TOWARDS MORE EFFECTIVE FARM MANAGEMENT CONSULTANCY
A FRAMEWORK FOR MANAGING BEHAVIOURIAL CHANGE

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ABSTRACT

A commercial management consultancy service (MSS) is used by horticultural consultants to support kiwifruit grower clients' needs in the Bay of Plenty. This commercial environment provided an opportunity to explore an action research application that attempted to enhance consultancy services by integrating cognitive analyses with conventional technical and financial services provided by the consultant. Case studies, involving the elicitation and spatial representation of concepts associated with profitable kiwifruit management, were used to analyse modelled changes in clients' attitudes and beliefs. Objectives were defined using preliminary information on clients' attitudes, beliefs and learning styles. Change strategies, consistent with clients' objectives, were compiled by the client and consultant. Attitudes and beliefs were predicted to move in accordance with clients' unique objectives. Case study observations confirmed consultants can identify and manage clients' attitudes and beliefs towards predicted outcomes using action research. Consultants were expected to become more aligned with profitable kiwifruit management, following the use of cognitive information to design client change strategies. However, consultants associated themselves less with kiwifruit management and believed their input to client management systems decreased in value over the period of the study. Two dimensional graphs, representing changes in overall and evaluative attitudes and principal beliefs, provided more useful images of cognitive changes than multidimensional maps. Recommended developments to MSS include completion of learning style inventories and pairwise comparison questionnaires by clients during needs analyses. Pairwise comparisons could also assist service evaluation procedures. Job satisfaction was identified as a significant concept to clients and consultants during the study. Further studies of job satisfaction could explore the development of an index to predict grower stability within the industry. Clients and consultants believed the use of a whole farm/systems approach became a more critical input to profitable kiwifruit management. Consequently, undergraduates considering a consultancy career, will benefit from using a systems approach in their farm management studies.

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Completing this thesis has been a personal objective spanning 10 years. Learning experiences, associated with its completion, have benefited from contributions made by numerous people. Education seems to reveal one of the most godlike attributes of individuals - their spirit of giving.

I have long considered Professor Robert Townsley my mentor, admiring the quality and power of his intellect. My supervisor, Professor Frank Anderson, contributed a pragmatic clarity to my studies - a difficult task when supervising from a distance. Dr Neil Cox provided untiring programming and statistical assistance with a study requiring an exploratory examination of data.

Many friends have contributed to this document, in particular my wife Karenza, who has given far more than understanding and support. Without her belief in me, love for the subject and ability with language, the task would have been daunting. My "best man" Brian Cloughley has always been encouraging and enthusiastic about the thesis, even when its completion meant severe strain to himself and the practise he was managing - thankyou for your unfaltering support. Consultants in the Tauranga office were zealous in their participation and expectations from the study - their commitment to integrating the findings within their practise is a gratifying outcome. Throughout the study clients were honest, patient and receptive to my requests. Their contributions opened my mind to new perspectives of life. Finally, I thank 2 people who will probably never read this thesis. Peter Gravitt and Avon Moorehouse were catalysts to my acquiring a love for learning and an awareness of dynamic horticultural systems.

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LIST OF ABBREVIATIONS

CRI - Crown Research Institute

LSI - Learning Style Inventory

MAFTech - Ministry of Agriculture and Fisheries (Technology)

MBO - Management by Objectives

MCS - Management Consultancy Services

MDA - Multidimensional Analysis

MSS - Management Support Services

NZKMB - New Zealand Kiwifruit Marketing Board

CHAPTER ONE:DEFINITION OF PROBLEM

1.0.0 Introduction

Kiwifruit consultants in the Bay of Plenty are less effective at helping clients achieve their objectives because of a limited understanding of clients' attitudes, beliefs and learning preferences, and how this knowledge can be used to bring about behaviourial change.

This thesis explores the possibility of consultants using cognitive information from clients for more effective support of clients' management behaviour.

The study is located in the Western Bay of Plenty, New Zealand (see figure 1.1). The district has a maritime climate and deep volcanic soils suitable for temperate and subtropical fruit production.

Consultancy servicing of kiwifruit managers is provided on an exchange for fees basis through MAFTechnology in Tauranga. In May 1990 six consultants provided management consultancy services to 51 kiwifruit managers throughout the region.

Consultants meet fortnightly to align and update technical and economic recommendations. Through these meetings a regular problem arose during discussions; how should consultancy services develop in future to more effectively meet the management needs of clients? The research in this thesis was made in response to this problem.

A rapid expansion in kiwifruit production throughout the district, from 1975 to 1985, resulted in Ministry of Agriculture advisors increasing staff numbers from 3 to 7. Mass extension techniques were used to meet the demand for technical information. Government policy changes in 1987 resulted in clients paying for services and servicing of individual clients (MAF Annual Report,

1988). Consequently consultants required new human relations skills to deal with individuals. In particular, consultants have sought more formal procedures to determine clients' needs than that available from casual conversations relating to technical problems. This study explores what contributions research on individuals can make to existing consultancy practises.

The need for knowledge of client behaviour is discussed in chapter one to define the scope and relevance of the problem to practise. Aspects of clients' needs, objectives, attitudes and beliefs are discussed separately before discussing their relationships in the context of typical client decisions. An overview of the Kiwifruit industry introduces the reader to issues of significance to the study. Chapter one concludes with a description of the thesis structure.

Figure 1.1 Location of Study

MAF's North Region

Northland

Farm Class	Type	Description	Number of Properties
4	Sheep/Beef	Easy Hill	1100
14	Dairy	Med. Sized	1800
20	Kiwifruit	Mature	110
23	Citrus	Mature	70

Auckland

Farm Class	Type	Description	Number of Properties
4	Sheep/Beef	Easy Hill	1250
14	Dairy	Med. Sized	910
20	Kiwifruit	Mature	135

Waikato

Farm Class	Type	Description	Number of Properties
3	Sheep/Beef	Hard Hill	205
4	Sheep/Beef	Easy Hill	480
5	Sheep/Beef	Intensive	455
14	Dairy	Med. Sized	2375
15	Dairy	Lg. Sized	1865

King Country

Farm Class	Type	Description	Number of Properties
3	Sheep/Beef	Hard Hill	345
4	Sheep/Beef	Easy Hill	1240
5	Sheep/Beef	Intensive	235
14	Dairy	Med. Sized	675

Bay of Plenty

Farm Class	Type	Description	Number of Properties
4	Sheep/Beef	Easy Hill	1080
11	Deer	Breeding	200
14	Dairy	Med. Sized	800
15	Dairy	Lg. Sized	630
23	Citrus	Mature	120
20	Kiwifruit	Mature	2000

1.1.0 Client Needs

A consultant's knowledge of client needs, as expressed by the client, directs efforts of assistance towards solutions that have a high perceived value to the client. Consultants have received limited training in methods to elicit client needs. A course to develop communication skills has provided consultants with effective questioning procedures (Centre for Effective Organisations, 1988). However, consultants are dependent on contingent skills, to organise information from client responses into useful support services.

Client business management needs are of particular concern to the consultant. Business needs are influenced by personal, social and family needs which in turn can affect management practises. It is necessary for a consultant to have a knowledge of these needs when they seek to influence the client's perception of their business. Consultants are therefore required to estimate the importance of clients' various perceived needs. The accuracy of these estimates can vary depending on the need elicitation circumstances and the consultant performing the task.

Problems in practise can involve several simultaneous needs. For example, a client may have a problem regulating croploads on his orchard. He therefore needs to know the relationship between fruit numbers and fruit size, and how the relationship alters with alternative pruning, thinning, pollination, irrigation, nutrition and plant protection practises. Providing this knowledge may satisfy production relationship needs (business management) but may not address personal needs such as confidence to adopt alternative management practises with a higher probability of success. Furthermore, these alternative practises may also involve working at a time when the family previously went on holiday, or demand a higher standard of instruction and supervision from staff. If they are to be effective in changing behaviour, consultants require an holistic framework, when eliciting clients' needs.

Needs are sometimes inadequately expressed by clients. In the example above, the client may have been more concerned to resolve the problem of pay-offs between sustaining the yield of export trays where the marginal revenue product of factor inputs equalled the factor prices, using a management system with which he was confident, and satisfying his need to spend time with his family. What the client expressed as a technical problem, may also involve undisclosed economic, personal and family dimensions.

It is assumed that if consultants could improve their knowledge of client needs, they could deliver services that had a higher probability of satisfying client expectations. This could involve the exploration and evolution of support services to each phase of the management process as applied to production, marketing, finance and human resource areas of the firm (Hopkins et al, 1973).

Consultants must decide on the important components within clients' management processes to support, as applied to the allocation of the firms' resources, consistent with clients' expressed needs. Knowledge of clients' objectives can provide some assistance to consultants confronting this task.

Table 1.1 Illustrating the Application of the Process of Management to the Organisational Areas of the Firm

management process	Production	Marketing	Finance	Human Resources
Objectives	Optima in resource use & allocation	optima in time, place, type of sales and purchase	optima in financial flows, structure	optima in job satisfaction, purpose and personal development
Problem definition	production relations	market opportunities	financial opportunity constraint	Behaviourial opportunity constraint
Gather information	production records, technical literature	market reports, sales & purchase records	observation of financial intermediaries	concepts of system
Analysis	Production co-efficients	supply, demand, terms of trade	leverage, liquidity co-efficients	attitude and belief relations
Synthesis	production outcomes	costs, returns	reserves, growth rate	cognitive maps
Decision	Enterprise and resource organisation plan	market plans	budgets investment choices	personal development plan
Action	commit resources	buy and sell	borrow, lease, pay debts, rent, insure	learning activities
Accept con-sequences	enterprise diversity, resource flexibility	contract sales, hedges,	insurance, liquidity management, growth, decline	self actualization
Evaluation	compare output with prod standards	compare budget with actual	compare actual with projected	compare achievement with purpose

(Adapted from Hopkins et al, 1973)

1.1.1 Objectives

Consultants knowledge of clients' objectives directs services towards measurable outcomes. Kempner (1978) defines objectives as statements that capture the raison d'être of the firm. Under this definition it is possible for the business to determine its level of success, while answering the question of its existence.

A management by objectives (MBO) procedure is used by consultants to establish client objectives. MBO provides the agreed focus between clients and consultants throughout the management process. Consultants are trained in the MBO procedure, assisting clients to set their objectives consistent with the overall business objectives. These objectives are reviewed regularly in the light of new information and the changing environment (Pearce & Robinson, 1989). Consultants strive to establish objective statements that are specific and understandable, measurable, timebound, concise, challenging, realistic, flexible and owned by the client. Targets are aligned with the objectives to provide measurable and frequently reviewable milestones for management. Targets are precise and unequivocal translations of the objectives (Kempner, 1978).

