficit and the on-going commitment to meet these payments greatly increases New Zealand's dependence and need for increased export revenue.

2.1.3 Strategic Attempts to Close the Gap

Historically attempts to close the gap between foreign payments and receipts have involved simultaneous efforts to both reduce import expenditure and increase export receipts.

2.1.3.1 Reducing Import Expenditure

Import reducing measures have centred on encouraging domestic manufacture of goods (import substitution), and by discouraging imports (licensing, devaluation, deflation, taxation, and exchange control and allocation).

Direct import control was first employed from 1938-50 when import licensing and exchange control and allocation were used to stem the increased demand for imports that followed the introduction of insulation policies.

Immediately following the second world war New Zealand experienced a favourable foreign exchange imbalance when the terms of trade improved as a result of a wool boom.

Condliffe (1969) notes that between 1945-53 New Zealand repaid 42% of its overseas debt and made substantial gifts to the United Kingdom besides.

From 1951 onwards many of the direct import restrictions that had prevailed since before the second world war were lifted in response to this favourable exchange imbalance. The ensuing increase in imports resulted in balance of payments deficits in each year until 1958 when, to redress a major balance of payments crisis, direct import controls were reintroduced.

From 1960 onwards these direct controls on imports have been progressively liberalised.

In reviewing the effectiveness of import reducing policies Maughan (1978) concludes that import control has been more successful than the establishment of import substituting industries. He asserts that the establishment of domestic industries that substitute finished foreign goods with locally produced goods have failed to alleviate the pressure on the balance of payments because of continued dependence of these industries on imported raw materials and capital equipment.

In noting that in 1978 85% of our imports were raw materials and capital goods for domestic industry Maughan suggests that

import substituting moves aimed at broadening the base of the economy and decreasing reliance on imports, have in fact created a situation where there is increased reliance on imports to maintain full employment and economic growth. He also suggests that adherence to a policy of import restraint will become extremely difficult in the future given the importance attached to a high level of employment.

2.1.3.2 Increasing Export Revenue

The export approach to remedying the balance of payments problem has been particularly favoured since 1960 (Maughan 1978), and until recently has concentrated on expansion of pastoral industries. Blyth (1983) maintains that despite product and market development emphasis on growth in livestock numbers has remained the central ingredient of national development strategy since 1950.

This strategy is reflected in the wide range of concessions that have been available to farmers. Favourable assistance to primary producers has included: cheap loan finance, priority borrowing, input and output

subsidies, tax incentives, and government funded research, extension, and quality control inputs.

As a consequence of these policies pastoral exports have shown considerable volume increases, particularly through the 1960's and 1970's. Associated with these increases have been relatively larger increases and fluctuations in the value of pastoral exports.

Through the 1960's and 1970's government assistance was extended to manufacturers in an attempt to further broaden the economic base and increase foreign revenue.

Pastoral exports that accounted for 94% of total exports in 1964 accounted for only 71% of exports in 1976 (Maughan 1978).

The apparent success of moves to broaden the base of the economy via manufacturing belie a continued dependence on land based primary production. Maughan (1978) asserts that decreased reliance on pastoral exports is due to diversification of land use and increased processing, rather than any large scale strategic swing away from agriculture into manufacturing.

Increases in export receipts have been insufficient to close the balance of payments gap despite expansion of pastoral agriculture and a broadening of the economic base. In fact deteriorating terms of trade and increasingly severe fluctuations in the size of pastoral receipts have resulted in increasingly large current account deficits.

2.1.4 Future Gap Closing Strategies

It is likely that future gap closing strategies will centre on export growth.

A continuing desire to achieve general goals of full employment, economic growth, and improved social welfare, coupled with substantial on-going commitments to service foreign debt, suggests both a need and a preference to increase exports.

For increased exports to successfully reduce the foreign account imbalance, the rate of growth for exports must be considerably greater than the rate of growth for imports. This differential has not been achieved in the past.

Blyth (1983) argues that failure to achieve this differential is due to reliance on traditional pastoral exports. He maintains that:

- (1) The demand for imports reflects New Zealand's aspirations regarding living standards. These aspirations are based on observations in rich countries with a higher level of economic growth than New Zealand.

Income elasticity of demand (percentage change in quantity demanded for a one percent change in income) for imports into New Zealand is thought to be slightly greater than unity, ie a 1% increase in New Zealand's G.N.P. will give rise to an increase in the volume of imports of slightly more than 1%.

- (2) The value of our exports (and hence our capacity for sustainable economic growth) is related to the economic growth in the countries we sell to. Blyth (1983) reports that the world income elasticity of demand for New Zealand's traditional exports is thought to be around 0.6, ie a 10% increase in world G.N.P. would result in a quantitative expansion of New Zealand's exports of about 6%.

The low income elasticity of demand for New Zealand's traditional pastoral exports is attributed to two things. Firstly the products are generally regarded as basic necessities that are unresponsive to income growth. Secondly,

trade barriers stop exports growing at a rate commensurate with rising incomes.

- (3) New Zealand's supply of traditional pastoral exports is large enough to influence world prices, contrary to common assumption. The implication is that expansion of traditional pastoral exports will have a depressing effect on world prices.
- (4) Supply responses of pastoral agriculture to changing market signals are necessarily slow due to the biological nature of farming and the uncertainty associated with the variable nature of market signals.

As a consequence of these supply/demand characteristics Blyth et al (1983) conclude that expansion of traditional pastoral exports is no longer acceptable as the main export growth strategy.

Schroder and Rae (1984) challenge the basis of this conclusion by Blyth et al (1983). They argue that it is inappropriate to use an average income elasticity figure for all traditional exports from New Zealand, when in fact there are substantial variations between different markets and products. They suggest for example that, compared to the average figure proposed by Blyth et al (1983), developing countries are

likely to have a high income elasticity for some basic foods, and developed countries are likely to have a high income elasticity for some horticultural and manufactured products. On this basis they suggest that farming still has a significant place in New Zealand's future development. Maughan (1978) also argues in support of further growth in agricultural exports. He maintains that the extent of our continuing and likely future dependence on agricultural exports precludes any solution to the balance of payments problem that ignores this dependence.

Expansion of agriculture is likely to be a central ingredient of any future growth strategy in New Zealand, and expansion of agriculture through the development of non traditional products and markets will assume increasing importance.

2.2 The Role of MAF's Advisory Services Division Economic Section

2.2.1 Objectives and Strategies of the Ministry of Agriculture and Fisheries

The Ministry of Agriculture and Fisheries (MAF) is an instrument of the New Zealand Government with a mission to help the farming, horticulture and fishing industries to identify and realise potentials; to

maintain and where possible improve New Zealand's animal, fish, and plant health status; and to provide customers with quality assurances that facilitate effective marketing of New Zealand products (MAF Directorate 1983).

MAF Directorate (1983) recognises four result areas in the pursuit of its mission:

- * Increased productivity for farming, horticulture and fishing;

by providing research, advisory and fisheries management services which assist solving problems, improving productivity and realising new opportunities in farming, horticulture and fishing.

- * Protection and enhancement of animal, fish, and plant health;

by preventing the introduction of exotic animal, fish, and plant diseases and pests, so protecting New Zealand's status as an approved source of species or produce; and by improving animal, fish, and plant health status within New Zealand.

* Quality assurance systems for primary product exports;

by assuring overseas Government agencies, overseas customers (and New Zealand consumers where required), of the consistent purity and safety of New Zealand food products, basing such quality assurance on monitoring quality control systems in industry.

* Policy advice;

by advising Government and industry of policies which will promote growth and development of farming, horticulture and fishing and facilitate efficient processing and marketing, and which will maintain renewable resources and enhance the New Zealand environment.

MAF's current development strategies in pursuit of its mission are encompassed in its goals for 1984/5. They are:

- (1) Improved productivity in agriculture.
- (2) Improved management of fisheries.
- (3) Concentrate research and advice on best export growth opportunities.

- (4) Improve export processing and marketing structures.
- (5) Implement cost effective quality assurance systems.
- (6) Improve industry relations.
- (7) Develop strategic planning capability.
- (8) Improve manager performance.
- (9) Improve MAF productivity.

2.2.2 Objectives and Strategies of Advisory Services Division

Advisory Services Division (ASD) is one of 10 MAF functional divisions. The objectives and strategies of ASD are taken from and are subordinate to those of MAF as a corporate body.

ASD's objectives and strategies have changed over time as MAF's Advisory Services has evolved.

Scott (1968) records that in the 1950's the objective of the State Farm Advisory Service was taken as that laid down for the whole Department of Agriculture as the MAF was then known. These objectives, taken from the Department of Agriculture Act 1953, were:

- (1) To promote and encourage the development of all phases of the agricultural, pastoral, and horticultural industries in New Zealand,

including the stock, poultry, fruit, vegetables, flax, tobacco, hops, and honey production industries, with a view to maintaining and improving the quality of products derived from those industries and increasing production of those products.

- (2) To promote and encourage the marketing and sale of those products.

The strategy of the Department of Agriculture's Extension Division in the 1950's was to provide technical problem solving advice on an ad hoc basis. Field research, service activities, and extension were all major concerns of the division.

In 1960 the Extension Division became the Farm Advisory Division and the 1968 Department of Agriculture annual report states that the objective of the Farm Advisory Division at that time was -

"To provide a sound technical and farm management advisory service to farmers to assist them to obtain from their farm enterprises the highest continuing net farm income".

The strategy of the Farm Advisory Division through the 1960's and 1970's was to abandon ad hoc technical problem solving in favour of a whole farm management

approach to advisory work. Field research and other non advisory tasks were progressively shed by the Farm Advisory Division.

In 1972 the Farm Advisory Division merged with the Horticultural Division to become Advisory Services Division. Since that time the objective of the State Farm Advisory Service has evolved further. ASD's current mission is -

"to contribute to a sustainable increase in net export earnings by improving the range, quality, volume and value of New Zealand's agriculture" (ASD Directorate 1984).

This objective identifies economic growth through future export earnings as a basic goal, and recognises product innovation as a source of export earnings. Result areas are seen as:

- * Agricultural development and productivity
- * Plant health
- * Quality assurance
- * Agricultural policy

The current ASD development strategy involves a whole industry approach to advisory work and this is encompassed in ASD's goals for 1984/5. They are:

- (1) Improve productivity in agriculture.
- (2) Concentrate advisory effort on best export growth opportunities.
- (3) Improve export processing and marketing structures.
- (4) Implement cost-effective quality assurance systems.
- (5) Improve plant health protection systems.
- (6) Develop strategic management.
- (7) Improve manager performance.
- (8) Improve ASD productivity.
- (9) Improve policy advice.

This strategy of a whole industry approach to MAF's work has developed as a result of beyond the farm gate failures of some agricultural product innovations.

In justifying involvement beyond the farm gate the Director General of Agriculture (update number 25 1984) states:

- "We must ask ourselves - could we have more effectively helped emerging industries such as the black currant, boysenberry and dairy goat industries as they struggled to organise themselves beyond the farm gate?"
- "Can we justify our extensive efforts on-farm when we know all could be lost because of failures outside?"

- "While carefully ensuring development on-farm, in the past we have largely ignored the impact of our work in the total process of the marketing system".

2.2.3 The Economic Section of Advisory Services Division

The Economic Section of ASD comprises 15 specialist advisors who function to service the management needs of the division's field advisors.

The role of the Economic Section has changed over time as ASD's objectives and strategies have evolved and changed the needs of field advisors.

In the 1950's many of the division's field advisors lacked professional farm management training and the Economic Section represented the Extension Division's farm management expertise. The Economic Section functioned to put ad hoc problem solving developments into a farm management context, to carry out cost-benefit analyses of community schemes affecting farm development, and to provide staff training in farm management.

From the 1960's when increasing emphasis was placed on a whole farm management approach to advisory work the State Advisory Service appointed only farm

management graduates to field advisory positions. The Economic Section was now involved with evaluating alternative farm management systems as well as ongoing work in cost-benefit analysis and staff farm management training.

The role of the Economic Section has further evolved with ASD's current mission and industry wide advisory strategy.

Ritchie (pers comm 1983) identifies four main areas of concern to the Economic Section of ASD:

- (1) The evaluation and development of improved farm/horticultural management systems.
- (2) Staff training in the area of farm/horticultural management.
- (3) Regional/industry development.
- (4) Policy guidance.

Ritchie (pers comm 1983) also notes the significance of these tasks to ASD's mission and goals and states that the Economic Section of ASD has a responsibility to see that growth in net export revenue from agriculture is profitable from both the farmers and the national viewpoint and that the various alternatives have been studied.

Responsibility for growth in profitable net export revenue relates directly to ASD's goal of concentrating advisory effort on the best export growth opportunities. In an elaboration of this goal the ASD directorate (pers comm 1984) describe a situation where 'Resource limitations will require that advisory effort on new and existing products/production systems will be addressed to those with identifiable impact on market opportunities'. The ASD directorate (pers comm 1984) also state that the division's response to this situation is to 'develop capability to align with other MAF divisions to adopt a 'marketing approach'.

A marketing approach to agricultural production assesses alternatives from the point of view of the products ability to satisfy consumer needs. A market orientated 'whole industry' approach considers both on-farm and off-farm factors in product decisions.

In contrast the production orientated approach to agricultural production that has historically been adopted by MAF, assesses alternatives from the point of view of the resources available for production. A production orientated 'whole industry' approach concentrates on on-farm factors for the product decision, and then considers off-farm factors to decide on how to most profitably sell the product.

MAF's current strategy of a whole industry approach to its work was adopted to reduce new product failure in areas beyond the farm gate.

A market orientated whole industry approach to product innovation attempts to further reduce risk of new product failure by endeavouring to match products with what consumers want.

Currently the Economic Section of ASD does not have the expertise to evaluate product opportunities with a whole-industry consumer orientated approach.

2.3 Chapter Summary and Conclusions

The national development strategy is likely to focus on non-traditional agriculture which involves the development and expansion of new food and fibre products. MAF Advisory Services aim to increase economic growth in agriculture by identifying and promoting new opportunities. The Economic Section of MAF's Advisory Services Division performs economic evaluations so that MAF can concentrate advice on the best export opportunities for economic growth in agriculture.

MAF's response to the development of non traditional agriculture has been to adopt a market orientated industry-wide approach to its work. This approach which involves primary producers, processors, export marketers and foreign consumers and governments, clouds the boundaries of MAF

Advisory Services. Further discussion regarding the role of MAF and the advisory services it should be involved in, is kept until the final chapter.

MAF's approach to the development of non traditional agriculture also means that economic evaluations by the Economic Section of its Advisory Services Division must consider more than just on farm management opportunities.

The following chapter develops an analytical framework for consumer orientated economic evaluations of new product opportunities.

CHAPTER 3

3 A FRAMEWORK FOR ANALYSIS

This chapter develops from the literature an analytical framework for the evaluation of new product opportunities. This framework places investment analysis and product development in a strategic planning context which is shown diagrammatically in figure 3.1.

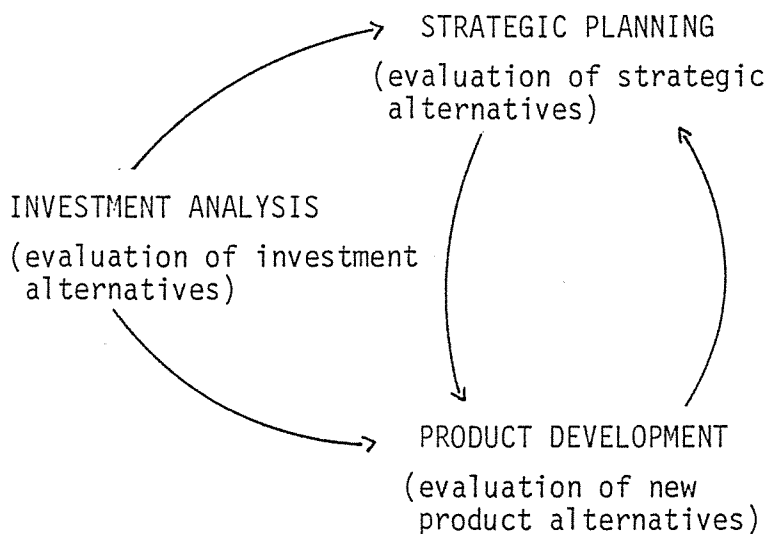


Figure 3.1 Schema showing a simplified version of the analytical framework that is developed.

Strategic planning, which provides the broadest analytical framework, considers product develop as a strategic development alternative and provides decision rules (strategy) that guide the product development process. Product development involves evaluation of new product alternatives to identify those that appear practical and profitable for the developing

firm to consider. The outcome of these evaluations have, in turn, an influence on the strategy of the developing firm. Investment analysis is used to help formulate strategy, and to evaluate the profitability of new product alternatives.

3.1 Method of Investment Appraisal

Investment involves the foregoing of current income in favour of future income. Investment analysis is concerned with determining whether the dollar benefits of future income exceed the dollar cost of current income foregone. As such it is only concerned with future cashflows and does not consider previous or 'sunken' costs.

3.1.1 Investment Criteria

In this thesis, the discounted cashflow criteria of net present value (NPV) and internal rate of return (IRR) are used to assess the net dollar benefits from investment. The application of these criteria involves weighting (discounting) future cashflows from an investment to the present to account for the time value of money. The discount factor is calculated as:

$$\text{Discount factor} = \frac{1}{(1+r)^t}$$

Where: r = discount rate

t = time period

The discount rate represents the opportunity cost of capital and is calculated as the weighted average

cost of debt and equity funds. The net present value criterion involves discounting future cashflows to determine their equivalent current dollar value. These discounted cashflows are then summed to give a net present value. The NPV rule says accept all investment projects with positive NPVs at the discount rate.

The internal rate of return criterion calculates the discount rate that will give a given cashflow a zero net present value. This discount rate, at which the present value of costs equals the present value of benefits, is a relative figure (as opposed to NPV which is an absolute measure) that indicates a maximum finance rate. The IRR rule says accept all investment projects with an IRR greater than the discount rate.

NPV and IRR discounted cashflow investment decision criteria have been selected for investment appraisal because they:

- (i) provide both an absolute and a relative indication of profitability
- (ii) both consider all cashflows
- (iii) both account for the relative timing of cashflows
- (iv) both show the overall relationship between revenues and costs.

3.1.2 Inflation

Inflation, ie a decline in the purchasing power of money as prices increase, affects both investment cashflows and the discount factor. In this study inflation is incorporated in investment appraisals by adjusting costs and revenues. Different rates of inflation are projected for costs and revenues and the discount factor is adjusted using the projected inflation rate for costs. The adjustment is made as follows:

$$\frac{1}{(1+r')} = \frac{1}{(1+r)(1+i)}$$

Where: r = discount rate, ie weighted average cost of capital

i = rate of inflation

r' = discount rate adjusted for inflation

3.1.3 Taxation

When post-tax investment appraisals are done ruling taxation rates and allowances are used and the discount factor is adjusted for taxation after it has been adjusted for inflation. In a post-tax analysis the discount factor becomes:

$$\frac{1}{1+r'(1-t)}$$

Where: r' = discount rate adjusted for inflation

t = rate of tax

3.1.4 Treatment of Risk

Problems arise in cashflow estimation due to uncertainties surrounding future states of nature. Investment appraisals in this thesis deal with risk by providing a sensitivity analysis in which NPVs and IRRs are calculated across a range of optimistic, and pessimistic states of nature. Decision makers can use the resulting payoff matrices to make investment decisions based on criteria that reflect their attitude to risk.

3.1.5 Forecasting Cashflows

Cashflow forecasts in this thesis are based mainly on judgemental (expert opinion), and time series (trend fitting) techniques. Judgemental techniques rely on subjective opinions and require little forecast information for their application. Time series techniques forecast future states of nature on the basis of extrapolated past patterns. These forecasts are generally considered to be quick and cheap although comparatively inaccurate.

3.2 Investment Analysis in a Product Development Context

3.2.1 The Need for New Products

New products are developed because existing products have only limited life.

The product life cycle that describes falling sales as existing products become obsolete also determines the profit that will accrue to the firms that produce them [see figure 3.2 below].

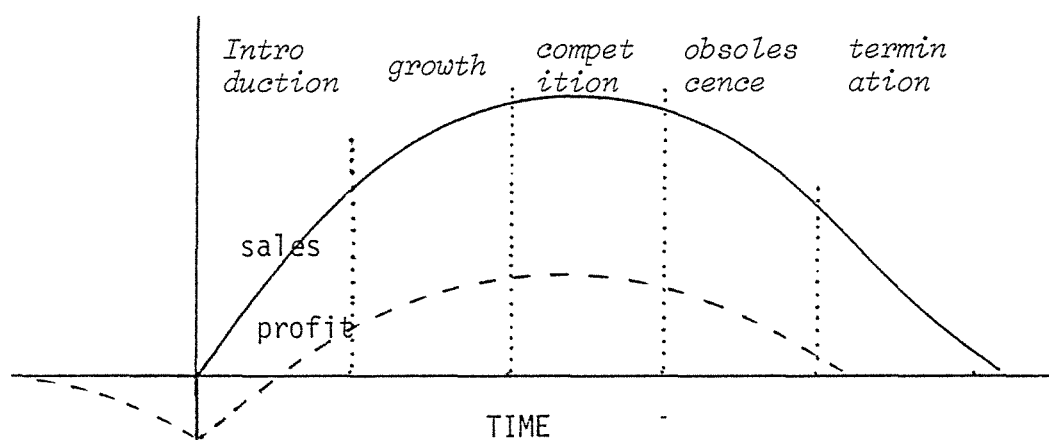


Figure 3.2 Schema showing the classical product life cycle and the decline in profit increases as existing products approach obsolescence.

The classical pattern of profit generation from successful new products shows an initial loss. The cost of product development increases rapidly as new product ideas progress towards commercialisation. These development costs must be met before any revenue from sales is received. Following product launch profit per period increases quickly as development costs are recovered and the product gains acceptance in the marketplace. Profit per period stabilises in the face of increased pressure from competitors and eventually decreases as the

product becomes outdated by new technology or changing tastes and needs.

Companies looking to maintain or increase profit need a strategic commitment to product development so that profit from new products can offset flagging profits from existing products nearing the end of their profitable life.

3.2.2 A Management Model for Product Innovation

Product development is a costly and risky business and only a fraction of the new products launched on the market enjoy financial success. The classical management model of product development that is widely described in the literature is designed to reduce the cost and risk associated with new product development. The model treats the commercialisation of a product idea as a series of decisions that involve repeated screening of promising proposals.

Cost and risk are reduced in the first instance by identifying and selecting only those product ideas deemed practical for commercial development.

Impractical ideas are thus eliminated before substantial capital is expended on their development.

Cost and risk are reduced secondly by progressively collecting more detailed information on which to

forecast the profitability of product ideas that are deemed practical for commercial development. Any practical product idea with forecasted profit that becomes unsatisfactory as more detailed forecast information is collected is eliminated. As the development process proceeds the cost of obtaining additional information increases along with the chances of success for any idea standing such scrutiny.

The structural characteristics of the new product development model documented in the literature can be identified as stages involving concept testing, and physical development and marketing.

Concept testing involves:

- product idea search
- preliminary evaluation of product ideas
- full economic evaluation of product ideas

Physical development and marketing involves:

- development of a physical product
- product test market
- full commercialisation

The model is shown schematically in figure 3.3

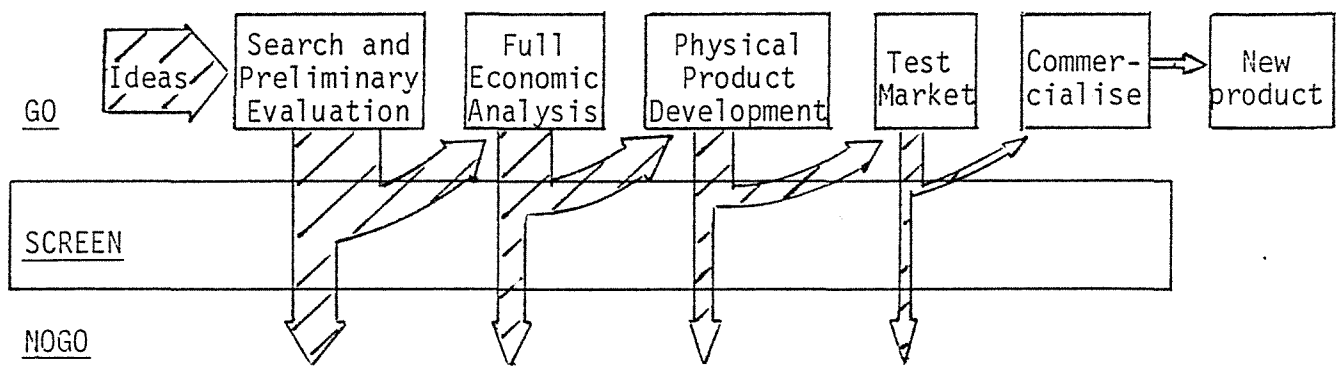


Figure 3.3 Schematic representation of the classical management model of product development.

At each step of the model the number of ideas selected for next step evaluation is reduced (see figure 3.4).

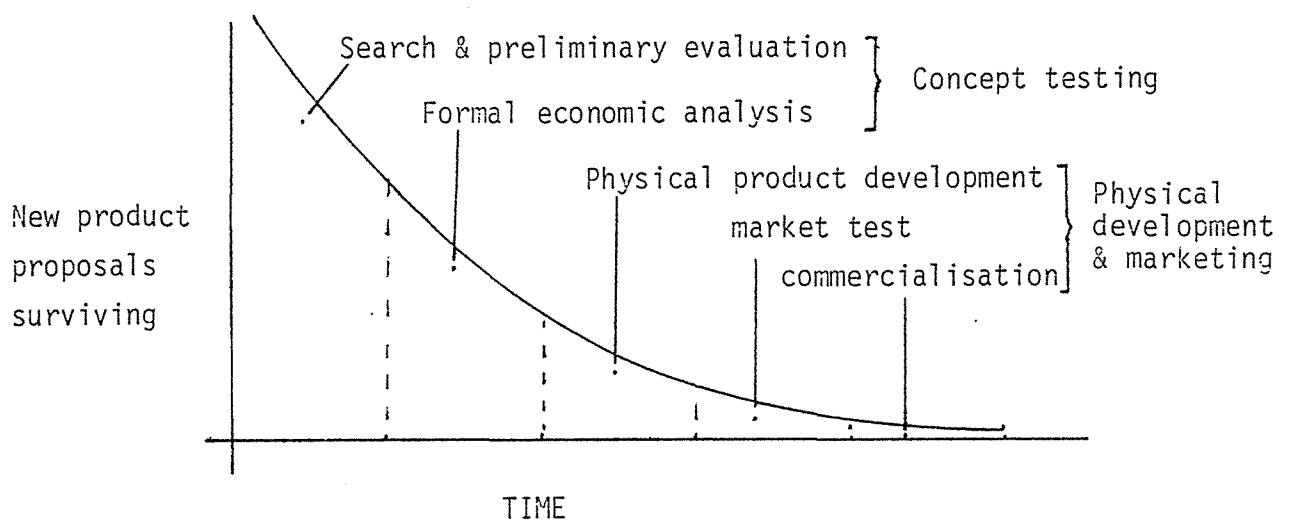


Figure 3.4 The classical pattern of product idea elimination during new product development.

3.2.2.1 Concept Testing

3.2.2.1.1 Product Idea Search

Product idea search involves an active process of finding potentially suitable new product ideas.

Idea generation is essentially a creative process and although strategic development criteria can provide direction for a product idea search, profitable new product ideas can not be produced to order in a planned or controlled manner.

Inspiration is encouraged however by the appointment of product investigation groups/managers who actively seek out new product ideas through such activities as 'brain-storming' sessions, suggestion boxes, and communication with interested parties.

Brain-storming sessions involve meetings where participants are encouraged to voice their ideas for new products in an uninhibited fashion without fear of ridicule. There are no guidelines, rules or criteria

concerning the types of products sought and participants are expected to speak out no matter how far-fetched an idea may seem. Participants can be selected from a variety of management disciplines but typically they involve marketing and research and development personnel.

Suggestion boxes and direct communication with involved parties serve to locate ad hoc ideas for new products as well as prompting thinking about additional new product ideas.

3.2.2.1.2 Preliminary Idea Evaluation

Preliminary evaluation of new product ideas is a rapid low cost process that eliminates weak new product proposals and informally weighs the relative desirability of promising proposals. Suggested new product ideas are screened against selection criteria that specify the type of product that is being sought. These criteria are determined in strategic planning and are used to select those product ideas

that are practical for the developing firm to consider.

3.2.2.1.3 Full Economic Evaluation

Product ideas surviving a preliminary evaluation are subjected to an investment appraisal. This component of new product development encompasses activities involved with assembling, sifting, and analysing relevant information to forecast the profitability of commercialising a new product. Budgeted profit is assessed against target profit criteria to identify alternatives worthy of further development.

3.2.2.2 Physical Development and Marketing

3.2.2.2.1 Physical Product Development

Product ideas surviving a full economic evaluation become the subject of physical product development.

Further elimination of product ideas may occur at this stage depending on the results of research and development efforts. Ideas may be eliminated if no satisfactory physical product can be

developed. Ideas that are successfully developed into physical products are re-assessed economically and elimination may still occur if the revised profit forecast fails to satisfy selection criteria.

3.2.2.2.2 Product Test Market

Physical products that satisfy selection criteria may become the subject of limited or test marketing operation to gauge customer reaction to the product and more accurately assess market demand. Test markets may be carried out in controlled laboratory situations or in restricted geographical locations.

Product ideas may still be dropped at this stage depending on test market results. Ideas may be eliminated if the physical product cannot be made to satisfy the particular need it was designed to meet. Product ideas that are test marketed are again re-assessed economically and elimination may still occur if the revised profit forecast fails to satisfy selection criteria.

3.2.2.2.3 Commercialisation

Physical products that survive test market analysis are finally the centre of full scale production and marketing operations to establish the product in its desired place in a firm's product line.

3.2.3 Investment Analysis and Product Development

Investment analysis and product development techniques are interdependent. The management model for product development is significant to investment appraisal as a framework for analysis. In turn investment appraisal techniques provide the management model for product development with an analytical tool for screening product ideas for profitability.

3.3 Product Development in a Strategic Planning Context

Strategic planning is central to product development. The decision criteria that are used to search and screen new product opportunities describe the strategy of a producer. Strategic planning is the process of establishing strategy.

3.3.1 The Concept of Strategy

Strategy refers to decision rules for resource deployments and is more formally defined by Hofer and Schendel (1978) as:

"the fundamental pattern of resource deployments and environmental interactions that indicates how the organisation will achieve its objectives".

From the point of view of the developer decision criteria for new product development must establish two things - viability and feasibility. Capital investment theory provides the criteria to establish viability (internal rate of return or net present value). Strategy must establish the criteria to estimate feasibility (practicality).

Ansoff (1976) cites Simons perception of decision making as a four step process involving:

- (i) perception (of decision need or opportunity)
- (ii) formulation (of decision alternatives)
- (iii) evaluation (of decision alternatives)
- (iv) choice (of decision alternatives).

For new product decisions capital investment theory provides the basis of evaluation and choice in terms of viability, but assumes that all decision alternatives are perceived, formulated, and feasible.

Strategic planning addresses the whole decision process. In addition to providing a realistic basis of evaluation and choice for potential new product alternatives, strategy plays an important role in:

- (i) perceiving the need for new products
- (ii) directing the search for new opportunities
- (iii) recognising that not all alternatives are known at decision time, and that better opportunities may be just around the corner.

The last point is particularly relevant to strategy.

Ansoff (1976) states:

- "Specification of strategy is forced under conditions of partial ignorance when alternatives cannot be arranged in advance."
- "... 'strategy', where the word means 'rules for decision under partial ignorance'."

3.3.2 Components of Strategy

Strategy identifies common threads that link the business activities of a firm. Product ideas are considered feasible if they enhance common threads.

Ansoff (1976) identifies four components of strategy that enhance perception of a common thread:

- (1) Product-market scope
- (2) Growth vector
- (3) Synergy
- (4) Competitive advantage

Hofer and Schendel (1978) add an additional component:

- (5) Distinctive competence.

3.3.2.1 Product-Market Scope

Product-market scope defines the domain of a firm in terms of its products and markets. Product-market scope is fundamental to a market orientation. A production orientation defines scope in terms of product characteristics or production technology. A market orientation defines scope in terms of the needs that products satisfy.

3.3.2.2 Growth Vector

The growth vector component of strategy shows the planned direction of future interactions of a firm with its external environment.

See figure 3.5.

Product Mission	Present	New
Present	Market penetration	Product development
New	Market development	Diversification

Figure 3.5 Growth vectors expressed in terms of Ansoff's (1976) product-market matrix.

While this matrix recognises the importance of expansion through marketing effort as a means of maintaining or boosting profit, De la Mere (1982) concludes that:

"such endeavours are eventually constrained by the product's commercial life".

The implication is that a firm must eventually consider new product development if it is to survive in the long term.

The product development growth vector in figure 3.5 encompasses replacement products and additions to a firm's present product/market position. This type of development is regarded as expansion within a firm's existing scope and is seen as distinct from diverse new product developments where both markets and products are new and unfamiliar.

Ansoff (1976) describes diversification developments in terms of a product-customer matrix. See figure 3.6.

		New Product	
		Related technology	Unrelated technology
New Mission	Product		
	Customer		
	Same type	Horizontal diversification	
	Firm its own customer	Vertical integration	
	Similar type	1 *	2 *
	New type	3 *	Conglomerate diversification

* (1) Marketing and technology related

* (2) Marketing related

* (3) Technology related

Figure 3.6 Ansoff's (1976) growth vectors in diversification.

Firms engage in diversification development for reasons associated with desired profit levels, the resources available, attitude to risk, and the size of the stakes.

Depending on the type of product development engaged in, firms can be described as defensive, consolidatory, or aggressive.

Firms undertaking replacement development take a defensive stance aimed at maintaining

profits for survival. Those developing additional products for familiar markets assume a consolidatory/aggressive stance aimed at maintaining or increasing profits for survival and growth. Firms developing products for unfamiliar markets take an aggressive stance for the purpose of profit growth.

In general firms first endeavour to reach profit targets by developing products for familiar markets. New products for familiar markets are deemed safer because development is likely to be cheaper, quicker and easier, and new products can be launched from an established position in a known market. Due to the uncertainty involved fewer firms engage in development for unfamiliar markets.

"On the whole firms lead from strength, seeking product opportunities that permit the use or extension of their special technical, production or marketing skills, or the employment of a resource base".

(Pessemier 1966)

3.3.2.3 Synergy

The synergy component of strategy refers to the fit between the various activities of a firm.

Synergy is often described as ' $2 + 2 = 5$ '. The implication being that there is a good fit between two independents if their combination yields more than the sum of their independent yields.

New product developments are said to exhibit synergy if they are more profitable in combination with existing activities than they would be if they were developed in isolation in a stand alone situation.

From a different perspective, new projects with synergy enhance or facilitate more efficient use of existing capabilities and resources.

It is normal however that synergy is sought to increase profit growth rather than to lower costs of existing activities.

The potential for synergy is usually assessed in terms of the strengths and weaknesses of a firm's resources. The implication is that

strength and synergy are closely related. New product opportunities that require strengths similar to those possessed by a firm are likely to offer strong synergy.

Ansoff (1976) cites Staudts description of analysis of strengths and weaknesses as "an audit of the tangible and intangible resources for diversification".

Ansoff (1976) assesses strengths and weaknesses in terms of competence profiles. These profiles constitute a checklist of skills and resources in various functional areas of business (see table 5.6). Strengths and weaknesses are subjectively assessed and may be relative to firms in the same or different product market positions.

Strategic decision criteria related to synergy are likely to be stated in terms of skills and resources that must be utilised or enhanced. New product ideas are assessed against synergy based strategic decision criteria to see if:

- (i) The new opportunity strengthens the existing product/market position.
- (ii) The existing product/market position strengthens the new opportunity.

3.3.2.4 Competitive Advantage

The competitive advantage component of strategy defines a common business thread between the activities of a firm in terms of particular properties of individual product/market positions that impart a strong competitive edge, eg patents, economies of scale, or brand image.

Hofer/Schendel (1978) define competitive advantage as:

"The unique positions an organisation develops vis-à-vis its competitors through its pattern of resource deployments and/or scope decisions".

3.3.2.5 Distinctive Competence

The distinctive competence component of strategy identifies a common business thread in terms of special capabilities peculiar to an individual producer that have been acquired as a result of involvement in a particular product/market position.

De la Mer (1982) refers to distinctive competence as: "What sets a firm apart from its rivals -". De la Mer also asserts that:

"the preservation and possibly the enhancement of this distinctive 'something' is the clue as to how the firm should invest its money". Hofer/Schendel (1978) define distinctive competence as: "...the level and patterns of the organisation's past and present resource and skill deployment that will help it achieve its goals and objectives". They argue that distinctive competence is a strategic consideration insofar as "no actions or goal achievement can take place unless some basic skills are created and resources obtained and deployed in ways that cannot be duplicated easily by others".

3.3.3 Strategy Formulation

Strategy is formulated in a planning process that identifies any profit gap, between target and budget, and evaluates the profitability of strategic alternatives.

The basic approach to strategic planning is illustrated in a simple model (see figure 3.7) that is appropriate to product strategy at the business level.

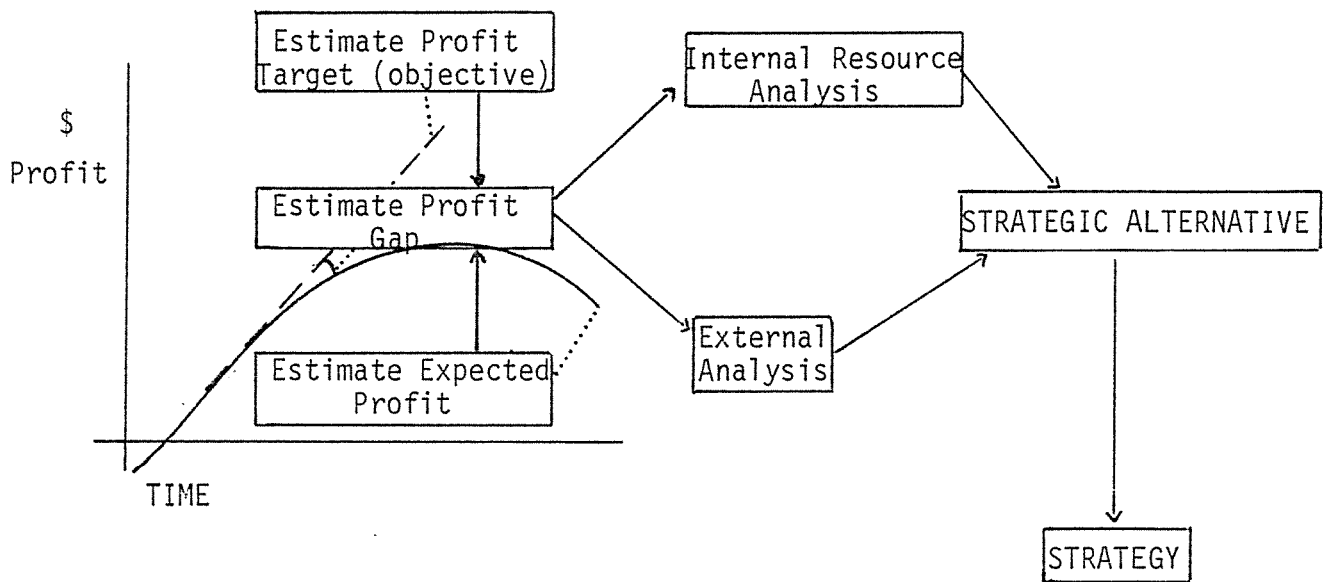


Figure 3.7 Schema showing a basic model of strategic planning

3.3.3.1 Strategic Objectives

Planning involves the conscious direction of resource use to attain defined objectives.

Strategic planning recognises profit as the primary objective of business. However unlike capital investment theory which assumes that maximum profit is the sole objective of business, strategic planning theory recognises a range of additional objectives such as public image, environmental concern, reputation as a good employer, the positioning of business for future moves, or the need for financial and business flexibility.

Argenti (1968) suggests there are three fundamental questions with three unique answers that are needed to establish the primary objective of business.

Question: Under what conditions would a firm not wish to achieve a particular objective?

Required Answer: None.

Question: Why would a firm wish to achieve that particular objective?

Required Answer: In order to survive.

Question: Would the firm fail to survive if it consistently did not achieve a particular objective?

Required Answer: Yes.

Profit is accepted as the primary objective of business because it is the only objective that completely satisfies Argenti's criteria. Secondary objectives of business are seen as constraints that must be considered in strategy formulation. These constraints have a profit limiting effect so that a more accurate description of the strategic objective is 'satisfactory profit'. Ansoff (1976) asserts the satisfactory profit should be considered in

terms of the level of profit, both short and long term, and flexibility as it relates to the ability to react to future opportunities.

In accepting profitability as the objective of business, strategy formulation relies heavily on capital investment theory to estimate the profit gap as the first step in the process. Strategic planning per se is needed only to qualify the target profit objective, and to perceive the need for strategic change.

The profit gap is calculated as the difference between target profit and that anticipated from the current pattern of business. Target profit is defined by the firm's cost of capital, and expected profit is estimated using projected cashflow forecasts. In defending the use of profit forecasts for gap determination De la Mer (1982) argues that despite discrepancies between forecasts and actual outcomes, forecasts represent a disciplined way

"...to map out those conditions which are likely to put the company in jeopardy, and those which could provide great opportunity, so that the company's strategy can be formulated accordingly".

3.3.3.2 Determination of Strategy

A firm's current strategy is defined in terms of common threads between its business activities, ie product/market scope, growth vectors, competitive advantages, distinctive competences, and resource strengths and weaknesses.

Development opportunities within different growth vectors are explored if a profit gap analysis indicates a need for strategic change. An internal analysis examines opportunities within expansion growth vectors (ie market penetration, market development, and product development).

An external appraisal examines development opportunities in the diversification growth vector.

Most firms prefer expansion to diversification because, other things being equal, the potential for synergy is greater, profits are higher (as a result of synergy), development is faster, and risk is lower.

If the profit gap cannot be closed by expansion an external appraisal is undertaken to seek promising diverse opportunities.

This appraisal considers foreign product/market positions and if suitable opportunities exist the scope of the firm may be modified.

If a firm is unable to find opportunities to close a profit gap in either an internal or an external analysis, profit targets (and hence the profit gap) may have to be reviewed downward).

3.3.4 Product Development and Strategic Planning

Strategic planning and product development are inter-dependent. The management model for product development is strategically significant as a means of assessing opportunities in product development growth vectors, hence it helps determine strategy. In turn strategic planning plays a key role in the application of the product development management model by:

1. Prompting active search for new opportunities.
2. Confining and directing active search to a particular product/market position.
3. Providing decision (screening) criteria to evaluate individual opportunities within that particular product/market position.

Decision rules that are significant to product development are likely to include:

- (i) Objectives Criteria - with decision rules relating to: target profit, capital costs, patterns of cash flow, constraining objectives, and business positioning and flexibility for future moves.
- (ii) Synergy Criteria - with decision rules relating to: strengths and weaknesses that new opportunities must enhance, and levels of synergy sought.
- (iii) Competitive Advantage Criteria - with decision rules relating to competitive advantages that new opportunities must enhance/create.
- (iv) Distinctive Competences - with decision rules relating to distinctive competences that new opportunities must enhance/create.

3.5 Summary

The analytical framework that is developed in this chapter recognises investment analysis as a central analytical tool in strategic planning and product development.

Product development is seen as a strategic alternative for developing firms. The decision to engage in product development is made during strategic planning which also provides the decision rules that constrain and guide development to those products that appear practical and profitable.

The analytical framework that is developed here is used in later chapters to evaluate investment opportunities in kiwifruit processing for the Opotiki Fruitgrowers Cooperative. The following chapter backgrounds this evaluation with a review of the New Zealand kiwifruit industry.

CHAPTER 4

4 A REVIEW OF THE NEW ZEALAND KIWIFRUIT INDUSTRY

This chapter backgrounds the economic appraisal of investment opportunities in kiwifruit processing with a review of the New Zealand kiwifruit industry.

4.1 The Fresh Fruit Industry

Commercial development of fresh kiwifruit has been a major success story in contemporary New Zealand primary production. In 1960 kiwifruit was a domestic fruit of little significance. In 1984 kiwifruit is recognised internationally and it is New Zealand's biggest horticultural export earner. The Agricultural Review Committee (1984) estimate that kiwifruit will earn \$100 million f.o.b. in 1984 and the Horticultural Export Development Committee (1982) predict that earnings could potentially exceed \$350 million f.o.b. by 1990.

4.1.1 Fruit Development

From 1959 the common name of *Actinidia chinensis* was changed from Chinese gooseberry to kiwifruit.

Although the name was changed for commercial reasons it was also symbolic of changes in the fruit itself. The small round fruit of *Actinidia chinensis* imported into Wanganui from the Hupoh and Szechuan provinces of China in either 1904 or 1906, bears little resemblance to present day fruit from *Actinidia chinensis*.

Initial development of the modern *Actinidia chinensis* occurred during the 20 years or so after kiwifruit was first imported into New Zealand. During this time nurserymen developed the plant as a domestic ornamental vine that was sold throughout the North Island. Commercially the vine was still the primary consideration at this stage but as a result of the nurserymen's deliberate selection and grafting the fruit of *Actinidia chinensis* was now larger, fleshier, and tastier.

Public familiarity with the fruit of *Actinidia chinensis* came about as a spin off of ornamental vine plantings. This familiarity was the basis of commercial fruit plantings that commenced in the 1930's and expanded through the 1940's and 1950's when the first fruit was exported.

In 1958 the main commercial varieties of kiwifruit, all of which originated from early imports into Wanganui, were identified as Abbott, Allison, Bruno, Hayward, and Monty.

Through the 1960's and 1970's Hayward gained increasing recognition as a superior variety in terms of large size, regular shape, and keeping quality. When the Kiwifruit Marketing Licensing

Authority came into being in 1977 it decreed that only the Hayward variety of kiwifruit was acceptable for export.

The fruit of *Actinidia chinensis* in the 1980's is exclusively Hayward, a large squat and fleshy variety with good keeping qualities that bears no resemblance to the fruit of the parent material imported from China about 80 years ago.

4.1.2 Commercial Development

4.1.2.1 Local Market Development

The first commercial fruit plantings of *Actinidia chinensis* were made in Te Puke in the mid 1930's. These plantings by a few innovative orchardists were prompted by low returns for citrus fruit and relatively good prices for local sales of kiwifruit from non commercial vines.

The commercial significance of kiwifruit on the local market grew appreciably during the early 1940's. Through the war years normal imports of fruit were banned and kiwifruit was able to fill a demand for off season fruit. The production skills acquired in this period proved to be valuable once the war had ended.

Commercial plantings of kiwifruit for local market consumption increased gradually through the late 1940's as a consequence of continued poor returns for citrus fruit. Yerex and Haines (1983) record a 1950 estimate of 30 acres [12 ha] of commercial kiwifruit producing 50 tons of fruit a year.

4.1.2.2 Export Market Development

Kiwifruit growers first turned their attention to export markets in the early 1950's. At this time local market prices had begun to decline as increasing production started to exceed local demand.

Early export endeavours were hampered by the absence of established market channels and foreign consumers lack of familiarity with kiwifruit as a generic product.

The first market channels were comprised of growers and their export and import agents who handled fruit on a commission basis. Attempts to export fruit to specialty shops in Britain and Australia through these channels in the 1950's proved unprofitable and export volumes eventually declined to insignificant levels.

In the late 1950's and early 1960's export agents turned their attention to the USA where the first substantial overseas outlet for kiwifruit was established. Yerex and Haines (1983) attribute initial success in the American market to the efforts of an enthusiastic import agent associated with one of the two New Zealand export agents then dealing in kiwifruit, and the success of the other New Zealand exporter in selling 25 tons of kiwifruit to the firm of Harry and David for promotion to 30,000 Americans as fruit of the month.

In the 1960's kiwifruit was still regarded as a novelty fruit sold mainly through specialty outlets. These outlets offered only limited market opportunities, and total sales were increased largely by geographic expansion into specialty markets in other areas. As the 1960's progressed more outlets for export kiwifruit were developed in specialty markets in the United States, the United Kingdom, Germany, and France. However by 1976 the export price was in danger of slipping as export volumes continued to increase.

Promotion was the key to kiwifruit's eventual elevation to the big commercial league in the late 1970's. It was only through promotion that kiwifruit made the transition from a little known novelty fruit to an in-vogue luxury fruit in the much larger gourmet fruit market segment.

Promotion of kiwifruit was first employed in 1967 when a third export agent entered the kiwifruit business. In a continuation of geographic expansion as a marketing strategy the new exporter sold fruit directly to Scandinavian supermarket chains complete with documentation to familiarise new end users. As owners rather than agents the supermarket chains were active in providing in-store kiwifruit promotion aimed at end use consumers. The success of this new approach was such that it was soon adopted by the other exporters. By the end of the 1960's exporters were experiencing some difficulty securing enough fruit to satisfy demand.

In-store promotions were not enough to lift kiwifruit out of the novelty category. This

change of status did not start to evolve until 1970 when the fledgling New Zealand kiwifruit industry levied both growers and exporters and commenced generic media promotion of kiwifruit in export markets.

Through the 1970's more exporters joined the fray and the industry continued to achieve increasing prices through a continuation of geographic expansion as a market strategy. Export destinations changed significantly. In 1971 North America and Europe were the main markets. By 1975 Japan had emerged as the largest market. In 1980 Europe [mainly Germany] had again ascended as the largest importers of kiwifruit.

Kiwifruit export development has been characterised by the unusual combination of rising volumes coupled with rising prices. In 1970 kiwifruit growers received about \$2.25/tray for their fruit. By the mid 1970's the price had risen to around \$5/tray triggering a rapid and sustained increase in commercial kiwifruit production (see table 4.1 below). In 1970 there were 440 ha planted in kiwifruit. In 1975 there were

1030 ha planted. By 1980 the area had increased to 5300 ha and the price to around \$8/tray.

Table 4.1

Kiwifruit Production Trends

Year	1950	1960	1970	1980
Est. Area (ha)	12	40	440	5300
Prod. (tonnes)	25	400	2120	17965
Export (%)	0	10	32	89

Source: various

NB. 1960 figures approximated from surrounding years.

Historically most kiwifruit production has come from the Bay of Plenty but production from other horticultural regions has become relatively more important as the land area committed to kiwifruit production has increased. In 1977 80% of the New Zealand kiwifruit crop was grown in the Bay of Plenty. By 1982 the Bay of Plenty accounted for only 60% of the total crop.

High fruit prices have also attracted overseas production of kiwifruit. Kernohan and Sale

(1983) estimate that in 1981 there were 7583 ha of kiwifruit planted in New Zealand and 6194 ha planted in other countries. The most significant foreign plantings, in decreasing order, are found in USA, Italy, Japan, and France. More recent news reports suggest that Italy may now have a larger area of kiwifruit than the USA.

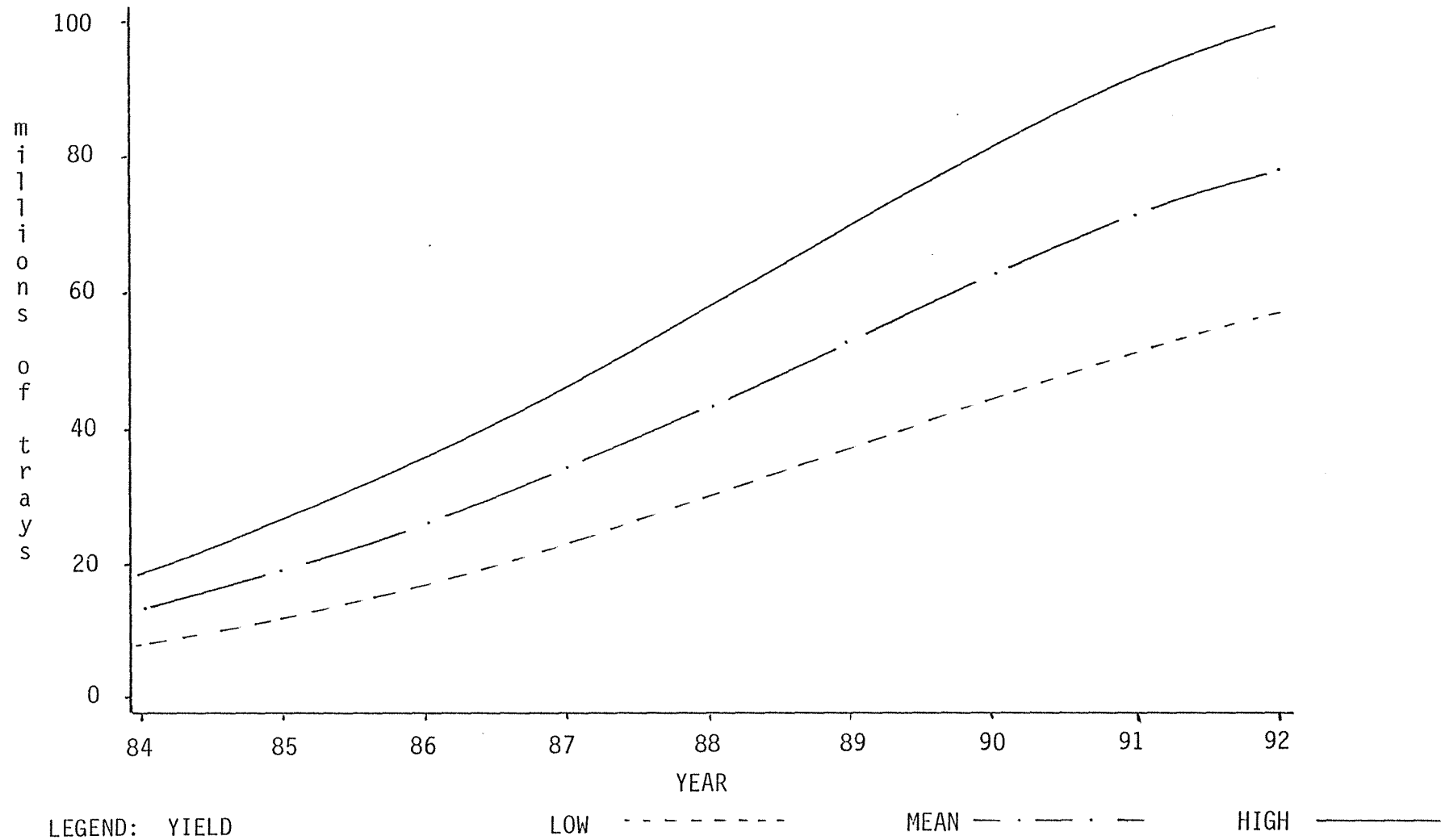
Off-season northern hemisphere production both competes and complements New Zealand production. It complements by providing a continuity of supply and competes by shortening the New Zealand selling season and increasing the total supply of kiwifruit in New Zealand's markets.

The increased New Zealand kiwifruit planting and production of recent years has placed considerable pressures on finance and facilities for orchard and downstream development. To date the demands for increased production inputs, labour, pack-houses, cool storage, transport, advice, research, and market expansion, have been satisfied.

Growth pressures are expected to persist through the 1980's at a level similar to those experienced in the 1970's [see table 4.2]. Kernohan and Sale (1983) estimate that the 1982 area of 9830 ha will grow to reach 19000 ha by 1987. Chapman et al (1982) estimates that until 1990, in real 1981 terms, \$110 million and \$266 million will be required for orchard and packhouse/coolstore development respectively. In noting that the industry appears capable of sustaining the rapid production growth of recent years, Chapman et al (1982) suggest that the real challenge of the 1980's will be marketing the vastly increased quantities of fruit that are anticipated. In 1980 17,965 tonnes of kiwifruit were produced. By 1990 Kernohan and Sale (1983) suggest a realistic production estimate is 296,000 tonnes.

Table 4.2

PROJECTED NZ KIWIFRUIT PRODUCTION



with 30% Bay of Plenty output & 75% other regions output exported.

Source: Kernohan M and P Sale (1983)

The historical success of the kiwifruit industry is largely attributable to the development of export markets. The evidence suggests that successful export marketing of both fresh and processed products will become increasingly vital to the long term prosperity of the kiwifruit industry.

4.1.3 Industry Development

The New Zealand kiwifruit industry is today characterised by competitive private enterprise working within a co-ordinated co-operative framework. This framework was formalised in 1977 by the formation of the New Zealand Kiwifruit Authority, a non trading statutory marketing board representing both grower and exporter interests.

Informal co-operation was first sought between exporters and growers in 1969. Exporters were concerned that promotion was needed to market the expanding kiwifruit crop at favourable prices. Following approaches to growers the Kiwifruit Export Promotion Committee (KEPC) was formed in 1970 as a voluntary grower/exporter promotional body. Funds for the KEPC were provided by a levy on each tray of fruit marketed. Growers paid 60% of the levy and exporters the balance. The initial budget of

\$12,000 was based on a levy of 10 cents/tray. By 1982 the promotional budget had grown to around \$1.6 million.

Continuing pressure of increasing fruit volumes required a planned and controlled approach to all aspects of marketing not just promotion. The need for a more comprehensive industry body became apparent as the 1970's progressed. There were problems with unco-ordinated fruit distribution and the appearance of new exporters cashing in on the benefits of past promotion and in some cases under cutting markets with poor quality fruit.

Comprehensive market planning and control was beyond the scope of a voluntary promotion committee.

In 1972 Tauranga kiwifruit growers set up a steering committee to draft proposals for a statutory kiwifruit marketing body based on the structure of the KEPC. In the intervening years until 1977 when the kiwifruit authority was formed, there was bitter division within the industry. Ideas on what form a statutory kiwifruit organisation should take were subject to much discussion at the political level. The steering committee set up by the Tauranga growers was primarily concerned with ensuring producers retained control of their industry. On

the other hand kiwifruit exporters were concerned that they would be excluded from the industry in favour of a trading producer marketing board with the single desk seller arrangement that characterises the Apple and Pear Marketing Board.

In 1975 exporters formed the New Zealand Kiwifruit Exporters Association (KEA) to co-ordinate the marketing activities of the increased number of exporters, and to act as their voice in industry matters. Exporters received support for their continued presence in the kiwifruit industry from a large body of growers who sought to retain the competitive marketing element that had prevailed as the industry developed.

The situation was resolved in 1977 with the formation of the New Zealand Kiwifruit Marketing Licensing Authority, a non trading marketing board which represents the interests of both growers and exporters. Now known as the New Zealand Kiwifruit Authority (NZKA), the board allows for the continuation of competitive marketing by exporters licensed by the authority.

Allison (1982) identifies the following legislated functions of the NZKA that require a planning framework:

- * Licensing of exporters.
- * Promoting the export of kiwifruit and encouraging marketing outside New Zealand.
- * Establishing co-ordinated export marketing of kiwifruit.
- * Assisting the general development of the kiwifruit industry.
- * Promoting greater efficiency in the kiwifruit industry.

The functions of the New Zealand Kiwifruit Authority are carried out through four committees concerned with market planning, quality assurance, scientific research, and packaging advice.

The Kiwifruit Authority is concerned with export marketing of fresh kiwifruit only. Kiwifruit processors have no official body of their own and remain independent of the fresh fruit industry.

4.2 The Kiwifruit Processing Industry

Commercial processing of kiwifruit has developed as a small independent export industry that utilises low grade fruit unsuitable for fresh export. In 1981/2 processed kiwifruit earned New Zealand over \$7 million export revenue (Hunt 1983).

4.2.1 Processed Kiwifruit Products

Kiwifruit can be processed into a variety of forms although it is a difficult fruit to process and quality is variable.

The current list of processed kiwifruit forms consists of canned/dried/frozen slices, frozen pulp, juice and concentrate, wine, fruit leather, nectar, candied slices, and actinidin (for tenderising meat).

Robertson (1981) states that in any processed kiwifruit product the most important quality attributes after flavour are colour and texture. To date the flavour, colour, and texture of most forms of processed kiwifruit produced have differed appreciably from those of the fresh fruit. In particular kiwifruit loses its attractive green colour when it is subjected to the heat experienced in many types of food processing.

Canned slices, and to a lesser extent frozen pulp, have been the dominant commercial forms of processed kiwifruit. In general the better quality process grade kiwifruit has been used for canning or other end use consumer products like wine, liqueurs, drinks, or dry/frozen/freeze dried slices. The poorer fruit has generally been processed into

frozen pulp/chunks for foreign industrial consumption in jams, bakery products, confectionery, and dairy products (yoghurt, cheese cakes, and ice cream).

The Department of Scientific and Industrial Research and Massey Universities Food Technology Research Centre have been closely involved with the development of processed kiwifruit products and the further development of processed products that retain the colour and flavour of fresh kiwifruit is seen as a major challenge to the industry (Hunt 1983).

4.2.2 Kiwifruit Processors

The kiwifruit processing industry takes its identity from the overall New Zealand fruit processing industry which cans and freezes kiwifruit as part of its product range.

In a 1980 review Sheppard (1980) describes the New Zealand fruit processing industry as being composed of a large number of small scale, relatively inefficient (by international standards) factories. Lack of international competitiveness was attributed to two things:

- (1) Lack of price competitiveness due to small and fluctuating export fruit volumes, protected local industry, and distance from markets.

- (2) A reputation for poor quality, particularly with regard to traditional canned fruit.

Fruit processing in New Zealand is based on utilisation of quality fruit surplus to fresh requirements and, as in the case of kiwifruit, poor quality fruit unsuitable for fresh sale. Volumes for processing tend to be small and variable as a consequence, and processing plants are designed to handle a variety of fruit or vegetable crops to utilise equipment and capital more efficiently.

Despite this flexibility of operation Sheppard (1980) concludes that lack of long production runs combined with relatively high input costs make even the largest New Zealand fruit processor a marginal international competitor. He also notes that trade tariffs and freight charges further reduce the price competitiveness of processed New Zealand fruit in international markets.

Lack of international competitiveness encourages New Zealand fruit processors to produce for domestic consumption. Domestic production is further encouraged by import licensing and tariffs that shield New Zealand production from foreign competition.

In New Zealand domestic production is dominated by the relative giant J Wattie Canneries Ltd.

Despite lack of international competitiveness Sheppard (1980) identifies two groups of New Zealand fruit processors who are involved in export production. One group is the New Zealand Apple and Pear Marketing Board which is a statutory single desk trading producer board that makes apple juice for export. The second group, which includes kiwifruit processors, is involved with the processing of exotic fruit for export.

Sheppard (1980) describes processors of exotic fruit as a progressive group that has got around a lack of international price competitiveness and achieved profitable export sales by producing unique goods well. He identifies the following general features of these processors:

- * They are relatively new firms (less than 20 years old) that develop into new fruit areas and maintain a diverse and variable range of products based on market demand and production synergy, eg canned kiwifruit is usually associated with canning of berryfruits, asparagus, tamarillos, and feijoas.

- * Operations are very small and only involve about 5-10 permanent staff plus up to 50 seasonal workers. Facilities are modern and include pre-final processing storage to counter the production limiting effect of small plant capacity. Tenure varies from co-operatives to small subsidiaries of major companies.
- * Overall profitability is not outstanding and depends on - flexibility of production, maintenance of high quality standards, and government export incentives.
- * Reliance on export sales is high and sales are small by international standards. Fluctuations in export markets can considerably influence viability and market intelligence is very important.

4.2.3 Commercial Processing Development

Exotic fruit processors first commercially produced small quantities of kiwifruit canned slices and frozen pulp in 1972. Lack of fruit has been a major constraint on the development of the kiwifruit processing industry and processed volumes have increased only as more fruit has become available. See table 4.3.

Table 4.3New Zealand Kiwifruit Production (Tonnes)

Year	Total	Export	Local	Processing
1971	2338	765	1573	-
1972	2799	978	1746	75
1973	3709	1359	2250	95
1974	5608	2734	2794	80
1975	4486	2724	1648	114
1976	6651	5136	1364	151
1977	8044	6204	1062	778
1978	9616	7992	324	1300
1979	18650	14919	1205	2526
1980	17965	15285	712	1968

Source: Kernohan M and P Sale (1983)

West Germany has been the major market for both consumer and industrial processed kiwifruit [see table 4.4] and New Zealand domestic sales have been negligible. Hunt (1983) reports that approximately 90% of the current product mix of canned and frozen kiwifruit is marketed in West Germany and Northern Europe. Sheppard (1980) maintains however that EEC countries offer only short/medium term market prospects because of the communities' attitude to outside food supply. He notes that EEC policies are designed to protect local production, and in the longer term as domestic European kiwifruit production increases, there is likely to be increasing protection for EEC processors, Sheppard (1980) sees market development away from the EEC as important to the long term success of New Zealand's exotic fruit processors.

Table 4.4

PROCESSED KIWIFRUIT BY COUNTRY OF DESTINATION:

1977 - 1981 C = Canned F = Frozen

	Tonnes									
	1977		1978		1979		1980		1981	
	C	F	C	F	C	F	C	F	C	F
Germany	60.5	-	290.7	5.0	505.0	246.3	1127.5	327.9	876.0	296.0
Netherlands	7.8	-	46.7	-	66.1	3.9	127.5	16.4	74.7	9.3
Australia	44.3	-	70.7	2.3	22.2	-	51.4	1.6	24.1	96.0
France	27.5	-	22.0	-	18.0	-	-	-	20.2	-
Belgium	2.3	-	74.7	-	22.9	2.4	17.7	9.0	17.3	-
Japan	-	-	11.6	-	75.6	87.2	2.2	66.9	16.0	154.1
Sweden	14.3	-	22.6	-	6.8	-	-	16.3	3.4	24.7
Denmark	1.8	7.4	-	34.8	-	11.8	-	2.5	2.2	-
South Africa	-	-	-	-	-	-	-	-	2.2	-
Italy	-	-	-	-	-	-	2.2	-	-	-
USA	-	-	3.3	-	0.2	29.8	2.2	17.0	0.05	-
United Kingdom	1.4	-	2.5	-	3.1	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-	15.5
Switzerland	2.7	-	-	-	-	-	-	14.1	-	-
Other		0.1	-	-	-	1.9	-	-	-	-
	163.5	7.5	547.2	42.4	720.9	382.3	1331.3	471.8	1040.1	595.5

Source: Department of Statistics.

Commercial development of kiwifruit processing has historically centred on canning because of the seasonal nature of fruit supply and the limited availability of fruit. Kiwifruit offers production synergy to fruit canners because it ripens from early winter onwards when there is a paucity of processing fruit, and it can be kept for 2-3 months without coolstorage. Canning was the central activity of all but one of the eight kiwifruit processors operating in the Bay of Plenty in 1980.

The production synergy between canned kiwifruit and other types of canned fruit has however been offset by processing difficulties and production inefficiencies.

Arguably the relationship between fresh and canned kiwifruit is competitive rather than complementary. Canned kiwifruit however bears little resemblance to fresh kiwifruit. During the canning process kiwifruit loses colour, taste, and texture making it a poor substitute for the fresh product. In addition Chapman et al (1982) note that New Zealand's reputation for quality has been tarnished by past exports of poor quality canned kiwifruit. They also note that despite these difficulties processed kiwifruit has continued to sell overseas even though in some countries (eg Italy) it is more expensive than the fresh fruit.

The large number of competitive small firms in the kiwifruit processing industry has tended to preclude economies of scale and pushed up processing costs, and

increased fruit purchase prices. In 1980 kiwifruit processors were dependent on high kiwifruit and asparagus product prices for their survival. Chapman et al (1982) note that in 1980 a "shake out" of kiwifruit processors occurred that led to the demise of three firms and several other firms pulling out or reducing their kiwifruit involvement. They attribute these changes to the poor 1979 kiwifruit season and the resulting high fruit prices that processors had to pay in order to fill forward contracts at previously negotiated prices. In 1982 there were 11 processors canning or freezing kiwifruit. By 1984 the number had further reduced to nine with Mount Processors, Kendon Industries, and grower canneries dominating the scene.

Future profitability of kiwifruit processing will depend on improved market planning and increased product development. Problems associated with lack of fruit have diminished as the national kiwifruit crop has expanded [see table 4.5]. However as overseas production of kiwifruit increases kiwifruit will become less exotic and New Zealand processors will face competition from more favourably priced products. Sheppard (1980) suggests that processed exotic fruits will have a probable market/product life cycle of about 10 years before new exotic fruits are required in commercial quantities.

Table 4.5

ESTIMATED NATIONAL KIWIFRUIT PRODUCTION AVAILABLE FOR PROCESSING/HOME MARKET
(tonnes)

	1984	1985	1986	1987	1988	1989	1990	1991	1992
80% Export Output									
High	17,400	24,900	33,400	43,600	54,900	66,000	77,300	87,000	93,600
Medium	12,200	17,500	24,100	32,100	41,300	50,000	59,200	67,200	73,400
Low	7,200	10,600	15,400	21,300	28,100	34,900	41,900	48,200	53,700
75% Export Output									
High	21,700	31,000	42,000	54,600	68,800	82,300	96,500	108,600	117,100
Medium	15,200	21,800	30,100	40,000	51,500	62,500	74,100	83,900	91,800
Low	8,900	13,300	19,100	26,600	35,100	43,600	52,400	60,300	67,100
80% Export B.O.P. 75% Export Rest of New Zealand									
High	18,500	26,700	36,400	47,800	60,500	72,700	85,700	96,700	104,400
Medium	12,900	18,700	26,000	34,900	45,200	55,100	65,700	74,600	81,900
Low	7,500	11,400	16,400	23,000	30,700	38,400	46,400	53,600	59,800

Source: Kernohan M and P Sale (1983)

While fruit was in short supply market planning was difficult and risky. The uncertainty surrounding future fruit supply has led to what Chapman et al (1982) describe as an erratic ad hoc trading pattern characterised by 'one-off' sales and inconsistent supply. They also question the marketing abilities of the processors and note a considerable reliance on agents performing marketing functions.

In 1984 canned slices and frozen pulp still account for most processed kiwifruit although some commercial product development has occurred. The most notable new commercial product to emerge on any scale is kiwifruit wine. In 1982 five wineries were making kiwifruit wine mainly for domestic consumption. In 1984 the number had grown to eight with one firm recording exports to Japan. Other recently developed commercial kiwifruit products include fruit juice/drink and sliced kiwifruit in quick frozen and freeze dried forms.

4.2.4 Processing Industry Development

The kiwifruit processing industry lacks the organisation of its more mature fresh fruit counterpart, and co-ordination and co-operation between processors has been minimal. However like the fresh kiwifruit industry there are signs that organisation is evolving as the processing industry expands.

Most kiwifruit processors are members of an exotic fruit processors committee formed in 1980 and now chaired by the Executive Director of The New Zealand Kiwifruit Authority. This committee meets to discuss the availability of processing fruit, prices to growers, general market prospects, and quality control aspects.