In practise, objectives evolve from effective client needs analyses. Discussions with a client may reveal concerns with the small scale of the orchard, debt burdens, a desire to be considered as an elite manager by his neighbours while continuing to enjoy his sport and outdoor pursuits with friends. An objective statement to capture these issues is presented below.

Objective

"To secure and take pride in an economic orchard area[1], while reducing debt servicing[2] and maintaining recreational pursuits, through improved orchard performance[3]."

Targets

    1.   Eight canopy hectares by June 1994

    2.   10% of cash orchard revenue

    3.   8000 trays/canopy hectare; 36 fruit/tray; $4.00/tray growing, picking and packing cost

The objective alludes to aspects of importance to the client like security, pride and lifestyle. The usefulness and success of objective statements will depend on the consultant's abilities to elicit client needs and provide assistance to clients constructing objective statements. Objectives motivate clients while providing a means for self evaluation (Bandura, 1986). Consultants' understanding of the motivational and self evaluative impacts of objectives on clients is limited by a lack of cognitive information from clients.

1.1.2 Values, Attitudes and Beliefs

A value system has been described as an enduring organisation of beliefs concerned with preferable modes of conduct along a continuum of importance (Rokeach, 1973). Values are beliefs that transcend attitudes towards objects, acting as standards that guide and determine actions. It is essential consultants have some knowledge of clients' attitudes and beliefs to understand a client's rationale for a particular behaviour employed to achieve their objectives.

Consultants current knowledge of clients' attitudes and beliefs has been derived and organised informally. Clients are questioned as to the strength of

their likes and dislikes towards objects or situations. Consultants retain client responses in their memory by building a mental image of the client and predicting patterns of client behaviour in response to new stimuli. No formal organisation and storing of client attitudes and beliefs are made, however a consultant's understanding of the client is regularly tested and revised through consultancy practises and challenges from colleagues.

It is proposed if consultants adopted more formal methods to acquire knowledge of clients attitudes and beliefs towards management practices, clients could expect their needs to be more effectively serviced. An understanding of the client's value system would evolve systematically from an ability to measure, analyse (by comparison and discussion) and store information on clients' attitudes and beliefs. Currently unidentified misunderstandings between clients and consultants , due to the use of informal cognitive assessments, could be identified and rectified. As barriers to thinking are removed, information on cognitive structures may inspire the evolution of new methods of problem-solving, as relationships between concepts are observed and discussed.

1.1.3 Typical Decisions Confronting Clients

The choices a person makes throughout their life will have a profound effect on their development (Tyler, 1978). In particular, a person's choices will determine what learning, interpersonal and environmental experiences will follow. These experiences shape the beliefs and attitudes of the individual, and give rise to changing needs, requiring regular objective reviews. Decision-making behaviour can be viewed as some function of a client's attitudes and beliefs in a given situation. In a dynamic environment, some modification to initial attitudes and beliefs may occur after the outcomes of the decision are experienced. Decision-making behaviour involves a complex set of relationships driven by the client's needs and objectives, modified by time and circumstance, and the attitudes and beliefs of the client.

Decision theory using bayesian analysis can be used to make rational choices between alternatives. Halter and Dean (1971) specify seven components to a decision problem;

1. the available actions that can be taken (A_i's);

2. the states of nature which could occur (θ_i's);

3. the consequences (gains, losses, utilities) of each combination of action and state of nature (state - act, pair);

4. an experiment or other device for obtaining knowledge about the states of nature. An experiment consists of;

    a) possible observations that are related to the state of nature and which are observable at the time the decision is made (the Z_i's);

    b) the estimation of a relationship that shows the dependence of the observations upon the states of nature in probabilistic terms (the $P(Z_k \mid \theta_i$'s);

5. the available strategies or recipes telling the decision-maker which action to take in the event of a particular Z_k observation from the experiment;

6. the consequence of each strategy for each state of nature is determined by the action probabilities (the $G(\theta_i, s_t$'s);

7. the choice criterion by which the decision-maker solves the final problem of choice (maximising the expected utility using the $P(\theta_i$'s).

In practise, clients have not made rational choices using a formal procedure. Although the method is logically appealing, clients can have difficulty estimating probabilities and sometimes decisions can involve several steps with the client using different decision rules at each step (Slovic, Fischhoff and Lichtenstein, 1977). Some decisions do not justify investment in such a comprehensive decision method. Finally, clients may use unique decision styles, developed to adapt to life's challenges but incapable of being expressed as a set of rational decision rules (Tyler, 1978).

Two common decisions, confronted by clients, serve to illustrate the decision environment for growers.

Many growers are faced with alternative ways of selling their crop. One option is to sell direct to the NZKMB. A second option is to sell their fruit on their vines to a packhouse. Another option is to lease their orchard to a packhouse. To choose between these options the grower needs to clarify his/her expectations of payouts from the NZKMB and the storage loss characteristics of their fruit. Consideration of the yield:fruit size relationship would be necessary as NZKMB payouts are affected by fruit size, yet selling on the vine or leasing (on a tray basis) is not. Growers need to reflect on the financial security of a packhouse offer (a guarantee of payment) and the cashflow effects and cost structures associated with each option.

A second decision facing many growers in the Bay of Plenty is whether to use hydrogen cyanamide and if so how much. Hydrogen cyanamide provides growers with more opportunity to regulate croploads. Benefits arising from the use of the chemical include larger volumes of fruit of a larger fruit size. Risks associated with the use of the chemical include more exposure to frost damage; phytotoxicity or the formation of "trebles" (three small fruit formed on one fruit stalk); poor pollination or severe disease outbreaks if inclement weather affects the compressed flowering period; poor fruit size if vines are overcropped. Orchard managers can minimise exposure to production risks if orchard specific information is available on budbreak dates, vine vigour (especially cane strength), winter bud numbers, the incidence of frosts at budbreak and rainfall at flowering, the nutrient and hygiene status of orchards along with possible cashflow and labour availability constraints for thinning after fruit set.

Both decisions could be modelled using bayesian analysis. The first example indicates clients are confronted with marketing decisions even in an industry with monopolistic control of export marketing (see section 1.2.0). The problem

exhibits varying levels of risks and returns resulting from incomplete knowledge of technical relationships and future events. The second decision portrays the implications of applying recent research results in practise. When technology offers an opportunity for clients to exert more control over their management system, a corresponding need for more knowledge of the system can ensue. If consultants recommend the use of new technology, they need to assess the client's current knowledge of their system, and their attitudes towards acquiring learning skills required to manage the new technology.

Consultants, concerned with supporting client decision-making towards the achievement of client objectives, have been provided with a number of computer based decision aids (Chang and Sullivan, 1986; Harmon, Maus and Morrissey, 1988; Laplin, 1988). However, effective use of these aids in practise requires an understanding of the fundamental causes of client's decision behaviour.

1.2.0   Overview of the Kiwifruit Industry

Knowledge of the kiwifruit industry, as a setting for the study, is discussed in terms of production and marketing.

Production

The task confronting advisory officers in the establishment years of the kiwifruit industry (1950 to 1970) was to develop interest in a relatively unknown plant (Ferguson, 1990). When kiwifruit was adopted commercially, scientists and advisory officers focused on the development and dissemination of cultural management information.   W A (Bill) Fletcher played a significant role in the early development of kiwifruit technology. His publication, (Bulletin No 349, 1968) became for many years the standard reference. A number of scientists concentrated on kiwifruit research after the initial work of Dr H M Mouat in

1952. Many of these scientists were centred at Mt Albert Research Station following the establishment of the National Research Advisory Council in 1978. In 1972 a research station was established in Te Puke on No 2 Road providing a centre for husbandry and breeding studies. Advisory officers specialising in kiwifruit with the Ministry of Agriculture and Fisheries increased in numbers from two to eight in the early 1980's when demands on their services were at a peak. The numbers of growers involved in kiwifruit production increased from 250 in 1970 to 3,500 in 1980 for the Bay of Plenty region, stretching from Waihi in the north to Opotiki in the south (Warrington, 1990).

Cultural practises have changed over the past twenty years in response to market signals, quarantine requirements, economic pressures and technological advances. Market preference has lead to the industry being dependent on Hayward as the only cultivar for export. Quarantine requirements have forced producers to use a restricted range of pesticides to totally eliminate species of leaf roller and armoured scale from export fruit. Sale (1991) reviewed what he considered to be the contributions from technology to the industry over the past twenty years:-

> 1970's
>
> pollination research, selection of Hayward as the only export cultivar, development of fruit maturity indices, fruit rot research.
>
> 1980's
>
> Increasing concern over spray residues on export fruit, objective nutrition indices established, artificial pollination developed, cropload regulation through hydrogen cyanamide, pruning and fruit thinning methods
>
> 1990's
>
> New cultivars, integrated pest management, quality management methods.

Sale's perception of industry development indicates a directing of efforts towards resolving a series of technical problems, and following their resolution, a concern with more effective resource allocation.

An industry dependent on one cultivar is vulnerable to changes in consumer preferences and pest and disease outbreaks. Breeding programmes have been developing new varieties over the past 15 years. The genetic material for developing new cultivars comes from China, which has 57 species and 39 cultivars identified to date (Qian, 1991). China currently has a breeding programme (Xieming, 1991) focused on:

1.   Selection from wild populations
2.   Transfer of different characteristics by hybridisation
3.   Research on the use of rootstocks.

Within New Zealand, selection and breeding work has concentrated on altering the timing to fruit maturity and fruit characteristics such as colour, size, hairiness, core size and overall fruit size (Pringle, 1991). A difficulty with breeding dioecious perennials is the extended period (15 to 20 years) required to develop and release new material. Consumer preferences and industry needs can alter in the interim, therefore breeding specifications ought to be regularly reviewed. Tissue culture is being used for rapid bulking up and invitro irradiation is being used for the development of mutations in breeding.

Sale (1990) has described a work schedule for kiwifruit management indicating peak workloads through the season.