Chapman et al (1982) note increasing co-operation between committee members as the industry has grown and Hunt (1983) reports that they have agreed to form a Kiwifruit Processors' Council to co-ordinate marketing and distribution and, if necessary, set quality standards. Hunt (1983) identifies major challenges which the industry is addressing as:

- * Co-ordination and control of market distribution.
- * Research into market diversification.
- * Development of products that retain kiwifruit flavour and colour.
- * Preservation of market access and negotiation of lower rates of tariff duties in various markets.

4.3 Summary

Fresh kiwifruit is the major new product success story of contemporary New Zealand agriculture. Kiwifruit processing has developed as an independent industry based on low quality

fruit unsuitable for fresh export. Volumes of process grade kiwifruit are increasing rapidly pro-rata with expansion of fresh kiwifruit production. There is concern that demand for existing processed kiwifruit products will be insufficient to absorb the anticipated increases in process grade fruit and product development is perceived as essential if returns for low grade kiwifruit are to be maintained.

CHAPTER 5

5 A STRATEGIC EVALUATION OF THE DEVELOPING FIRM

This chapter describes the developing firm (Opotiki Fruitgrowers Co-operative), and outlines its strategy for development.

5.1 Characteristics of the Developing Firm

Opotiki Fruitgrowers Co-operative (OFC) is made up of kiwifruit growers who formed a co-operative to provide fruit handling facilities for their fresh export kiwifruit.

Characteristics of the OFC can be identified and described in terms of the general features of co-operative firms.

5.1.1 General Features of Co-operative Firms

"A co-operative is an association of persons, usually of limited means, who have voluntarily joined together to achieve a common economic end through the formation of a democratically-controlled business organisation, making equitable contributions to the capital required and accepting a fair share of the risks and benefits of the undertaking."

Ward (in Beattie 1983)

Four features distinguish co-operatives from other types of business organisation. They are:

- (i) A 'service at cost' objective .
- (ii) A subordinate role of capital.
- (iii) Open membership.
- (iv) Democratic control.

5.1.2 A Service at Cost Objective

The motivation of co-operatives is fundamentally different to profit motivated firms. The principle objective of co-operatives is to provide a service at cost to members. The principle objective of profit motivated firms is to provide a return on capital invested. The benefits of co-operative membership are related to the level of patronage. The benefits of profit motivated investment relate to the level of capital invested.

The apparent lack of profit motive implicit in a 'service at cost' objective is reconciled by the fact that the formation of a co-operative is a vertical integration move within a market channel. 'Service at cost' at one level in the channel means that co-operative members' profits at another level in the channel will be increased. Co-operatives strive to lower the cost of their services to members, through efficiency of operation or the use of any market power they possess, to increase the profitability of members' related activities.

5.1.3 Subordinate Role of Capital

The role of capital in a co-operative is subordinated by a 'service at cost' objective. Co-operative equity capital is regarded as an advance payment for future services, not an investment for profit. Equity shares in co-operatives can usually only be redeemed at par and any dividends, which are minimised, are perceived as interest payments rather than profit from capital investment. Louwes (in Schroder 1982) describes co-operatives in terms of an 'association of people' rather than an 'association of capital'.

Despite the subordinated role of capital and lack of profit motive co-operatives still have to make capital investment decisions to be able to provide members with services at cost. Shroder (1982) asserts that investment is a decision to defer current consumption and as such co-operatives should assess investments using the same discounted cash flow criteria used by profit motivated firms.

Investments by co-operatives are usually characterised by a high level of debt funding and interest payments on debt can account for a significant proportion of working capital requirements. This situation reflects both the limited means of shareholders and their

general reluctance to provide equity finance for investments where their personal financial risk increases, benefits are tied to patronage, and shares can usually only be redeemed at par.

5.1.4 Open Membership

The principle of open membership embraced by co-operatives requires that no-one be excluded from membership on the basis of personal prejudice. Membership may be restricted however by objective criteria designed to preserve the economic well-being of the co-operative.

5.1.5 Democratic Control

A democratic control tenet requires that control of a co-operative stays with co-operative members and that each member receives only one vote regardless of shareholding. To facilitate management decision making an executive committee or board of directors is usually elected from and by co-operative members on a one man one vote basis.

The co-operative principle of democratic control can pose management problems related to control and direction of business activities. In a co-operative there are three groups with an

interest in management control - ordinary shareholders with democratic control over policy and strategy, their elected representatives who control and direct the affairs of the co-operative, and paid employees who implement management decisions and control the day to day running of the co-operative. Problems occur when the boundaries of control and responsibility are poorly defined.

In co-operative organisations direction and control may be poor as a result of director inadequacies or understanding. Co-operative directors tend to be elected on their ability to represent shareholders' interests rather than any business skills they may possess. Understaffing caused by limited finance can lead to shareholder involvement in the day to day activities of the co-operative.

5.2 The Opotiki Fruitgrowers Co-operative

In keeping with Ward's definition of a co-operative, OFC is an association formed by kiwifruit growers whose means were limited by the financial demands of orchard development. These kiwifruit growers voluntarily joined together to achieve a common economic end through the

formation of a democratically controlled business organisation. They made equitable contributions to the capital required and accepted a fair share of the risks and benefits of the undertaking.

5.2.1 OFC Service at Cost Objectives

The principle objective of OFC is to provide its kiwifruit grower members with fruit handling services for their export fresh kiwifruit at the lowest possible cost.

OFC was formed in 1977 to overcome a lack of post harvest facilities for a rapidly expanding kiwifruit crop in an area geographically isolated from other kiwifruit growing locations. It was formed from an existing local fruit growers co-operative that was established in 1973 to market citrus fruit juice. Under the new articles of association the marketing function was dropped in favour of a fruit handling function. Fruit handling remains the principle function of the OFC and packhouse and coolstore facilities have been expanded as members kiwifruit production has increased.

Table 5.1

OPOTIKI FRUITGROWERS CO-OPERATIVE - PHYSICAL ASSET SUMMARY

Year		1978	1979	1980	1981	1982	1983	1984
	<u>Units</u>							
1 <u>BUILDINGS</u>								
(a) Cool storage	m ²	307	307	307	307	617	617	1151
(b) Pre cool	m ²					249	249	249
(c) High humidity	m ²					205	205	205
(d) Refrigeration rooms	m ²					84	84	104
(e) Total cool stores	m ²	307	307	307	307	1155	1155	1709
(f) Packing	m ²	550	550	550	550	550	550	2174
(g) Sep. Admin/ Staff	m ²					70	70	190
(h) Total area	m ²	857	857	857	857	1775	1775	4073
2 <u>PLANT & VEHICLES</u>								
(a) Graders (4 lane)		1	1	1	1	1	1	2
(b) Forklifts		1	1	2	2	2	2	2
(c) Fleet vehicles						1	1	1
(d) Refrigeration units		1	1	1	1	2	2	2
(e) Bins (approx)		250	250	250	1000	1500	2000	2000
(f) Pallet trolleys		1	1	1	1	2	2	2
(g) Rollers and stands		1	1	1	1	1	1	1
(h) Bin tipper						1	1	2
(i) Compressor						1	1	1
(j) Stacking jigs						1	1	1
(k) Controlled Atms Tent							1	1
(l) Tray makers						1	1	1

SOURCE: Analysed from annual accounts and building plans

The limited quantities of fresh fruit rejected for export have also been handled by OFC. The majority of this fruit has been sold directly to fruit processors although some of the better quality fruit has been sold on the local market through the auction system.

OFC's interest in expanding its function to include a fruit processing service stems from:

- (i) A perception that anticipated fruit volume increases will be accompanied by a large decline in returns for low grade kiwifruit sold to processors or the local market.
- (ii) A desire to utilise existing co-operative resources more efficiently. Due to the seasonal nature of kiwifruit production extensive packhouse and coolstore facilities are required but only for short periods each year.
- (iii) A desire to provide additional opportunities for permanent employment.

In terms of a co-operative framework OFC is seeking involvement in kiwifruit processing to provide an additional service to members so that returns at the orchard level will be further increased. The altruistic desire to provide employment is a secondary consideration albeit an important one.

5.2.2 OFC and the Subordinate Role of Capital

The role of capital in OFC is characteristically subordinated by the co-operative structure.

A financial summary of OFC, see table 5.2, shows a high level of debt funding, low interest cover, and interest on debt accounting for a significant proportion of working capital.

Table 5.2

OPOTIKI FRUITGROWERS CO-OPERATIVE - FINANCIAL SUMMARY

Year		1978	1979	1980	1981	1982	1983
	<u>Unit</u>						
1	<u>CASH FLOW</u>						
(a)	Revenue	\$	91,123	99,801	167,134	230,243	524,141
(b)	Expenses:						
-	Production	\$	68,556	77,300	141,752	174,876	364,511
-	Interest	\$	10,483	10,467	15,255	52,823	64,983
-	Depreciation	\$	9,571	10,235	9,858	45,292	63,819
(c)	Net Cash Flow	\$	12,511	1,203	10,125	2,544	94,829
(d)	Accounting Profit	\$	2,082	1,796	267	-42,747	30,828
(e)	Interest Cover	\$	1.24	1.17	1.02	0.19	1.47
2	<u>CAPITAL SUMMARY</u>						
(a)	Working Capital	\$	8,373	29,075	73,064	24,534	187,409
(b)	Fixed Assets	\$	177,600	174,070	186,289	773,029	782,693
(c)	Total Funds	\$	185,973	203,085	259,353	797,563	970,102
(d)	Working Capital/Total Funds	%	5	14	28	3	19
(e)	Interest/Working Capital	%	125	36	21	215	35
3	<u>FINANCIAL SUMMARY</u>						
(a)	Paid Capital	\$	74,110	81,336	127,647	232,726	280,853
(b)	Reserves	\$	169	12,584	26,908	10,569	81,827
(c)	Borrowings	\$	111,694	109,165	104,798	554,268	607,422
(d)	Total Finance	\$	185,973	203,085	259,353	797,563	970,122
(e)	Debt/Equity		60/40	54/46	40/60	69/31	63/37
(f)	% Paid Capital	%	40	40	50	30	29
(g)	% Reserves	%	0	6	10	1	8

SOURCE: Analysed from annual accounts

Equity funding for OFC fruit handling facilities has come mainly from share issues and development levies. Debt funding has come largely from the Rural Banking and Finance Corporation (RBFC) with working capital and some term capital coming from OFC's trading bank.

5.2.2.1 Equity Funding

- (i) Share Capital - In keeping with the co-operative principle of allocating costs and benefits to members pro-rata with patronage, initial share capital was based on two \$1 shares for each female kiwifruit vine a member registered with the co-operative. These shares are known as 'basic' shares and were issued and called at the time a member planted his vines. Basic share capital from the 35 original members of OFC provided the finance to purchase their property at Stoney Creek Road and start site development for the 1978 harvest.

In 1982 packhouse and coolstore facilities were increased substantially. To provide equity capital for this development membership was re-opened

and a further share issue was made. Membership increased from 35 to 55 and then 72, and the number of \$1 shares/vine was increased from two to six. Every member was now required to hold two fully paid basic shares per planted vine plus four additional ordinary shares/vine. Additional shares were called to 25 cents/share as a deposit with the balance to be paid as a levy of 10 cents per tray of fruit packed until fully paid. In addition the new issue attracted a premium of \$1/vine.

- (ii) Reserve Capital - Reserves provided only a minor source of equity funds prior to 1983. Until this time OFC services to members were costed on a break even basis with no allowance for an operating surplus or retained earnings. Sizeable reserves came from depreciation, development levies, and share premiums, but these were offset by a large operating deficit in 1982 when hail damage drastically reduced fruit throughput. Since 1983 OFC

services have included an allowance for an operating surplus and this surplus was retained in 1983 to offset the previous season's operating loss. Reserves now provide a significant part of equity capital and the major source of these funds is a roll-over development levy of 20 cents/tray of fruit packed. This levy has been charged since 1981 and strictly speaking it is loan money that is repaid (rolled-over) every five years. As with most co-operatives, shares in OFC can only be redeemed at par which means that retained earnings cannot be recovered through share appreciation. The advantage of a roll-over development levy is that it provides a reserve similar to retained earnings but allows members to recover their contributions.

5.2.2.2 Debt Funding

OFC has characteristically endeavoured to finance capital projects using the maximum amount of debt finance it can. To date this

has come from the RBFC whose rural industry policy allows them to lend up to two-thirds of the cost of site purchase and development. OFC has borrowed up to this margin on three separate occasions.

In 1978 they borrowed \$111,695 to extend their buildings. Of this \$53,040 was in the form of an export suspensory loan that converts to a grant if OFC shareholders exports 100,000 trays of kiwifruit per year from 1981 to 1985 inclusive. The balance of this loan is on a table mortgage basis over 10 years from November 1979 with interest currently at 11% per annum.

In 1982 OFC uplifted another Rural Bank loan of \$494,000 to provide substantial additional coolstorage, a new computerised kiwifruit grading machine, a traymaking machine, and additional working capital. This loan is also on a table mortgage basis over 10 years from February 1984 with interest at 11% per annum.

In 1984 OFC uplifted a third RBFC loan for \$583,000 to provide a substantially enlarged packhouse building, an additional computerised kiwifruit grader, and one more coolstore. This loan is also on a 10 year table mortgage basis with interest at 11% per annum.

All three RBFC loans are secured by way of a first mortgage over land and buildings together with a first debenture over the fixed and floating assets of the company. In addition a condition of the 1982 RBFC loan was that a further issue of 'B' class shares was made to members pro-rata with existing shareholding. These shares provide additional security to the RBFC by bypassing the limited liability nature of OFC and requiring personal indemnity from members. Except in the case of the co-operative defaulting on its loan repayments 'B' shares do not represent a source of uncalled capital for OFC.

OFC's debt raising ability is assisted by its requirement that members' fruit proceeds are paid out through the co-operative. This pre-empts problems associated with collecting members' contributions to equity capital or debt servicing.

Future expansions of OFC's services are likely to show a continued preference for a high level of gearing using the maximum available RBFC finance.

It is also possible that OFC may qualify for concessional finance under the government's regional development programme which classes Opotiki as a priority region. Under this programme firms investing in horticultural processing in priority regions qualify for special assistance that involves half the cost of preliminary investigations to a maximum of \$15,000, and suspensory or concessional loans to a maximum of \$220,000 based on 12.5% of the capital cost of the project.

5.2.3 OFC and the Principle of Open Membership

Membership to OFC is controlled by the amount of authorised share capital. Initial OFC membership involved 35 members and 200,000 ordinary \$1 shares. Prior to the 1982 capital expansion authorised capital was increased to 600,000 ordinary \$1 shares and membership increased to 72. Membership closed at this level and has since fallen to 69 with the withdrawal of three members. There is no 'dry' shareholding and all members are actively involved in kiwifruit production.

OFC handles about half of the kiwifruit grown in Opotiki but does not intend re-opening membership unless the number of vines grown by members falls below 100,000. In accepting a person's shareholding OFC undertakes to provide the necessary facilities to handle and store all the kiwifruit produced by that person. OFC is currently expanding to cater for the considerable production increases from existing members (see table 5.3) and there are no perceived advantages in increasing membership.

Table 5.3

OPOTIKI FRUITGROWERS CO-OPERATIVE

REALISTIC FORECAST OF MINIMUM COOLSTORE/PACKHOUSE FACILITIES*

	Units	1985	1986	1987	1988	1989	1990
1 <u>FRUIT THROUGHPUT</u>	Trays	575,000	825,000	1000,000	1200,000	1500,000	1700,000
2 <u>BUILDINGS</u>							
(a) Coolstores:							
-Precool	m ²	249	332	415	498	664	747
-Cool	m ²	1,343	1,927	2,336	2,804	3,504	3,972
-High Humidity	m ²	205	205	234	281	351	398
-Refrig.	m ²	104	125	125	125	150	150
TOTAL	m ²	1,901	2,614	3,135	3,733	4,719	5,317
(b) Packhouse	m ²	2,174	2,174	2,174	2,750	3,300	3,850
(c) Admin/Staff	m ²	190	190	190	190	190	190
(d) Total Buildings	m ²	4,265	4,978	5,499	6,673	8,209	9,357
3 <u>PLANT</u>							
(a) Graders (4 lane equiv.)		3	4	4	5	6	7
(b) Forklifts		2	2	2	3	3	4
(c) Bins		3,833	5,500	6,662	8,000	10,000	11,333
(d) Pallet Trolleys		3	4	4	5	6	7
(e) Tray Makers		1	1	1	1	1	1
(f) Vehicles		1	1	1	1	1	1
(g) Bin Tipplers		3	4	4	5	6	7
(h) Refrigeration Units		2	3	3	3	3	3
(i) Stacking Jigs		1	1	1	1	1	1
(j) Rollers & Stands		1	1	1	1	1	1
(k) Controlled Atms Tent		1	1	1	1	1	1

* Based on the following assumptions:

30 day packing season, 1½ shifts/day, 1½ days packing reserve, 750 trays/hr packed per 4 lane grader equivalent, 45 people/grader/shift, area/grader = 550 m², coolstorage capacity = 214 trays/m², coolstorage provided for 50% of throughput, precooling/tray takes 3 hrs, precooling capacity = 2436 trays/unit, precoolers occupy 83 m²/unit, average quantities of fruit supplied by shareholders, 1 forklift per 2 grading tables, bin capacity 40% of throughput, 1 pallet trolley per grading table, 1 bin tipper per grading table, 1 stacking jig per 2 grading tables, other plant as per status quo tray maker capacity - 5000/day.

5.2.4 OFC and the Principle of Democratic Control

OFC shareholders retain ultimate control of their co-operative through their voting powers. Individual members are however distanced from decision making by the existence of a board of member directors and paid management.

5.2.4.1 Shareholders Control

Ordinary OFC shareholders direct policy and strategy through democratic voting at general shareholder meetings. OFC voting rights have however been modified to reflect shareholding. Members with less than 200 shares have no vote, members with 200 - 2499 shares have one vote, members with 2500 - 4999 shares have two votes, and members with more than 5000 shares have three votes.

5.2.4.2 Director Control

OFC operates through a board of directors who are elected from and by ordinary shareholders to direct the affairs of the company in the best interests of all shareholders. Currently there are six ordinary directors plus two additional directors co-opted to assist with development and management planning. All

current directors are shareholders although the articles of association, which provide for a range of five to eight directors, do not require that directors be shareholders.

In addition to normal monthly meetings OFC directors also operate three sub-committees concerned with diversification, development, and internal planning. The diversification sub-committee comprises the deputy chairman and the OFC manager and is responsible for the evaluation of kiwifruit processing alternatives.

5.2.4.3 Management Control

A paid manager has been responsible for the control of OFC's fruit handling operations and development since mid 1981. Prior to this directors assumed this responsibility.

OFC's first and current manager has extensive fruit handling experience gained in both Great Britain and the United States of America. This previous experience, which spanned 14 years from 1967, involved an initial three year period as packhouse and orchard foreman on a 60 ha UK orchard. The balance of the time was spent in the USA,

mainly on a 400 ha orchard as orchard foreman and then orchard and packing manager with control over 350 people. This position required completion of university courses on people and orchard management. The last three years of OFC's manager's time in the USA was spent as coolstore manager with a large supermarket chain where he was responsible for quality and dispatch of stored fruit.

In addition to a manager OFC also employs three other permanent staff. These involve an office administrator and two factory staff who operate the coolstores, make trays, and carry out general maintenance.

As OFC expands the number of permanent employees is also expected to increase. For the 1985 season 12 extra employees will be engaged. These will include an accountant, an assistant manager, and 10 extra factory staff who will provide the basis of fruit handling expertise at factory level in OFC's expanding operations. It is anticipated that office staff will have capacity for involvement in any future processing activities, but that factory staff will be fully occupied in

fruit handling operations. Wells (pers com) estimates that a fruit throughput of two million trays, possible by 1990, will require a permanent labour force of 35 to 40 people.

OFC has a high and growing requirement for casual or seasonal labour during the five week packing season. Forty-five people are required per shift to operate each four lane grading table. This number is made up of one forklift driver; one bin dumper; five graders; eight people servicing machines; 20 people to check, adjust, enclose promotional material, lid, stamp, and stack trays of packed fruit; two people to stack pallets; one tally clerk; and one quality controller.

So far the local community has met the demand for casual labour. In the 1984 season 200 - 220 people were employed casually in 1½ eight hour shifts/day for six days a week over the five week packing season. Wells (pers com) feels that the supply of available casual labour is just about exhausted at the 1984 level. This suggests that future fruit volumes will require that the hours per

shift are increased and/or itinerant labour from nearby Whakatane is brought in. The activities carried out by paid management can be described in terms of seasonal and daily routines.

- (i) Seasonal Routine - OFC's kiwifruit packing operations are completed in a five week harvest period from early May. In January each year the co-operative asks members for an estimate of their crop for the coming season. These estimates which are confirmed nearer harvest provide the basis for a packing schedule. The packing schedule is compiled on the basis that each member will have one-fifth of his crop packed during each of the five weeks of the season. This ensures that benefits are equitably received pro-rata with total patronage.

Shareholders also have the option of supplying additional fruit for storage in the high humidity coolstore and packing at a later date. Fruit supplied under this arrangement is

not guaranteed by the co-operative and is at the shareholders' risk. However shareholders exercising the option of storing unpacked fruit perceive reduced risk compared with leaving fruit on the vine. From the co-operative's point of view stored unpacked fruit provides them with a packing reserve for days when bad weather interrupts scheduled picking.

OFC provides members with bins to pick their fruit into and organises the transport of empty and full bins between the co-operative and members' properties.

Co-operative members harvest their fruit in two picks according to quality.

Priority goes to export fruit and in the first pick small fruit that is obviously unsuitable for export is left on the vine. This fruit is picked at a later date and sent directly to processors through OFC. Other reject fruit is picked up during grading at the packhouse. About 3% of fruit rejected for fresh export at the packhouse is small

or damaged and sent directly to processors in Hastings or Mount Maunganui. The remaining 97% is bulked back into bins and kept in coldstorage until the end of the export packing season when it is graded into three classes according to size.

OFC handles the sale of all kiwifruit rejected for fresh export on a pool basis. The quantity of reject fruit from each supplier is determined as the difference between the quantity of fruit supplied and the quantity packed for export. Reject fruit from different suppliers is bulked together and payments from the sale of reject fruit are made on the basis of the quantity supplied by each grower.

During the packing season the coolstores are fully utilised but they progressively empty out once packing is completed and are empty of fruit from about the end of October. Once packed fruit enters the coolstore it becomes the responsibility

of each shareholders' elected export agent. Export agents organise distribution of the fruit and pay for the coolstorage prior to distribution. Turnover of fruit is such that OFC budgets on providing coolstorage capacity for half the anticipated total fruit throughput for the season.

Coolstores remain empty from about the end of October until December/January when they start to fill up with empty trays that are put together by the co-operative for the coming season's crop.

- (ii) Daily Operational Routine - Binned fruit arriving at the co-operative premises is identified to a shareholder by chalk markings applied by the member before the fruit leaves his orchard. The member also provides the truck driver delivering his fruit with an invoice stating how much fruit he has supplied to the truck. When the truck reaches the co-operative the fruit on board is checked against these invoices

to ensure that there are no discrepancies. Cards are then attached to the bins that indicate the grower's name, the number of bins in the pick, which machine the fruit is to be packed on, and when the fruit is packed. This card, which stays on the bin until it is packed, provides identification and an administrative record of packing activities.

Once fruit is identified back to a grower it is offloaded from the truck and packing commences. Incoming fruit enters the grading table via an automatic dumping machine that also determines the amount of fruit in each bin by weighing each bin before and after it is emptied.

Dumped fruit first passes over a conveyor belt where it is physically checked for size and physical fault. Wells (pers com) records that on average 15% of the fruit passing over the grading tables is rejected for fresh export. Most of these rejects are picked up during the initial physical check.

Fruit surviving the initial physical check pass onto the grading table which sorts fruit for packing according to weight. OFC operate two computerised automatic four-lane weight/size grading machines that weigh each individual fruit and then, on the basis of weight and using a system of magnets, each individual fruit is conveyed and discharged into trays with fruit of similar weight and size.

Fruit exiting the grading table in trays is adjusted and subjected to final quality control before promotional material from the appropriate export agent is added, and trays are closed and labelled to identify the grower and the number of fruit enclosed. Closed trays are then stacked on pallets with fruit of the same size that are being handled by the same export agent.

Full pallets are strapped and labelled to indicate their contents and then placed into a pre-cooler where chilled air is passed over the fruit to rapidly cool it down to a skin surface temperature of one degree celsius. Pre-cooling takes about six hours and cooled fruit is then removed and stacked in coolstorage, according to fruit size and export agent, where it is kept at zero degree celsius until it is removed for export.

On a daily basis OFC administration is responsible for liaising with export agents and recording and accounting for all fruit it receives.

5.3 The Development Strategy of the Opotiki Fruitgrowers Co-operative

OFC had already made a strategic decision to explore kiwi-fruit processing opportunities before the author became involved with the co-operative. This decision did not result from any formal strategic planning exercise and strategy was not explicitly stated.

Strategic considerations for the development of OFC were discussed with Craig (pers com). The decision rules that guide the product development process were formulated by the author based on these discussions. In what follows these decision rules, which are later used to evaluate opportunities for processed kiwifruit product development, are documented and explained.

5.3.1 Strategic Development Objective

OBJECTIVE:

'TO PROVIDE SERVICES AIMED AT INCREASING SHAREHOLDERS' RETURNS'

This objective is consistent with the co-operative principle of a service at cost. For low grade kiwifruit OFC provides members with a selling service. The aim of this service is to achieve the highest return for low grade fruit by channelling it to either processors or local market auctions.

The decision to examine kiwifruit processing opportunities was motivated primarily by a desire to maintain or increase members' returns for low grade fruit unsuitable for fresh export. OFC anticipates that, as volumes increase, prices for low grade kiwifruit will fall. In a strategic planning context OFC anticipates a gap between target (current) and expected (future) returns to members for low grade fruit. The extent of the expected price reduction has not been quantified and no formal estimate of a profit gap has been made for shareholders.

OFC's decision to examine kiwifruit processing opportunities was also influenced by a desire to utilise fruit handling facilities more efficiently, and an altruistic desire to provide more permanent employment.

Despite a non-profit objective, investment analysis is still an appropriate means of identifying the best kiwifruit processing opportunities for a co-operative such as OFC. To provide a service a co-operative must make investments and borrow money like any other business, and these investments must still be profitable. In a co-operative

situation however the benefits of investment are passed directly to shareholders by way of increased product payments or reduced service costs.

Investment appraisals in this study assume that the OFC buys kiwifruit for processing from supplier shareholders at current market prices. In this situation any budgeted profit from OFC investment in kiwifruit processing is available for additional payments on low grade kiwifruit supplied by shareholders. It is important therefore that the most profitable processing alternative be chosen as this will increase members' returns by the greatest amount.

5.3.2 Product/Market Scope

DECISION RULE:

'PRODUCTS MARKETED BY THE CO-OPERATIVE MUST BE GOURMET FOODS'

As a single product firm OFC can define its product/market scope from a product orientation (ie 'fruit' or 'horticulture') or a market orientation. This evaluation uses a market or consumer orientation. A market orientation describes product/market scope in terms of the needs that products satisfy. A request to the New Zealand Kiwifruit Authority (Ohara pers com) for a definitive description of the needs satisfied by fresh kiwifruit was declined

on the grounds of commercial sensitivity. However Yerex and Haines (1983) variously refer to kiwifruit as being:

"... a gourmet item, one of the "in" favourites of the "better off" people."

"... not too upper class that it could not appear in supermarkets, yet snobbish enough to carry a luxury price tag."

"... eaten as is, or in fruit salads, with meat, or fish, as a topping, and as the basis for fashionable fancy specialties which chefs vied to invent and give their name to."

Yerex and Haines (1983) also refer to a Manhattan retailer who claimed that the press had:

"misrepresented nouvelle cuisine by equating it with kiwi".

Sokolov (in Yerex and Haines 1983) also makes reference to kiwifruit:

"... cut the kiwi open and it comes to life. Suddenly all is electric green and fragrant, with a violet-ringed yellow sunburst in the centre."

"Accordingly it is seen at the right places. Fruit stands on Manhattan's Upper West Side glamorise fruit salads with green flecks of kiwi. Fashionable restaurants from Tokyo to Frankfurt serve verdant kiwi slices with meat and fish, in meringues, tarts and mousses. Ronald Reagan's pastry chef, Roland Mesnier, plans to liven up this summer of remedial recession with kiwi sherbert swans in papaya shells."

These references suggest that a market orientated description of the product/market scope of OFC and other kiwifruit suppliers is 'gourmet food'. The inference is that kiwifruit is an elite delicacy perceived as such because it is exotic (in origin, aroma, flavour, colour, and texture), expensive, relatively scarce, aesthetically appealing, and fashionable. These are qualities that are needed or accepted by food connoisseurs or people who aspire to the image of a food connoisseur. By definition food favoured by connoisseurs is gourmet food.

5.3.3. Growth Vector

DECISION RULE:

'NEW PRODUCTS MARKETING BY OFC SHOULD BE
FOR EXISTING CONSUMERS OF FRESH KIWIFRUIT'

In deciding to explore processing opportunities for low grade kiwifruit OFC made a strategic decision to consider product development growth vectors. OFC seeks to achieve its objectives using the development strategy with the least risk. The appropriate strategy for the development of processed kiwifruit products is, therefore, development of new products for existing consumers. Diversification (ie new products for new consumers) is not considered because of the increased risks involved. Less risky market expansion strategies are precluded (for low grade fruit) by the statutory marketing powers of the New Zealand Kiwifruit Authority.

5.3.4 Competitive Advantage

DECISION RULE:

'PRODUCTS PRODUCED BY OFC MUST SEEK TO ENHANCE
OR CREATE ANY COMPETITIVE ADVANTAGE IMPARTED BY':

1. SURPLUS FRUIT HANDLING CAPACITY
2. NEW ZEALAND'S COMPARATIVE ADVANTAGE IN PRIMARY PRODUCTION
3. PRODUCT DIFFERENTIATION

As members of the New Zealand kiwifruit industry OFC enjoy certain competitive advantages over foreign competitors. These are perceived as:

- (i) The ability to cheaply produce large volumes of off-season kiwifruit.
- (ii) The name kiwifruit that links the product to New Zealand.
- (iii) Kiwifruit's established position as a popular gourmet food.
- (iv) An established industry that features orderly marketing and increasing promotion of the New Zealand product.
- (v) New Zealand kiwifruit's reputation as a quality product.

As potential processors of kiwifruit, OFC could enjoy competitive advantages over other processors that include:

- (i) Surplus capacity of fruit handling resources.
- (ii) Availability of cheap process grade fruit.

It is assumed that the competitive advantages that OFC aim to benefit from or establish in a kiwifruit processing operation are the name kiwifruit that links the product to New Zealand and capitalises on the promotion of fresh New Zealand kiwifruit which is established as a popular gourmet food, the availability of process grade fruit, surplus fruit handling resources, and the creation of a branded or differentiated processed kiwifruit product. Seasonal surpluses of packhouse and coolstore space are estimated in table 5.4, and plant and equipment is listed in table 5.1. Future supplies of low grade kiwifruit anticipated from shareholders are projected in table 5.5.

Table 5.4

OPOTIKI FRUITGROWERS CO-OPERATIVEREALISTIC FORECAST OF COOLSTORE/PACKHOUSE BUILDINGS, AVAILABLE FOR PROCESSING

		<div>Month</div> <div>Year</div>											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
1	<u>COOLSTORES</u>												
	(a) Percent Available (%)	80%	60%	40%	20%	0%	30%	70%	85%	95%	100%	100%	100%
	(b) Area Available (m ²)	1985	1367	1025	684	342	0	570	1331	1616	1806	1901	1901
		1986	1520	1140	760	380	0	784	1830	2222	2483	2614	2614
		1987	2091	1568	1046	523	0	941	2195	2665	2978	3135	3135
		1988	2508	1881	1254	627	0	1120	2613	3173	3546	3733	3733
		1989	2986	2240	1493	745	0	1416	3303	4011	4483	4719	4719
		1990	3775	2831	1888	944	0	1595	3722	4519	5051	5317	5317
		1991	4253	3190	2127	1063	0	1595	3722	4519	5051	5317	5317
2	<u>PACKHOUSE</u>												
	(a) Percent Available (%)	100%	100%	100%	50%	0%	0%	100%	100%	100%	100%	100%	100%
	(b) Area Available (m ²)	1985	2174	2174	2174	1087	0	0	2174	2174	2174	2174	2174
		1986	2174	2174	2174	1087	0	0	2174	2174	2174	2174	2174
		1987	2174	2174	2174	1087	0	0	2174	2174	2174	2174	2174
		1988	2750	2750	2750	1375	0	0	2750	2750	2750	2750	2750
		1989	3300	3300	3300	1650	0	0	3300	3300	3300	3300	3300
		1990	3850	3850	3850	1925	0	0	3850	3850	3850	3850	3850

Table 5.5

FORECAST OF MINIMUM QUANTITIES OF PROCESSING GRADE KIWIFRUIT FROM
SHAREHOLDERS AND REQUIRED COOLSTORE CAPACITY

	Units	1985	1986	1987	1988	1989	1990
(a) FRUIT QUANTITIES	Tonnes	527	756	916	1099	1374	1557
(b) COOLSTORE REQUIREMENT	m ²	673	964	1169	1402	1753	1987
(c) COOLSTORE REQUIREMENT As a percent of estimated capacity	%	35	37	37	38	37	37

NOTE: 1. Assumes - 273 trays/tonne, 214 trays/m² of coolstore space, 20% fresh kiwifruit reject rate.

2. From 1990 onwards fruit volumes are expected to remain constant at 1557 tonnes/yr.

Tables 5.1 and 5.4 show that most of the substantial fruit handling resources that are planned will be available for fruit processing for about eight months of the year from July - February inclusive. Table 5.5 shows that process grade fruit supplied by OFC shareholders is expected to increase rapidly to a 1990 level that is close to the total volume of kiwifruit processed in New Zealand in 1981.

5.3.5 Synergy

DECISION RULE:

'ADDITIONAL SERVICE ACTIVITIES PERFORMED BY OFC MUST EXHIBIT A GOOD FIT WITH OFC'S KIWIFRUIT HANDLING ACTIVITIES'

In table 5.6 OFC strengths and weaknesses have been subjectively assessed in terms of Ansoff's (1976) competence profile. In general terms OFC has strengths in operational, and general management and finance areas, and weaknesses in research and development, and marketing. Strong synergy is sought between these fruit handling strengths and those required for kiwifruit processing activities.

Table 5.6

OFC COMPETENCE PROFILE

	Facilities and equipment	Personnel skills	Organisational capabilities	Management capabilities
General management & finance	Data processing equipment*	Depth of general management* Finance* Industrial Relations* Legal Personnel recruitment and training* Accounting* Planning*	Multi-divisional structure Consumer financing Industrial financing* Planning and control* Automated business data processing	Investment management* Centralised control* Large systems management Decentralised control R & D intensive business Capital-equipment intensive business Merchandising intensive business Cyclical business* Many customers Few customers*
Research and development	Special lab equipment General lab equipment Test facilities	Areas of specialisation Advanced research Applied research Product design: industrial consumer military specifications Systems design Industrial design: consumer industrial	Systems development Product development industrial consumer process Military specifications compliance	Utilisation of advanced state of the art Application of current state of the art Cost-performance optimisation
Operations	General machine shop Precision machiner* Process equipment* Automated production* Large high-bay facilities* Controlled environment*	Machine operation* Tool making Assembly* Precision machinery Close tolerance work Process operation* Product planning*	Mass production* Continuous flow* process Batch process* Job shop Large complex product assembly Subsystems integration Complex product control* Quality control Purchasing*	Operation under cyclic demand* Military specifications quality Tight cost control* Tight scheduling*
Marketing	Warehousing* Retail outlets Sales offices Service offices Transportation equipment	Door-to-door selling Retail selling Wholesale selling* Direct industry selling Department of Defence selling Cross-industry selling Applications engineering Advertising Sales promotion Servicing Contract administration Sales analysis	Direct sales Distributor chain Retail chain Consumer service organisation Industrial service organisation Department of Defence product support Inventory distribution and control	Industrial marketing Consumer merchandising Department of Defence marketing State and municipality marketing

Note: * indicates competence

5.3.6 Distinctive Competence

DECISION RULE:

'THE NEED FOR NEW DISTINCTIVE COMPETENCES SHOULD BE MINIMISED'

OFC has distinctive competence in fruit production, packaging, and storage.

For any venture into kiwifruit processing OFC aims to minimise cost and risk by utilising existing distinctive competence in fruit handling, and seeking opportunities that involve processing competence that is easily acquired.

In kiwifruit processing OFC seeks to further minimise the requirement for new distinctive competences by using an agent for research and development and a business partner for marketing functions. Massey University's Food Technology Research Centre will be commissioned to carry out physical product development and oversee the establishment of processing facilities, and a business partner with marketing experience with related gourmet foods in markets where fresh kiwifruit is established, will be sought.

5.4 Chapter Summary

OFC is a co-operative established to provide fruit handling services to its kiwifruit producing shareholders. Shareholder fruit production is expected to increase rapidly until 1990.

This increase is being accompanied by expanding fruit handling facilities which are only utilised for about four months a year.

As fresh kiwifruit production increases, so too do the volumes of low grade kiwifruit unsuitable for fresh export. OFC sells this fruit on behalf of its members and is concerned that returns for this fruit will fall as supply increases.

OFC has made a strategic decision to consider extending its services to include kiwifruit processing. This decision was based on concern over future prices for low grade fruit, and the poor utilisation of fruit handling facilities.

The strategic criteria that will be used to evaluate kiwifruit processing opportunities for OFC are:

- 1 Processed kiwifruit products must be gourmet foods.
- 2 Processed kiwifruit products must be for existing consumers of fresh kiwifruit.
- 3 Processed kiwifruit products must enhance/create competitive advantage imparted by surplus fruit handling resources, surplus low grade kiwifruit, and product differentiation.
- 4 Kiwifruit processing and fruit handling activities must be complementary.
- 5 The need for new skills must be minimised by the selection of processed kiwifruit products that are relatively easy to produce, and for which a suitable partner exists.

CHAPTER 6

6 IDEA SEARCH AND PRELIMINARY EVALUATION

This chapter identifies ideas for processed kiwifruit products and determines those that are worthy of investment consideration by the Opotiki Fruit Growers Co-operative.

6.1 Idea Search

Ideas for products to utilise low grade kiwifruit were generated in a brainstorming session, and solicited from communication with people in the kiwifruit industry.

A brainstorming session was held by Massey University's Food Technology Research Centre, as one of a series of 'Product Investigation Group' (P.I.G.) meetings. People participating in the session were all members of the Food Technology Research Centre, with the exception of the author. The list of ideas that was generated in this brainstorming session was comprehensive, and included all the known processed kiwifruit products, and most of the ideas solicited from organisations within the kiwifruit industry.

Organisations within the kiwifruit industry that were contacted for their ideas for processed kiwifruit products were the Department of Trade and Industries, Department of Scientific and Industrial Research (Division of Horticulture and Processing), NZ Kiwifruit Authority, Kiwifruit Exporters (Auckland Export Ltd, and Turners and Growers Ltd), and the Horticultural Market Research Unit. Contact with these

kiwifruit industry groups provided opportunity for input from people closer to kiwifruit consumers.

The complete list of ideas for processed kiwifruit products is given in table 6.1.

Table 6.1

IDEAS FOR PROCESSED KIWIFRUIT PRODUCTS

- * Fruit drinks (concentrate, powdered and ready to use forms of juice, drink, carbonated, nectar, and flavoured milk products).
- * Herbal tea.
- * Wine.
- * Snacks (bars, leathers).
- * Preserved fruit (dried, canned, frozen, or powdered forms of whole fruit, slices, pulp, or concentrate/essence).
- * Liqueur.
- * Health products (bars, pills, natural fibre).
- * Meat tenderiser.
- * Condiments (sauce, marinade, pickle/chutney, pickled fruit, salad dressing, vinegar).
- * Hors-d'oeuvre (as a pate of kiwifruit mixed with venison, lamb, orange roughy, Camembert/Brie, snails, avocado, Asian pears, crab/crayfish).
- * Meat stuffing.
- * Pet food attractant.
- * Table confectionary (chocolate slices, glazed slices, sliced fruit in syrup, jellied fruit).
- * Dairy goods (icecream, yoghurt).

- * Deserts (jelly, fruit salad, fruit topping).
- * Industrial preserved fruit (dried, canned, frozen, or powdered forms of whole fruit, slices, pulp, or concentrate/essence).
- * Cosmetic/toiletries (soap, toothpaste, skin creams).
- * Baked goods (kiwifruit pies, pastries, cakes, biscuits, tinned cakes).
- * Spreads (butter, jam, conserve/combination spreads).
- * Sorbet.
- * Novelty products (cloaks from skins).
- * Wall spray coatings (from skins).

6.2 Preliminary Evaluation

Feasible ideas for processed kiwifruit products were selected from the list in table 6.1 in a preliminary evaluation that involved screening product alternatives against the selection criteria formulated in chapter five.

6.2.1 Evaluation of Marketing Partners

OFC's strategy requires that processed kiwifruit products be commercially developed in partnership with the marketer. In this sense suitable marketing partner is seen as an adjunct to each product idea.

6.2.1.1 Selection of Marketing Partners

The selection criteria (ie strategy) that are used to search and screen product alternatives, also provide the appropriate criteria to search

and select the marketing partners that are adjunct to each product idea. For this purpose these criteria are re-stated to say that a marketing partner for the commercial development of a processed kiwifruit product must:

- (i) Have a 'gourmet food' product/market scope.
- (ii) Be active in the main geographic markets for fresh kiwifruit.
- (iii) Perform distribution, packaging, pricing, and promotion functions.
- (iv) Market products that could include the kiwifruit product alternative under consideration as a line variation.
- (v) Provide distinctive competence in the production and marketing of the product being considered.

The search for potential marketing partners was made using a business directory and the assistance of the Department of Trade and Industries. The New Zealand Business Who's Who (1983) lists 85 companies as foodstuff exporters. The Department of Trade and Industries (Thompson pers comm) provided a

list of 119 foodstuff exporters. The total number of potential marketing partners was reduced to 102 after allowing for companies that were common to both lists, and eliminating companies who were considered unsuitable. Suitability was assessed in terms of the established selection criteria and information provided in the New Zealand Business Who's Who (1983), and profiles provided for some of foodstuff exporters listed by the Department of Trade and Industries.

A short list of nine potential marketing partners was created using the established selection criteria, and based on the expert opinion of Dr Mary Earle (pers comm).

Dr Earle is the immediate past head of Massey University's Food Technology Research Centre, a position that involved wide contact with the New Zealand food processing industry. The short list of potential marketing partners is shown in table 6.2.

Table 6.2POTENTIAL MARKETING PARTNERS FOR
INVESTMENTS IN KIWIFRUIT PROCESSING

Focus Marketing Ltd
 Abbeville Sauce Company Ltd
 Chelton Foods Ltd
 Producer Exports Ltd
 Fuller and Company Ltd
 Sullivan (NZ) Ltd
 NZ Glass Manufacturing Company Ltd
 Epicurean Foods of New Zealand Ltd
 Van Camp Ltd

Shortlisted firms were contacted by telephone to further assess their suitability as marketing partners for Opotiki Fruit Growers Co-operative, and to get an indication of their interest in such a partnership. Three firms were identified as unsuitable, and four firms indicated that they could be interested in a marketing association with the Opotiki Fruit Growers Co-operative. These were the Abbeville Sauce Company Ltd, Sullivans (NZ) Ltd, Epicurean Foods of New Zealand Ltd, and Van Camp Ltd. These firms were visited personally by the author, and after more detailed discussions only two of the four - Sullivans (NZ) Ltd and Epicurean Foods of New Zealand Ltd - expressed a continued

interest, and only one - Epicurean Foods of New Zealand - was considered suitable.

Epicurean Foods is a new private firm with an office in Auckland and a small factory in Mercer. Established in 1983, Epicurean Foods has a paid capital of \$180,000 and turnover for its first year of operation was \$1,200,000.00. The company is jointly owned in an equal three way partnership. Two of the partners, Nigel McLisky and John Keith, are active as Export Marketing/General Manager and Production/Factory Manager respectively. The third partner is Agrex Ltd, a firm involved with meat, game, and fish export.

Characteristics of Epicurean Foods that make them a suitable marketing partner for the Opotiki Fruit Growers Co-operative can be described in terms of the co-operative's selection criteria. These characteristics are:

- (i) - Their product/market scope is 'gourmet food'.
- (ii) - They are expanding into Australia and the USA which are major markets for fresh kiwifruit. However the fact that they are not yet established in these markets means that there is increased product development business risk.

- (iii) - Their product range comprises a frozen vegetable (asparagus), a snack food (pork crackling), nectars/purees (asparagus, onion, feijoa, tomato, tamarillo, babaco, pears, raspberry, and boysenberry), and condiments (wine vinegars, garlic paste, bacon bits, smoked salts, steak spice, and stocks).
- Products are marketed under a family brand name ('Butler and Hall'), and packaging types include glass bottles, plastic phials, foil packs, and frozen packs.
- Products are considered to be convenience goods, and care is taken to avoid a 'specialty' product classification as this market is considered to be too elitist and small.
- Products are sold through supermarkets, gift stores, hotels, delicatessens, and butcher shops.
- An 'upmarket' product image is sought through packaging design and colour, and a high physical product quality.
- (iv) - They are involved with production, packaging, distribution, promotion, and pricing activities. Although Epicurean Foods are a new firm their Export Marketing Director, Nigel McLisky B.Tech (Food) and Dip.Mgt, has a food processing and marketing history that includes five years as Export Development Manager with J Wattie Canned Foods Ltd. He

has considerable experience in European, Middle East, North American, and Australian markets as a result of this position. This experience reduces the business risk of expanding into any of these markets.

- Distribution channels involve sales direct from Epicurean Foods to Wholesalers or retailers, as well as sales through import agents.
 - Pricing is based on considerations of what the market will bear, and the prices of competing products. Cheap price is not considered to be an important factor for the types of products that are marketed.
 - They produce themselves all the products they market to consumers, except for wine vinegars. They also contract manufacture for other consumer marketers, and supply high quality puree for the industrial market.
 - Packaging materials are purchased from AHI Ltd, but Epicurean Foods take responsibility for the choice of containers and label design.
 - They prepare all their own printed promotional material.
- (v) - They have particular distinctive competence in the production and marketing of fruit pulps and purees, and condiments.

This Description of Epicurean Foods was supplied to Opotiki Fruit Growers Co-operative with the recommendation that, if acceptable, the two firms meet to establish intent and the basis of any association in kiwifruit processing.

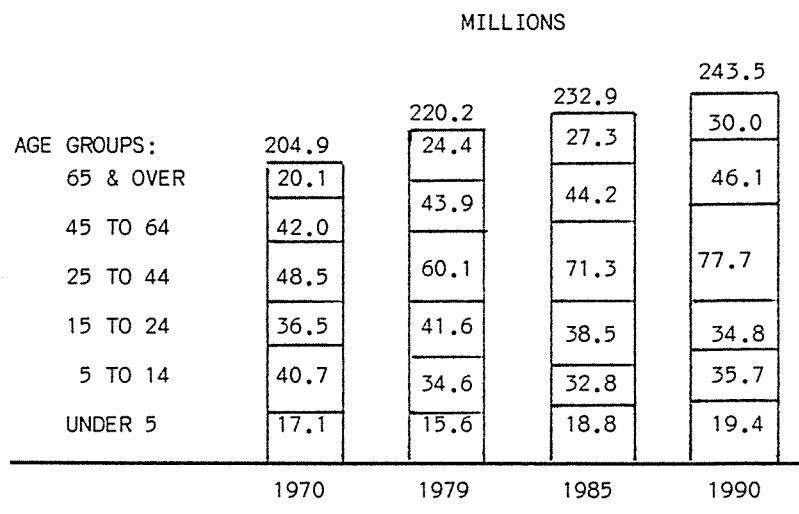
Opotiki Fruit Growers Co-operative did consider Epicurean Foods to be a suitable prospect as a marketing partner and a meeting between the two was arranged. This meeting was held at Epicurean Foods Mercer Factory and involved the General Managers of both firms and the author. It was established at this meeting that both firms would consider as a single body, the opportunities for commercial development of processed kiwifruit products. Although the structure of any formal alliance was not pursued in any depth, it was felt that both firms should have a financial interest in any joint venture. There was also agreement in principle to a general functional division between production and marketing. The co-operative would continue the initiative for the venture, and assume responsibility for any commercial production. Epicurean Foods would provide a technical production input and assume responsibility for marketing activities.

6.2.1.2 Target Consumer Review

Epicurean Foods target consumers are males and females with above average income, aged from mid-twenties to mid-forties.

A review of target consumers in the USA and Australia shows that they are increasing in number, and that they have an increasing demand for gourmet foods that includes kiwifruit.

The increase in the number of consumers is attributed to a post second world war 'baby boom'. Carlson (1982) reports that between the second world war and 1961, the USA population grew by an unprecedented 45 million people. Babies born in this boom period are now in the 25-44 age group (ie they are target consumers) which is the most populous and rapidly growing segment of US society. See figure 6.1.



Source: Carlson (1982)

Figure 6.1 USA population trends by age groups.

A similar situation exists in Australia where the percentage of the population in each age group matches closely that of the United States (International Marketing Data and Statistics 1983).

Stowell (1983) asserts that, compared to previous generations in the USA, the 25-44 year olds of the 1980's have "new values and behaviour regarding such issues as the role of women, their family size, 'self' and the importance of education. They also voiced loudly their concerns regarding food, diet and body". The literature also describes a similar situation in Australia. The increasing need for gourmet foods and healthy/nutritious foods is a manifestation of these life-style changes. Braconie (in Pehanich 1983) asserts that in the USA "two prevailing trends in eating patterns are hard to avoid noting, one is the emphasis on nutrition and healthy foods and the other is the interest in gourmet foods. No food area has been uninfluenced by these trends". The types of food being demanded are sophisticated, adult, healthy, convenient, and of high quality.

Hardin (1981) attributes the increasing need for sophisticated or gourmet foods to rising standards of education. He notes that in the USA "forty percent of the college age people are in college today, and an enormous number of older people are involved in adult education - three times the rate of 25 years ago. Today there are more women than men in college. Half the dollars spent in the late 80's will be spent by college educated people. This means more sophisticated foods and more buyers knowledgeable in such areas as nutrition and health". Trotman (1982) refers to the Australian trend towards gourmet cooking as "a reflection of the growing and broader family eating pattern in general".

The increasing need for adult foods is related to changes in household size and make up. In both USA and Australia the number of households with 25-44 year old householders is increasing and the number of people per household is decreasing. These trends reflect an increase in the number of unmarried householders, and a tendency amongst married couples to have smaller families later in life. Hardin (1981) argues that "all this means more focus on adult and individual foods".

The increasing need for healthy and nutritious food products reflects what Hardin (1981) refers to as "a rising interest in health and nutrition - not far-out, counterculture organic foods, but rather a more sensible and pleasure-orientated purchasing pattern".

Trotman (1982) refers to Australian "food-scientist housewives" as a "growing group who carefully watch their calories and who take pleasure in a general understanding of the more technical side of food with its classification of carbohydrates, fats, protein, vitamins and minerals".

The increasing need for convenience foods reflects an increasing number of multiple-worker households with associated higher household income and increased pressure on time. Hardin (1981) notes that in the USA "women have moved into the work force in droves. The proportion of working women has gone from a fourth to well over a half in the last three decades, and it will continue to rise, although at a slower rate. This increase means more pressure on convenient, easy food preparation". Carlson (1982) estimates that 63% of all women over 16 years of age in the USA in 1990 will be working. He also notes

currently more than half of all married couples in the USA are dual income families. Trotman (1982) records "that more and more Australian women are entering the work force and taking more positions of responsibility with the result that "the housewife's demand for shopping and preparation convenience must necessarily continue". The growing need for convenience food also manifests itself in increased away-from-home eating. Stowell (1983) reports that in 1980/1 only 70% of main meals were eaten at home in the USA (compared with 75% in 1973). In 1980/1, 15% of all main meals were purchased and eaten away-from-home, 10% of all main meals were skipped altogether, and the balance were carried ('brown bag') meals. Trotman (1982) also notes a similar trend in Australia towards away-from-home eating. He asserts that "the fast food diet has hit the entire western world. It may be a little bland and lack the variety that some would want, but it is an ideal solution for the working mother, especially when stores are closed six nights a week. Mother can treat herself and her family, thanks to the second family income, and not feel so bad about avoiding the chores of shopping and cooking". For those main meals that are eaten

at home the trend is towards fewer dishes for increased convenience. The tendency is also to offset skipped main meals with increased snacking between meal times.

The trend towards gourmet and healthy/nutritious foods has resulted in a number of dietary changes in both the USA and, to a lesser extent, Australia. Coffee/tea and milk consumption has declined in favour of carbonated and uncarbonated beverages and juices. Beef consumption has declined in favour of pork, poultry, and seafood. The use of meat as an end dish has declined in favour of its use as an ingredient in sandwiches (snacks), entrees, and main dishes. Australian food consumption statistics (Australian Bureau of Statistics 1983) indicate that dietary changes have been more pronounced in the USA, and that, in absolute terms, Australians eat more red meat, dairy products and sugar, and less pork and poultry.

Kiwifruit is seen at the heart of the trend towards gourmet foods. Pehanich (1983) states that "Many identify the gourmet craze as 'adventurous'. That may well be what accounts for the popularity of 'kiwi', which one new

products chronicler calls today's 'in-fruit'. Kiwi jams and preserves perhaps epitomise today's search for unusual taste pleasures and join the parade of unusual jams, jellies, and marmalades entering grocery store shelves and gourmet counters in upscale department stores."

6.2.2 Evaluation of Product Alternatives

The only processed kiwifruit product alternatives that can be considered for development by the Opotiki Fruit Growers Co-operative are those that are compatible with the product range of Epicurean Foods. Alternatives that are incompatible with this range do not have a marketing partner adjunct to them and are precluded from further consideration as infeasible. Product alternatives that are considered to be feasible line variations of the range of products made by Epicurean Foods are listed in table 6.3.

Table 6.3

PROCESSED KIWIFRUIT PRODUCT ALTERNATIVES WITH A MARKETING PARTNER ADJUNCT TO THEM

- * Fruit drinks (ready-to-use and concentrate forms of of drink, juice, and nectar).
- * Snacks (bar, leather).
- * Condiments (sauce, marinade, pickle/chutney, salad dressing, wine vinegar, pickled fruit).
- * Preserved fruit (frozen whole fruit, slices, pulp, concentrate).

6.2.2.1 Screening Product Alternatives

Product ideas listed in table 6.2 were evaluated for feasibility in a multi-attribute analysis that screened alternatives against OFC's strategic selection criteria.

Ability to satisfy selection criteria was subjectively assessed using the following scale.

ASSESSMENT	POINTS
Marginal	0
Below average	5
Average	10
Above average	15
Outstanding	20

Product/market scope, growth vector, and competitive advantage criteria were assessed by the author. Synergy and distinctive competence were independently assessed by Earle and Barnett (pers comm) in their capacity as food product development experts.

Each product alternative was independently scored out of 20 for each criterion. These scores were then totalled to give an overall score out of 100 for each product. Those with the highest total are considered the most

feasible products for development by OFC and Epicurean Foods. In arriving at a subjective score out of 20 for each criterion several product attributes were considered. The various attributes that were considered for each criterion are listed below.

1. The product/market scope criterion was considered in two parts:

- (i) Could the product be considered 'gourmet' in a generic sense?
- (ii) Could the product be positioned as a gourmet food through marketing effort?

2. The growth vector criterion was considered in two parts:

- (i) Did the product alternative complement (as opposed to compete with) consumption of fresh kiwifruit?
- (ii) Was it likely to be purchased by consumers of fresh kiwifruit?

3. The competitive advantage criterion was considered in three parts:

- (i) Could the product alternative being considered be easily differentiated from its competitors (ie could it be considered a branded product or a commodity)?
- (ii) Did the product utilise fruit handling resources?

- (iii) Was processed kiwifruit the major product ingredient?

4. The synergy criterion was considered in three parts:

- (i) Would production of the alternative under consideration be enhanced by kiwifruit handling operations?
- (ii) Would production of the alternative under consideration enhance kiwifruit handling operations?
- (iii) Would production of the alternative under consideration present possibilities for future strategic development?

5. The distinctive competence criterion was considered in two parts:

- (i) Did production of the alternative being considered require a high degree of processing competence?
- (ii) Was the competence required for processing similar to that possessed for fruit handling?

The results of the multi-attribute feasibility analysis are presented in table 6.4.

Table 6.4

MULTI-ATTRIBUTE FEASIBILITY ANALYSIS OF
PROCESSED KIWIFRUIT PRODUCT ALTERNATIVES

C R I T E R I A						
	Product/ Market Scope	Growth Vector	Competitive Advantage	Synergy	Distinctive Competence	Total
<u>PRODUCT ALTERNATIVE</u>						
A. DRINKS						
(i) Ready-To-Use -Drink	5	5	10	10	10	40
-Juice	10	10	15	10	15	60
-Nectar	15	10	15	10	15	65
(ii) Concentrate -Drink	5	5	10	5	0	25
-Juice	10	10	15	5	0	40
-Nectar	15	15	15	5	0	50
B. SNACKS						
-Bar	15	10	10	5	10	50
-Leather	10	10	10	5	10	45
C. CONDIMENTS						
-Sauce	15	20	15	10	15	75
-Marinade	20	20	15	10	10	75
-Pickle/Chutney	15	20	15	10	15	75
-Salad Dressing	10	15	5	10	10	50
-Wine Vinegar	15	15	15	10	5	60
-Pickled Fruit	20	20	20	10	20	90
D. FROZEN FRUIT						
-Whole Fruit	5	0	10	20	20	55
-Slices	5	0	10	20	15	50
-Pulp	5	0	10	15	15	45
-Concentrate	5	0	10	5	5	25

Condiment products were judged to be the most feasible products for commercial development by Opotiki Fruit Growers Co-operative.

Condiments are defined by Lindsay (1984) as "flavour bearing substances that are usually used in foods in substantial quantities compared to other flavours, and have been traditionally regarded as foods. Examples are mustard, catsup, and vinegar". Condiment production is considered to be feasible from both production and market points of view. Giges (1982) asserts that "As Americans seek more variety, convenience and economy in meal preparation, they are becoming enamored with prepared sauces, marinades and toppings - anything that can give standard fare a gourmet touch in minutes".

Fruit drinks are considered to be only moderately feasible overall. Drink concentrates are considered infeasible from a production point of view because of the high degree of processing competence required. Ready-to-use drinks, particularly nectar, were judged to be reasonably feasible at this preliminary stage. This feasibility diminishes however in the light of physical product development work

described by Lodge (1981) and McLisky (pers comm), which suggests that kiwifruit drinks lose the green colour of fresh kiwifruit and possess a 'fish-hook' or after taste that is not likely to be acceptable to consumers.

Frozen fruit products were judged to be only moderately feasible overall. Production feasibility was considered to be very good for all but the frozen concentrate. Market feasibility was considered to be poor because of the commodity nature of frozen fruit products and their tendency to compete with, rather than complement, fresh kiwifruit consumption. It was felt that these processed products, which, according to the literature, lack the flavour, texture and colour of fresh kiwifruit, would have little appeal to consumers of fresh kiwifruit. Snack products were also judged to be only moderately feasible overall. The major limitation was perceived to be below average production synergy.

6.3 Chapter Summary

This chapter applied the analytical framework that was developed in chapter three in a preliminary evaluation to assess the feasibility of developing processed kiwifruit products. A list of product ideas was generated and assessed

using Opotiki Fruit Growers Co-operative's strategic selection criteria. These criteria were first used to identify and screen the marketing partners that were required to be adjunct to each product idea. They were then used in a multi-attribute feasibility analysis that screened product alternatives that did possess the necessary marketing partner.

In the event there was only one suitable firm that was interested in a kiwifruit processing alliance with the Opotiki Fruit Growers Co-operative. This firm, Epicurean Foods of New Zealand Ltd, is a new firm that is not yet established in any of the major geographic markets for fresh kiwifruit. The extra risk that is inherent in association with a small unproven firm is reduced by the competence of Epicurean Foods Export Marketing/General Manager.

Epicurean Foods make a range of nectar, puree, condiment, snack and frozen vegetable products. Processed kiwifruit product alternatives that were compatible with this product range were screened for feasibility.

The most feasible processed kiwifruit product alternatives, for development by Opotiki Fruit Growers Co-operative, were judged to be condiment products of pickled fruit, sauce, marinade, and pickle/chutney. The economic viability of developing these alternatives is assessed in the following chapter.

CHAPTER 7

7 ECONOMIC APPRAISAL

This chapter examines the profitability of the four condiment products identified in the last chapter as most feasible for development by the Opotiki Fruit Growers Co-operative and Epicurean Foods. Five alternatives are considered. Each product is assessed individually, and then as part of a product line involving all four condiment products.

7.1 Method of Investment Appraisal

The profitability of each product alternative is assessed in three stages. In the first instance profitability is calculated over a range of production volumes. Next the level of demand for each alternative is predicted, and finally profit sensitivity is examined.

For each product NPV (net present value) profit estimates are made using pessimistic, realistic, and optimistic forecasts of costs and returns. Profitability is estimated across a range of volumes to indicate the general level and sensitivity of profitability, and to determine break-even sales volumes.

Predictions of market demand come from expert opinions that are based on consumer and market information derived from the literature. Expert opinion is provided by Nigel Mclisky in his capacity as Export Marketing Director of Epicurean Foods. Mclisky was presented with the target consumer review contained

in chapter six, together with a summary of the limited amount of historical consumption and expenditure data that is documented in the literature. He was also given a set of six possible output levels representing the range the plant of budgeted capacity could produce. Mclisky was also asked to assign to each output level a subjective value indicating the probability of the firm being able to sell that particular level of output at the assumed price. An expected sales volume is calculated using these probabilities.

Comparison of expected sales volume and break-even volume provides an indication of expected profit. The exact magnitude of the expected profit is calculated using the pert-beta method. Pessimistic, realistic, and optimistic profit forecasts are respectively equated with the lower bound, mode, and upper bound of a beta distribution, and expected values and standard deviations are calculated using the following formulae.

$$\text{Expected (Y)} = \frac{Y_{\text{pess.}} + (4 \times Y_{\text{real.}}) + Y_{\text{opt.}}}{6}$$

$$\text{Standard deviation (Y)} = (Y_{\text{opt.}} - Y_{\text{pess.}}) / 6$$

Where Y=profit forecast

Profit sensitivity to changes in levels of key parameters was determined by substituting pessimistic and optimistic values of selected parameters, into the realistic forecast of investment costs and returns at the expected level of demand.

7.2 Schedule of Common Budget Assumptions

The following list of common budget assumptions were made for each of the four products under appraisal.

7.2.1 General Assumptions

7.2.1.1 Budget Period

The budget period chosen is 10 years starting from 1986 (ie the year the project is expected to start). The NPV profit figures are expressed in terms of 1985 dollars.

7.2.1.2 Tenure

It is assumed for budget purposes that the Opotiki Fruitgrowers Co-operative is the sole commercial developer of the kiwifruit condiment products under appraisal. While it is known that the reality will be a joint venture between the Co-op and Epicurean Foods, the uncertain nature of how costs and benefits will be shared make a joint appraisal difficult. As it stands this appraisal can assist with guiding the sharing of costs and benefits between the Co-op and Epicurean Foods. Such considerations would however need to allow for the use of the Co-operative's buildings and facilities. These do not feature in this investment appraisal because they are not cash items.

In the context of this appraisal it is assumed that the Co-op will cover the activities to be performed by Epicurean Foods with a marketing employee and agents and merchant middlemen, ie freight forwarders and importers.

7.2.1.3 Geographic Markets

It is assumed that geographic markets are the USA and Australia. 88% of sales are assumed to occur in the USA with the balance in Australia, ie demand is assumed to be pro-rata with the number of target consumers in each country, and during the budget period approximately 88% of target consumers are in the USA.

7.2.1.4 Products

300 ml jars or bottles, packed in cartons of one dozen capacity (based on advice from Mcliskypers comm).

7.2.1.5 Inflation

It is assumed that both costs and returns will inflate, but at different rates. Over the budget period returns are inflated at a rate based on forecasted levels of food price inflation in the USA and Australia for the next two years. Over the budget period costs are inflated at a rate based on the predicted general level of inflation for the next two years, and expert opinion judgement.

7.2.1.6 Taxation

It is assumed for budget purposes that the co-operative structure will be preserved thus obviating the need to consider taxation. It is possible however that a joint venture between the Co-operative and Epicurean Foods may preclude a co-operative structure. In recognition of this expected, profit is recalculated for each alternative, assuming normal depreciation allowances and a 45 cents in the dollar taxation levy, to illustrate the impact of taxation if a co-operative structure is abandoned.

7.2.1.7 Budget Forecasts

Profit projections are given for pessimistic, realistic and optimistic forecasts of budget parameters. Realistic forecasts are based on expert opinion or calculated estimates. To get pessimistic and optimistic forecasts the calculated estimates are, in the main, varied downwards and upwards respectively by 20%. Wilkinson (pers comm) suggests that for studies of this kind realistic forecast accuracy is about plus or minus 20%. Pessimistic and optimistic estimates are actually calculated however, if there is some knowledge of how parameters might reasonably be expected to vary.

7.2.1.8 Packaging

On the advice of Mclisky (pers comm) packaging is assumed to include glass containers, labels, and cartons of one dozen capacity. Budget figures are: labels - 5 cents, jars and lids - 34 cents, bottles and caps - 30 cents, unit contribution to carton - 6 cents. Rates were advised by Mclisky (pers comm).

7.2.2 Financial Assumptions

7.2.2.1 Capital Expenditure

(a) Plant and Equipment - It is assumed that new plant and equipment is used. It is noted though that second hand equipment is generally available. The following budget prices were obtained from Fabers Machinery Ltd. (Bruce Kirk pers comm) and generally relate to minimum commercial plant sizes that are typically capable of handling 2-3 tonnes of fruit per hour.

Table 7.1PLANT COST ESTIMATES

ITEM OF PLANT	BUDGET PRICE(\$)
Caustic peeler (2t/hr)	25,000
Brush washer (3t/hr)	25,000
Inspection belt	4,500
Conveyor - drive	2,000
- belt/m	800
Elevator	3,000
Hammermill (2t/hr)	2,500
Finisher (2t/hr)	15,000
Cooker - batch kettle (1t)	9,000
Mixer (1000 l)	4,000
Orientator for slicer	50,000
Accelerator belt to slicer	25,000
Slicer (5t/hr)	22,000
Steriliser (Cl twist rinse)	15,000
Pump (mono flo)	7,500
Bottling plant - auto	20,000
- hand pack	25,000
Single head capper - vacuum	45,000
- std	26,000
Tunnel cooler	30,000
Labeller	30,000
Roller tables/m (est. only)	500

A 20% allowance is also assumed, to cover contingencies and ancillary equipment.

Prices are ex Fabers Auckland store and include duties. On the advice of Wilkinson (pers comm) a budget allowance of 5% of plant cost has been made for transport and installation.

- (b) Buildings - It is assumed that existing Co-op buildings are satisfactory with only minor alteration. A contingency allowance of \$30,000, \$20,000, and \$10,000 has been assumed for pessimistic, realistic, and optimistic forecasts respectively.

7.2.2.2 Debt Finance

It is assumed that debt finance will come from the commercial division of the Rural Bank. Beattie (pers comm) suggested the following table mortgage terms that have been adopted for this appraisal:

TABLE 7.2
DEBT SERVICING TERMS

FORECAST	TERM (Yrs)	INTEREST (%)	% FINANCED
Pessimistic	7	18.5	100
Realistic	8	17.5	66.7
Optimistic	10	15	66.7

It is noted that some debt finance could come from the regional development programme administered by the Department of Trade and Industries. The terms of this finance provide for loans of 16.75% of plant and equipment costs to a maximum of \$200,000 with no repayments for up to 5 years, followed by a loan term of 2-5 years. The scheme also provides a grant of 50% of the cost of preliminary investigations to a maximum of \$15,000.

7.2.2.3 Equity Finance

Schroder (1982) asserts that the appropriate discount rate for co-operative equity capital is the opportunity cost of capital for the marginal shareholder. On this basis it is assumed that equity finance will be financed by bank overdraft at 16.75% interest. This interest rate was suggested as appropriate by the loans officer at the Broadway Avenue branch of the Bank of New Zealand, Palmerston North.

7.2.2.4 Salvage Values

Wilkinson (pers comm) suggests that budgeted plant and equipment should have a 15 year life span. Salvage values at the end of year 10 are calculated by depreciating plant and equipment by 20% per year on a diminishing value basis until year 10, and then inflating the year 10 figure by the inflation index for costs, to give a nominal salvage value.

7.2.2.5 Cost of Capital

The cost of capital is calculated using the weighted average cost of debt and equity capital adjusted for inflation.

Table 7.3COST OF DEBT AND EQUITY CAPITAL

FINANCE TYPE	CHARGE	TAX ADJUST.	INFLATION ADJUST.	COST
Equity				
- Pess.	0.1675	x0.68	+1(x1.1)	22.5
- Real.	0.1675	x0.68	+1(x1.08)	20.3
- Opt.	0.1675	x0.68	+1(x1.06)	18.1
Debt				
- Pess.	0.185		+1(x1.1)	30.4
- Real.	0.175		+1(x1.08)	26.9
- Opt.	0.15		+1(x1.06)	21.9

Note: Assumes a marginal tax rate for shareholders of 32%

7.2.2.6 Product Development

It is assumed that \$10,000/product is spent on physical development and test marketing. This allowance based on advice from Mclisky (pers comm) assumes a 50% preliminary investigation grant has been obtained from the Trade and Industry Department's Regional Development Programme.

7.2.3 Income Assumptions

7.2.3.1 Retail Price

Retail prices of US\$2.50 and Aust.\$2.00 are assumed for all products on the advice of Mclisky (pers comm). All products are assumed to have the same retail price, even though it is expected that prices for the different products will vary, because of a lack of specific information on market prices.

7.2.3.2 Middlemen Margins

The following mark-ups are assumed on the advice of Mclisky (pers comm).

Table 7.4

MIDDLEMEN'S MARGINS

COUNTRY	MIDDLEMAN	% MARK-UP
USA	Importer	10
	Distributor	25
	Super-mkt Retailer	32.5 (25-40)
Australia	Importer	7.5
	Distributor	25
	Super-mkt Retailer	25

7.2.3.3 Exchange Rates

Budgeted exchange rates are based on rates provided by the Broadway Avenue branch of the Bank of New Zealand, Palmerston North on 19 November 1984. These rates are US\$0.501 and Aust.\$0.578. Ward (pers comm) suggests that these rates are representative of the current value of USA and Australian currency. He also suggests that, given the uncertainty surrounding future exchange values, it is reasonable for budget purposes to assume that these exchange rates will prevail for the duration of the budget period. This assumption has been made, although the effect of exchange rate alterations is also illustrated through price sensitivity.