Figure 1.2 Kiwifruit Management Work Schedule

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Pruning												
Fertiliser												
Spraying												
Weed spraying												
Mowing												
Pollination												
Harvesting												
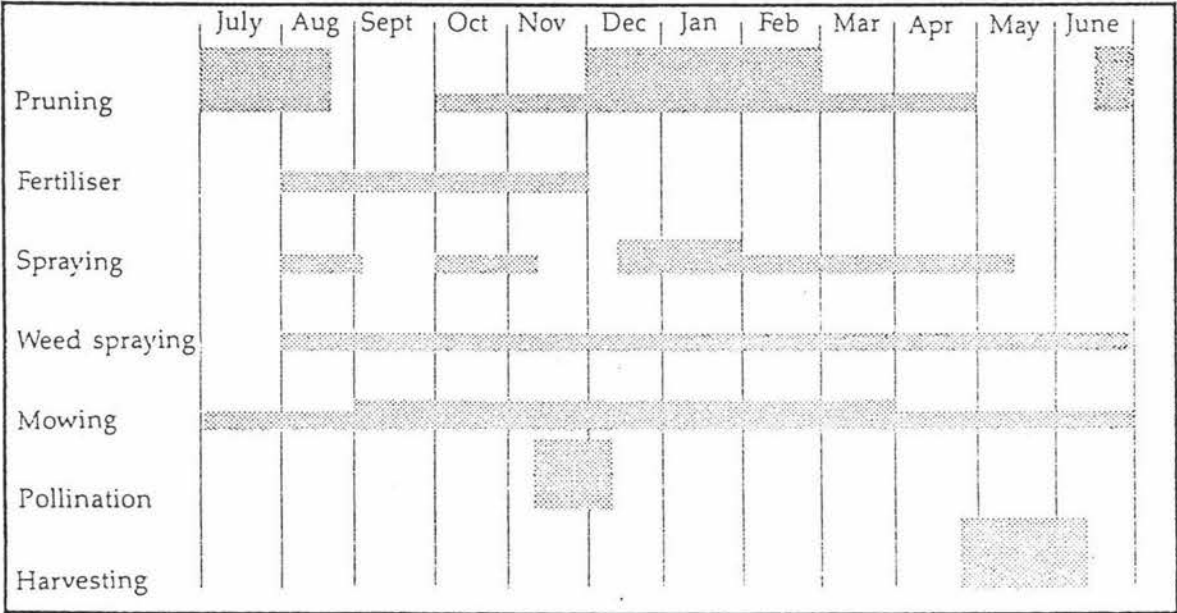
(from Sale, 1990)

Pruning

A replacement prune in winter (see Figure 1.3) removes old fruiting wood while retaining a fruiting arm to be cropped the following season. Winter pruning is followed by thinning in November or December to regulate cropload and fruit size. Summer pruning may be practised from October to April, however

December to February demand the most labour inputs. Smith and Buwalda (1991) claim many growers are over pruning their vines resulting in decreased energy reserves and consequently lower yields and fruit. In practise, the quantity of fruiting arms and leaves retained on vines will depend on the light interception of the orchard. Light interception will vary with the training system, orchard location, orchard shelter system and the time of the year and weather oscillations. Growers need to monitor light levels in terms of a standard (eg. leaf area index) and regulate their canopies accordingly.

Figure 1.3 Replacement Pruning
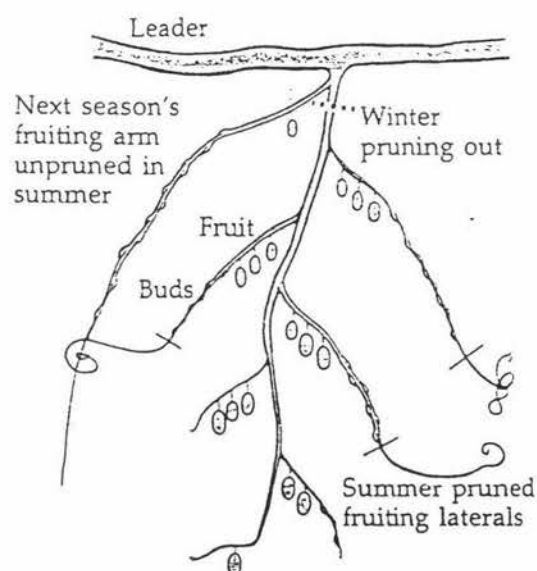
(from Sale, 1990)

Nutrition

From a production and technological perspective, nutrition is probably the most thoroughly researched yet contentious aspect of kiwifruit management (Limmer, 1988). Early work focused on surveys and monitoring large numbers

of growers over a 5 - 7 year period. No conclusive information could be gleaned from these surveys to suggest optimum nutrition levels for kiwifruit vines. Smith's (1984) pot trial and physiological studies resulted in initial standards for the industry being set in the mid 1980's. Results from soil tests and leaf analyses could be correlated to vine performance indices (sustained yields and fruit size) establishing optimum nutrition levels (normal adequate ranges) that were reviewed annually as further information became available. Smith & Buwalda (1988) later developed a predictive model to express the mathematical relationship of each essential nutrient to kiwifruit vine performance (yield and fruit size) through time. The model has subsequently been used by consultants to make nutrition recommendations to clients (see section 2.2.0)

Plant Protection

Kiwifruit, like most horticultural crops, needs to be protected from a range of pests. The major categories of pests affecting kiwifruit include; insects, diseases (fungi, bacteria and viruses), and physiological disorders. Kiwifruit also need to be protected from weed competition.

The primary insect pests include; greedy scale, leaf rollers (of which there are 5 species, 2 being native), and mites. Fungal diseases include; Botrytis (an important storage rot) and Sclerotinia which causes fruit rot on vines, and in severe cases, the loss of fruiting shoots on vines. Blossom Blight is a bacterial disease which can rot flowers on vines before fruit set, under conditions of high humidity. Blossom blight can occur as a partial infection, resulting in poor pollination and consequently irregular fruit shapes. Armillaria root rot has been responsible for a substantial loss of vines in some orchards throughout the Bay of Plenty. The disease can establish in orchards developed from cut-over forest, or where shelter belts have been removed leaving remaining stumps to decay. Studies involving biological control

methods have achieved some success in controlling the disease (Hill, 1988).

Increasing concerns over the threat to export markets from spray residue detection has resulted in efforts to establish an integrated pest management (IPM) programme in the Bay of Plenty (Watts, 1988; Hill et al, 1988; Paine, 1990). A pest management programme has been proposed, requiring environmental monitoring and predictive pest management models, used in conjunction with pest management decision making procedures (see Figure 1.4).

Figure 1.4 A Suggested Pest Management Service
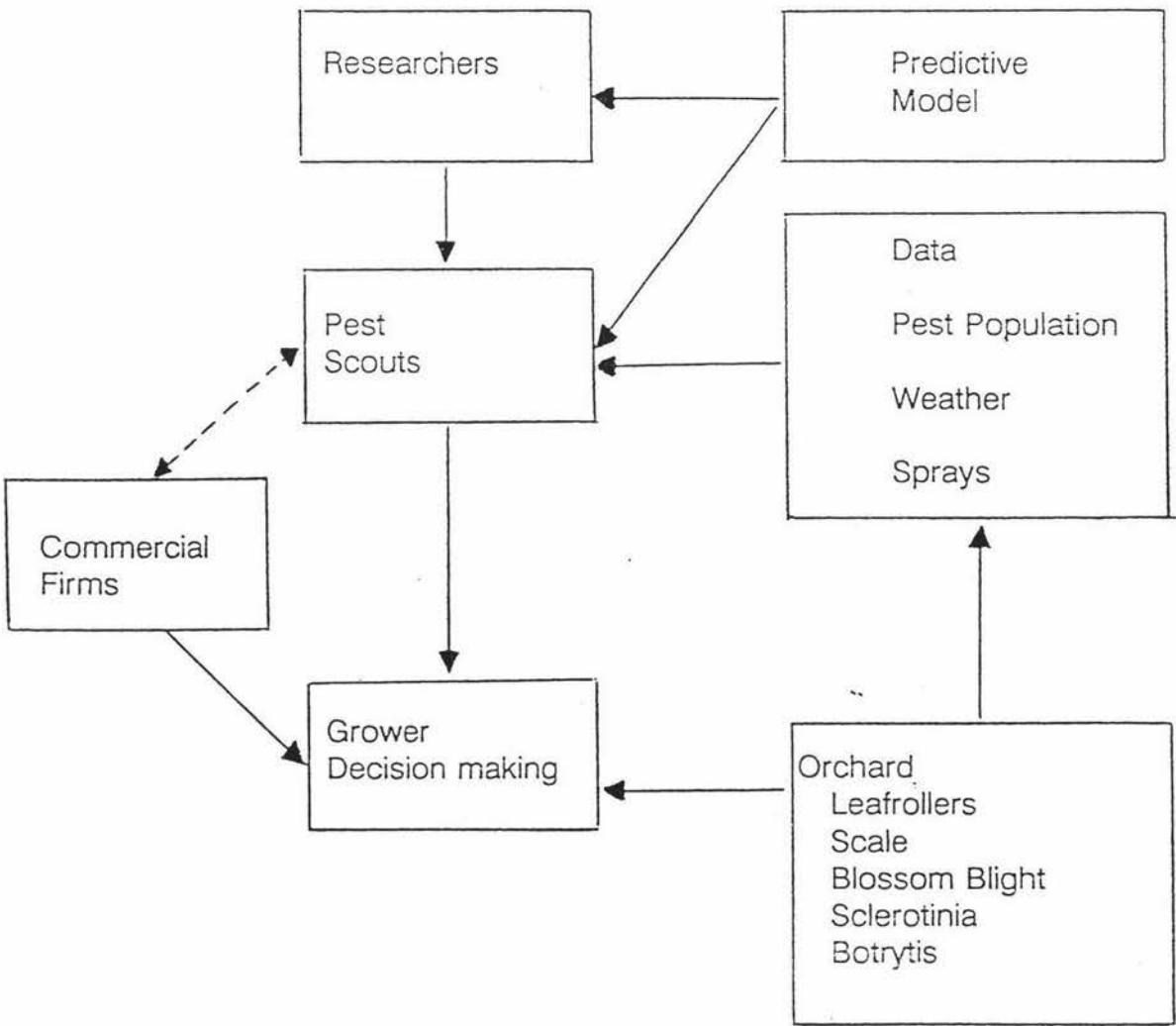
(from Paine, 1990)

To date IPM developments within New Zealand have not researched economic and decision criteria as extensively as technical monitoring and control procedures with respect to Blossom Blight, Leaf Roller, Scale & Botrytis. For example, an extensive five year survey of blossom blight infections within the Te Puke district, concluded that Blossom Blight was most strongly associated with high humidity (Pennycook & Trigs, 1991). Correlations were then established between the incidence of Blossom Blight and levels of rainfall, area in gullies, vine structures, etc. A monitoring procedure for Blossom Blight has now been established, however, no predictive models or decision procedures have been forthcoming for the grower to make rational judgements to minimise his exposure to risks of crop failure.