7.2.4 Direct Cost Assumptions

7.2.4.1 Raw Materials

- (a) Kiwifruit - It is assumed that lower grade fruit with an average value of 45¢/kg is used for chutney, sauce, and marinade production, and that higher grade fruit with an average value of 55¢/kg is used for pickled slice production.
- (b) Other raw materials are costed ex manufacturers store. These costs are summarised below.

Table 7.5

RAW MATERIAL COSTS

ITEM	SOURCE	\$/UNIT	\$/KG
Vinegar	Mauri DYC	20ℓ	
- Malt	(FIS)	8.11	0.41
- Spiced	"	11.79	0.59
- White	"	12.82	0.64
- Wine	"	10.93	0.55
Sugar	NZ Sugar Co	35 kg	
- White		26.30	0.75
- Brown		27.70	0.79
- Raw		27.30	0.78
Salt	Dominion Salt Co	tonne	
- V41		258.78	0.26
Apple Pulp	FPH CO-op	17 kg	
- Std		8.50	0.60
Spices	Greggs Ltd	kg	
- Mixed		7.00	7.00
- Ginger (ground)		11.09	11.09
- Cayenne Pepper		12.54	12.54
- Chillie (ground)	Dunninghams Ltd	7.00	7.00
Onion	Epicurean Foods	kg	
- Puree		0.55	0.55

A transport allowance of 10¢/kg is assumed for all raw materials except sugar, which is quoted free in store, and kiwifruit:

7.2.4.2 Power

Assumed power consumption figures are taken from brochures provided by Fabers or estimated by Barnett (pers comm).

Table 7.6

POWER CONSUMPTION RATES

ITEM	POWER CONSUMPTION
	KW
Peeler	75
Brushwasher	1.5
Elevator	0.75
Hammermill	3
Cooker - on high	160
- on low	64
Mixer	3
Pump	1
Bottle filler	0.4
Capper	1.3
Tunnel cooler	3.6
Labeller	1.5
Accelerator belt	0.4
Orientator	1.5
Slicer	2
Finisher	3

Power in Opotiki is currently charged at 9.5¢/kwh (Wells pers comm) and this figure is assumed for budget purposes.

7.2.4.3 Repairs and Maintenance

An allowance per jar for repairs and maintenance has been estimated on the basis of 5%/year of the realistic estimate of initial capital expenditure for installed plant and equipment, and a plant operating at capacity for 130 days/year (ie a six month season).

7.2.4.4 Labour

Budget charges are based on award rates advised by the Department of Labour, Palmerston North. Hourly rates are based on a 40 hour week and include a cost of living allowance.

Table 7.7

LABOUR AWARD RATES

A. FOOD PROCESS WORKERS AWARD

GRADE	\$/HR
4	4.65
3	4.82
2	5.00
1	5.18

B. CLERICAL WORKERS AWARD

GRADE	\$/WEEK
1	185.00
2	204.49
3	216.96
4	226.69
5	240.30

7.2.4.5 Transport

Assumes rail, sea, and road transport is used to convey products from factory to free in store at buyers warehouse. Freight charges are based on freight forwarders rates. Budget figures are based on rates advised by Mogal International Ltd for a 20 ft container that will hold 2800 cartons of product.

Table 7.8

TRANSPORT CHARGES

FREIGHT BETWEEN:		EAST COAST (NZ\$)	WEST COAST (NZ\$)
A. Opo.-Auck.	Aust.	638.00	638.00
	USA	638.00	638.00
B. Auck. to port of destination	Aust.	3201.00	5273.00
	USA	2400.00	2300.00
C. Port to free in store	Aust.	208.00	208.00
	USA	240.00	240.00
OTHER CHARGES:			
A. Insurance (prem. 1.5% of CIF value)	Aust.	1038.00	1038.00
	USA	1381.00	1381.00
B. Customs clearance	Aust.	121.00	87.00
	USA	140.00	140.00
C. NZ Documentation	Aust.	35.00	35.00
	USA	40.00	40.00
TOTAL COST:	Aust.	5241.00	7279.00
	USA	4839.00	4739.00
COST/UNIT:	Aust.	.16	.22
	USA	.14	.14

NOTE: USA customs duties and freight charges port - free in store are estimates only based on known Australian charges.

7.2.4.6 Tariffs and Duties

Budget figures are as per advice from the Department of Trade and Industries (Secker pers comm).

Table 7.9

TARIFF CHARGES

COUNTRY	PRODUCT	TARIFF ITEM	TARIFF
USA	Chutney	182.46	7.5%
	Marinade	182.46	7.5%
	Sauce	182.46	7.5%
	Pickled	149.60	7.0%
	Slices		
Aust.	Sauce	21.04.000	0
	Marinade	20.01.900	0
	Chutney	20.01.900	0
	Pickled	20.01.900	0
	Slices		

NOTE: Tariff charges are based on the GATT code at FOB level. Products are exempt sales tax in Australia. Sales tax in USA varies between states and is assumed to be additional to the retail price.

7.2.4.7 Operating Expenses

(a) A general operating allowance/jar equal to 5% of the realistic daily allowance for repairs and maintenance is assumed, to cover general cleaners, overalls, and miscellaneous operating items.

(b) Forklift time is charged at hire rates.

Budget figure is \$75/day based on monthly rates charged by Industrial Hire, Palmerston North.

(c) An allowance of \$35.09 per day of operation is budgeted to cover the cost of replenishing caustic soda in the peeler. This assumes a 1300l tank, a 20% weight for volume solution of caustic, and 10% loss per day. Caustic soda (ex Pharma Chemicals Ltd) costs \$30.20/25 kg bag.

7.2.5 Overhead Cost Assumptions

7.2.5.1 Administration

(a) Salaries - It is assumed for budget purposes that realistic overhead salaries are as follows:

Table 7.10

ADMINISTRATION SALARIES

PERSONNEL	NUMBER OF PEOPLE	SALARY PER PERSON/YR
Office person	1	\$12,500
Accountant	0.25	\$25,000
Manager	0.25	\$25,000

- (b) Vehicles - Budgets allow for 5000 kms at Government mileage rates for a car over 2 litres.

Table 7.11

VEHICLE EXPENDITURES

DISTANCE	CENTS/KM	TOTAL
1600 km at	62.35	997.60
1600 km at	53.50	856.00
1600 km at	49.10	785.60
200 km at	46.45	92.90
Total		<u>\$2,732.10</u>

- (c) Office Expenses - An allowance of 5% of administration salaries is budgeted to cover phone, mail, stationery, power and general office expenses.

7.2.5.2 Marketing

- (a) Salaries and Expenses - It is assumed for budget purposes that a marketing officer is employed with an allowance of 80% of salary for expenses. This figure was suggested by Mclisky (pers comm).
- (b) Promotion - It is assumed on the advice of Mclisky (pers comm) that NZ\$50,000/year is spent on magazine advertising and consumer information attached to products.

7.2.5.3 Standing Charges

(a) Debt Servicing - The following rates of debt servicing per \$1,000 of debt are assumed for pessimistic, realistic, and optimistic forecasts respectively, and are based on finance alternatives outlined in section 7.2.1.2.2.

Table 7.12

DEBT SERVICE CHARGES

FORECAST TYPE	DEBT SERVICING (\$/1000)
Pessimistic	266.098
Realistic	241.456
Optimistic	199.252

(b) Insurance - A budget allowance for annual plant insurance premiums of 1.1% of value is based on rates provided by State Insurance, Palmerston North.

A premium allowance of \$2,000/year to cover fruit and inventory insurance is budgeted on the advice of Wells (pers comm).

7.3 Calculation and Schedule of Common Budget Parameters

The following common budget parameters are assumed for all alternatives that are considered. In what follows realistic estimates of various common parameters are calculated and

adjusted to show pessimistic and optimistic values. Parameter values are summarised in table 7.13 at the end of this section.

7.3.1 Sales Revenue

Calculated by converting retail prices to CIF (cost insurance freight) prices in NZ\$ for both USA and Australia, using the middlemen's margins detailed in table 7.4, and then deriving an expected or average revenue based on the proportion of sales in each market, ie 88% in USA, 12% in Australia.

(a) Realistic estimate of CIF prices.

$$\begin{aligned}\text{CIF US\$} &= \text{US retail price} / \text{US middlemen's margins} \\ &= \text{US } \$2.50 / (1.1 \times 1.25 \times 1.325) \\ &= \text{US } \$1.37\end{aligned}$$

$$\begin{aligned}\text{CIF NZ\$} &= \text{US } \$1.37 / 0.501 \\ &= 2.74\end{aligned}$$

$$\begin{aligned}\text{CIF Aust\$} &= \text{Aust. retail price} / \text{Aust. middlemen's margins} \\ &= \text{Aust\$ } 2.00 / (1.075 \times 1.25 \times 1.25) \\ &= \text{Aust\$ } 1.19\end{aligned}$$

$$\begin{aligned}\text{CIF } \$\text{NZ\$} &= \text{Aust\$ } 1.19 / 0.578 \\ &= 2.06\end{aligned}$$

(b) Realistic estimate of Expected revenue.

$$\begin{aligned}\text{Expected revenue} &= (\text{US revenue} \times 0.88) + (\text{Aust. revenue} \times 0.12) \\ &= (\$2.74 \times 0.88) + (\$2.06 \times 0.12) \\ &= \$2.66/\text{unit}\end{aligned}$$

7.3.2 Transport

Calculated using the information in table 7.8 and the assumption that 88% of sales will be to the USA with the balance to Australia. The amount of product shipped to East and West Coast Australia is also assumed to be pro-rata with the number of consumers on each coast, ie 89% on the East and 11% on the West.

- (a) Realistic estimate of expected cost of transport to Australia.

$$\begin{aligned}
 \text{Expected cost} &= \text{trans. cost to W.Coast} \times \text{ppn sales} \\
 &\quad + \text{trans. cost to E.Coast} \times \text{ppn sales} \\
 &= (22 \text{ cents} \times 0.11) + (16 \text{ cents} \times 0.89) \\
 &= 17 \text{ cents/unit}
 \end{aligned}$$

- (b) Realistic estimate of expected cost of transport to Australia and USA.

$$\begin{aligned}
 \text{Expected cost} &= \text{Expected cost Aust.} \times \text{ppn sales} \\
 &\quad + \text{Expected cost USA} \times \text{ppn sales} \\
 &= (17 \text{ cents} \times 0.12) + (14 \text{ cents} \times 0.88) \\
 &= 14 \text{ cents/unit}
 \end{aligned}$$

7.3.3 Labour

Calculated using the information in table 7.7 and the following staff levels for fruit preparation, production, and packaging - 1 foreman, 1 leading hand, 1 forklift driver, and 8 process workers. This is considered to be core staff. Direct labour not common to all products is not listed here.

(a) Realistic estimate of direct labour costs per day.

	\$/DAY
1 Foreman @ \$6.50/hr	52.00
1 Leading hand @ \$6.00/hr	48.00
1 Forklift driver @ \$5.09/hr	40.72
8 Process workers @ \$5.18/hr	331.52
Quality control (Dairy factory laboratory and staff) 2 hrs/day @ \$50.00/hr	<u>100.00</u>
Total	<u>572.24</u>

NOTE: Foreman and Leading hand rates are only estimates based on award rates. The cost of quality control is also only an estimate (made by Wells pers comm).

7.3.4 Administration

Calculated using the information in tables 7.10 and 7.11 and section 7.2.5.1. Realistic estimate of these costs are:

	\$/YEAR
Salaries (see table 7.10)	25,000
Vehicles (see table 7.11)	2,732
Office expenses (5% of salaries)	<u>1,250</u>
Total	<u>28,982</u>

7.3.5 Product Development and Marketing

(a) Physical product development is budgeted at \$10,000/product as per section 7.226.

(b) Marketing costs are calculated using the assumptions in section 7.2.5.2.

Salary	- 1 person at \$25,000/yr	25,000
Expenses	- at 80% of salary	20,000
Promotion		<u>50,000</u>
	Total	<u>95,000</u>

NOTE: Salary level was suggested by Mclisky (pers comm).

7.3.6 Standing Charges

(a) Insurance - Insurance premium charges are assumed to be the same for all products. Variations in plant value between products is insufficient to cause significant differences in insurance premiums. Calculation of a realistic insurance premium is based on details in section 7.2.5.3 and capital plant budgeted for kiwifruit sauce.

$$\begin{aligned}
 \text{(i) Plant premium} &= \text{realistic plant value} \times 1.1\% \\
 &= \$295,000 \times .011 \\
 &= \$3,245.00
 \end{aligned}$$

$$\text{(ii) Fruit and inventory premium} = \$2,000$$

$$\begin{aligned}
 \text{(iii) Total premiums} &= \$3,245.00 + \$2,000 \\
 &= \$5,245.00
 \end{aligned}$$

7.3.7 Inflation

Calculated on the assumptions outlined in section 7.2.1.5 and the following information.

(a) Background to estimates of realistic price and cost inflation.

- average US annual percentage increase in food prices 1976-81=7.8% (SAUS 1982-3)
- average annual US percentage increase in general prices 1976-81=9.2% (SAUS 1982-3)
- forecast general levels of US inflation for 1984 and 1985 are 5% and 6% respectively (NZ Institute of Economic Research March 1984)

- average annual percentage increase in Australian food prices 1976-81=13% (International Marketing Data and Statistics 1983)
- average annual percentage increase in general Australian prices 1976-81=10.5% (SAUS 1982-3)
- forecast general level of Australian inflation for 1984=6.5% (NZ Institute of Economic Research March 1984)
- average annual percentage increase in general New Zealand prices 1976-81=14.9% (Source International Marketing Data and Statistics 1983)
- forecast general level of New Zealand inflation for 1984=6.5% (NZ Institute of Economic Research March 1984).

(b) Realistic estimate of expected price inflation.

Assuming that the relationship between price and general inflation persists, the following levels of price inflation will occur in 1984.

USA

$$\begin{aligned}
 \text{Food inflation 1984} &= (\text{Food infl. 1976-81} \times \text{forecast general infl. 1984}) / \text{general infl. 1976-81} \\
 &= (7.8\% \times 0.05) / 0.092 \\
 &= 4.3\%
 \end{aligned}$$

Australia

$$\begin{aligned}
 \text{Food inflation 1984} &= (\text{Food infl. 1976-81} \times \text{forecast general infl. 1984}) / \text{general infl. 1976-81} \\
 &= (13\% \times 0.065) / 0.105 \\
 &= 7.6\%
 \end{aligned}$$

Assuming that 88% of sales occur in the USA and the balance in Australia, expected price inflation equals:

$$\begin{aligned}
 \text{Expected price infl.} &= (\text{expected price infl. USA} \times \text{ppn of sales}) + (\text{expected price infl. Aust.} \times \text{ppn of sales}) \\
 &= (4.3\% \times 0.88) + (7.6\% \times 0.12) \\
 &= 4.7\%
 \end{aligned}$$

(c) Realistic estimate of expected cost inflation.

Ward (pers comm) suggests a realistic general rate of New Zealand inflation of 8% per year for the next 10 years.

7.3.8 Cost of Capital

The weighted average cost of capital (WACC) is calculated using the information in tables 7.2 and 7.3.

$WACC = (\% \text{debt finance} \times \text{cost of debt finance}) + (\% \text{equity finance} \times \text{cost of equity finance})$

(i) Pessimistic WAAC=30.4

(ii) Realistic WACC=(26.9x0.667)+(20.3x0.333)
=24.7

(iii) Optimistic WACC=(21.9x0.667)+(18.1x0.333)
=20.6

7.3.9 Schedule of Common Budget Parameters

Values of budget parameters that are common to all alternatives being considered are shown in table 7.13.

Table 7.13

VALUES OF COMMON BUDGET PARAMETERS FOR PESSIMISTIC REALISTIC, AND OPTIMISTIC SITUATIONS

PARAMETER	SITUATION		
	PESSIMISTIC (\$)	REALISTIC (\$)	OPTIMISTIC (\$)
Unit price	2.12	2.66	3.18
Transport per unit	0.17	0.14	0.11
Direct labour cost per day	684	570	456
Administration	34,800	29,000	23,200
Marketing	114,000	95,000	76,000
Insurance	6,000	5,000	4,000
Product development	12,000	10,000	8,000
FINANCIAL PARAMETERS	(%)	(%)	(%)
Price inflation	4	5	6
Cost inflation	10	8	6
Cost of capital	30.4	24.7	20.6

7.4 Investment Appraisal - Kiwifruit Sauce

7.4.1 Product Details

7.4.1.1 Product

Spicy meat sauce. The following assumed product recipe is based on recipes for plum sauce (Edmonds 1976), and tomato sauce (Browne et al 1983).

Recipe

Kiwifruit	2.7 kg
Vinegar	1.7 kg
Brown sugar	1.0 kg
Salt	120 g
Ground ginger	40 g
Mixed spices	100 g
Cayenne pepper	10 g

7.4.1.2 Production

(a) Production logic

- (i) Pulp, refine and mix ingredients.
- (ii) Heat and simmer for 2 hours.
- (iii) Bottle and pack.

(b) Production schema

```

RECEIVE→→→PEEL→→→WASH→→→MILL→→→REFINE→
→→→COOK→→→BOTTLE→→→CAP→→→COOL→→→LABEL→
→→→PACK→→→STORE

```


7.4.2 Budget Inputs

Budgeted costs and benefits are summarised in table 7.14 and table 7.15. Capital, direct, and overhead costs are detailed in appendix I.

Table 7.14

KIWIFRUIT SAUCE DIRECT COST SUMMARY

PARAMETER	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
	\$/Unit	\$/Unit	\$/Unit
Raw materials	0.30	0.25	0.20
Power	0.02	0.02	0.01
Repairs & maint.	0.01	0.01	0.01
Labour	0.08	0.07	0.05
Packaging	0.49	0.41	0.41
Transport	0.17	0.14	0.11
Operating exp.	0.01	0.01	0.01
Tariffs & duty	0.22	0.18	0.14
TOTAL	1.30	1.09	0.94

Table 7.15

KIWIFRUIT SAUCE - BUDGET INPUT DATA SUMMARY

ITEM	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
Capital cost \$	396,000	325,000	254,000
Debt finance %	100	66.7	66.7
Loan interest %	18.5	17.5	15.0
Loan period yrs	7	8	10
Price/unit \$	2.12	2.66	3.18
Direct costs per unit \$	1.30	1.09	0.94
Inflation - cost %	10.0	8.0	6.0
- revenue %	4.0	5.0	6.0
Overheads less debt servicing \$	154,000	129,000	103,200
Salvage value \$	108,448	73,856	48,102
Discount rate	0.304	0.247	0.206

7.4.3 Investment Appraisal Results

7.4.3.1 Breakeven Analysis

NPV profit (in January 1985 dollars) is projected across a range of production volumes. Results are summarised in table 7.16 and presented graphically in figure 7.1.

Table 7.16

KIWIFRUIT SAUCE NPV PROFIT VS PRODUCTION

PRODN/YR X 1000 UNITS	NPV\$ FORECAST		
	PESSIMISTIC	REALISTIC	OPTIMISTIC
0	-968,040	-912,529	-759,393
200	-699,448	275,294	1,598,222
400	-430,855	1,463,115	3,955,838
600	-162,263	2,650,937	6,313,454
800	106,332	3,838,759	8,671,071
1000	374,921	5,026,582	11,028,687
1200	643,513	6,214,404	13,386,303
1400	912,105	7,402,225	15,743,918
1600	1,180,697	8,590,047	18,101,534
1800	1,449,288	9,777,870	20,459,151
2000	1,717,881	10,967,692	22,816,767

Break-even volumes are shown in table 7.17.

Table 7.17

KIWIFRUIT SAUCE - BREAK-EVEN VOLUMES

TYPE OF FORECAST	UNITS PER YEAR	TONNES OF KIWIFRUIT PER YEAR
Pessimistic	720,820	121.10
Realistic	153,650	25.81
Optimistic	64,420	10.82
Expected	233,307	39.19
Std deviation	109,400	18.38

NOTE: Expected values and standard deviations are calculated using pert-beta.

7.4.3.2 Expected Profit

Expected profit is calculated using expected demand predictions supplied by Mclisky (pers comm).

For kiwifruit sauce Mclisky (pers comm) was supplied with the following demand information to supplement the general consumer appraisal in chapter six:

- (i) Target Consumers - Estimated to number approximately 70-75,000,000 for the budget period (see Appendix VI).
- (ii) Consumption - No free data was available on USA or Australian per head sauce consumption figures. Canadian figures for sauce and dressing consumption in 1978 and 1979 provide some indication of likely levels.

PRODUCT GROUP	CONSUMPTION KG/HEAD		GROWTH %/YEAR
	1978	1979	
Condiments	5.83	6.08	4.3
Sauce/dressing	4.13	4.26	3.15

(iii) Market Size

PRODUCT GROUP	US SALES (M\$)		
	1981	1982	1983
All condiments*	4731.6	5129.9	
Spaghetti sauce**	500		
Traditional meat sauce**	200		
Salad dressing*			506

SOURCE: * Processed Prepared Foods (May 1984)

** Giges (1982)

NOTE: Figures are wholesale figures that incorporate 82.7% of all US food stores. There is no free data available on Australian condiment consumption.

(iv) Growth - US condiment sales increased by 8% between 1981 and 1982 (Processed Prepared Foods 1984). Sales Areas Marketing Inc. (in Stowell 1983) report that in 1980-81 salad dressing and sauce sales were up 29.3% by weight and were one of the fastest growing food categories. There are no figures for Australia.

The following probabilities were assigned to the various possible sales levels. Each probability figure represents the likelihood that the firm will be able to sell that particular level of output with the given price and marketing assumptions.

DEMAND/YEAR	PROBABILITY
300 ML UNITS X 1000	
50	10
100	70
200	20
500	0
1000	0
2000	0
	<hr/>
Total	100%
	<hr/>

$$\begin{aligned}
 \text{Expected sales} &= (50,000 \times 0.1) + (100,000 \times 0.7) \\
 &\quad + (200,000 \times 0.2) \\
 &= 115,000 \text{ units/year}
 \end{aligned}$$

Using the expected sales figure, cashflows for pessimistic, realistic and optimistic cases were calculated and discounted. The Pert-beta method was then used to calculate expected (average) profit. The result shows that

$$\text{NPV (expected profit)} = -159,914$$

Expected profit is negative at the expected sales level as was expected from a comparison of expected sales and break-even volume.

7.4.3.3 Profit Sensitivity

Profit sensitivity is assessed by substituting pessimistic and optimistic values of key variables into the realistic forecast of costs and benefits at the expected level of demand. Sales volume is varied by 20% from the expected demand. Sensitivity is expressed as a percentage variation in NPV profit.

Table 7.18KIWIFRUIT SAUCE - PROFIT SENSITIVITY

PARAMETER	PROFIT VARIATION (%)	
	DOWNWARDS	UPWARDS
Capital expend.	27	27
Price received	115	89
Direct costs	52	37
Overheads less debt servicing	55	54
Salvage value	1.5	1
Sales volume	.49	.60
Price inflation	27	29
Cost inflation	61	54
Debt servicing	22	4.2

Most parameters in table 7.18 are varied by 20%. Profitability is highly sensitive to price received. Profitability is relatively sensitive to changes in overheads excluding debt servicing, demand, direct costs, and cost inflation. Profitability is relatively insensitive to capital expenditure, salvage value, price inflation, and debt servicing.

7.4.3.4 Taxation

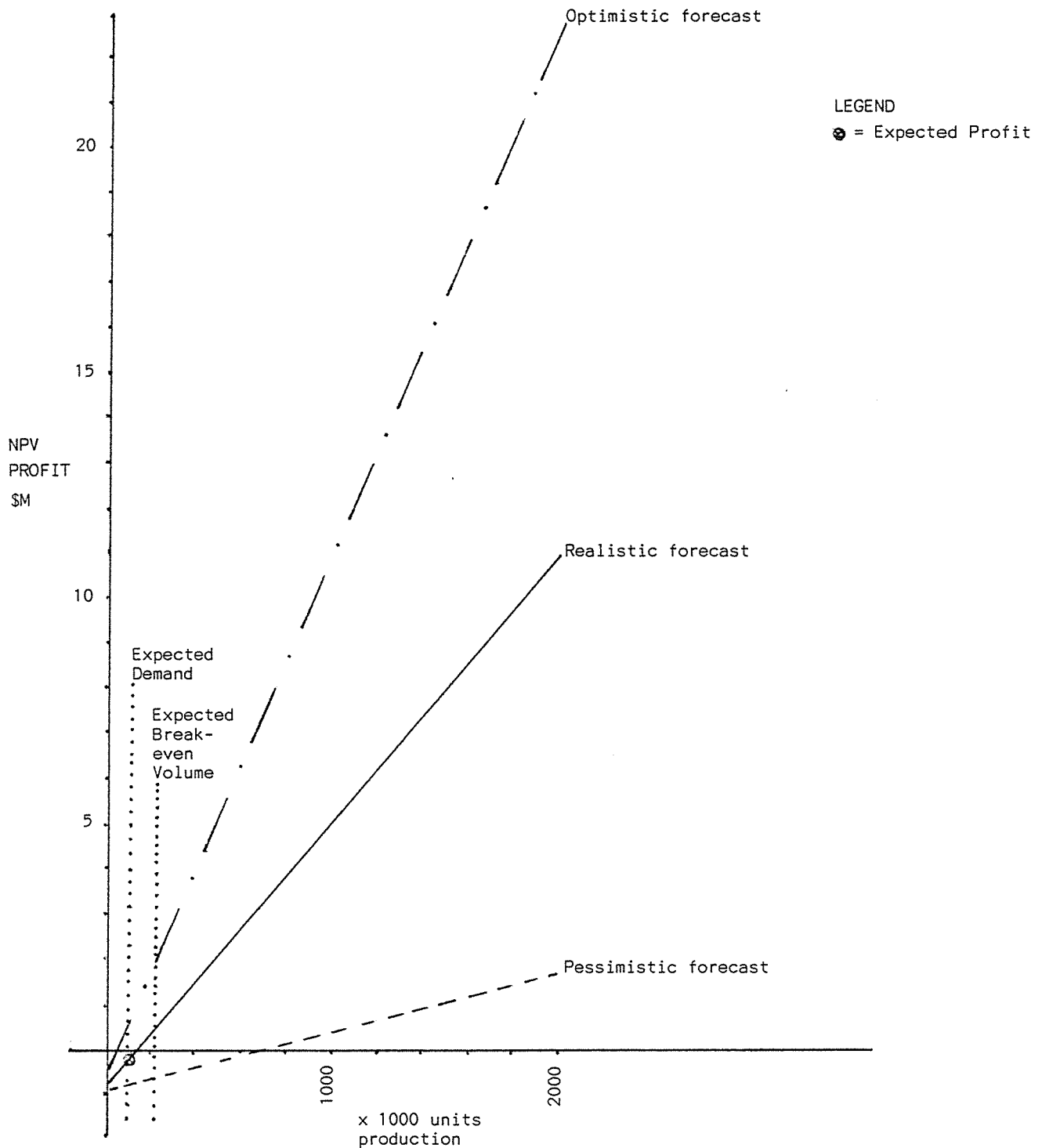
No tax would be incurred on the expected level of demand.

7.4.3.4 Profit Summary

Profitability is summarised diagrammatically in figure 7.01.

FIGURE 7.01

KIWIFRUIT SAUCE - PRODUCTION VS NPV PROFIT



7.5 Investment Appraisal - Kiwifruit Chutney

7.5.1 Product Details

7.5.1.1 Product

Spicy Relish. The following assumed product recipe is based on a recipe for feijoa chutney by Browne et al (1983).

Recipe

Kiwifruit	1200 g
Onions	150 g
Apples	400 g
Vinegar	250 g
Sugar	450 g
Salt	50 g
Mixed spices	75 g
Cayenne pepper	10 g

7.5.1.2 Production

(a) Production logic

- (i) Pulp, and mix ingredients.
- (ii) Heat and simmer for half an hour.
- (iii) Bottle and pack.

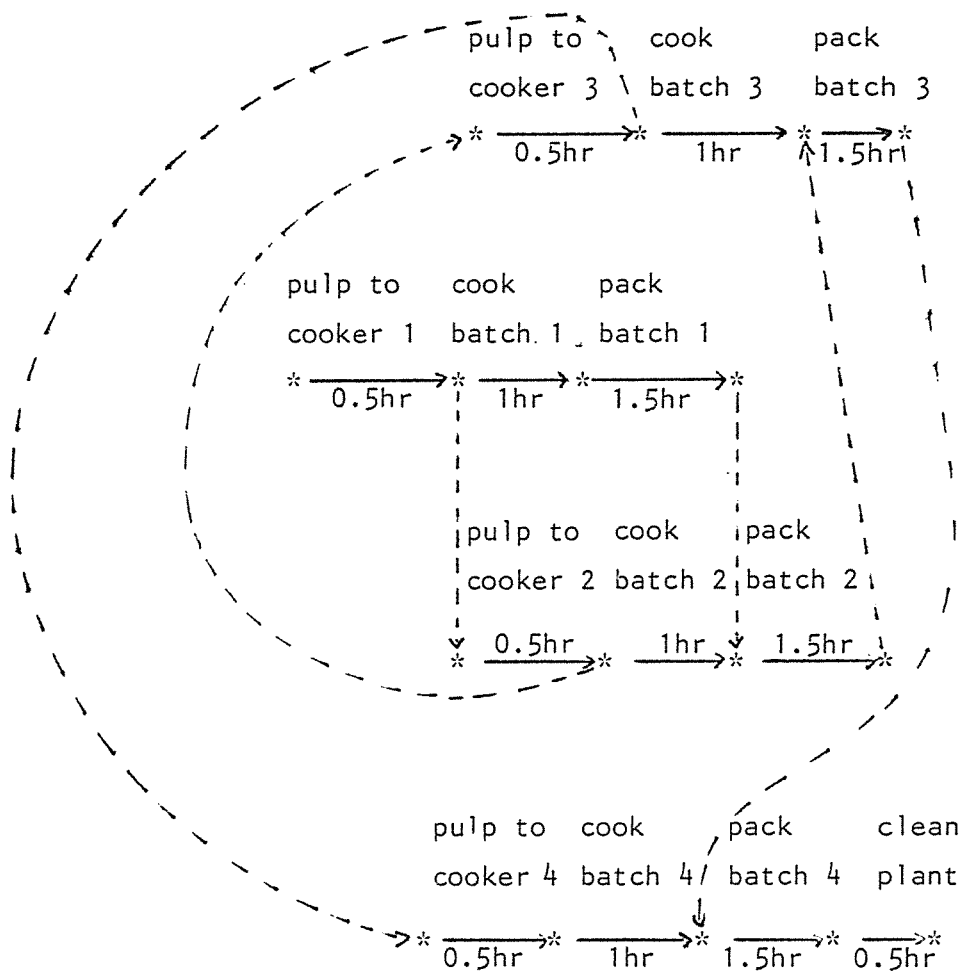
(b) Production schema

```

RECEIVE → PEEL → WASH → MILL →
→ COOK → BOTTLE → CAP → COOL → LABEL →
→ PACK → STORE

```

(c) Critical production path



Production time = 8 hours

Product output = 4 tonnes x 95% recover
 (estimated by Barnett pers comm)
 = 3.8 tonnes or 12,667 units

Pulping time = 2.0 hours

Cooking time = 4.0 hours

Packing time = 6.0 hours

7.5.2 Budget Inputs

Budget costs and benefits are summarised in table 7.19 and table 7.20. Capital, direct, and overhead costs are detailed in Appendix II.

Table 7.19

KIWIFRUIT CHUTNEY DIRECT COST SUMMARY

PARAMETER	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
	\$/Unit	\$/Unit	\$/Unit
Raw materials	0.30	0.25	0.20
Power	0.01	0.01	0.01
Repairs & maint.	0.01	0.01	0.01
Labour	0.06	0.05	0.04
Packaging	0.54	0.45	0.45
Transport	0.17	0.14	0.11
Operating exp.	0.01	0.01	0.01
Tariffs & duty	0.22	0.18	0.14
TOTAL	<u>1.32</u>	<u>1.10</u>	<u>0.87</u>

Table 7.20

KIWIFRUIT CHUTNEY - INPUT DATA SUMMARY

ITEM	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
Capital cost \$	402,000	330,000	258,000
Debt finance %	100	66.7	66.7
Loan interest %	18.5	17.5	15.0
Price/unit \$	2.12	2.66	3.18
Direct costs per unit \$	1.32	1.10	0.87
Inflation - cost %	10.0	8.0	6.0
- revenue %	4.0	5.0	6.0
Overheads less debt servicing \$	154,000	129,000	103,200
Salvage value \$	110,286	75,107	48,919
Discount rate	0.304	0.247	0.206

7.5.3 Investment Appraisal Results

7.5.3.1 Breakeven Analysis

NPV profit (in January 1985 dollars) is projected across a range of production volumes. Results are summarised in table 7.21 and presented graphically in figure 7.02.

Table 7.21

KIWIFRUIT CHUTNEY NPV PROFIT VS PRODUCTION

PRODN/YR X 1000 UNITS	NPV\$ FORECAST		
	PESSIMISTIC	REALISTIC	OPTIMISTIC
0	-916,355	-916,769	-762,792
200	-721,395	261,190	1,668,500
400	-470,437	1,439,149	4,099,791
600	-219,479	2,617,109	6,531,083
800	31,480	3,795,067	8,962,375
1000	282,439	4,973,027	11,393,667
1200	533,398	6,150,986	13,824,958
1400	784,356	7,328,945	16,256,945
1600	1,035,314	8,506,905	18,687,541
1800	1,286,274	9,684,864	21,118,833
2000	1,537,232	10,862,823	23,550,124

Breakeven volumes are shown in table 7.22.

Table 7.22

KIWIFRUIT CHUTNEY - BREAKEVEN VOLUMES

TYPE OF FORECAST	UNITS PER YEAR	TONNES OF KIWIFRUIT PER YEAR
Pessimistic	774,900	113.30
Realistic	155,650	22.76
Optimistic	62,750	9.17
Expected	243,375	35.58
Std deviation	118,692	17.36

NOTE: Expected values and standard deviations are calculated using pert-beta.

7.5.3.2 Expected Profit

Calculated using expected sales predictions supplied by Mclisky (pers comm).

For kiwifruit chutney Mclisky (pers comm) was supplied with the following demand information to supplement the general consumer appraisal in chapter six:

- (i) Target Consumers - Estimated to number approximately 70-75,000,000 for the budget period. See Appendix VI.
- (ii) Consumption - No free data was available on USA or Australian per head chutney consumption figures. Canadian figures for pickle and relish consumption in 1978 and 1979 provide some indication of likely levels.

PRODUCT GROUP	CONSUMPTION KG/HEAD		GROWTH % YEAR
	1978	1979	
Condiments	5.83	6.08	4.3
Sauce/dressing	1.70	1.82	7.06

- (iii) Market Size - No free information available.
- (iv) Growth - No free information available.

The following probabilities were assigned to the various possible sales levels. Each probability figure represents the likelihood that the firm will be able to sell that particular level of output with the given price and marketing assumptions.