Water Status and Drought Management

The management of kiwifruit water status has traditionally been one of observing the canopy and fruit size for any symptoms of stress. More observant growers would periodically dig holes in the soil to evaluate soil moisture status. Some growers have recently used biological and environmental monitoring techniques. Biological monitoring tools have included pressure bombs and heat pulse techniques. Pressure bombs (similar to those used in pastoral situations) operate by applying pressure to the leaf lamina until leaf exudate is observed from the leaf petiole (Lord, 1989). The heat pulse technique uses a pulse of heat which is injected into the stem of the kiwifruit plant while monitoring the time taken to pass a sensor, thus indicating the water usage rate from the kiwifruit vine if the cross sectional area of the stem is known (Clothier, 1986). The simplicity and low capital cost of the pressure bomb has attracted some growers to use the method.

Environmental monitoring techniques used by growers include the use of weather stations to indicate humidity, light levels, wind runs and evapotranspiration levels from the canopy. Some growers use tensiometers to estimate the soil moisture status to predict subsequent stress on vines.

Tensiometers mimic root behaviour to indicate suctions required to extract water from the soil. Quick draw (mobile) tensiometers are used by consultants to check a number of sites throughout the orchard to determine correlations between fixed tensiometer stations and overall orchard soil water status.

Control of vine water status is exerted through the design of irrigation systems (primarily drip and mini sprinkler systems throughout the Bay of Plenty). Wetted strips are achieved through one metre spacings of drippers along the irrigation lateral and often electronic timers are used to regulate total water supply. In more advanced systems it has been possible to use tensiometer connections to regulate water application rates.

Pollination

The task confronting the kiwifruit grower, to achieve a satisfactory fruit set in their orchard, epitomises the dilemma of decision making under risk. Alternative management strategies are available to minimise the risk of poor fruit set, however this involves the use of further working capital. A decision is made on the basis of a perceived pay-off from an investment made in November and December, the consequence of which will be unknown until June two years later.

Research has focused primarily on the mechanisms of pollination, both by artificial methods (Hopping, 1984) and by the activity of pollinators (principally honey bees). Pomeroy (1983) considered the use of bumble bees as pollinators for kiwifruit, however this did not become a commercially viable alternative due to the difficulties of establishing bumble bee colonies. Environmental monitoring of wind, temperature and light levels need to be correlated to bee pollinating activity. To date, no single environmental parameter has provided a useful predictive indice of bee pollinating activity. Growers monitor flower numbers, incidence of blossom blight and flower opening times to determine male:female flowering overlaps and demands on

pollinators. Monitoring of pollinators include bee counts (number of bees counted in a bay over a given time period), the use of pollen traps set on pollinating units to determine the quantity of pollen collected, auditing of pollinating units (in terms of the status of the queen, the quantity of brood etc), and the effect of the pollinating distance demanded from pollinating units. Cameron Jay (1982) studied the behaviour of bees with regard to flight pattern throughout canopies to determine the preferred location of pollinating units within an orchard. Further studies have suggested the use of sugar feeding to stimulate pollen collection (Goodwin, 1988).

Artificial pollination has been developed using either dried pollen techniques or pollen in a suspension (PollenAid). To be effective growers need to monitor the grams of pollen applied per thousand flowers, as flowers can be over or under pollinated. A satisfactory pollination and fruit set result can be achieved through the use of artificial techniques in situations unsuitable for bee pollinators. Decisions relating to the choice of pollinating method depend on estimates of the final product price and production benefits attributed to a particular technique.

No decision aids are currently available to solve the problem of selection and evaluation of pollinating methods for growers. However, correlating environmental, vine and pollinator data with fruit size and the incidence of misshapen fruit at harvest provides growers with some opportunity to evaluate their decision rules for the future. Correlations are available between the number of seeds per fruit and size of the fruit (Goodwin, 1991).

Hydrogen cyanamide (see section 1.1.3) influences flowering date, flowering intensity and the overlap between males and females at flowering. Hydrogen cyanamide can therefore be used as a management tool to improve pollination (by improving the overlap between male and female flowering). Compressed flowering can be a two edged sword as an experience of bad weather during the flowering period can result in crop failure without the use of artificial pollination.

Harvesting and Packing

The kiwifruit Industry has utilised much of the harvest and post harvest technology developed in the deciduous fruit industry. Fruit maturities are determined using refractometers establishing Brix (soluble solids) levels before picking. A minimum average brix of 6.2 is required before an orchard is cleared for harvest by the New Zealand Kiwifruit Marketing Board (NZKMB). Fruit maturity varies with location, both within the orchard and within the canopy of vines. Often warm days with cool nights result in a quick rise in fruit brix levels. Brix levels have not been strongly correlated with the physiological maturity of fruit and studies are currently looking for a better fruit maturity index for kiwifruit (Hopkirk, 1991). Fruit storage life decreases with fruit picked before 6.2 brix, but fruit picked at any level above 6.2 does not appear to shorten storage life, or loss of flavour and colour characteristics (Hopkirk, 1990).

Fruit is harvested into canvas bags before being loaded into bins and transported to a dry bin dump in the packaging line. Grade standards are reviewed annually. Standards for the May 1991 harvest are expected to increase average orchard reject rates by 50% (reducing export yields by 10%) through stricter controls on misshapen fruit. Consequently growers are concerned to apply husbandry techniques that can economically minimise reject rates.

Fruit is graded into 8 size grades on the basis of the number of fruit per 3.6 kg tray. Sizes range from 25 up to 46 fruit per tray. Growers are paid a price differential for fruit size with larger fruit attracting a higher price. The differential paid by grade varies between seasons.

Table 1.2 Indicative Price Ratios For 1991 Harvest

Count	25	27	30	33	36	39	42	46
Ratio	1.5	1.4	1.3	1.1	1	.9	.6	.5

(Honeybone, 1990)

Growers therefore attempt to grow large fruit. Growers attitudes and beliefs about the relationships between fruit size, yields and costs may be a basis for the different management practises observed in the industry.

Fruit is packed into a plix liner within a variety of single layer tray types (from cardboard to wood). In most seasons, packaging costs account for over 50% of the growers production costs (MAF, 1991). In 1989 the use of tripacks (loose fruit packaging of 3 tray equivalents in one cardboard container) were used for 40% of the export crop in an attempt to reduce packaging costs for the grower. Adverse reactions to tripacks from the market saw a decreased to 10% of the export for the 1990 crop, with a consequent increase in packaging costs. For the 1991 season, 25% of the crop will be packed in Tripacks. The effect of this will be a decrease in fruit packaging costs from approximately $2.50 per tray equivalent for the 1990 harvest, to $2.20 per tray equivalent for the 1991 harvest.

Grading and packing operations have increased both in technological sophistication and economic scale. Table 1.3 illustrates the expansion in packhouses and coolstores over time.

Table 1.3 Kiwifruit Packing and Coolstoring Facilities

YEARS	NO OF PACKHOUSES	NO OF COOLSTORES
1987	588	NA
1988	620	212
1989	532	193
1990	483	209

(Adapted from Martin, 1991.)

As competition increases between post harvest facilities to attract growers' fruit, attention has been given to the supply of information to clients and bulk purchasing of orchard materials for production.

Labour and packing material costs account for 80% of the total packaging costs, the remaining 20% being overheads and profit to the packhouse. Packhouses throughout the Bay of Plenty have therefore been increasing throughput to gain economies of scale, thereby reducing packaging costs and remaining competitive with other packhouse suppliers. Packhouses are paid $1.75/tray by the marketing board at packaging. This payment is deducted from the initial $3.50/tray payment to the grower from the NZKMB. Negotiations between the grower and the packhouse settle the remaining charge from the packhouse. Growers incur penalty charges for higher reject rates through the packhouse, as shed throughput is reduced if grading tables are slowed down for poor quality fruit.

Controversy over fruit losses and the poor payouts relative to previous years has resulted in divisions occurring between producers and packhouses in recent years. A number of Co-operatives are being formed to share the risks and returns in both production and packaging in coming seasons.

Storage

McDonald and Snowball (1990) described a standard curve of fruit loss in storage. This curve has become the basis for a fruit loss policy providing an incentive to growers to store fruit. The storage life of kiwifruit varies between orchards, packhouses and coolstores. The policy has been designed to reward growers who produce good storing fruit and select reputable packhouses and coolstores to manage their crops postharvest. The storage loss policy remains a contentious issue within the industry with some growers believing they are rewarded or penalised for factors beyond their control (Beer, 1991).

Further research has been undertaken to study the use of controlled atmosphere storage and the use of ethylene scrubbers. The NZKMB has funded the conversion of a number of high humidity stores into controlled atmosphere storage trials for the 1991 season. No economic feasibility studies have been carried out to date on the use of controlled atmosphere storage. This must be considered a high priority before any incentives are set within the industry to convert to controlled atmosphere storage.

Economic Considerations

The cashflow characteristics of kiwifruit orchards are similar to other perennial fruit crops. Consider an aspiring kiwifruit producer who wishes to purchase a property. If he purchased in June 1991, all the growing costs for a full season would be incurred before receipt of any income. From June to August he would be paying approximately 15% of his total annual expenditure on winter pruning. In August another 3% would be spent on fertiliser and in November an additional 5% on pollination. From November through to March, 5% of his annual expenditure would go on summer pruning and a further 5% on spraying. In May and June, 50% of his total expenditure on the crop would be incurred in picking and packing the crop. If he purchased in June 1991, he would receive no income until June 1992 when he would get a payment of $3.50/export tray (if his fruit was the same size as the industry average) after

his packed crop enters the coolstore. If his fruit size was different to that of the industry average he would receive proportionately more or less, as determined by the indicative price ratios announced at the start of the season. From the $3.50/export tray payment, the NZKMB pays the packhouse $1.75/tray direct (the grower and packhouse negotiate settlement of the remaining amount owing on packing). He will receive additional monthly payments (depending upon the market returns achieved by the NZKMB) for the remainder of the 1992/93 financial year until the NZKMB's final audit in June 1993. It is therefore 2 years before final returns are received on initial expenditures. The grower may confront additional expenditure on his 1992 harvest in October 1992, if fruit storage losses are greater than the industry average.

Timing of an orchard purchase is therefore a critical factor in the cashflow management of an orchard. Many sales are made between the months of January to March where the purchaser has avoided the expenditures of winter pruning, fertilisation, pollination and a majority of the spraying and summer pruning costs, while negotiating for the purchase of the property with the existing crop. Under this arrangement cash income could be received in the June of the year the purchase was made.