DEMAND/YEAR	PROBABILITY
300 ML UNITS X 1000	
50	20
100	70
200	10
500	0
1000	0
2000	0
	<hr/>
Total	100%
	<hr/>

$$\begin{aligned}
 \text{Expected demand} &= (50,000 \times 0.2) + (100,000 \times 0.7) \\
 &\quad + (200,000 \times 0.1) \\
 &= 100,000 \text{ units/year}
 \end{aligned}$$

Using the expected sales figures, cashflows for pessimistic, realistic, and optimistic cases were calculated and discounted. The Pert-beta method was then used to calculate expected (average) profit. The result shows that

$$\text{NPV (expected profit)} = -241,491$$

Profit is negative at the expected sales level as was expected from a comparison of expected sales and breakeven volumes.

7.5.3.3 Profit Sensitivity

Profit sensitivity is assessed by substituting pessimistic and optimistic values of key variables into the realistic forecast of costs and benefits at the expected level of demand. Sales volume is varied by 20% from the expected demand. Sensitivity is expressed as a percentage variation in NPV profit.

Table 7.23

KIWIFRUIT CHUTNEY - PROFIT SENSITIVITY

PARAMETER	PROFIT VARIATION (%)	
	DOWNWARD	UPWARD
Capital expend.	19	19
Price received	70	68
Direct costs	33	35
Overheads less debt servicing	38	39
Salvage value	1	1
Sales volume	36	36
Price inflation	17	17
Cost inflation	39	35
Debt servicing	21	8

Most parameters in table 7.23 are varied by 20%. Profitability is most sensitive to prices received. Profitability is relatively sensitive to direct costs, overheads excluding debt servicing, sales volume, and cost inflation. Profitability is relatively insensitive to capital expenditure, salvage value, price inflation, and debt servicing.

7.5.3.4 Taxation

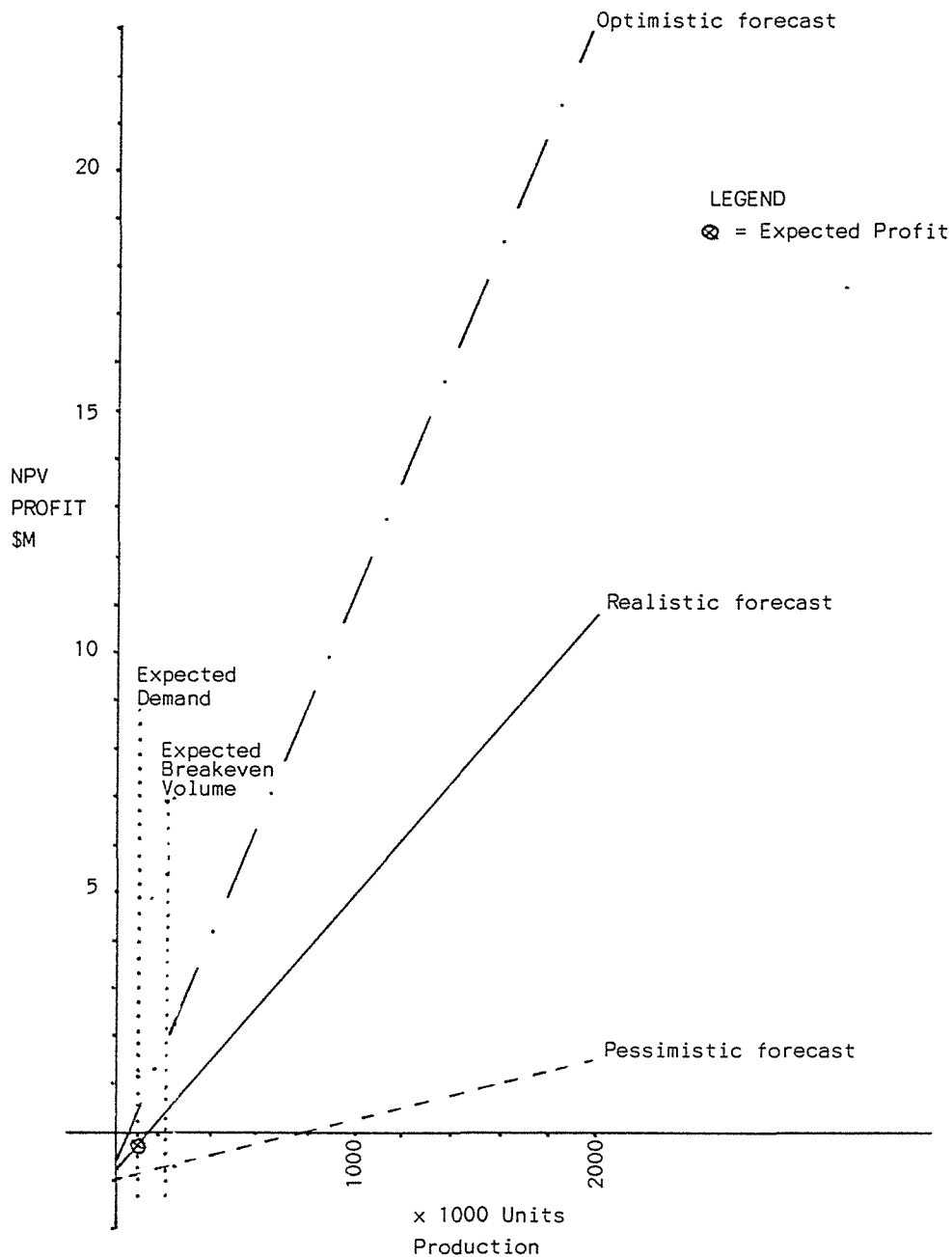
No tax would be incurred at the expected level of demand.

7.5.3.5 Profit Summary

Profitability is summarised diagrammatically in figure 7.02.

FIGURE 7.02

KIWIFRUIT CHUTNEY - PROFIT SUMMARY



7.6 Investment Appraisal - Kiwifruit Marinade

7.6.1 Product Details

7.6.1.1 Product

Liquor for steeping meat in prior to cooking.
The following assumed product recipe is based on recipes for marinated fish and meat tenderiser in Bilton (1981).

Recipe

Kiwifruit	300 g
Onions	50 g
Cider vinegar	200 g
Chillie	25 g
Grated ginger	25 g

7.6.1.2 Production

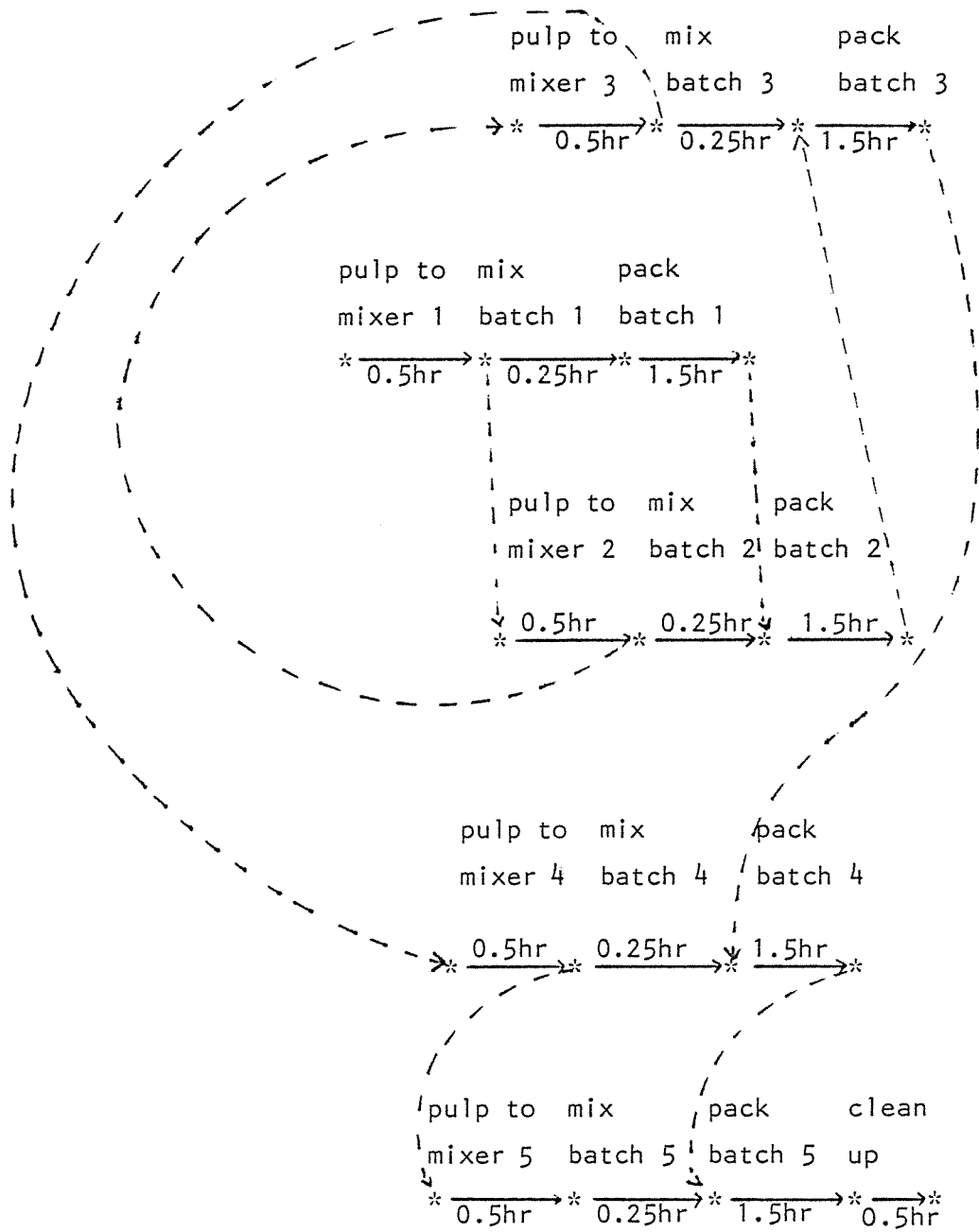
(a) Production logic

- (i) Pulp, refine, and mix ingredients.
- (ii) Bottle and pack.

(b) Production schema

RECEIVE→→→PEEL→→→WASH→→→MILL→→→REFINE→
→→→BOTTLE→→→CAP→→→LABEL→→→PACK→→→STORE

(c) Critical production path



Production time = 8.75 hours
 Product output = 5 tonnes x 95% recovery
 (estimated by Barnett pers comm)
 = 4.75 tonnes or 15,833 units
 Pulping time = 2.5 hours
 Mixing time = 1.25 hours
 Packing time = 7.5 hours

7.6.2 Budget Inputs

Budget costs and benefits are summarised in table 2.24 and table 7.25. Capital, direct, and overhead costs are detailed in Appendix III.

Table 7.24

KIWIFRUIT MARINADE DIRECT COST SUMMARY

PARAMETER	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
	\$/Unit	\$/Unit	\$/Unit
Raw materials	0.48	0.40	0.32
Power	0.01	0.01	0.01
Repairs & maint.	0.01	0.01	0.01
Labour	0.05	0.04	0.03
Packaging	0.49	0.41	0.41
Transport	0.17	0.14	0.11
Operating exp.	0.01	0.01	0.01
Tariffs & duty	0.22	0.18	0.14
TOTAL	<u>1.44</u>	<u>1.20</u>	<u>1.04</u>

Table 7.25KIWIFRUIT MARINADE - INPUT DATA SUMMARY

ITEM	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
Capital cost \$	324,000	265,000	206,000
Debt finance %	100	66.7	66.7
Loan interest %	18.5	17.5	15.0
Price/unit \$	2.12	2.66	3.18
Direct costs per unit \$	1.44	1.20	1.04
Inflation - cost %	10.0	8.0	6.0
- revenue %	4.0	5.0	6.0
Overheads less debt servicing \$	154,000	129,000	103,200
Salvage value \$	86,391	58,834	38,320
Discount rate	0.304	0.247	0.206

7.6.3 Investment Appraisal Results7.6.3.1 Breakeven Analysis

NPV profit (in January 1985 dollars) is projected across a range of production volumes. Results are summarised in table 7.26 and presented graphically in figure 7.03.

Table 7.26KIWIFRUIT MARINADE NPV PROFIT VS PRODUCTION

PRODN/YR X 1000 UNITS	NPV\$ FORECAST		
	PESSIMISTIC	REALISTIC	OPTIMISTIC
0	-916,257	-861,648	-718,618
200	-771,097	217,682	1,533,748
400	-625,940	1,297,013	3,786,112
600	-480,781	2,376,342	6,038,477
800	-335,622	3,455,672	8,290,843
1000	-190,465	4,535,001	10,543,208
1200	-45,306	5,614,332	12,795,585
1400	99,853	6,693,662	15,047,939
1600	245,011	7,772,992	17,300,304
1800	390,170	8,852,322	19,552,670
2000	535,329	9,931,651	21,805,035

Profitability above the expected breakeven volume is very high.

Breakeven volumes are shown in table 7.27.

Table 7.27

KIWIFRUIT MARINADE - BREAKEVEN VOLUMES

TYPE OF FORECAST	UNITS PER YEAR	TONNES OF KIWIFRUIT PER YEAR
Pessimistic	1,262,400	199.33
Realistic	159,660	26.61
Optimistic	63,810	10.08
Expected	327,475	52.64
Std deviation	155,821	31.54

NOTE: Expected values and standard deviations are calculated using pert-beta.

Expected breakeven volume is very low relative to the capacity of the budgeted plant.

7.6.3.2 Expected Profit

Calculated using expected sales predictions supplied by Mclisky (pers comm).

For kiwifruit marinade Mclisky (pers comm) was supplied with the following demand information to supplement the general consumer appraisal in chapter six:

- (i) Target Consumers - Estimated to number approximately 70-75,000,000 for the budget period. See Appendix VI.
- (ii) Consumption - No free information available.

- (iii) Market Size - Giges (1982) reports that the US market for marinades is \$20,000,000. It is presumed that this information relates to 1981 sales but no year is given.
- (iv) Growth - There is no free data that quantifies growth in the US or Australian marinade sales. Comments by Giges (1982) that, "As Americans seek more variety, convenience and economy in meal preparation, they are becoming enamored with sauces, marinades and toppings-", suggests that marinades will enjoy positive growth.

The following probabilities were assigned to the various possible sales levels. Each probability figure represents the likelihood that the firm will be able to sell that particular level of output with the given price and marketing assumptions.

SALES/YEAR	PROBABILITY
300 ML UNITS X 1000	
50	10
100	70
200	20
500	0
1000	0
2000	0
	<hr/>
Total	100%
	<hr/>

$$\begin{aligned}\text{Expected sales} &= (50,000 \times 0.1) + (100,000 \times 0.7) \\ &\quad + (200,000 \times 0.2) \\ &= 115,000 \text{ units/year}\end{aligned}$$

Using the expected sales figures, cashflows for pessimistic, realistic, and optimistic cases were calculated and discounted. The Pert-beta method was then used to calculate expected (average) profit. The result shows that

$$\text{NPV (expected profit)} = -172,931$$

Profit is negative at the expected level of demand as was expected from a comparison of expected sales and breakeven volumes.

7.6.3.3 Profit Sensitivity

Profit sensitivity is assessed by substituting pessimistic and optimistic values of key variables into the realistic forecast of costs and benefits at the expected level of demand. Sales volume is varied by 20% from the expected demand. Sensitivity is expressed as a percentage variation in NPV profit.

Table 7.28

KIWIFRUIT MARINADE - PROFIT SENSITIVITY

PARAMETER	PROFIT VARIATION (%)	
	DOWNWARD	UPWARD
Capital expend.	21	21
Price received	110	95
Direct costs	57	38
Overheads less debt servicing	51	53
Salvage value	1	1
Sales volume	51	51
Price inflation	26	27
Cost inflation	59	53
Debt servicing	23	9

Most parameters in table 7.28 are varied by 20%. Profitability is most sensitive to prices received. Profitability is relatively sensitive to direct costs, overheads excluding debt servicing, sales volumes, and cost inflation. Profitability is relatively insensitive to capital expenditure, salvage value, price inflation, and debt servicing.

7.6.3.4 Taxation

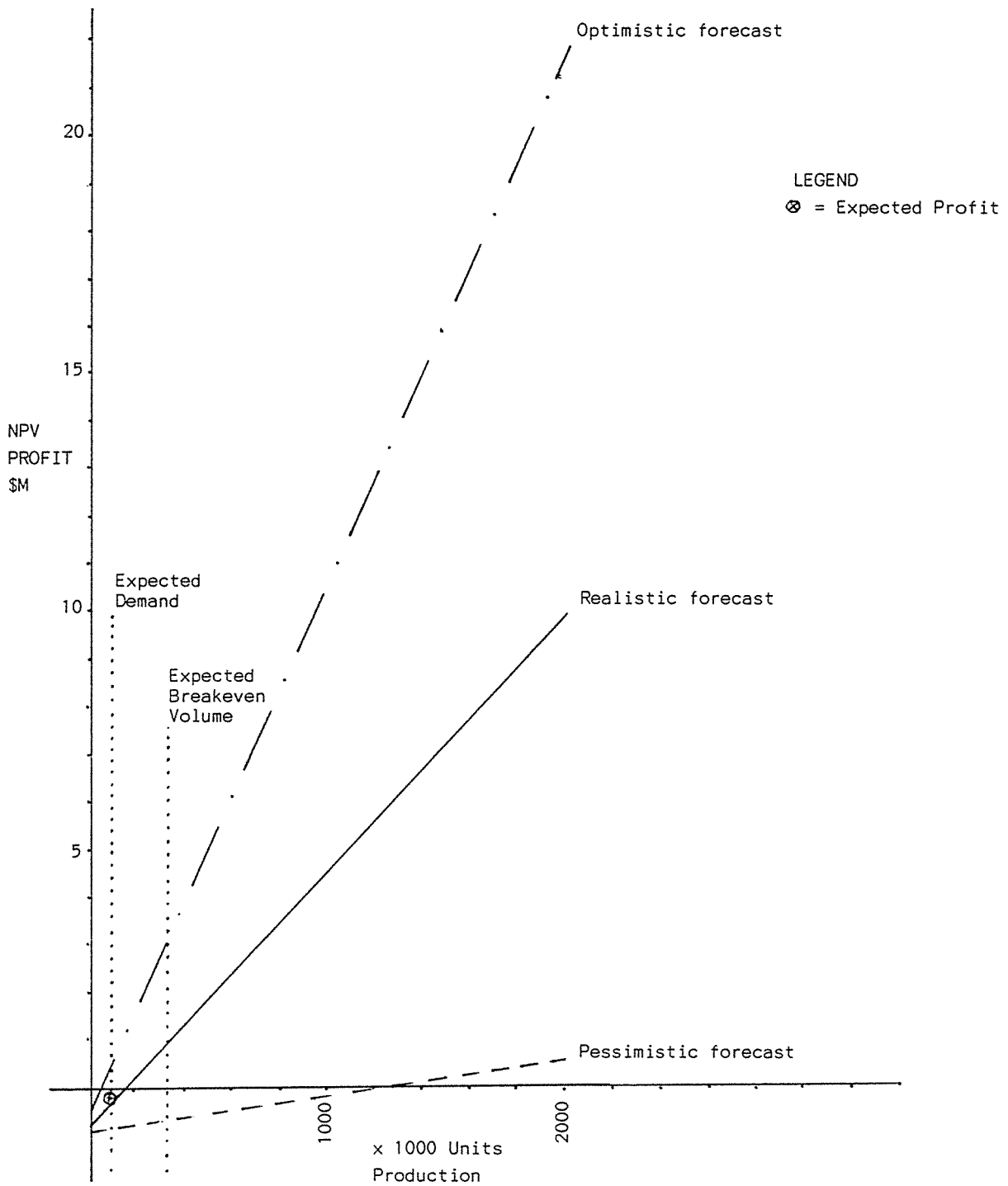
No tax would be incurred at the expected level of demand.

7.6.3.5 Profit Summary

Profitability is summarised diagrammatically in figure 7.03.

FIGURE 7.03

KIWIFRUIT MARINADE - PROFIT SUMMARY



7.7. Investment Appraisal - Pickled Kiwifruit Slices

7.7.1 Product Details

7.7.1.1 Product

Kiwifruit slices fermented and packed in brine. The following assumed product recipe is based on a general description of fermentation pickling in 'All About Pickling' (J K McNair Ed. 1980).

Recipe

- (i) Submerge and store slices in an 8% brine solution.
- (ii) Remove scum daily from surface and sides and top up brine levels as required.
- (iii) When bubbling desists (ie fermentation has ceased), bottle in fresh brine.

7.7.1.2 Production

(a) Production logic

- (i) Peel and slice fruit.
- (ii) Ferment in brine.
- (iii) Bottle and pack.

(b) Production schema

```
RECEIVE→→→PEEL→→→WASH→→→SLICE→→→BRINE→
→→→HAND PACK→→→BOTTLE→→→CAP→→→LABEL→
→→→PACK→→→STORE
```

(c) Critical production path

- (i) Stage 1 - Peeling and slicing at
-
- 2 tonnes/hour.

Daily production = 2 tonne/day x 8 hours
= 16 tonnes/day

Production time = 8.0 hours

Product output = 16.0 tonnes of
ingredient x 95%
recover in peeled
slices (advised by
Barnett pers comm)

Peeling and
slicing time = 8.0 hours

- (ii) Stage 2 - Fermentation.

Production time = 6 weeks

- (iii) Stage 3

hand fill jars bottle and pack
* —————> * * —————> *

Stage three output is governed by the speed of handfilling slices into jars. On the advice of Barnett (pers comm) this rate is assumed to be 10 bottles per minute for a two man hand pack filler, ie 25% of the capacity of the automatic bottling plant.

rate/day = 10 units/minute x 60 minutes/hour x 8 hours/day
= 4,800 units/day

Assuming jars are two-thirds full of fruit and one-third full of brine -

fruit packed/day = 4,800 x 300ml units/day x 0.667
= 960.48 kg

Production time = 8.0 hours

Product output = 961 kg of fruit and 4,800
units of product

Packing time - hand pack = 8.0 hours

- auto pack = 2.0 hours

7.7.2 Budget Inputs

Budget costs and benefits are summarised in table 7.29 and table 7.30. Capital, direct, and overhead costs are detailed in Appendix IV.

Table 7.29

KIWIFRUIT PICKLED SLICES - DIRECT COST SUMMARY

PARAMETER	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
	\$/Unit	\$/Unit	\$/Unit
Raw materials	0.14	0.12	0.10
Power	0.01	0.01	0.01
Repairs & maint.	0.02	0.02	0.02
Labour	0.18	0.15	0.12
Packaging	0.54	0.45	0.45
Transport	0.17	0.14	0.11
Operating exp.	0.02	0.02	0.02
Tariffs & duty	0.20	0.17	0.14
TOTAL	1.28	1.08	0.97

Table 7.30

PICKLED SLICES - INPUT DATA SUMMARY

ITEM	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
Capital cost \$	453,600	373,000	292,400
Debt finance %	100	66.7	66.7
Loan interest %	18.5	17.5	15.0
Price/unit \$	2.12	2.66	3.18
Direct costs per unit \$	1.28	1.08	0.97
Inflation - cost %	10.0	8.0	6.0
- revenue %	4.0	5.0	6.0
Overheads less debt servicing \$	154,000	129,000	103,000
Salvage value \$	126,094	85,873	55,930
Discount rate	0.304	0.247	0.206

7.7.3 Investment Appraisal Results

7.7.3.1 Breakeven Analysis

NPV profit (in January 1985 dollars) is projected across a range of production volumes. Results are summarised in table 7.31 and presented graphically in figure 7.04.

Table 7.31

PICKLED SLICES - NPV PROFIT VS PRODUCTION

PRODN/YR X 1000 UNITS	NPV\$ FORECAST		
	PESSIMISTIC	REALISTIC	OPTIMISTIC
0	(1,009,466)	(953,233)	(792,013)
200	(723,24)	244,451	1,534,027
400	(437,014)	1,442,136	3,860,068
600	(150,780)	2,639,822	6,186,109
800	135,436	3,837,506	8,512,149
1000	421,661	5,035,191	10,838,190
1200	707,887	6,232,877	13,164,232
1400	994,113	7,430,561	15,490,272
1600	1,280,338	8,628,246	17,816,313
1800	1,566,563	9,825,932	20,142,354
2000	1,852,788	11,023,616	22,468,394

Breakeven volumes are shown in table 7.32.

Table 7.32

PICKLED SLICES - BREAKEVEN VOLUMES

TYPE OF FORECAST	UNITS PER YEAR	TONNES OF KIWIFRUIT PER YEAR
Pessimistic	705,350	148.57
Realistic	159,175	33.53
Optimistic	68,100	14.34
Expected	235,025	49.51
Std deviation	106,208	22.37

NOTE: Expected values and standard deviations are calculated using pert-beta.

Expected breakeven volume is very low relative to the capacity of the plant.

7.7.3.2 Expected Profit

Calculated using expected demand predictions supplied by Mclisky (pers comm).

For pickled kiwifruit slices Mclisky (pers comm) was supplied with the following demand information to supplement the general consumer appraisal in chapter six:

- (i) Target Consumers - Estimated to number approximately 70-75,000,000 for the budget period. See Appendix VI.
- (ii) Consumption - No free data was available on USA or Australian per head pickled fruit consumption figures. Canadian figures for pickle and relish consumption in 1978 and 1979 provide some indication of likely levels.

PRODUCT GROUP	CONSUMPTION KG/HEAD		GROWTH % YEAR
	1978	1979	
Condiments	5.83	6.08	4.3
Pickles/relish	1.70	1.82	7.06

- (iii) Market Size - No free information available.
- (iv) Growth - No free information available.

The following probabilities were assigned to the various possible sales levels. Each probability figure represents the likelihood that the firm will be able to sell that particular level of output with the given price and marketing assumptions.

DEMAND YEAR	PROBABILITY
300 ML UNITS X 1000	
50	40
100	50
200	10
500	0
1000	0
2000	0
	<hr/>
Total	100%

$$\begin{aligned}
 \text{Expected demand} &= (50,000 \times 0.4) + (100,000 \times 0.5) \\
 &\quad + (200,000 \times 0.1) \\
 &= 90,000 \text{ units/year}
 \end{aligned}$$

Using the expected sales figures, cashflows for pessimistic, realistic and optimistic cases were calculated and discounted. The Pert-beta method was then used to calculate expected profit. The result shows that

$$\text{NPV (expected profit)} = -326,176$$

Profit is negative at the expected level of demand as was expected from a comparison of expected sales and breakeven volumes.

7.7.3.3 Profit Sensitivity

Profit sensitivity is assessed by substituting pessimistic and optimistic values of key variables into the realistic forecast of costs and benefits at the expected level of output. Sales volume is varied by 20% from the expected level. Sensitivity is expressed as a percentage variation in NPV profit.

Table 7.33

PICKLED KIWIFRUIT SLICES - PROFIT SENSITIVITY

PARAMETER	PROFIT VARIATION (%)	
	DOWNWARD	UPWARD
Capital expend.	17	17
Price received	50	48
Direct costs	21	12
Overheads less debt servicing	30	31
Salvage value	1	1
Sales volume	26	26
Price inflation	12	12
Cost inflation	30	27
Debt servicing	21	9

Most parameters in table 7.33 are varied by 20%. Profitability is relatively sensitive to price, overheads excluding debt servicing, sales volume, and cost inflation. Profitability is relatively insensitive to capital expenditure, direct costs, salvage value, price inflation, and debt servicing.

7.7.3.4 Taxation

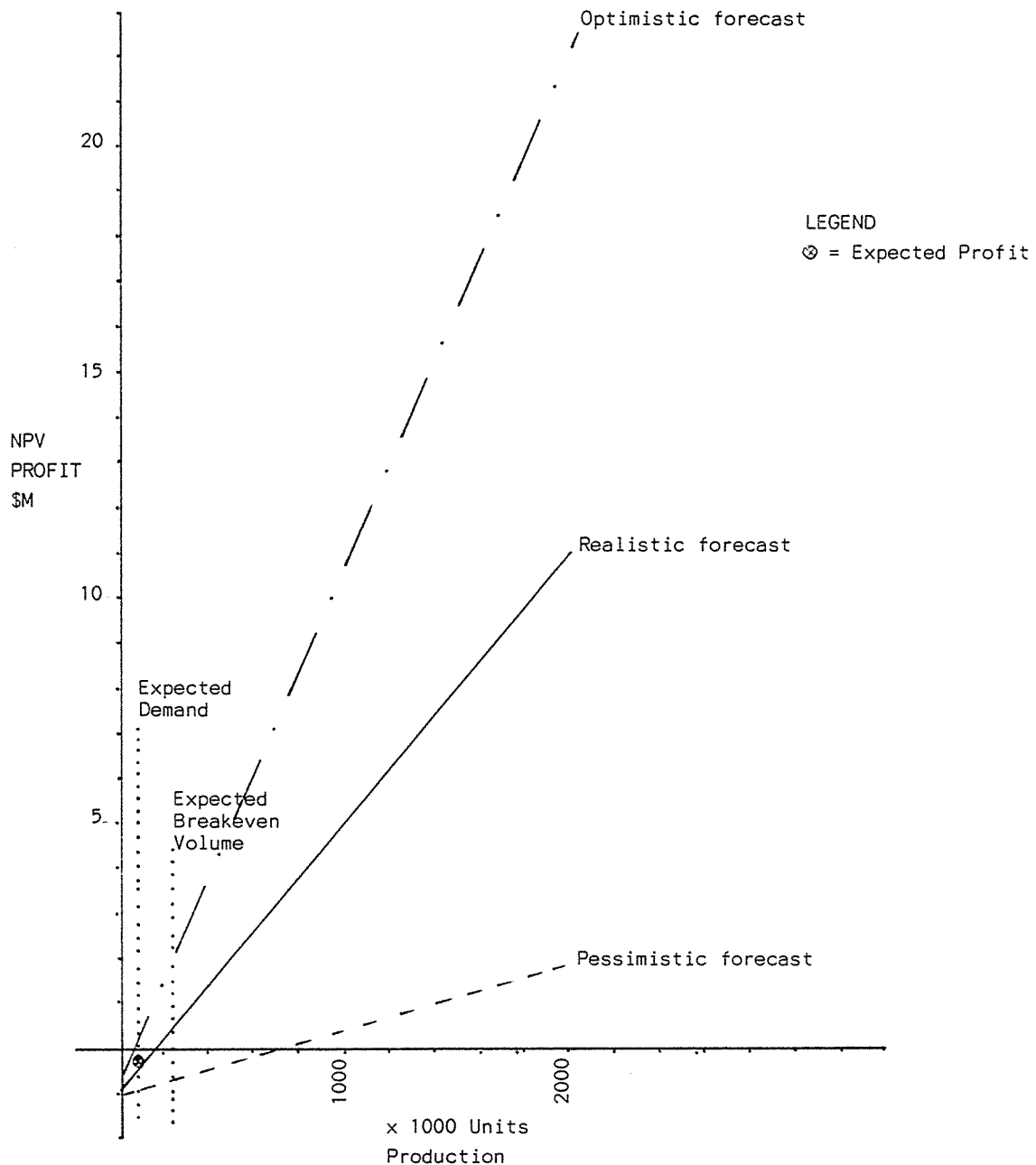
No tax would be incurred at the expected level of demand.

7.7.3.5 Profit Summary

Profitability is summarised diagrammatically in figure 7.04.

FIGURE 7.04

PICKLED KIWIFRUIT SLICES - PRODUCTION VS NPV PROFIT



7.8 Investment Appraisal - Product Line

In this section the profitability of making sauce, pickled slices, marinade, and chutney as a product line is considered. There is a high degree of production synergy between these products, and the budgeted plant and overhead structures have the capacity to make all four products. Increased utilisation of fixed resources means that overhead costs for a product line are only slightly higher than overheads budgeted against each individual product.

7.8.1 Budget Inputs

Budget costs and benefits are summarised in table 7.34. Capital, direct, and overhead costs are detailed in Appendix V.

Table 7.34

PRODUCT LINE - INPUT DATA SUMMARY

ITEM	TYPE OF FORECAST		
	PESS.	REAL.	OPT.
Capital cost \$	660,000	545,000	430,000
Debt finance %	100	66.7	66.7
Loan interest %	18.5	17.5	15.0
Loan term (yrs)	7	8	10
Price unit \$	2.12	2.66	3.18
Direct costs per unit \$	1.34	1.12	0.96
Inflation - cost %	10.0	8.0	6.0
- revenue %	4.0	5.0	6.0
Overheads less debt servicing \$	154,000	129,000	103,200
Salvage value \$	178,296	121,424	79,086
Discount rate	0.304	0.247	0.206

7.8.2 Investment Appraisal Results

7.8.2.1 Breakeven Analysis

NPV profit (in January 1985 dollars) is projected across a range of production volumes. Results are summarised in table 7.35 and presented graphically in figure 7.05.

Table 7.35

PRODUCT LINE - NPV PROFIT VS PRODUCTION

PRODN/YR X 1000 UNITS	NPVS FORECAST		
	PESSIMISTIC	REALISTIC	OPTIMISTIC
0	-1,155,088	-1,099,858	-909,611
200	-921,763	58,376	1,426,955
400	-688,437	1,216,609	3,763,521
600	-455,112	2,374,842	5,100,087
800	-221,787	3,533,076	7,436,653
1000	11,539	4,691,309	10,773,219
1200	244,864	5,849,542	13,109,784
1400	478,189	7,007,776	15,446,350
1600	711,514	8,166,009	17,782,916
1800	944,840	9,324,242	20,119,482
2000	1,178,165	10,482,476	22,456,048

Breakeven volumes are low relative to the capacity of the plant. Profitability above breakeven volumes is very high.

Breakeven volumes are shown in table 7.36.

Table 7.36PRODUCT LINE - BREAKEVEN VOLUMES

TYPE OF FORECAST	UNITS PER YEAR	TONNES OF KIWIFRUIT PER YEAR
Pessimistic	990,000	169.92
Realistic	190,000	32.61
Optimistic	77,900	13.37
Expected	304,650	52.29
Std deviation	152,017	26.09

NOTE: Expected values and standard deviations
are calculated using pert-beta.

7.8.2.2 Expected Profit

Expected profit is calculated at the expected sales level of 420,000 units/year. 420,000 units converts to 72.09 tonnes of kiwifruit. The results show that

$$\underline{\text{NPV (expected)} = \$1,569,761}$$

Expected profit is strongly positive at the expected sales level. Details of realistic cashflow forecasts at the expected demand level are shown in table 7.38.

7.8.2.3. Profit Sensitivity

Profit sensitivity is assessed by substituting pessimistic and optimistic values of key variables into the realistic forecast of costs and benefits at the expected sales level. Sales volume is varied by 20% from the expected level.

Sensitivity is expressed as a percentage variation in NPV profit.

Table 7.37

PRODUCT LINE - PROFIT SENSITIVITY

PARAMETER	PROFIT VARIATION (%)	
	DOWNWARD	UPWARD
Capital expend.	8	8
Price received	72	70
Direct costs	34	25
Overheads less debt servicing	9	10
Debt servicing	19	19
Sales volume	37	13
Price inflation	17	18
Cost inflation	24	21
Salvage value	0	0

Compared with individual products, the profitability of a product line is far less sensitive to changes in all variables. In relative terms profit is still highly sensitive to changes in price. Profit is also reasonably sensitive to changes in direct costs and sales volume. It is relatively insensitive to changes in capital expenditure, overheads less debt servicing, price and cost inflation, and salvage value.

7.8.2.4 Taxation

The effect of taxation on NPV profit is illustrated in table 7.38 which shows the realistic estimate of NPV profit at the expected sales level, with and without taxation included. For tax calculations plant is depreciated by 10% per year on a diminishing value basis, and tax payments are deferred by one year. Tax has an appreciable impact on profit.