The impact of time also has implications for any lease and sale agreements over crops. In March 1991, a co-operative packing group released proposals which gave orchardists the options of either selling fruit on the vine or leasing their orchard to the co-operative packing group. Selling the crop on the vine involved a payment of 25 cents to the grower upon commitment of the fruit (say March 1991) and a further $2.25/tray paid 14 days after the packing of the crop. The orchardist paid for no expenditure other than production costs (the packhouse pays for all picking and packing and bears any fruit loss costs through the season). This payout of $2.50 (nett of picking, packing, fruit loss, port and transport levies) could equate to a gross payout from the NZKMB of $5.50. Growers are therefore given the option of taking certain money early

in the season and avoiding the risk of fruit losses and possible poor payouts during the marketing of the crop, or anticipating a higher payout later in the season that would justify bearing the additional risk. The same co-operative group offered a lease arrangement in March of the year the crop was to be harvested. This lease of $2/tray plus 5 cents/month for 12 months after the crop was packed, included a clause whereby the grower would receive an additional 40% of any returns above $6 paid by the NZKMB. Under lease arrangements growers transfer their orchard management role over the orchard to the co-operative.

To date, the Government has monitored the financial position of kiwifruit growers through the use of Farm Monitoring Reports. These reports are produced on a six monthly basis (with quarterly updates) by MAF. Reports are released in June and December of each financial year. The data presented in the reports are based on actual data collected from 16 growers throughout the Bay of Plenty region (from Katikati to Opotiki). The same growers are used each year and their property sizes are all approximately five canopy hectares of mature kiwifruit. A standardised format is used by consultants as they interview the farmers on a six monthly basis and data is compared using a Delphi method to determine representative revenue and expenditure values (Morriss, 1990). Farm Monitoring Reports analyse the orchard economic surplus. In addition to the economic orchard surplus, analyses of personal drawings, tax, debt servicing, development, off-farm income and introduced capital are included to determine the current account balances for the model. The model has been running at a loss since the 1987/88 financial year. Orchard deficits are not carried over from one financial year to the next. The accumulated deficit situations are therefore represented in the debt servicing levels of the individuals analysed in the field, before the data is entered into the computer model.

Using the economic model from the Farm Monitoring Report, an analysis was made of grower responses to lower kiwifruit payouts (Cloughley, 1989). This study suggested that a no change scenario, using growers' current production systems, would result in approximately 650 non viable Bay of Plenty kiwifruit growers (28%). The report predicted mortgagees would probably continue to farm the properties to control the flow of sales on the market thereby minimising capital losses. The historic orchard sales rate at the time of the report in the Bay of Plenty was 80 orchards/year. This sales rate has lifted to 150 properties/year for the 1989/90 financial year (Valuation New Zealand, 1991).

Marketing

New Zealand's production of kiwifruit has increased from approximately 20,000 metric tonnes in 1982 to just under 200,000 metric tonnes in 1989 (Crocombe, 1990). Europe was the major market for the growth in export volume (see Figure 1.5). However, real export receipts only grew 5 fold over the same period (based on 1989 dollars), as a consequence of declining product prices (see figure 1.6). Real grower returns have declined sharply throughout the eighties (see Figure 1.7) from a high of $21.00/tray in 1982, to a low of $5/tray in 1988.

Figure 1.5 New Zealand Kiwifruit Exports ('000MT) by Market
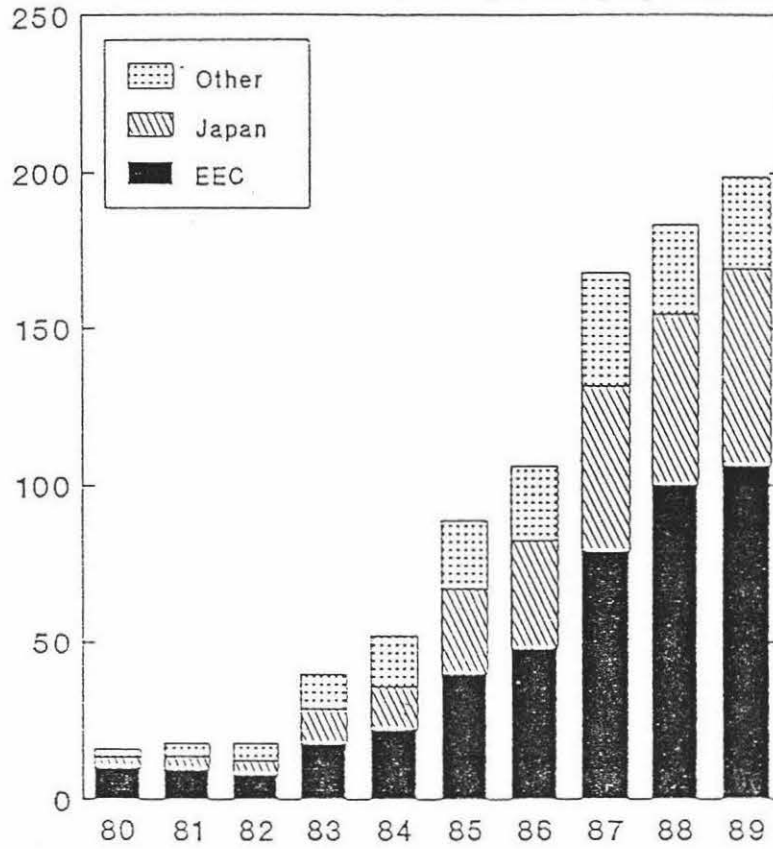
(from Crocombe, 1990)

Figure 1.6 New Zealand Kiwifruit Export Receipts (1989 $m)
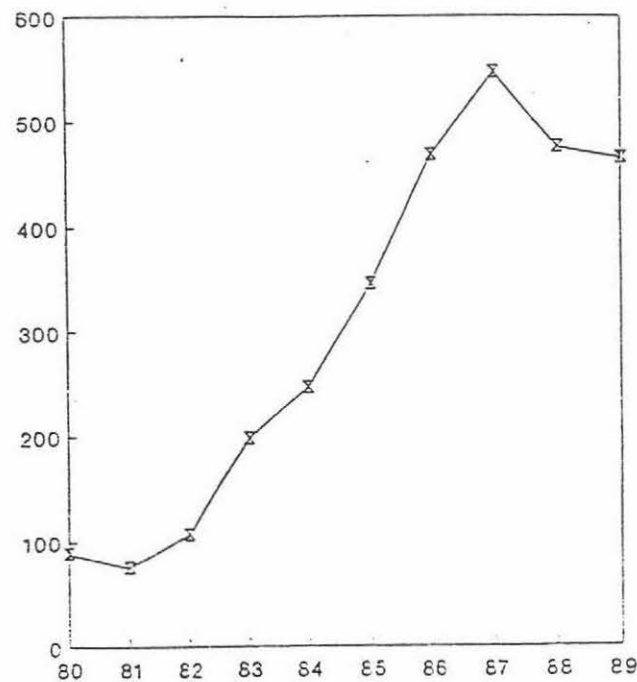
(from Crocombe, 1990)

Figure 1.7 Grower Return - June 1989 ($ per Tray)
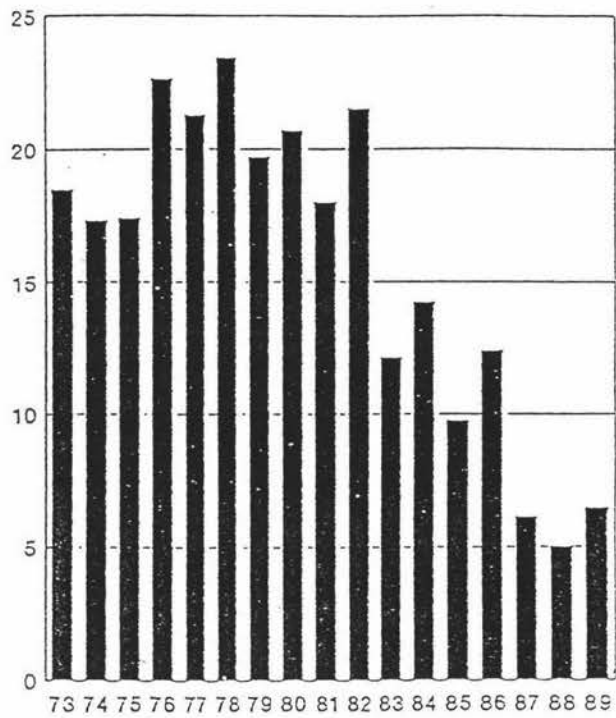
(from Crocombe, 1990)

New Zealand has responded to declining profitability by directing production efforts to achieve high quality output while lowering production costs. Marketing has focused on exerting more control over distribution costs (see figure 1.8) and differentiating product through standards, service and reliability (Crocombe, 1990).

An analysis of distribution costs has been provided by Crocombe (1990).

Figure 1.9 Distribution Costs from Orchardist to Consumer

Consumer	100%	Retail price @ 49pf	$17.30
Retailer	29%	40% markup	$4.96
Wholesaler	4%	6% commission	$0.77
NZKMB	29%	EEC duty	$1.20
		Freight & insurance	$1.25
		Cool storage	$0.80
		Other costs	$1.84
Packhouse	14%	Grading & packing	$2.40
		Finance	$1.30
Orchardist	24%	Orchard	$2.13
		Residual	$0.67
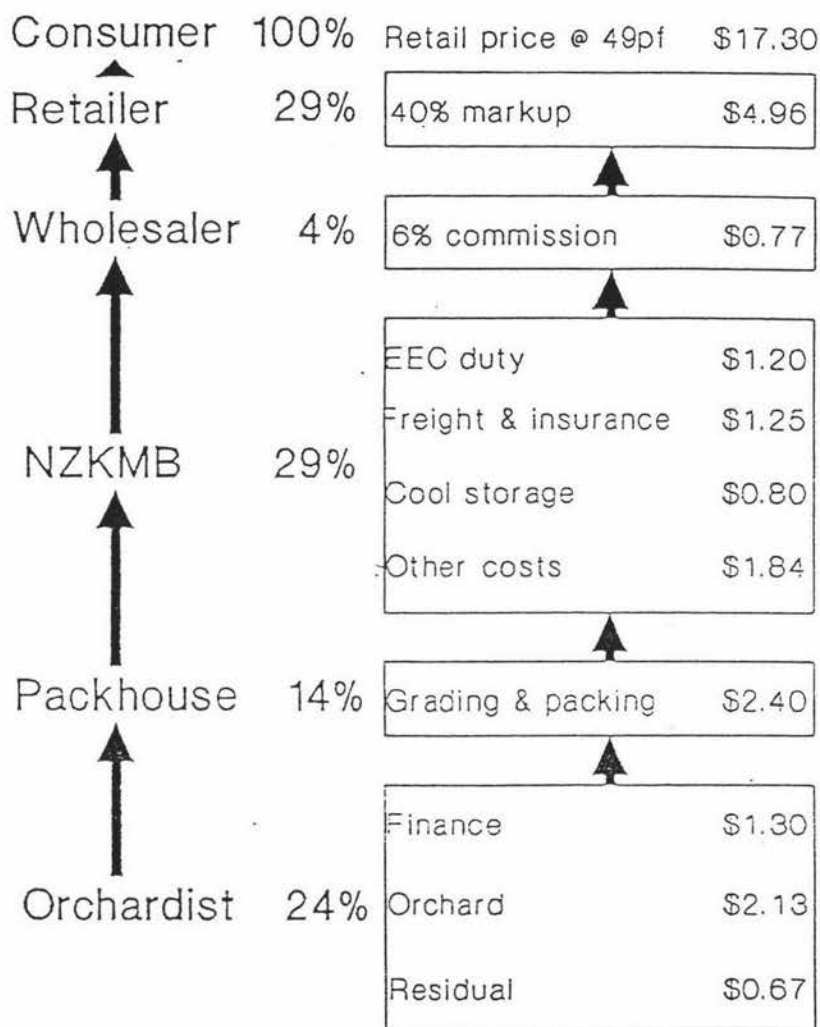
(from Crocombe, 1990)

The analysis suggests research priorities directed at reducing grading, packing and distribution costs could substantially alter grower returns.

The NZKMB has employed market research consultants to advise on product positioning strategies for the future. Strategies to date have included a brand image with a new kiwifruit logo emphasising New Zealand and quality.

Dalgleish (1990) reported European buyers' awareness of kiwifruit to be similar to their awareness of Coca Cola and Kelloggs, implying a need for strategies that increased consumption compared with those strategies that expand awareness. The NZKMB has opted for a position of leadership in the market with the message,"the world's finest, New Zealand kiwifruit".

Promotional pushes will include larger fruit stickers, using vibrant, strong, bright colours (reds and blues of the New Zealand flag) portraying fresh slices of kiwifruit and working on the link between kiwi (the international fruit market term for kiwifruit) and New Zealand kiwifruit (Dalgleish, 1991). These promotional programmes appear to be associated more with increasing consumer awareness of New Zealand kiwifruit than expanding the consumption of kiwifruit. No cognitive or predictive studies of kiwifruit consumer purchasing behaviour has been cited in current literature. Expanding the demand for kiwifruit is clearly consistent with the NZKMB's objectives of maximising grower revenue at the orchard gate, while providing customers with unrivalled quality, service and reliability (NZKMB Annual Report 1990).

1.3.0 Structure of Thesis

A knowledge of current consultancy practise is required to attack the problem of improving consultants ability to support clients achieve their objectives. The service system used by kiwifruit consultants in the Bay of Plenty is described in the following chapter. After defining the service and describing the procedures used by consultants, the advantages and disadvantages of the approach are discussed before reviewing potential service opportunities.

An understanding of current theoretical perspectives on individuals at work provides a context for the subsequent study of cognitive change in clients. A model of human nature is developed and individuals attitudes, beliefs and

learning are reviewed in detail. Having established a perspective on human nature relevant to the study, strategies for changing human behaviour are reviewed.

Selection of a research method is described before discussing the research schedule and procedures. A pilot and main study were used to elicit and monitor the strengths of clients' attitudes and beliefs. These studies are discussed in terms of their structure, timing and observations.

Chapter five discusses case study results from the main study. Comparisons are made between clients, consultants and the change agent (the consultant working with both groups) over time. After describing what changes occurred with each respondent, in response to individualised change strategies, changes in attitudes and beliefs towards specific concepts are analysed for alignment between consultants and clients.

The final chapter suggests some immediate implications and possible initiatives for relevant organisations. The study concludes with an outline of further human behaviour research needs in farm management.

1.4.0 Summary

Consultants are concerned to improve their knowledge and use of clients' attitudes and beliefs, thereby enhancing client servicing. Furthermore, consultants need to know what impact messages and tasks, used to achieve desired changes, have on clients. An understanding of these relationships is expected to benefit consultants in their efforts to elicit client needs and objectives, and consequently, to more effectively support client decision-making.

An industry overview portrayed the grower under economic pressure to improve the profitability of their orchards through the use of technologies that

exert more control over production processes. Changes in postharvest and marketing sectors of the industry require growers to have a greater understanding of their management systems. For example, the storage loss policy has resulted in greater grower responsibility for fruit quality beyond the packhouse. Accompanying this increased grower responsibility, is an opportunity for clients to profit from self-determined orchard performance through the adoption of more effective management processes.

The following chapter discusses how consultants support clients to manage their orchard management.

CHAPTER TWO:MANAGER SUPPORT SERVICE

2.0.0 Introduction

Kiwifruit consultants in the Bay of Plenty developed a consultancy model to support clients perform management tasks (Paine, 1991). A generic name "Management Support Services" (MSS) has been used to market the service to clients. This chapter defines MSS and discusses consultancy procedures towards need and task analyses, implementation and monitoring. Advantages of the service, over traditional advisory programmes, are examined before proposing potential opportunities arising from the modification of existing services.

2.1.0 Definition

MSS has been a conceptual development by MAF Technology to provide consultants with a competitive edge in a farm management consultancy market. Concepts have been defined as ideas which combine several elements from different sources into a single notion (Chaplin, 1975). The name implies the involvement of management systems (Glans, 1968), managers, and support provided to managers by consultants using a systems framework.

MSS is a service provided by consultants to clients with management skill needs.

The service relies on production systems which in turn are dependant on technical research applications to practise problems. MSS involves a management consultant, who develops a relationship with a manager, to develop and implement systems specific to the needs and objectives of the manager.

Consultants, working to compliment client skills required to achieve their objectives, use the MSS concept to provide a framework for change experiences.

More specifically the MSS will provide:

1.   Objective setting and planning procedures.
2.   Monitoring systems.
3.   Choice procedures.
4.   Implementation programmes (including, for example, incentive programmes).
5.   Access to new technological information.
6.   Evaluation procedures.

The provision of these systems and procedures should have a high chance of delivering security, social and esteem needs sought by the client, while giving the client the opportunity to achieve a sense of autonomy and fulfilment (Porter, Lawler and Hackman, 1975).

The consultant acts as a change agent in MSS (Rogers and Schumaker, 1971). The change agent is trying to increase performance (improvement in outputs consistent with the client's objectives) through changes in knowledge, attitudes, skills, and/or ideas. Margerison (1990) proposes six ways consultants manage change with clients;

1.   Individual development; concentrating on training and assessment of individuals (the psychological approach)

2. Human relations and interpersonal skills; the underlying assumption being organisational problems often stem from conflict between individuals. The T groups of the 1950's & 1960's have developed in this area of human relations. Human relation experts consider effective communication and understanding between individuals will help resolve problems.

3. Structural change; involving analyses of organisational structure, job descriptions and MBO systems.

4. Socio-technical systems approach developed by the Tavistock Institute of Human Relations (Brown, 1967). This approach requires that a balance be maintained between the technical system and the social needs of the people operating it, using groups dependent on each other, to provide meaningful and rewarding experiences.

5. Conflict management; argues that effective change comes about through conflict and attempts to position the client in a more advantageous position than his competitors. Often this is achieved through the supply of information which is not available to competitors.

6. Information and Decision science; involves the provision of information to management to make more informed decisions. Use of computers and advanced statistical and mathematical methods, applied to business problems, have dominated this approach to consultancy. Margerison notes the effectiveness of decision science methods has depended on the design and interpretative skills of the consultant.

In practise, consultants may use one or several of these methods depending on the client's needs. Margerison's general descriptions of what consultants do, provides no insights into underlying processes responsible for success or failure with clients. These issues are discussed further in section 2.2.0.

A management centre has been established in Tauranga to enhance the management system used in MSS. This property is 3.66 canopy hectares and has set the following objectives;

1. refine the existing management system,

2. illustrate the potential for increasing profitability on Bay of Plenty kiwifruit orchards,

3. give kiwifruit growers the confidence to achieve increased profitability on their properties.

A series of targets have been set in the context of these objectives to measure the management centre performance through time. An orchard manager is responsible for the implementation of management plans which are set in consultation between the consultant and the orchard manager. All horticultural consultants in the Bay of Plenty meet on a fortnightly basis with the Morgans Management centre consultant and the manager, to discuss tactical plans throughout the season. Human resource planning, using programme evaluation and review techniques along with labour profiles and gantt charts (bar charts that display tasks against a time scale), assists with the management of contract labour. Incentive schemes, supervision and training programmes are also developed at the Management Centre, for use in other commercial environments when required. Portable computers are used extensively for monitoring and as an aid in decision making within the orchard. For example, Kiwimod (Atkins, 1989) analyses the relationship between yield and fruit size, using a linear regression, to estimate the change in fruit size with changes in croploads. This provides a crude approximation of the relationship between yield and fruit size, however model outputs require consultant/manager discussions about their beliefs of the effects of pollination, light levels, drought stress, thinning operations and vine vigour on the relationship. Kiwimod is used as a decision aid to facilitate a decision-making procedure that develops between the client and consultant.

2.2.0 Procedures

At a mechanistic level MSS activities include the writing of proposals, pricing of consultancy services, and tracking of income, expenditure and client satisfaction throughout the process of the consultancy delivery. Consultants attempt to support client decision-making through their perceptions of the client's needs and by providing management systems to meet these perceived needs. However consultants need procedures to conduct needs analyses and elicit objectives from clients, develop management plans and implement information systems for monitoring business performance. Within MSS, procedures are also necessary to evaluate and review the delivery of services.

2.2.1 Objectives and Needs Analysis

Consultants need to determine the client's personal, family and farm goals. Consultants also need to evaluate the client's skills to perform essential management tasks towards expressed objectives. Furthermore, consultants need to determine what is relevant farm information useful for comparisons with farm and district performance levels. These comparisons may be used to motivate and educate the client. Consultants are primarily concerned with determining the client's vision for their farm, comparing that with their own vision for the farm.

The learner helper concept of extension has contributed to consultants' understanding of needs analysis (Woog, 1982). Interactions between learner and helper can be interpreted using Kelly's theory of personal constructs (Kelly, 1955). The learner (client) interprets life through the sum of all their constructs (concepts representing relationships between processes) and inquires of the helper (consultant) for support in the active pursuit of skills, knowledge and understanding relating to his farm business. Woog suggests extension should be given the charter to aid and abet a natural process,

making resources available as required. The helper also interprets life through the sum of their personal constructs and provides feedback to the learner. Woog's model therefore claims the extension worker learns more about the client with whom they are working, so together they can work to improve the situation. The client:consultant relationship in MSS is dynamic and based upon both the client's and consultant's perceptions of the world, resulting in change through a shared, self directed learning process.