Table 7.38

PRODUCT LINE - REALISTIC CASHFLOW FORECAST AT EXPECTED DEMAND

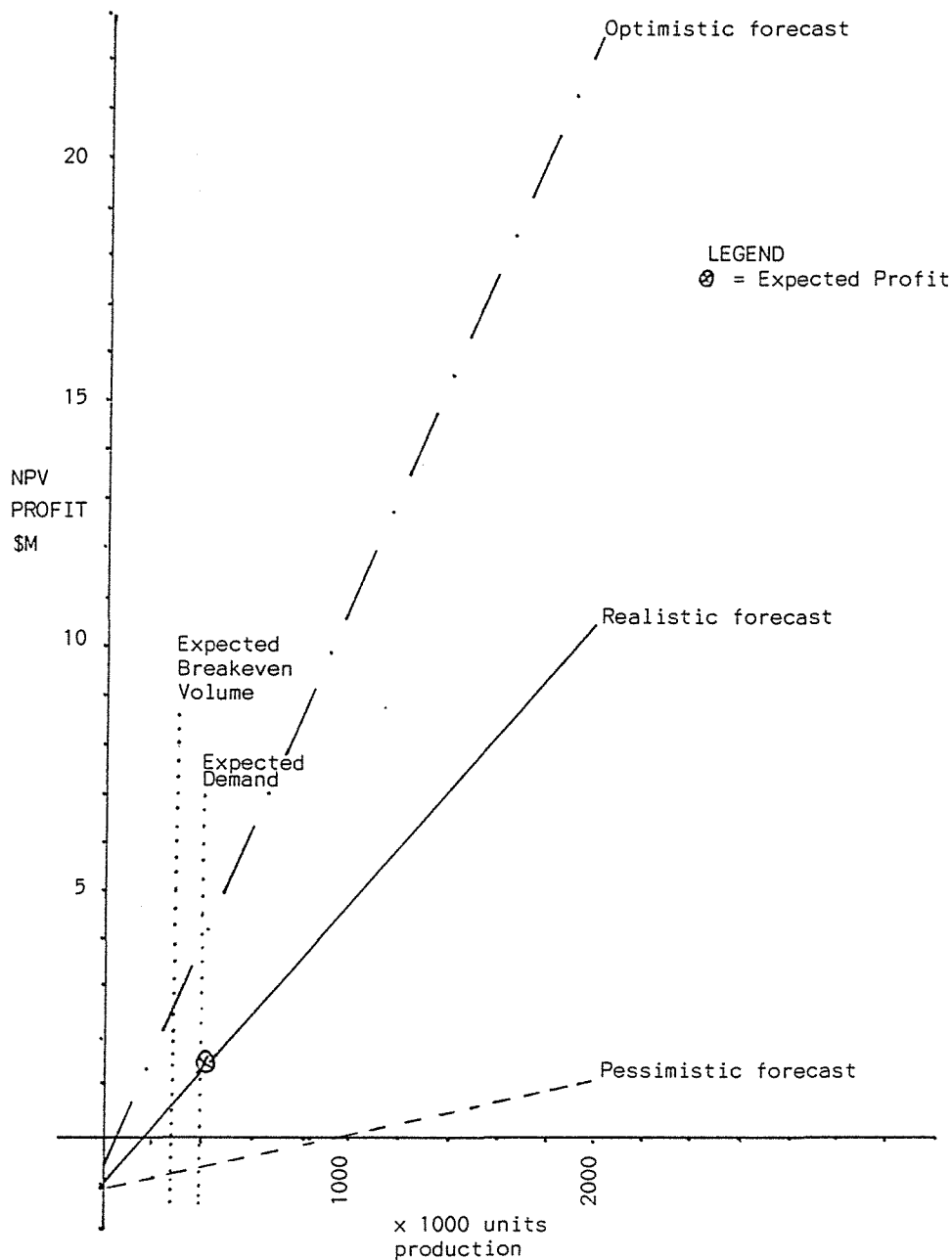
YEAR	0	1	2	3	4	5	6	7	8	9	10	11
A WITHOUT TAX												
Sales revenue		1,231,713	1,293,299	1,357,964	1,425,862	1,497,155	1,572,013	1,650,613	1,733,144	1,819,801	1,910,791	
Loan revenue	392,596											
Salvage revenue											121,424	
Capital expenditure	588,600											
Direct costs		548,675	592,569	639,974	691,172	746,466	8,016,183	870,678	940,332	1,015,558	1,096,802	
Overheads less debt servicing		150,466	162,503	175,503	189,543	204,707	221,083	238,770	257,872	278,501	300,781	
Debt servicing		94,795	94,795	94,795	94,795	94,795	94,795	94,795	94,795			
Net Cashflow R = 24.7% NPV = 1,332,432	-196,004	437,778	443,432	447,692	450,352	451,188	449,952	446,371	440,146	525,741	634,631	
B WITH TAX												
Cashflow	-196,004	437,778	443,432	447,692	450,352	451,188	449,952	446,371	440,146	525,741	634,631	
Tax			186,046	192,675	198,792	204,383	209,436	213,939	217,898	221,242	272,234	256,621
Net Cashflow R = 19.0% NPV = 962,921	-196,004	437,778	257,286	255,017	251,560	246,805	240,516	232,432	222,248	304,499	407,347	-255,621

7.8.2.5 Profit Summary

The profitability of making a condiment product line of pickled slices, chutney, sauce, and marinade, is summarised diagrammatically in figure 7.05.

FIGURE 7.05

PRODUCT LINE - PROFIT SUMMARY



7.9 Chapter Summary

In this chapter the profitability of the Opotiki Fruit Growers Co-operative processing kiwifruit into pickled slices, sauce, chutney, or marinade was examined. Each product was assessed individually and then as part of a product line involving all four products.

For each alternative profitability was estimated across a range of outputs volumes that reflected the capacity of the budgeted plant. Profitability was also estimated at the expected level of demand.

None of the four products examined is profitable by itself. Relative to the capacity of the budgeted plant, breakeven volumes for all products are low. However, for all products, the expected demand is below the expected breakeven volume and plant utilisation is poor.

Production of a product line involving all four products is the only profitable alternative. There is a high degree of synergy between the production of all four products, and budgeted plant and overhead structures have the capacity to make all four products. Production resources are utilised more efficiently and overhead costs per unit are substantially reduced.

Profit is highly sensitive to changes in factory price. Factory price level is influenced by foreign currency exchange rates and middlemen's margins. In this appraisal high levels of profitability from relatively low production volumes can be attributed to the low value of the New Zealand dollar.

CHAPTER 8

8 DISCUSSION AND CONCLUSIONS

In this final chapter the methodology used and the results obtained are discussed in terms of the objectives outlined in chapter one, and conclusions are drawn.

8.1 The Analytical Framework

One objective of this study was to develop and evaluate an analytical framework for consumer orientated economic evaluations of new product opportunities.

It is concluded that the analytical framework that was developed in this study is an appropriate framework for consumer orientated economic evaluations of new product opportunities. Some modifications to the way the framework was applied in the case study are recommended however.

In what follows, the analytical framework that was developed and applied to the case study, is discussed in its component parts.

8.1.1 Strategic Planning

Although this study concentrated mainly on investment analysis as part of the product development process, a broad strategic planning framework is considered appropriate because, in order of priority, it considers:

1. The need to consider strategic change.
2. Whether product development is a suitable type of of strategic change.
3. The constraints or guides that should be applied to ensure that new products are feasible and viable.

A strategic planning context is also important to the adoption of a market or consumer orientation. By defining product-market scope and growth vector criteria in terms of consumer needs, the product development process is guided towards products that will satisfy these needs. However these consumer based criteria are only two of the five criteria used to assess the overall practicality of a product idea. While it is considered appropriate to consider practicality in terms of both consumer and production aspects, consideration should be given to differential weighting of criteria. In the case study, criteria are given equal weighting in the multi-attribute analysis that is completed in the preliminary evaluation of product ideas. It is therefore possible for production based practicality criteria to outweigh consumer based practicality criteria, so that the products that are selected for further development might not satisfactorily meet consumer needs. The need to consider weighting criteria is discussed further at the end of section 8.1.3.

A review of consumer trends and needs is an important part of a market orientated approach to strategic planning. This review is needed to define and apply product-market scope and growth vector criteria. It is also needed for the economic appraisals that are carried out in the product development process, where a consumer orientation manifests itself in decisions on product pricing, promotion, packaging, and distribution.

A strategic planning context for product development is also important where, as in the case study, business partners are sought for the development project. In these situations the criteria formulated in the strategic planning process serve to guide the search and evaluation of potential partners.

8.1.2 Product Development

In the narrower view the management model for product development provides the central setting for economic evaluations of new product opportunities. While this model provides a suitable framework for these economic evaluations, there are many situations where it would be inappropriate to follow the model too rigidly. Situations where some steps in the model may be eliminated or glossed over, include those where:

1. The products being considered are established commodities that are new only to the individual producer, but not the market.

2. The level of business risk and development cost is low. For example, a firm may be considering a line variation of a successful product for which only minimal development expenditure is required.
3. Speed of product development is crucial to market success.
4. Additional research information is not justified. Although it was not used in this study, the value of additional information is usually weighed against its cost using Bayesian analysis. This technique involves anticipating the changes that would result from additional information, and comparing any increase in expected profit that would result from these changes, with the cost of acquiring the additional information.

For the case study in this thesis it is considered appropriate that the model be strictly applied. Speed of development is not crucial, development costs are relatively high, business risk exists, and kiwifruit variations of the products being considered are new to the market.

8.1.3 Economic Appraisal

As it was applied in the case study, economic appraisal was treated as one of six steps in the product development process. The purpose of the preliminary evaluation was to confine investment appraisals to the most

practical alternatives. Similarly the purpose of investment analyses was to identify profitable alternatives for physical development. There are several limitations to this approach.

1. Ideas eliminated at any step in the product development process are not reconsidered unless all alternatives surviving that step are eliminated at some later step in the process.
2. The majority of ideas are eliminated during the preliminary evaluation without any assessment of profitability.
3. Profitable ideas surviving investment appraisal are not re-assessed for practicality before proceeding to physical development.
4. There is no opportunity to consider a trade-off between profitability and practicality.

It is considered that the perceived limitations to the way the product development model was applied to the case study, could be overcome by performing a multi-attribute analysis at each step in the product development model. It is envisaged that the multi-attribute analysis would be of the form used in the preliminary evaluation in the case study, but expanded to include a separate index for NPV or IRR profit.

This would position investment analysis as a component of each step of the product development model, rather than as one separate step. It is also envisaged that, as before, only the most promising alternatives would be selected for next-step evaluation, but that the results of next-step evaluation would be revised estimates of both practicality and profitability. These could then be compared with the indices for profit and practicality previously assigned to all the other product ideas. In this way the process is made more dynamic so that no idea is eliminated outright, and a next step decision could involve going back and developing one step further, ideas that were previously disregarded but now appear relatively more favourable. The next step could alternatively be a decision to go forward and develop still further product ideas that are re-assessed as still being the most promising.

The major practical implication of expanding the role of multi-attribute analysis as outlined, is the need to carry out investment appraisals during the preliminary evaluation stage of the product development model. However it would not be necessary to perform an investment analysis on ideas that are assessed to be highly impractical, and it is envisaged that the economic assessments that are carried out would be subjective 'ball-park' estimates only.

One of the reasons for suggesting that 'ball-park' economic assessments be included in preliminary evaluations of new product opportunities, is a perception that the economic assessments made in the case study are too detailed for the information they are based on. Estimates of product recipes, sales volumes, prices, and promotion, are all based largely on subjective assessment with very little factual information to support them. Furthermore many of the capital, direct, and overhead cost estimates that were used could be used for economic assessments of other ideas that were identified. It would seem more appropriate that these sorts of estimates be used in preliminary economic assessments which would not need to involve such detailed costings or sensitivity analyses. Ideas that survived this type of preliminary evaluation could then be the subject of a fuller and more detailed economic assessment that did involve sensitivity analysis, as well as some field research on product formulae and marketing factors.

A further reason for favouring expansion of the role of the multi-attribute analysis as outlined, is that, although profitability and practicality are seen as distinct, the information that is acquired for investment analyses also allows a better assessment of practicality. In the case study synergy, which is

important to OFC, was assessed to be high. However this assessment could be reviewed downward in the light of the low level of output that is forecast in the investment analysis. By the same logic, another product alternative might improve its synergy rating if sales levels that are forecast for the economic appraisal of that product suggest a high level of output.

In expanding the role of the multi-attribute analysis, consideration would also need to be given to attaching weights to each criterion used in the practicality index. In the case study each criterion was given equal weighting. It seems reasonable to assume however, that OFC, as a fruit handling co-operative, would place more importance on synergy between fruit handling and processing activities, than they would on distinctive competence which would perhaps be brought in from outside.

8.2 Processed Kiwifruit Product Alternatives Worthy of Further Development by the Opotiki Fruitgrowers Co-operative

The second objective of this study was to identify, using the framework that was developed, kiwifruit alternatives worthy of further development by OFC. Notwithstanding the limitations imposed by the way the analytical framework was applied, discussed in section 8.1, the following sections summarise the evaluation and document recommendations.

8.2.1 Summary

This evaluation of kiwifruit processing opportunities identifies a condiment product line of sauce, chutney, marinade, and pickled fruit, as worthy of further development by OFC in association with Epicurean Foods. This assessment is based on consideration of practicality and profitability.

In terms of the OFC's main objective, returns for all the low grade kiwifruit produced by shareholders could be substantially boosted if the expected profit from condiment production was distributed as an additional payment for fruit supplied. It is noted however that production of a condiment line will only utilise 72 tonnes/year of reject kiwifruit, provide temporary employment for about 11 people, and require only a small area of coolstore space. It is also noted that most of the budgeted processing plant is needed to produce any processed kiwifruit products, so that additional processed kiwifruit products could be considered for development in the future.

8.2.2 Recommendations

1. OFC and Epicurean Foods should satisfy themselves that the assumptions used in this evaluation are reasonable. In particular, attention should be given to the selection criteria that are used, the subjective scores assigned in the multi-attribute analysis, and the sales forecast levels used.

2. It is recommended that OFC and Epicurean Foods should consider further development of a kiwifruit condiment product line. The remaining recommendations assume that this decision is made.
3. A market report by business trend analysts on the US condiment market should be purchased as a next step.

The investment appraisals in this study show that condiment products are increasingly profitable to produce as sales volumes rise. They also show that breakeven volumes and expected sales are low relative to plant capacity.

The marketing assumptions and sales estimates that were used in the investment appraisals are appropriate to an evaluation of this type. They are however subjective and based on very little specific market information, as this was not freely available in the literature. The market report by Business Trends Analysts would serve as a check on sales estimates and marketing assumptions.

The 180 page US condiment market report by Business Trends Analysts was published in September 1982.

The report documents market size and growth, pricing, financial trends, demographics, advertising and promotional strategies, new products and corporate developments, and provides forecasts through to 1992.

Products covered include salad dressings, mayonnaise, oil and vinegar, ketchup, mustard, relishes, sauces, and gravies.

4. If the market report by Business Analysts Inc. supports the investment analysis in this study, it is recommended that OFC-Epicurean Foods joint venture commission the Food Technology Research Centre at Massey University to physically develop kiwifruit sauce, pickled slices, chutney, and marinade, as the next step in the product development process. If the market report does not support the investment appraisal in this study the OFC-Epicurean Foods joint venture should consider economic evaluation of some of the less practical product ideas.
5. The nature of any joint venture arrangement between OFC and Epicurean Foods should be formally established before any major product development costs are incurred.

Practicalities suggest that contract manufacture is an appropriate form of joint venture. The formation of a new company between the co-op and Epicurean Foods would create several problems. It would be difficult to separate the overhead activities of the new firm from those of the co-op and Epicurean Foods.

It would be difficult to retain the co-operative structure and the tax and financing advantages this imparts. The situation would also arise whereby the joint venture company would be promoting and selling products under the Butler and Hall brand that belongs to Epicurean Foods. Contract manufacture would circumvent these problems.

Any contract manufacturing agreement could still ensure that both firms had a financial interest in the success of the venture. As a part of the contract it could be required that both firms share the cost of product development, that the co-operative buys the processing plant, and Epicurean Foods pays a specified amount for promotion and product development. The co-op could bear the direct costs of raw materials, power, repairs and maintenance, labour and operating expenses.

Epicurean Foods could bear the direct costs of packaging, transport, and tariffs.

8.3 MAF Advisory Services

The third objective of this study was to evaluate and discuss MAF's industrywide, market orientated approach to its advisory work, with particular regard to the role of the Economic Section of MAF's Advisory Services Division. In what follows discussion and conclusions focus on who MAF's clients should be, the type of advice that should be offered to these clients,

and whether MAF needs to assume an industrywide or market orientation to fulfill its advisory commitments. The implications of these conclusions to the economic evaluations carried out by the Economic Section are also discussed.

8.3.1 The Scope of MAF Advisory Services

The objective of MAF's Advisory Services Division is to contribute to sustainable increases in net export earnings. This objective recognises economic growth rather than political, equity, or welfare considerations as the basis of MAF advisory services.

MAF Advisory Services are funded by tax payers' money and provided as a public good. The only circumstances in which this assistance can be regarded as economically efficient are those where:

- (i) The service promotes economic growth in areas where New Zealand perceives a comparative advantage.
- (ii) The marketplace underinvests in extension of information needed to increase economic growth in areas where comparative advantage is perceived, because small producers cannot individually afford to generate the information they need to operate efficiently and externalities prevent private specialist firms from appropriating all the benefits of their extension work.

- (iii) The service benefits a large number of firms in a non competitive manner, avoids duplication of effort, and achieves economies of scale in information gathering.

These circumstances suggest that MAF advisory services to agriculture are only justified where the following criteria are met.

1. The advice promotes economic growth in areas where comparative advantage is perceived.
2. Private firms do not, or cannot, provide the advice that is needed.
3. The advice is public in nature.
4. The advice benefits a large number of people.

8.3.1.1 Services to Processors

In the light of the above criteria it is clear that MAF is not justified in providing advisory services to processors. Most processed products are differentiated so that production and marketing information is private in nature. Furthermore processors are relatively few in number and they can appropriate all the benefits from their business endeavours. Processed agricultural product development has become increasingly significant as a strategy for exploiting New Zealand's perceived comparative

advantage in primary agriculture, and many processors, like export fruit processors, are very small in size. There are however research organisations like Massey University's Food Technology Research Centre who provide private product and market information services to processors. As specialists these organisations can achieve scale economies in information generation and any product development service offered to processors by MAF would constitute a duplication of effort.

Given the increased importance of processed food and fibre product development MAF could consider sponsoring development on a partial cost recovery basis. MAF could pay for physical product development and test marketing to be carried out by private research organisations on behalf of small processors on the understanding that these costs would be recovered if a firm decides to commercialise any products that have benefitted from sponsored research. This would have the affect of encouraging an increased level of efficient product development by reducing the costs and risks associated with new product failure. If such a service was to be offered the analytical framework that has been developed in

this thesis provides an appropriate way of evaluating new product research proposals for MAF sponsorship.

8.3.1.2 Services to Marketers of Agricultural Commodity Products

The criteria for determining areas of MAF involvement also suggest that MAF should not provide advisory services to marketers of agricultural commodities, unless the service relates to aspects of production. Marketers perform functions of packaging, pricing, distribution, and promotion. As specialist intermediaries the information needs of marketers are private in nature, and marketers, who are relatively few in number, can appropriate all the benefits of their work.

8.3.1.3 Services to Agricultural Commodity Producers

MAF should continue to provide management advisory services to agricultural commodity producers. Farm management advice on what and how to produce is public in nature and private specialist firms cannot appropriate all the benefits from mass extension of farm management advice, producers are small in size and many in number, improved farm management leads to

economic growth in an area where comparative advantage is perceived, and MAF services avoid duplication of effort and offer scale economies.

8.3.2 An Industrywide Approach

An industrywide approach to MAF advisory work is essential if MAF is to concentrate its advisory services on agricultural commodity production to the best export opportunities. However an industrywide approach is only justified to the extent that production strategies promoted by MAF must reflect the product strategies determined by intermediary processors and marketers. To this end MAF should establish closer links with processors and marketers, not as advisors, but rather as production co-ordinators.

The main purpose of MAF involvement beyond the farm gate should be to acquire information and forecasts of the volumes of agricultural commodities required by processors and marketers, and the prices that will be paid to producers.

For new agricultural commodities that have either not been previously commercialised, or commercialised only to a limited extent, MAF could play a catalyst role in the formation of market channels. This could involve placing primary producers in touch with processors and marketers, or helping in the formation (but not the

operation) of industry bodies such as statutory marketing authorities, or producer groups such as co-operatives or producer associations.

MAF involvement in the formation of statutory marketing authorities or producer co-operatives would require an increased level of expertise in agribusiness areas. However the institutional framework already exists for the formation of marketing authorities and co-operatives, and the experience of the kiwifruit industry suggests that there are significant advantages in a co-ordinated and planned industrywide approach to the marketing of new agricultural commodities.

8.3.3 A Market Orientation

MAF should not adopt a market orientation to its advisory services. This conclusion is based firstly on the fact that a market orientation involves information that is largely private in nature, and secondly on the fact that MAF can concentrate its advisory services on the best export opportunities without assuming this orientation.

For agricultural commodities the responsibility for a market or consumer orientation rests with processors and marketers. This orientation (where it exists) will manifest itself in the product strategies of processors and marketers, which in turn will reflect their pricing, processing, packaging, promotion and distribution

strategies. If MAF adopts an industrywide approach to its advisory work, along the lines suggested in section 8.2.2, the on-farm production strategies promoted by MAF will reflect the product strategies adopted by processors and marketers, which in turn will reflect the needs of consumers.

8.3.4 Economic Evaluations by the Economic Section of MAF's Advisory Services Division

It is concluded that the Economic Section of MAF's Advisory Services Division should be given responsibility for the division's strategic planning, and that the purpose of economic evaluations by the Economic Section should be to identify the best advisory opportunities for economic growth in agriculture. In terms of the scope and perspective that MAF is justified in taking, the best advisory opportunities are those farm production opportunities that:

1. Are most practical and profitable for producers;
and
2. at the same time, add the most export value,
consistent with the demands of commodity processors
and marketers.

In this study the main focus has been on developing and applying an analytical framework for consumer orientated economic evaluations of new product opportunities. The strategic planning framework that was developed allowed

for economic assessments that could be consumer, product, or production orientated, with application to both new and existing products. To be relevant as a framework for economic evaluations of farm production opportunities, the framework developed in this study would have to be applied with a production orientation that considered management opportunities to expand production, as well as opportunities to switch to production of new commodities.

It is considered that the Economic Section could use a production orientated version of the analytical framework developed in this study to identify the best farm production opportunities. By applying the framework to the typical farmer for each major class of farm, the Economic Section could identify the most practical and profitable opportunities for different types of farms. The export value of production opportunities for each type of farm could be determined by applying FOB prices to the extra production that would result if opportunities were realised. Comparison of the best production opportunities for each distinct farm type would then identify at an industry level, the production opportunities to increase supply of the various commodity alternatives. These industry level supply opportunities could then be compared with the demands of commodity processors and marketers, to identify the best overall farm production opportunities.

APPENDIX I

KIWIFRUIT SAUCE - BUDGET COST DETAILS

1 CAPITAL EXPENDITURE

1.1 Plant

- (a) Realistic estimate of plant costs based on the figures in table 7.1.

ITEM	\$
Caustic peeler	25,000
Brush washer	25,000
Inspection table	4,500
Elevator	3,000
Hammermill	2,500
Cookers (3)	27,000
Pump	7,500
Bottling plant	20,000
Vacuum capper	45,000
Tunnel cooler	30,000
Steriliser	15,000
Finisher	15,000
Labeller	30,000
Packing table	<u>5,000</u>
Sub Total	254,000
Plus 20% allowance for contingencies and ancillary equipment	<u>+ 25,450</u>
Total Plant	279,950
Plus 5% allowance for transport and installation	<u>+ 13,998</u>
Total installed plant	<u>293,948</u>

- (b) Budget Range - based on the above and assuming a 20% variation.

PLANT CAPITAL

FORECAST TYPE	\$
Pessimistic	354,000
Realistic	295,000
Optimistic	236,000

1.2 Buildings

(a) Budget Range - as per section 7.2.2.1.

BUILDING TYPE	
FORECAST TYPE	\$
Pessimistic	30,000
Realistic	20,000
Optimistic	10,000

1.3 Product Development

(a) Budget Range - as per section 7.226.

PRODUCT DEVELOPMENT CAPITAL	
FORECAST TYPE	\$
Pessimistic	12,000
Realistic	10,000
Optimistic	8,000

1.4 Total Capital Expenditure

(a) Budget Range

TOTAL CAPITAL	
FORECAST TYPE	\$
Pessimistic	396,000
Realistic	325,000
Optimistic	254,000

2 REVENUE

2.1 Sales

(a) Budget Range - as per table 7.13.

SALES REVENUE	
FORECAST TYPE	\$/UNIT
Pessimistic	2.12
Realistic	2.66
Optimistic	3.18

2.2. Salvage Values

Calculated as per section 7.2.2.4.

(a) Budget Range

SALVAGE VALUES

FORECAST TYPE	\$
Pessimistic	108,448
Realistic	73,856
Optimistic	48,103

3 DIRECT EXPENSES

3.1 Raw Materials

- (a) Realistic estimate of the contribution of raw materials to the total product cost - prices taken from table 7.5.

ITEM	QUANTITY/ TONNE OF INGREDIENTS (kg)	COST/TONNE OF INGREDIENTS (\$)
Kiwifruit	476	214.20
Malt vinegar	300	123.00
Brown sugar	176	139.04
Salt	21	5.46
Ground ginger	7	77.63
Mixed spice	18	126.00
Cayenne pepper	2	25.08
Sub Total		710.41
Plus Freight		+ 22.40
Total		<u>732.81</u>

One tonne of ingredients yields 2,833 units of product assuming 85% recovery of raw materials in the final product, ie -

$(1000\text{kg} \times 85\%) / 300\text{ml bottles} = 2833\text{bottles/tonne}$
 Contribution of raw materials to product cost
 = $\$732.82 / 2833$ bottles per tonne
 = \$0.26 cents

- (b) Budget Range - based on the above and assuming a 20% variation.

RAW MATERIALS

FORECAST TYPE	\$
Pessimistic	0.30
Realistic	0.25
Optimistic	0.20

3.2. Power

- (a) Realistic estimate of power contribution to total product cost. Based on consumption rates documented in table 7.6.

ITEM	HOURS/DAY	POWER/DAY (kwhrs)
Peeler	8	600.00
Washer	1.5	2.25
Inspect belt	0.75	1.13
Elevator	0.75	1.13
Mill	3	4.50
Cookers - high	1.5	240.00
- low	6.0	384.00
Pump	4.5	4.50
Bottler	4.5	1.80
Vac. capper	4.5	5.85
Tunnel cooler	4.5	16.20
Finisher	0.5	4.50
Labeller	4.5	6.75
Sub Total		1272.61
Plus 10% contingency allowance		+ 127.26
Total		1399.87

Cost/day = 1399.87 kwh x 9.5 cents/kwh
= \$132.98

Contribution = \$132.98 per day/8500 units per day
= 1.56 cents/unit

- (b) Budget Range - based on the above calculations and assuming approximately 20% variation.

POWER

FORECAST TYPE	\$/UNIT
Pessimistic	0.02
Realistic	0.02
Optimistic	0.01

3.3. Repairs and Maintenance

- (a) Realistic estimate of contribution to total product cost. Based on assumptions outlined in section 7.2.4.3.

$$\$/\text{year} = 5\% \times \$295,000$$

$$= 14,750$$

$$\text{Contribution} = 14,750 / (130 \text{ days} \times 8500 \text{ units per day})$$

$$= 1.33 \text{ cents/unit}$$

- (b) Budget Range - based on above calculations and assuming a 20% variation.

REPAIRS & MAINTENANCE

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.4 Labour

- (a) Budget Range - based on the daily labour costs detailed in section 7.2.4.4 and daily production of 8,500 units.

LABOUR

FORECAST TYPE	\$/UNIT
Pessimistic	0.08
Realistic	0.07
Optimistic	0.05

3.5 Packaging

- (a) Budget Range - based on details in section 7.2.1.8 and assuming 20% upward variation only.

PACKAGING

FORECAST TYPE	\$/UNIT
Pessimistic	0.49
Realistic	0.41
Optimistic	0.41

3.6 Transport

- (a) Budget Range - as per table 7. 8.

BUDGET RANGE

FORECAST TYPE	\$/UNIT
Pessimistic	0.17
Realistic	0.14
Optimistic	0.11

3.7 Operating Expenses

- (a) Realistic estimate of operating cost contribution to total product costs. Based on details in section 7.2.4.7.

(i) General allowance per day.

$$= 5\% \times (\$14,750/130 \text{ days})$$

$$= \$5.67/\text{day}$$

(ii) Forklift at \$75.00/day.

(iii) Caustic soda at \$35.09/day.

$$\begin{aligned} \text{Total daily allowance} \\ \$/\text{day} &= 5.67 + 75.00 + 35.09 \\ &= 115.76 \end{aligned}$$

$$\begin{aligned} \text{Contribution} &= \$115.76/8,500 \text{ units per day} \\ &= 1.36 \text{ cents/unit} \end{aligned}$$

- (b) Budget Range - based on the above calculations and assuming 20% variation.

OPERATING EXPENSES

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.8 Tariffs and Duties

- (a) Realistic estimate of contribution to total product costs. Based on details in table 7.9.

$$\begin{aligned} \text{Contribution} &= \text{USA FOB price} \times 88\% \text{ of sales} \times 7.5\% \text{ tariff} \\ &= (\text{US\$CIF} + \$0.12 \text{ shipping}) \times 0.88 \times 0.075 \\ &= \$2.78 \times 0.88 \times 0.075 \\ &= 18.3 \text{ cents/unit} \end{aligned}$$

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

TARIFFS & DUTIES

FORECAST TYPE	\$/UNIT
Pessimistic	0.22
Realistic	0.18
Optimistic	0.14

4 OVERHEAD COSTS4.1 Overheads Less Debt Servicing

(a) Budget Range - as per table 7.13.

OVERHEADS LESS DEBT SERVICING

FORECAST TYPE	\$/UNIT
Pessimistic	154,800
Realistic	129,000
Optimistic	103,200

APPENDIX II

KIWIFRUIT CHUTNEY - BUDGET COST DETAILS

1 CAPITAL EXPENDITURE

1.1 Plant

- (a) Realistic estimate of plant costs based on the figures in table 7.1.

ITEM	\$
Caustic peeler	25,000
Brush washer	25,000
Inspection table	4,500
Elevator	3,000
Hammermill	2,500
Cookers (2)	18,000
Pump	7,500
Bottling plant	20,000
Vacuum capper	45,000
Tunnel cooler	30,000
Steriliser	15,000
Labeller	30,000
Packing table	<u>5,000</u>
Sub Total	230,500
Plus 20% allowance for contingencies and ancillary equipment	+ <u>46,100</u>
Total Plant	276,600
Plus 5% allowance for transport and installation	+ <u>13,830</u>
Total Installed Plant	<u>290,430</u>

- (b) Budget Range - based on the above and assuming a 20% variation.

PLANT CAPITAL

FORECAST TYPE	\$
Pessimistic	360,000
Realistic	300,000
Optimistic	240,000

1.2 Buildings

- (a) Budget Range - as per section 7.2.2.1.

BUILDING CAPITAL

FORECAST TYPE	\$
Pessimistic	30,000
Realistic	20,000
Optimistic	10,000

1.3 Product Development

(a) Budget Range - as per section 7.2.2.6.

PRODUCT DEVELOPMENT CAPITAL

FORECAST TYPE	\$
Pessimistic	12,000
Realistic	10,000
Optimistic	8,000

1.4 Total Capital Expenditure

(a) Budget Range

TOTAL CAPITAL

FORECAST TYPE	\$
Pessimistic	402,000
Realistic	330,000
Optimistic	258,000

2 REVENUE

2.1 Sales

(a) Budget Range - as per table 7.13.

SALES REVENUE

FORECAST TYPE	\$/UNIT
Pessimistic	2.12
Realistic	2.66
Optimistic	3.18

2.2 Salvage Values

Calculated as per section 7.2.2.4, and using inflation rates from table 7.13.

(a) Budget Range.

SALVAGE VALUES

FORECAST TYPE	\$
Pessimistic	110,286
Realistic	75,107
Optimistic	48,919

3 DIRECT EXPENSES

3.1 Raw Materials

- (a) Realistic estimate of the contribution of raw materials to the total product cost - prices taken from table 7.5.

ITEM	QUANTITY/ TONNE OF INGREDIENTS (kg)	COST/TONNE OF INGREDIENTS (\$)
Kiwifruit	463	208.35
Onion puree	58	31.90
Apple pulp	154	77.00
Malt vinegar	96	39.36
Sugar	173	129.75
Salt	19	4.94
Mixed spice	29	203.00
Cayenne pepper	8	<u>100.32</u>
Sub Total	-	794.64
Plus Freight		<u>+ 44.10</u>
Total		<u>838.74</u>

One tonne of ingredients yields 3,167 units of product assuming 95% recovery of raw materials in the final product, ie -

$(1000\text{kg} \times 95\%) / 300\text{ml bottles} = 3,167 \text{ bottles/tonne}$
 Contribution of raw materials to product cost
 $= \$838.74 / 3167 \text{ units per tonne}$
 $= \$0.27 \text{ cents}$

- (b) Budget Range - based on the above and assuming a 20% variation.

RAW MATERIALS

FORECAST TYPE	\$
Pessimistic	0.30
Realistic	0.25
Optimistic	0.20

3.2 Power

- (a) Realistic estimate of power contribution to total product cost. Based on consumption rates documented in table 7.6.

ITEM	HOURS/DAY	POWER/DAY (kwhrs)
Peeler	8.0	600.00
Washer	2.0	3.00
Inspect belt	2.0	1.50
Elevator	2.0	1.50
Mill	2.0	6.0
Cookers - high	1x2	320.00
- low	1x2	128.00
Pump	6.0	6.00
Bottler	6.0	2.40
Vac. capper	6.0	7.80
Tunnel cooler	6.0	21.60
Labeller	6.0	9.00
Sub Total		1106.80
Plus 10% contingency allowance		+ 110.68
Total		1217.48

Cost/day = 1217.48kwh x 9.5 cents/kwh
= \$115.66

Contribution = \$115.66 per day/12667 units per day
= 0.91 cents/unit

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

POWER

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.3 Repairs and Maintenance

- (a) Realistic estimate of contribution to total product cost. Based on assumptions outlined in section 7.2.4.3.

\$/year = 5% x \$300,000
= 15,000

Contribution = 15,000/(130daysx12,667 units per day)
= 0.91 cents/unit

- (b) Budget Range - based on above calculations and assuming a 20% variation.

REPAIRS & MAINTENANCE

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.4 Labour

- (a) Budget Range - based on the daily labour costs of \$572.24 (detailed in section 7.2.4.4) and daily production of 12,667 units.

LABOUR

FORECAST TYPE	\$/UNIT
Pessimistic	0.06
Realistic	0.05
Optimistic	0.04

3.5 Packaging

- (a) Budget Range - based on details in section 7.2.1.8 and assuming 20% upward variation only.

PACKAGING

FORECAST TYPE	\$/UNIT
Pessimistic	0.54
Realistic	0.45
Optimistic	0.45

3.6 Transport

- (a) Budget Range - as per table 7. 8.