Clients are usually interested in employing the services of consultants to solve problems of immediate concern to them. Handy (1978) has suggests a process that can be adapted to addressing a client's immediate problem while allowing for the exploration of broader issues that may be constraining management. Handy proposes consultants apply a process of diagnosis and prescription (similar to a General Practitioner) to determine the objectives and needs of clients. Consultants therefore need to be trained in communication skills to analyse the source of the problem and not to deal with the problem at a symptomatic level. Diagnosis is performed in three stages;

1.   determining the context of the problem within the production system;
2.   through open questioning, analyse the personal goals, objectives and targets of the client with the respect to the context established in step 1;
3.   use comparative analysis to provide a measurement base for the clients to track their performance through time against either district or anticipated farm performance levels. Often this information is historical and is either provided by the client, or from farms similar to the client's farm.

For example, a client may contact a consultant to resolve an ongoing problem of small fruit size. In response, the consultant may draw upon undergraduate training and technical research and consider whether inadequate pollination; drought stress; nutrient deficiency; insufficent leaf area; high croploads and/or

root damage were possible causes to be explored further with the client. However, focussing on the expressed problem early in the relationship may mislead the consultant without more exploratory questioning. Why should the client be concerned about small fruit production? Poor payments for small fruit may mean the issue is one of poor prices requiring an analysis of orchard profitability and ultimately reveal client confidence problems about himself and the kiwifruit industry. A consultant who toils away at the technical dimension of the problem, ignorant of the financial and human components, may confront a sequence of economic and personal barriers to resolving difficulties. A more informed practise, through exploratory needs analyses, could plan to manage a range of barriers (including attitude and belief barriers) as learning experiences to enhance the clients skills for managing similar problems in future.

Needs analysis is an iterative process requiring each step to be revisited several times as new information comes available. The number of iterations required depends on the client and the type of problem confronted.

Throughout the process the client's and consultant's visions and interpretations of the farm's performance are compared and contrasted to expand the scope of consultant involvement in the farm management process with the client. In the first exploratory discussion initial targets are tested and periodically reviewed to establish the client's performance aspirations. Communication styles are observed by the consultant to minimise misunderstandings and capture significant information from the client.

If the objectives and needs analyses have been agreed, the consultant will outline a prescriptive procedure to provide management solutions to the problems identified. This process results in the preparation of a proposal which will summarise the background, needs analysis, outcomes, benefits, schedule of services and level of investment required from the client to participate in the MSS. Contractual obligations are also detailed within the

proposal. If the proposal is accepted the client will begin paying for services (on either a fixed or flexible contract basis) and a management plan will be constructed between the client and the consultant.

2.2.2   Management Plans

Management plans include the strategic goals of the client and the production and economic performance targets for the business. Plans are constructed by consultants and clients after the client objectives and targets have been established. Production targets and input thresholds are scheduled through the season for:

> yield (trays, fruit size);
> canopy (winter-bud, leaf area and replacement cane);
> pollination (flower, fruitset, seed, bee visits, hive audits);
> nutrition (leaf and soil analyses);
> plant protection (pest and disease thresholds, harvest analyses);
> irrigation (leaf pressures, tensiometer suctions);
> shelter dimensions;
> economic targets (returns, growing costs, margins);
> labour input.

Management plans detail orchard operations throughout the year considered necessary to achieving the established targets. Information requirements are specified with respect to pruning, growth regulators and leaf/fruit ratios throughout the growing season. The management plan also provides instructions on monitoring methods such as crop estimating through the season, fruit size measurements and budgetry control. Financial management procedures specify the budget assumptions and the monthly cashflow providing details on contractors, timing of activities and levels of inputs.

Management plans are comprehensive documents of scheduled inputs, anticipated outputs and essential procedures to achieving the specified targets. Furthermore the plan provides a framework for the alignment of management activities between each component within MSS. The client's role includes data collection, contributions to the technical and economic knowledge base and skills to adapt and implement the management plan towards achieving the client's objectives throughout the growing season. Clients also provide feedback to evaluate the service in terms of the objectives and client expectations.

When preparing management plans, consultants may work with researchers, if technically demanding procedures are required. Contact between clients, consultants and researchers can be mutually beneficial when insights to new research problems occur.

2.2.3   Information Systems (Monitoring)

Having specified the objectives, targets, specific actions and information needs to be followed within the management plan, the consultant assists the manager with collection methods and interpretation of information throughout the growing season. Regular monitoring of each decision area outlined in the management plan is undertaken, and summarised in monthly reports to aid decision-making and orchard control. Management reports document interpretations of results compared with targets documented in management plans. If monitoring suggests further data is required, or that actual performance is showing a major discrepancy from projected performance, additional information can be gathered by intensifying the initial monitoring programme. These reviews may also identify new skills required by clients, leading to additional training needs or alteration to management plans.

Financial monitoring involves coding of invoices (if the client chooses not to use a bureau service available through MAF) and data entry into a cashbook. Most clients use an electronic cashbook from Lincoln University (Financial Recording System) to provide budget:actual reviews of the monthly cashflow, monthly cash summaries (providing analyses of monthly and year to date actual:budgeted:variance analysis across each account category) and enterprise analysis where applicable. GST returns are automatically generated by the routine.

Labour usage is recorded using timesheets which are analysed on a budgeted:actual basis using labour profiles and networking programmes. Where appropriate, methods are provided for capturing information for recruitment and incentive schemes.

During each period of recording, the client is questioned regarding the value of information in terms of timeliness, cost, usefulness, ease of interpretation and provision of insights to the performance of the business. Monitoring procedures are regularly upgraded following feedback from clients (see Section 2.2.5).

2.2.4   Decision Making

Three classes of decisions are dealt with under MSS; strategic, tactical and operational decisions.

Strategic decisions have implications for the business for three years or more. Within this class of decisions, support is provided for problems involving estate planning, real estate management (purchase, sale or subdivision), diversification of operations, reorganisation of the business structure (from sole proprietor to partnership, company trust etc), reviewing strategic objectives and changes in management skills through education, recruitment and/or training.

Tactical decisions have implications throughout the growing season and include; decisions on sale of the crop (to NZKMB or to packhouses), the use of Hi-Cane, target yields and seasonal performance targets in both production and profit, changes in technical knowledge, changes in resource base in terms of staff, equipment, use of contractors.

Operational decisions have management implications on a daily, weekly or monthly basis. These include management of vine nutrition, regulation of light levels within canopies, and choices between alternative pollination, irrigation and pest and disease control procedures. Staff and working capital allocations require regular monitoring of productive performance, market returns and interest rates.

Decision-making rests with the client (only the client can "own" the final decision). However consultants provide tools and techniques to assist the client (Hasseland, 1990). For example, decision theory applications may be used to prepare annual budgets. Subjective probabilities were used by one client to choose between selling his crop to the NZKMB or to sharefarm with a packhouse. The "best-bet" (Makeham et al, 1978) was calculated to be sharefarming. The client reflected on the results of the analysis and decided to continue selling to the NZKMB for reasons such as, "loss of freedom; getting a thrill out of being successful ourselves; preference to work on the orchard rather than off-farm employment". The client was initially concerned to make the most profitable decision, but the formal decision process exposed other dimensions to the problem that were previously not expressed. Needs analyses ought to probe client thinking and be repeated at regular intervals.

2.2.5   Evaluation and Review Procedures

Evaluation and review procedures span client satisfaction, financial and profit performance, administration considerations and content and delivery quality within MSS.

The objective of consultants using MSS is to optimise client satisfaction. To this end, evaluation focuses on compatibility of client:consultant personalities, timeliness of service, the technical content and its appropriateness, the technical and economic competence of consultants, value of the investment to clients, and reporting procedures. These evaluations can either be six monthly or annual and are performed as an informal discussion. Although informal, discussions are structured to attend to service areas requiring improvement, before reflecting on aspects of the service that pleased the client. Written reviews can also be used, however consultants have usually found an impersonal atmosphere, often associated with written reviews, is inappropriate for clients involved at the level of MSS.

MAF's financial analyses of MSS evaluates the profit contribution to the organisation. This involves quarterly reviews of dollar/hour rate (total hours and chargeable hours) to clients, total time/client, value added to the client. Comparative analysis includes disbursements incurred versus disbursements recovered and recovery of bad debts.

Administration procedures are reviewed in terms of feedback received from clients, and financial analyses of services. Consultants identify bad debtors, effective invoicing procedures and effective procedures to retrieve client information when consultants are absent. Information from administration evaluations result in the re-design of client files and standardisation of reporting procedures to a quality acceptable to clients and consultants.

Consultants regularly review each others client services through joint visit programmes, providing feedback and suggesting improvements to the consultant under review. An important area requiring evaluation involves changes in clients' thinking due to participation in MSS. If consultants had access to this information from the client they may identify perceptual barriers held by clients to the adoption of certain management practises. Consultants' perceptions of the system clients are managing may also alter after reviewing

clients' perceptions. Analyses of client and consultant perceptions, concerning client management systems, is studied in detail in chapter 5.

2.3.0 Advantages and Disadvantages

Although MSS has only operated 3 seasons, some comparisons can be made with traditional advisory services previously offered by MAF.

ADVANTAGES

The emphasis on clients' objectives in MSS has provided consultants with more purpose and responsibility towards client needs. Advisory Services Division of MAF was concerned to improve production technologies in primary export industries (Walker, 1982). Although MAF's objective was consistent with national needs, several grower needs were neglected. For example, non-export crops (like tomatoes) received no technical assistance. Consultants were not equipped to deal with individual clients, leading to a limited understanding of barriers to technology adoption. Furthermore, for some technology to be effective (such as the use of computers for farm management) required support in the field. Fee paying clients determine service needs and provide regular feedback on service effectiveness. Stress on client objectives is no different from procedures used by successful private consultants. However, using the formal service structure of MSS allows MAF to contribute research and training capabilities towards client problem-solving.

MSS can improve managers' abilities to regulate their system performance through monitoring. Researchers have developed techniques to capture production data. Consultants have modified some of these techniques to assist clients monitor and regulate croploads, leaf areas, pollination, irrigation and nutrition. As clients use similar monitoring methods, research findings are

more easily scrutinised and applied to orchard management problems.

Improving orchard performance is frequently antecedent to clients attaining objectives. By applying the components of orchard management (see Table 1.1) to sequential production problems, orchards using MSS in the Bay of Plenty have achieved an 81% yield increase (Paine, 1991). The problem of setting an appropriate sustainable yield target cannot be solved if winter bud numbers, vine nutrition, male pollen availability and disease risks are unknown. MSS provides consultants with procedures (see section 2.2) to explore client knowledge and understanding of these relationships before implementing plans.

Client decisions are often made under uncertainty (Castle, Becker and Smith, 1972). With an emphasis on system monitoring, MSS clients can more effectively apply formal decision procedures to problems (Halter and Dean, 1971). An application to a marketing problem described earlier in the text (see Section 1.1.3) implies formal decision procedures can benefit clients by eliciting previously undefined decision rules. A benefit from this approach has been an ability to systematically chose between numerous alternatives. Even if the results of the analysis are not followed by the client, the process assists clients to make decisions with confidence and review their decisions as further information is accessible.