TRANSPORT

FORECAST TYPE	\$/UNIT
Pessimistic	0.17
Realistic	0.14
Optimistic	0.11

3.7 Operating Expenses

- (a) Realistic estimate of operating cost contribution to total product costs. Based on details in section 7.2.4.7.

(i) General allowance per day

$$= 5\% \times (\$15,000/130 \text{ days})$$

$$= \$5.77/\text{day}$$

(ii) Forklift at \$75.00/day.

(iii) Caustic soda at \$35.09/day.

Total daily allowance

$$\$/\text{day} = 5.77 + 75.00 + 35.09$$

$$= 115.86$$

$$\text{Contribution} = \$115.86/12,667 \text{ units per day}$$

$$= 0.92 \text{ cents/unit}$$

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

OPERATING EXPENSES

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.8 Tariffs and Duties

- (a) Realistic estimate of contribution to total product costs. Based on details in table 7.9.

$$\text{Contribution} = \text{USA FOB price} \times 88\% \text{ of sales} \times 7.5/5 \text{ tariff}$$

$$= (\text{US\$CIF} + \$0.12 \text{ shipping}) \times 0.88 \times 0.075$$

$$= \$2,78 \times 0.88 \times 0.075$$

$$= 18.3 \text{ cents/unit}$$

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

TARIFFS & DUTIES

FORECAST TYPE	\$/UNIT
Pessimistic	0.22
Realistic	0.18
Optimistic	0.14

4 OVERHEAD COSTS4.1 Overheads Less Debt Servicing

(a) Budget Range - as per table 7.13.

OVERHEADS LESS DEBT SERVICING

FORECAST TYPE	\$/YEAR
Pessimistic	154,800
Realistic	129,000
Optimistic	103,200

APPENDIX III

KIWIFRUIT MARINADE - BUDGET COST DETAILS

1 CAPITAL EXPENDITURE

1.1. Plant

- (a) Realistic estimate of plant costs based on the figures in table 7.1.

ITEM	\$
Caustic peeler	25,000
Brush washer	25,000
Inspection table	4,500
Elevator	3,000
Hammermill	2,500
Finisher	15,000
Mixer (2)	8,000
Pump	7,500
Bottling plant	20,000
Standard capper	26,000
Steriliser	15,000
Labeller	30,000
Packing table	<u>5,000</u>
Sub Total	186,500
Plus 20% allowance for contingencies and ancillary equipment	+ <u>37,300</u>
Total Plant	223,800
Plus 5% allowance for transport and installation	+ <u>11,190</u>
Total Installed Plant	<u>234,990</u>

- (b) Budget Range - based on the above and assuming a 20% variation.

PLANT CAPITAL

FORECAST TYPE	\$
Pessimistic	282,000
Realistic	235,000
Optimistic	188,000

1.2 Buildings

- (a) Budget Range - as per section 7.2.2.1.

BUILDING CAPITAL

FORECAST TYPE	\$
Pessimistic	30,000
Realistic	20,000
Optimistic	10,000

1.3 Product Development

- (a) Budget Range - as per section 7.2.2.6.

PRODUCT DEVELOPMENT CAPITAL

FORECAST TYPE	\$
Pessimistic	12,000
Realistic	10,000
Optimistic	8,000

1.4 Total Capital Expenditure

- (a) Budget Range.

TOTAL CAPITAL

FORECAST TYPE	\$
Pessimistic	324,000
Realistic	265,000
Optimistic	206,000

2 REVENUE

2.1 Sales

- (a) Budget Range - as per table 7.13.

SALES REVENUE

FORECAST TYPE	\$/UNIT
Pessimistic	2.12
Realistic	2.66
Optimistic	3.18

2.2. Salvage Values

Calculated as per section 7.2.2.4, and using cost inflation rates from table 7.13.

- (a) Budget Range.

SALVAGE VALUES

FORECAST TYPE	\$
Pessimistic	86,391
Realistic	58,834
Optimistic	38,320

3 DIRECT EXPENSES

3.1 Raw Materials

- (a) Realistic estimate of the contribution of raw materials to the total product cost - prices taken from table 7.5.

ITEM	QUANTITY/ TONNE OF INGREDIENTS (kg)	COST/TONNE OF INGREDIENTS (\$)
Kiwifruit	500	225.00
Onion puree	83	45.65
Cider vinegar	333	213.12
Chillie	42	294.00
Ground ginger	42	465.78
Sub Total		1243.55
Plus Freight		+ 50.00
Total		<u>1293.55</u>

One tonne of ingredients yields 3,167 units of product assuming 95% recovery of raw materials in the final product, ie -

$(1000\text{kg} \times 95\%) / 300\text{ml bottles} = 3,167 \text{ bottles/tonne}$
 Contribution of raw materials to product cost
 = $\$1293.55 / 3167 \text{ units per tonne}$
 = \$0.41 cents

- (b) Budget Range - based on the above and assuming a 20% variation.

RAW MATERIALS

FORECAST TYPE	\$
Pessimistic	0.48
Realistic	0.40
Optimistic	0.32

3.2 Power

- (a) Realistic estimate of power contribution to total product cost. Based on consumption rates documented in table 7.6.

ITEM	HOURS/DAY	POWER/DAY (kwhrs)
Peeler	8.0	600.00
Washer	2.5	3.75
Inspect belt	2.5	1.88
Elevator	2.5	1.88
Mill	3.0	7.55
Mixers	8.75	26.25
Pump	7.5	7.50
Bottler	7.5	3.00
Std capper	7.5	9.75
Finisher	7.5	22.50
Labeller	7.5	<u>11.25</u>
Sub Total		695.31
Plus 10% contingency allowance		+ <u>69.53</u>
Total		<u>764.84</u>

Cost/day = 764.84 kwh x 9.5 cents/kwh
= \$72.66

Contribution = \$72.66 per day/15,833 units per day
= 0.46 cents/unit

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

POWER

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.3 Repairs and Maintenance

- (a) Realistic estimate of contribution to total product cost. Based on assumptions outlined in section 7.2.4.3.

\$/year = 5% x \$235,000
= 11,750

Contribution = \$11,750/(130daysx12,667 units per day)
= 0.57 cents/unit

- (b) Budget Range - based on above calculations and assuming a 20% variation.

REPAIRS & MAINTENANCE

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.4 Labour

- (a) Budget Range - based on the daily labour costs of \$572.24 (detailed in section 7.3.3 and daily production of 15,833 units.

LABOUR

FORECAST TYPE	\$/UNIT
Pessimistic	0.05
Realistic	0.04
Optimistic	0.03

3.5 Packaging

- (a) Budget Range - based on details in section 7.2.1.8 and assuming 20% upward variation only.

PACKAGING

FORECAST TYPE	\$/UNIT
Pessimistic	0.49
Realistic	0.41
Optimistic	0.41

3.6 Transport

- (a) Budget Range - as per section 7.3.2.

TRANSPORT

FORECAST TYPE	\$/UNIT
Pessimistic	0.17
Realistic	0.14
Optimistic	0.11

3.7 Operating Expenses

- (a) Realistic estimate of operating cost contribution to total product costs. Based on details in section 7.2.4.7.

(i) General allowance per day

$$= 5\% \times (\$11,750/130 \text{ days})$$

$$= \$4.52/\text{day}$$

(ii) Forklift at \$75.00/day

(iii) Caustic soda at \$35.09/day

Total daily allowance

$$\begin{aligned} \$/\text{day} &= 4.52 + 75.00 + 35.09 \\ &= 114.61 \end{aligned}$$

$$\begin{aligned} \text{Contribution} &= \$114.61 / 15,833 \text{ units per day} \\ &= 0.72 \text{ cents/unit} \end{aligned}$$

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

OPERATING EXPENSES

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.8 Tariffs and Duties

- (a) Realistic estimate of contribution to total product costs. Based on details in table 7.9.

$$\begin{aligned} \text{Contribution} &= \text{USA FOB price} \times 88\% \text{ of sales} \times 7.5\% \text{ tariff} \\ &= (\text{US\$CIF} + \$0.12 \text{ shipping}) \times 0.88 \times 0.075 \\ &= \$2.78 \times 0.88 \times 0.075 \\ &= 18.3 \text{ cents/unit} \end{aligned}$$

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

TARIFFS & DUTIES

FORECAST TYPE	\$/UNIT
Pessimistic	0.22
Realistic	0.18
Optimistic	0.14

4 OVERHEAD COSTS

4.1 Overheads Less Debt Servicing

- (a) Budget Range - as per table 7.13.

OVERHEADS LESS DEBT SERVICING

FORECAST TYPE	\$/YEAR
Pessimistic	154,800
Realistic	129,000
Optimistic	103,200

APPENDIX IV

PICKLED KIWIFRUIT SLICES - BUDGET COST DETAILS

1 CAPITAL EXPENDITURE

1.1. Plant

- (a) Realistic estimate of plant costs based on the figures in table 7.1.

ITEM	\$
Caustic peeler	25,000
Brush washer	25,000
Inspection table	4,500
Slicer orientation device	50,000
Accelerator belt to slicer	25,000
Slicer	22,000
Hand pack filler	25,000
Bottling plant	20,000
Standard capper	26,000
Steriliser	15,000
Labeller	30,000
Packing table	<u>5,000</u>
Sub Total	272,500
Plus 20% allowance for contingencies and ancillary equipment	<u>+ 54,500</u>
Total Plant	327,000
Plus 5% allowance for transport and installation	<u>+ 16,350</u>
Total installed plant	<u>343,350</u>

- (b) Budget Range - based on the above and assuming a 20% variation.

PLANT CAPITAL

FORECAST TYPE	\$
Pessimistic	441,600
Realistic	343,000
Optimistic	274,400

1.2 Buildings

- (a) Budget Range - as per section 7.2.2.1.

BUILDING CAPITAL

FORECAST TYPE	\$
Pessimistic	30,000
Realistic	20,000
Optimistic	10,000

1.3 Product Development

(a) Budget Range - as per section 7.2.2.6.

PRODUCT DEVELOPMENT CAPITAL

FORECAST TYPE	\$
Pessimistic	12,000
Realistic	10,000
Optimistic	8,000

1.4 Total Capital Expenditure

(a) Budget Range.

TOTAL CAPITAL

FORECAST TYPE	\$
Pessimistic	453,600
Realistic	373,000
Optimistic	292,400

2 REVENUE

2.1 Sales

(a) Budget Range - as per table 7.13.

SALES REVENUE

FORECAST TYPE	\$/UNIT
Pessimistic	2.12
Realistic	2.66
Optimistic	3.18

2.2 Salvage Value

Calculated as per section 7.2.2.4, and using cost inflation rates from table 7.13.

(a) Budget Range.

SALVAGE VALUE

FORECAST TYPE	\$
Pessimistic	126,094
Optimistic	85,873
Realistic	55,930

3 DIRECT EXPENSES

3.1 Raw Materials

- (a) Realistic estimate of the contribution of raw materials to the total product cost - prices taken from table 7.5.

ITEM	QUANTITY/ TONNE OF PRODUCT (kg)	COST/TONNE OF PRODUCT (\$)
Kiwifruit	702	386.10
Salt - in bottles	27	7.02
- fermentation	48	<u>12.48</u>
Sub Total		405.60
Plus Freight		+ <u>7.50</u>
Total		<u>413.10</u>

NOTE: Assumes - plastic lined packing bins hold 250 kg of sliced fruit and 150 kg of brine.
 - 95% recovery of kiwifruit in final product
 - products contain 2/3 kiwifruit slices and 1/3 brine.

No. of units per tonne of product
 = 1000 kg/0.3 kg per unit
 = 3333 units

Raw material contribution to product cost = \$413.10/3333
 = \$0.12 cents

- (b) Budget Range - based on the above and assuming a 20% variation.

RAW MATERIALS

FORECAST TYPE	\$
Pessimistic	0.14
Realistic	0.12
Optimistic	0.12

3.2 Power

- (a) Realistic estimate of power contribution to total product cost. Based on consumption rates documented in table 7.6.

ITEM	HOURS/TONNE	POWER/TONNE (kwhrs)
Peeler	0.625	46.87
Washer	0.5	0.75
Inspect belt	0.5	0.38
Orientator	0.5	0.75
Accelerator	0.5	0.20
Slicer	0.5	1.00
Hand filler	5.5	7.15
Bottler	1.4	0.56
Std capper	1.4	1.82
Labeller	1.4	2.10
Sub Total		61.58
Plus 10% contingency allowance		+ 6.16
Total		67.74

Cost/day = 67.74 kwh x 9.5 cents/kwh
= \$6.43

Contribution = \$6.43 per tonne/3333 units per tonne
= 0.19 cents/unit

- (b) Budget Range - based on the above calculations and assuming a 20% variation.

POWER

FORECAST TYPE	\$/UNIT
Pessimistic	0.01
Realistic	0.01
Optimistic	0.01

3.3 Repairs and Maintenance

- (a) Realistic estimate of contribution to total product cost. Based on assumptions outlined in section 7.2.4.3. It is assumed that peeling and slicing plant operates at 16 tonnes/day and packaging plant operates at 1.44 tonnes of product per day.

(i) Peeling and slicing.

\$/year = 5% x \$190,890
= 9,544.50

Contribution = \$9544.5/(130daysx(16,000kg x 95% x 1/.667))
= 0.32 cents/unit

(ii) Packing

\$/year = 5% x \$152,110
= 7,605.5

Contribution = \$7605.5/(130x4800 units per day)
= 1.22 cents per unit

(iii) Total repairs and maintenance.

$$= 0.32 + 1.22$$

$$= 1.54 \text{ cents per unit}$$

(b) Budget Range - based on above calculations and assuming a 20% variation.

REPAIRS AND MAINTENANCE

FORECAST TYPE	\$/UNIT
Pessimistic	0.02
Realistic	0.02
Optimistic	0.02

3.4 Labour

(a) Realistic estimate of contribution to total product cost. Based on the information in section 7.3.3 and table 7.7.

(i) Peeling and slicing.

PEOPLE	\$/DAY
1 foreman	52.00
1 leading hand	48.00
1 forklift driver	40.72
4 process workers	<u>165.76</u>
Total	<u>306.48</u>

$$\begin{aligned} \text{Contribution} &= \$306.48 / (16,000 \text{ kg} \times 95\% \times 1/.667) \\ &= 1.3 \text{ cents per unit} \end{aligned}$$

(ii) Fermenting - labour to remove scum and top up brine.

$$\begin{aligned} &1 \text{ person at } 0.25 \text{ hours/tonne per day for 6 weeks} \\ &= 0.25 \text{ hours/day} \times 42 \text{ days} \\ &= 10.5 \text{ hours} \\ &\$/\text{tonne} = 10.5 \text{ hours} \times \$5.18/\text{hour} \\ &= 54.39 \\ \text{Contribution} &= \$54.39 / 3333 \text{ units per tonne} \\ &= 1.6 \text{ cents/unit} \end{aligned}$$

(iii) Packing - as per section 7.3.3, ie

$$\begin{aligned} &\$572.24/\text{day for } 4800 \text{ units/day} \\ \text{Contribution} &= \$572.24 / 4800 \\ &= 11.9 \text{ cents/unit} \end{aligned}$$

(iv) Total labour cost per unit.

$$= 1.3 + 1.6 + 11.9$$

$$= 14.8 \text{ cents/unit}$$

LABOUR

FORECAST TYPE	\$/UNIT
Pessimistic	0.18
Realistic	0.15
Optimistic	0.12

3.5 Packaging

- (a) Budget Range - based on details in section 7.2.1.8 and assuming 20% upward variation only.

PACKAGING

FORECAST TYPE	\$/UNIT
Pessimistic	0.54
Realistic	0.45
Optimistic	0.45

3.6 Transport

- (a) Budget Range - as per table 7.8.

TRANSPORT

FORECAST TYPE	\$/UNIT
Pessimistic	0.17
Realistic	0.14
Optimistic	0.11

3.7 Operating Expenses

- (a) Realistic estimate of operating cost contribution to total product costs. Based on details in section 7.2.4.7.

(i) Stage 1.

- general allowance per day
 $= 5\% \times (\$17,150/130 \text{ days})$
 $= \$6.60/\text{day}$
- forklift at \$75.00/day
- caustic soda at \$35.09/day
- total daily allowance
 $\$/\text{day} = 6.60 + 75.00 + 35.09$
 $= 116.69$

$$\text{Contribution} = \$116.69/22,789 \text{ unit equivalents per day}$$

$$= 0.51 \text{ cents/unit}$$

(ii) Stage 2. No allowance.

(iii) Stage 3.

- General allowance as per stage 1
 = \$6.60/day
 - Forklift allowance as per stage 1
 = \$75.00/day
 - Total daily allowance
 = 6.6+75
 = \$81.6
 Contribution = \$81.60/4800 units per day
 = 1.7 cents/unit

(iv) Total operating costs.

= 0.51+1.7
 = 2.21 cents/unit

(b) Budget Range - based on the above calculations and assuming a 20% variation.

OPERATING EXPENSES

FORECAST TYPE	\$/UNIT
Pessimistic	0.02
Realistic	0.02
Optimistic	0.02

3.8 Tariffs and Duties

(a) Realistic estimate of contribution to total product costs. Based on details in table 7.9.

Contribution = USA FOB price x 88% of sales x 7.0% tariff
 = (US\$CIF+\$0.12 shipping)x0.88x0.070
 = \$2.78x0.88x0.070
 = 17.1 cents/unit

(b) Budget Range - based on the above calculations and assuming a 20% variation.

TARIFFS \$ DUTIES

FORECAST TYPE	\$/UNIT
Pessimistic	0.20
Realistic	0.17
Optimistic	0.14

4 OVERHEAD COSTS4.1 Overheads Less Debt Servicing

(a) Budget range as per table 7.13.

OVERHEADS LESS DEBT SERVICING

FORECAST TYPE	\$/YEAR
Pessimistic	154,800
Realistic	129,000
Optimistic	103,200

APPENDIX V

CONDIMENT PRODUCT LINE - BUDGET COST DETAILS

1 CAPITAL EXPENDITURE

1.1 Plant

- (a) Realistic estimate of plant costs based on the figures in table 7.1.

ITEM	\$
Caustic peeler	25,000
Brush washer	25,000
Inspection table	4,500
Elevator	3,000
Hammermill	2,500
Finisher	15,000
Mixers (2)	8,000
Cookers (3)	27,000
Pump	7,500
Slicer orientation device	50,000
Accelerator belt to slicer	25,000
Slicer	22,000
Hand pack filler	25,000
Bottling plant	20,000
Vacuum capper	45,000
Tunnel cooler	30,000
Steriliser	15,000
Labeller	30,000
Packing table	<u>5,000</u>
Sub Total	384,500
Plus 20% allowance for contingencies and ancillary equipment	<u>+ 76,900</u>
Total Plant	461,400
Plus 5% allowance for transport and installation	<u>+ 23,070</u>
Total Installed Plant	<u>484,470</u>

- (b) Budget Range - based on the above and assuming a 20% variation.

PLANT CAPITAL

FORECAST TYPE	\$
Pessimistic	582,000
Realistic	485,000
Optimistic	388,000

1.2 Buildings

- (a) Budget Range - as per section 7.2.2.1.

BUILDING CAPITAL

FORECAST TYPE	\$
Pessimistic	30,000
Realistic	20,000
Optimistic	10,000

1.3 Product Development

- (a) Budget Range - as per section 7.2.2.6 an allowance of \$10,000 per product is assumed. In using this figure it is noted that the preliminary investigation grant from the Trade and Industry Department's regional development programme is limited to \$15,000. However it is assumed also that the cost of developing a line of products will be cheaper than developing products individually.

PRODUCT DEVELOPMENT CAPITAL

FORECAST TYPE	\$
Pessimistic	48,000
Realistic	40,000
Optimistic	32,000

1.4 Total Capital Expenditure

- (a) Budget Range.

TOTAL CAPITAL

FORECAST TYPE	\$
Pessimistic	660,000
Realistic	545,000
Optimistic	430,000

2 REVENUE2.1 Sales

- (a) Budget Range - as per table 7.13.

SALES REVENUE

FORECAST TYPE	\$/UNIT
Pessimistic	2.12
Realistic	2.66
Optimistic	3.18

2.2 Salvage Value

Calculated as per section 7.2.2.4, and using cost inflation rates from table 7.13.

(a) Budget Range.

SALVAGE VALUE	
FORECAST TYPE	\$
Pessimistic	178,296
Realistic	121,424
Optimistic	79,086

3 DIRECT EXPENSES

Direct expenses are expressed as a weighted average calculated using the direct cost figures for each individual product. Weighting is based on the expected demand for each product as a fraction of total expected demand.

(a) Total Expected Demand.

= expected demand slices + expected demand marinade
 + expected demand chutney + expected demand sauce
 = 90,000+115,000+100,000+115,000
 = 420,000 units/year

(b) Weighted average direct cost.

= (direct cost slice x 0.214)+(direct cost marinade x 0.274)
 +(direct cost chutney x 0.238)+(direct cost sauce x 0.247)

(c) Budget Range.

WEIGHTED AVERAGE DIRECT COSTS	
FORECAST TYPE	\$/UNIT
Pessimistic	1.34
Realistic	1.12
Optimistic	0.96

4 OVERHEAD COSTS

4.1 Overheads Less Debt Servicing

(a) Budget range as per table 7.13.

OVERHEADS LESS DEBT SERVICING	
FORECAST TYPE	\$/YEAR
Pessimistic	154,800
Realistic	129,000
Optimistic	103,200

APPENDIX VI

TARGET CONSUMERS

POPULATION PROJECTIONS FOR 25-44 YEAR OLDS - USA

NUMBER 25-44 YEAR OLDS - TOTAL USA (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate ¹	74,310	75,966	77,658	79,388	81,157	82,965	83,448	83,933	84,422	84,913	85,407	85,204
Realistic Estimate ²	73,779	75,235	76,719	78,233	79,777	81,351	81,576	81,801	82,028	82,255	82,483	82,002
Pessimistic Estimate ³	73,383	74,656	75,952	77,270	78,611	79,975	79,963	79,951	79,940	79,928	79,916	79,203

SOURCE: Statistical Abstract of United States (1982)

NOTE: 1 Optimistic and pessimistic projections are calculated using the same ratios used by the US Bureau of the Census in calculating highest, lowest, and most likely projections for the total population of the USA.

2 Realistic projection is based on that given by the US Bureau of the Census. Figures calculated for years not given by the US Bureau of the Census assume a compound rate of annual growth, derived from the figures given by the US Bureau of the Census. Compound growth rates used are 1985-1990 = 1.9731%, 1990-1995 = 0.2767%, 1996 = 0.5867%.

NUMBER OF HOUSHOLDS WITH THE HOUSEHOLDER AGED 25-44 - USA

25-44 YEAR OLD HOUSEHOLDERS - USA

YEAR	NO. PEOPLE 25-44 YRS OLD (X1000)	HOUSEHOLDS WITH A 25-44 YR OLD HOUSEHOLDER (X1000)	PROPORTION OF 25-44 YEAR OLDS WITH HOUSEHOLDS
1970	48,474	23,521	0.485
1975	54,302	26,805	0.494
1976	55,853	29,233	0.523
1977	57,560	30,085	0.523
1978	59,400	29,792	0.502
1979	61,384	30,302	0.494
1980	63,465	32,482	0.512
1981	65,487	33,702	0.515

It is assumed that the following proportions of 25-44 year olds will head households throughout the budget period.

Optimistic Estimate - 55%

Realistic Estimate - 50%

Pessimistic Estimate - 45%

SOURCE: Statistical abstract of United States (1982)

PROJECTED HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	40,871	41,781	42,712	43,663	44,636	45,631	45,896	46,163	46,432	46,702	46,974	46,862
Realistic Estimate	36,890	37,618	38,360	39,117	39,889	40,676	40,788	40,901	41,014	41,128	41,242	41,001
Pessimistic Estimate	33,022	33,595	34,178	34,772	35,375	35,989	35,983	35,978	35,973	35,967	35,962	35,641

SOURCE: Statistical Abstract of United States (1982)

NOTE: Projections based on Population projections for 25-44 year olds and assuming the proportion of 25-44 year olds with households to be 45%, 50%, and 55% for optimistic, realistic, and pessimistic projections respectively.

PERSONS PER HOUSEHOLD WITH 25-44 YEAR OLD HOUSEHOLDERS - USA

AVERAGE SIZE OF
ALL HOUSEHOLDS - USA

YEAR	AVERAGE HOUSEHOLD SIZE (NO.)	COMPOUND ANNUAL RATE OF DECLINE %
1950	3.37	
1960	3.33	0.1194
1965	3.29	0.2419
1970	3.14	0.9376
1975	2.94	1.3249
1980	2.75	1.3451

Projected rates of decline
in household size (compound).

%/Year

Optimistic Estimate - 0.5

Realistic Estimate - 1.0

Pessimistic Estimate - 1.5

SOURCE: Statistical Abstract
United States (1982)

SIZE OF 25-44 YEAR OLD
HOUSEHOLDER HOUSEHOLDS - USA 1981

AGE HOUSEHOLDER	NO. HOUSEHOLDS	PERSONS PER HOUSEHOLD
25-34	19,153	2.92
35-44	14,462	3.65

SOURCE: Statistical Abstract of United
States (1982).

PROJECTED NO. PEOPLE/HOUSEHOLD FOR HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate ¹	3.17	3.15	3.13	3.12	3.10	3.09	3.07	3.06	3.04	3.03	3.01	3.00
Realistic Estimate ²	3.10	3.07	3.04	3.01	2.98	2.95	2.92	2.90	2.87	2.84	2.81	2.78
Pessimistic Estimate ³	3.04	3.00	2.95	2.91	2.87	2.82	2.78	2.74	2.7	2.66	2.62	2.58

NOTE: 1 Optimistic Estimate assumes 3.23 people/household in 1981 and a compound growth rate of -0.5%/year

2 Realistic Estimate assumes 3.23 people/household in 1981 and a compound growth rate of -1.0%/year

3 Pessimistic Estimate assumes 3.23 people/household in 1981 and a compound growth rate of -1.5%/year

NUMBER HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS EARNING ABOVE AVERAGE HOUSEHOLD INCOME - USA

MONEY INCOME OF HOUSEHOLDS - USA 1981

CHARACTERISTIC	TOTAL HOUSEHOLDS (X1000)	PERCENT DISTRIBUTION OF HOUSEHOLDS BY INCOME LEVEL (%)								MEDIAN INCOME (\$)
		(\$) UNDER 5,000	(\$) 5,000- 9,999	(\$) 10,000- 14,999	(\$) 15,000- 19,999	(\$) 20,000- 24,999	(\$) 25,000- 34,999	(\$) 35,000- 49,999	(\$) 50,000 AND OVER	
All Households	83,527	10.5	14.9	14.4	12.3	11.4	17.2	12.1	7.2	19,074
Aged 25-34	19,327	1.2	11.1	15.2	14.7	15.2	21.3	11.5	3.8	20,513
Aged 35-44	15,326	5.4	8.0	10.7	11.6	13.3	22.8	17.9	10.3	25,384

SOURCE: Statistical Abstract of the United States (1982)

In 1981 57.32% of households with 25-44 year old householders had incomes in wage brackets above the median for all households.

PROJECTED HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS EARNING ABOVE AVERAGE INCOME - USA

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate ¹	24,523	25,069	25,627	26,198	26,782	27,379	27,538	27,698	27,859	28,021	28,184	28,117
Realistic Estimate ²	20,290	20,690	21,098	21,514	21,939	22,372	22,433	22,496	22,558	22,620	22,683	22,551
Pessimistic Estimate ³	16,511	16,798	17,089	17,386	17,688	17,995	17,992	17,989	17,987	17,984	17,981	17,821

NOTE: 1 assumes 60% of 25-44 year old householders earn above average income
 2 assumes 55% of 25-44 year old householders earn above average income
 3 assumes 50% of 25-44 year old householders earn above average income

NUMBER OF PEOPLE IN TARGET MARKET - USA

<u>PROJECTED NUMBER OF PEOPLE IN TARGET MARKET - USA (X1000)</u>												
YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	77,738	78,967	80,213	81,738	83,024	84,601	84,542	84,756	84,691	84,904	84,834	84,351
Realistic Estimate	62,899	63,518	64,138	64,757	65,378	65,997	65,504	65,238	64,741	64,241	63,739	62,692
Pessimistic Estimate	50,193	50,394	50,413	50,593	50,765	50,746	50,018	49,290	48,565	47,837	47,110	45,978

POPULATION PROJECTIONS FOR 25-44 YEAR OLDS - AUSTRALIA

PROJECTED POPULATION OF AUSTRALIA (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	15,817	16,055	16,297	16,542	16,791	17,044	17,300	17,508	17,719	17,933	18,149	18,367
Realistic Estimate	15,707	15,915	16,127	16,341	16,558	16,777	17,000	17,181	17,364	17,549	17,736	17,925
Pessimistic Estimate	15,595	15,774	15,955	16,138	16,323	16,511	16,700	16,853	17,008	17,165	17,322	17,482

SOURCE: Calculated from Review of Australian Demographic Trends 1983 (1983)

NOTE: 1 Assumes constant percentage increase for years between those predicted by the source

PROJECTED PERCENTAGE OF TOTAL POPULATION 25-44 YEARS OLD - AUSTRALIA

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	28.4	28.4	28.4	28.3	28.3	28.2	28.2	28.2	28.1	28.1	28	28
Realistic Estimate	28.4	28.3	28.3	28.2	28.2	28.1	28.1	28	28	27.9	27.8	27.8
Pessimistic Estimate	28.3	28.3	28.2	28.1	28	28	27.9	27.9	27.8	27.7	27.7	27.6

SOURCE: Calculated from Review of Australian Demographic Trends 1983 (1983) and Summary of Characteristics of Persons and Dwellings Australia (1983)

NOTE: 1 Assumes that 25-44 year olds comprise 28.6% of the population in 1981 and 26%, 26.5%, and 27% of the population in 2021 for pessimistic, realistic, and optimistic projections respectively.

2 Assumes an annual rate of decline of 0.238%, 0.191%, and 0.144% for pessimistic, realistic, and optimistic projections respectively.

POPULATION PROJECTIONS FOR 25-44 YEAR OLDS - AUSTRALIA (CONTINUED)

PROJECTED NO. OF 25-44 YEAR OLDS - AUSTRALIA (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	4,492	4,560	4,628	4,681	4,752	4,806	4,879	4,937	4,979	5,039	5,082	5,143
Realistic Estimate	4,461	4,504	4,564	4,608	4,669	4,714	4,777	4,811	4,862	4,896	4,931	4,983
Pessimistic Estimate	4,413	4,464	4,499	4,535	4,570	4,623	4,659	4,702	4,728	4,755	4,798	4,825

NUMBER 25-44 YEAR OLD HOUSEHOLDERS - AUSTRALIA

PROJECTED HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	2,470	2,508	2,545	2,575	2,614	2,643	2,683	2,715	2,738	2,771	2,795	2,829
Realistic Estimate	2,231	2,252	2,282	2,304	2,335	2,357	2,389	2,406	2,431	2,448	2,466	2,492
Pessimistic Estimate	1,986	2,009	2,025	2,041	2,057	2,080	2,097	2,116	2,128	2,140	2,159	2,171

NOTE: Assumes 25-44 year olds head households in the same proportions as their N.America equivalents, ie 45%, 50%, and 55% for pessimistic, realistic, and optimistic projections respectively. Australian statistics do not give households by age of householder.

NUMBER OF PEOPLE/HOUSEHOLD FOR HOUSEHOLDS WITH A 25-44 YEAR OLD HOUSEHOLDER - AUSTRALIA

NO. HOUSEHOLDS AND PEOPLE/HOUSEHOLD - AUSTRALIA

YEAR	NO. PEOPLE	NO. HOUSEHOLDS	PEOPLE/ HOUSEHOLD	ANNUAL % RATE OF DECLINE
	(X 1000)	(X 1000)		
1976	12,943	4,141	3.13	
1981	13,918	4,669	2.98	0.987

SOURCE: Summary of characteristics of persons and dwellings Australia (1983).

NO. PEOPLE/HOUSE FOR HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS - AUSTRALIA

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	18996
Optimistic Estimate	3.46	3.44	3.43	3.41	3.39	3.38	3.36	3.34	3.32	3.31	3.29	3.28
Realistic Estimate	3.43	3.4	3.38	3.35	3.33	3.30	3.28	3.25	3.23	3.20	3.18	3.16
Pessimistic Estimate	3.39	3.36	3.33	3.29	3.26	3.23	3.20	3.16	3.13	3.10	3.07	3.04

NOTE: 1 Assumes households with 25-44 year old householders are proportionately larger than the average for all households as per the USA. In 1981 average household sizes for all households were 2.73 and 2.98 for USA and Australian respectively. In 1981 the average size of households with 25-44 year old householders in the USA was 3.23. It is assumed that the average size of Australian households with 25-44 year old householders in Australia in 1981 was 3.53 persons/household.

2 Annual rates of decline in household size are assumed to be 0.75%, and 1% for pessimistic, realistic, and optimistic projections respectively.

HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS EARNING ABOVE AVERAGE INCOME - AUSTRALIA

PROJECTED HOUSEHOLDS WITH 25-44 YEAR OLD HOUSEHOLDERS EARNING ABOVE AVERAGE INCOME - AUSTRALIA (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	2,695	2,736	2,777	2,809	2,851	2,884	2,927	2,962	2,987	3,023	3,049	3,086
Realistic Estimate	2,454	2,477	2,510	2,534	2,568	2,593	2,627	2,646	2,674	2,693	2,712	2,741
Pessimistic Estimate	2,207	2,232	2,250	2,268	2,285	2,312	2,330	2,351	2,364	2,378	2,399	2,413

NOTE: Assumes the proportion of Australian 25-44 year old householders with above average income is the same as for the USA, ie 50%, 55%, and 60% for pessimistic, realistic, and optimistic projections respectively. Australian figures do not state income by age of householder.

NO. PEOPLE IN THE TARGET MARKET - AUSTRALIA

PROJECTED NO. OF PEOPLE IN TARGET MARKET - AUSTRALIA (X1000)

YEAR	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Optimistic Estimate	9,325	9,412	9,525	9,579	9,665	9,748	9,835	9,893	9,917	10,006	10,031	10,122
Realistic Estimate	8,417	8,422	8,484	8,489	8,551	8,557	8,617	8,600	8,637	8,618	8,624	8,662
Pessimistic Estimate	7,482	7,500	7,493	7,462	7,449	7,468	7,456	7,429	7,399	7,372	7,365	7,366

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PERSONS COMMUNICATED

ASD Directorate, Advisory Services Division Directorate, New Zealand Ministry of Agriculture and Fisheries.

Barnett, John W., Food Technology Research Centre, Massey University.

Beattie M I, Rural Banking and Finance Corporation, Wellington.

Earle Dr, Mary D., Reader In Food Technology and Past Director of Massey Universities Food Technology Research Centre.

Kirk B L, Fabers Machinery Ltd, Auckland.

McLisky, Nigel H., Export Marketing Director, Epicurean Foods of New Zealand Limited.

O'Hara J W, Marketing Executive, New Zealand Kiwifruit Authority.

Ritchie I J, Chief Advisory Officer (Economics), Advisory Services Division, New Zealand Ministry of Agriculture and Fisheries.

Secker H, Department of Trade and Industries, Wellington.

Thompson Dorothy, Horticultural Desk Officer, Department of Trade and Industries, Wellington.

Ward A B, Reader in Agricultural Economics, Massey University.

Wells R, Manager, Opotiki Fruitgrowers Co-operative.

Wilkinson BHP, Food Technology Research Centre, Massey University.