A heavy emphasis on client needs focuses services on practical implementation procedures. Scientists may recommend fruit thinning within 3 weeks of fruit set to obtain maximum fruit size benefits. However, consultants and clients work together to schedule workloads and priorities weighing gains in fruit size to the current harvest, against a possible poor pollination of the subsequent harvests, if male pruning is delayed. Constrained by the availability of cashflows and skilled staff, a scientist's recommendation is modified, by informed judgement, to an appropriate solution for the client.

By applying the management process to client needs, services evolve to enhance subsequent procedures. Clients confronting above industry average coolstore losses have to analyse on orchard (vine stress, canopy management, nutrition, and orchard hygiene), harvest (fruit maturity, fruit handling and transport), packhouse and coolstore contributions to the problem. Each factor's contribution to the problem may be poorly understood, yet formalising procedures of identification, monitoring and attempted prioritising of relationships initiates a process that can evolve towards a better understanding and control of storage losses.

Payment for services by clients provides more measurable accountability of consultant performance than that attainable under public good extension activities. By formally evaluating client satisfaction, consultants can explain and improve service performance. A consultant receiving feedback from a client may discover dissatisfaction with demands for additional monitoring efforts to resolve orchard performance problems. When the consultant probes the client further, it is established the client considers monitoring arduous and sees little relevance between information collected and decisions being made. As a consequence, services to the client are modified to fully explain the decisions monitoring information will be supporting and a less intense monitoring programme is instigated to the satisfaction of the client and consultant.

DISADVANTAGES

Consultants' experiences with MSS have identified several disadvantages of the approach compared with advisory services and private consultant practises.

Consultants using an MSS approach encounter certain problems that do not require a whole farm approach to service client needs. If a client was evaluating the wisdom of applying a pre-harvest fungicide on an orchard with

a sale agreement after harvest, the consultant needs little more than a knowledge of the orchard hygiene, expected weather conditions during harvesting, and proposed load-out times (indicating the time fruit is in storage) to provide a recommendation. The client is not seeking a progressive management learning experience to excel as an orchardist. MSS services would be irrelevant and uneconomic for this type of problem.

Inquiring clients, seeking a comprehensive and evolving knowledge of their management system, benefit most from MSS. Some clients prefer assistance with elementary production tasks while considering personal and business objectives confidential. When objective setting is separated from the consultancy process, MSS is an inappropriate procedure for meeting client needs. Fees would be exorbitant, compared with client expectations, because skilled staff and technology would be applied to modest consultancy tasks.

If MAF were to pursue MSS as a servicing system throughout the nation, success may be constrained in the short term by the availability of consultants capable of delivering the service. A close liaison between management training in universities and farm management consultancy practises would be required to minimise resource expenditure. Conceptual barriers, such as understanding the impact of individuality on the study and support of client management processes, may need to be addressed before effective communication between institutions facilitates consultant training in future.

Acquiring a common concept of farm management has been difficult for clients and consultants (Alleblas, 1989; Ashby, 1982; Bokelmann, 1987; Dillon, 1980; Loftus and Carey, 1982; Nitecki, 1987). As MSS relies upon the application of a management process to client needs, agreement between consultants and clients on a management process relevant to the problem is essential to service success. Consultants who emphasis the management process often used by consultants in MSS (see Table 1.1) may be oblivious to already successful management processes used by clients. In these circumstances

resources are wasted as problem-solving procedures are replaced rather than enhanced.

Behavioural research, to further the support of client management processes, is exploratory and may require several years to develop theories useful at a practise level.

2.4.0 Opportunities

The management process in MSS is comparable to instructional processes used in education (Davies, 1980; Kolb, 1984; Menges, 1977; Mumford, 1985; Stuart, 1990). By furthering consultants understanding of clients' learning processes, more effective contributions to advancing clients' management abilities are expected.

A more formal understanding of clients attitudes and beliefs would assist identification and modification of perceived barriers to the adoption of recommendations. Enriched communication processes would provide consultants with an extended understanding of clients and their management system needs. Opportunities arising from this understanding may include a wider application of MSS to different types of clients with different needs. Furthermore innovative management techniques may evolve to assist client problem-solving.

2.5.0 Summary

Consultants' concepts of clients as managers have not been the subject of a formal study but appear to involve consideration of clients as decision-makers and learners. Consultants do not possess a clear and agreed understanding of the processes clients use to select between alternatives, or how clients acquire new skills and abilities. Furthermore, consultants have not explored the implications of clients' unique motivational behaviour, attitudes and beliefs. These issues are the subject of further study in subsequent chapters, exploring the possibility of developments in MSS arising out of the management literature and a field study.

CHAPTER THREE: THEORETICAL PERSPECTIVES ON INDIVIDUALS AT
WORK

3.0.0 Introduction

A study of individuals at work is required, as consultants usually operate with
individuals rather than groups. Partnerships, as occurs with operations run by
a husband and wife, are common yet also require a knowledge of each
partner's unique perspectives and business needs. Large syndicate orchards
are an exception, however consultants usually find they work predominantly
with individuals within these organisations, using skills for group work at
management meetings.

3.1.0 Introduction to the Study of Individuals

A normative view of man represents individuals mechanistically, with people
responding to various environmental pressures. This perspective fails to
explain man's ability to interpret experiences and represent them to himself
(Cohen and Manion 1980). Often findings from studies based on normative
perspectives were so trivial, they generated little of consequence to those for
whom it was undertaken. An interpretive approach to research, studying the
ways a person construes their world, probing into accounts of their actions
and endeavouring to understand what people do in certain circumstances,
attempts to provide predictive generalisations of human nature. This study is
interpretive in its approach, endeavouring to understand client perceptions of
their orchard systems to more effectively support their management needs.

Considerable controversy and disagreement has existed between laboratory
and field psychologists. Crano and Brewer (1986), suggest a more
complementary approach whereby laboratory findings are validated by field
tests and field experiments are verified by laboratory analysis. Problem-solving
can be studied in both laboratory and field situations, however validation
requires experimentation in both situations. This field based interpretive study

is concerned with the development of services in a commercial setting. A conceptual framework of human nature is used to introduce more detailed analyses of values, attitudes, beliefs and learning. From this understanding of individuals, research methods used in practise situations are reviewed.

3.1.1 Human Nature

Porter, Lawler and Hackman (1975) have described individuals as proactive and social, and having different needs while actively perceiving, evaluating, thinking and choosing throughout their work. Furthermore, individuals have limited response capabilities in their work environments.

Considering the proactive nature of clients, it is important to realise they may resist change, but at the same time will seek a means to satisfy personal goals and aspirations. Consultants should consider the social dimension to individuals at work. Often individuals need to have a sense of membership to a group and often retain a sense of territorial control (this can be psychological as well as geographic). Clients will be seeking a personal identity, a need for belonging, they will be generating a self concept throughout their life. Individuals will be seeking information on themselves and their environment and this will be changing. Consultants therefore need to realise their place within the mental framework of the client they are dealing with, during this continuous and changing information search.

Clients continually perceive and evaluate their situation (Jarvis, 1983). It is an active and selective process being appraised in terms of each client's experiences and evaluated in terms of their needs and values which can often distort perceptions between individuals. To gain an understanding of themselves and their environment, clients select what to attend to and what to ignore, and interpret, in the context of their experiences, what it is they are perceiving (Tyler, 1977). A high level of distortion occurs with those clients that have a high emotional investment in the events taking place (Porter,

Lawler and Hackman, 1975). Any messages consultants may give clients will be weighted in terms of the costs and rewards of the action taken.

An ability to analyse the needs of clients is one of the most important skills required by consultants. Client needs are often diverse and dynamic and need to be defined as concisely as possible. Different behaviourial explanations of individuals and their environment can be due to the different assumptions consultants hold with respect to client needs. Mazlow's hierarchy of needs can be considered as existing only as high and low order needs (Porter, Lawler and Hackman, 1975). Security, social and self esteem needs represent one level whereas autonomy and self actualization represent another level of needs. Consultants can therefore identify outcomes that may satisfy several client needs. For example, profit may indirectly satisfy needs of existence, security and self esteem. Consultants need to be aware that it is the least satisfied needs that are the most important to clients. If low order needs are partially satisfied and high order needs unsatisfied, the latter will be more important to the client. Often only extrinsic needs (material non-personal needs) can be met by consultants (intrinsic needs such as self actualization can usually only be met by the person themselves). Differences in individuals' needs appears to be a function of the values and experiences individuals possess.

Beliefs are used as a mechanism by individuals to predict likely future consequences of different courses of action. If the consultant can clearly identify the beliefs that clients are using as the basis for their prediction of future consequences, they can more easily align their advice with the perceptions of the client. A knowledge of beliefs in terms of client needs, ought to consider the affective reactions of the clients (their likes, dislikes, good or bad feelings etc). Three dimensions to affective reactions have been described (Porter, Lawler and Hackman, 1975).

1.	job satisfaction, which appears to be more a reaction to, rather than a determinant of job performance. The intensity, variety, complexity, uncertainty and meaningfulness of the job will determine the level of satisfaction.

2.	psychological arousal experienced, appears to take a ∩ shape relationship between job performance and level of arousal (if either low or high levels of arousal occur, job performance appears to suffer).

3.	valence (the degree to which the individual desires the outcomes in question) attached to the job. Outcomes become valiant, either directly such as food, or instrumentally such as money to buy food.

Some function of beliefs (or subjective probabilities) and attitudes (or utilities) will result in motivational forces directing the behaviour of individuals. When consultants view clients as selectors of different outcomes consequential to their attitudes and beliefs, more acceptable and effective management strategies should ensue, satisfying client needs. The consultant needs to be aware that the client may differentially select information and even express some beliefs in an acted role to appear internally consistent and maintain a rational stance (Bourne et al, 1987).

An important determinant of client behaviour is their capacity to perform as they intend. This response capability is a function of aptitude and learning, existing as a continuum of responses from those uninfluenced by training and experience to those that are open to change, unconstrained by genetic or physiological factors (Porter, Lawler and Hackman, 1975). It is this aspect of individuality of most interest to consultants when they interact with clients. Consideration needs to be given to the mental, physical and inter-personal response capabilities of clients. Client mental capabilities (quantitative and verbal abilities) are probably the most important consideration for consultants. Almost all types of mental ability are highly related to each other. Physical response capabilities of clients are only of significance in describing work tasks

requiring unique dexterity or reaction times. Inter-personal skills and personality will reflect how a person will want to respond or behave. Often the consultant may need to impart inter-personal skills and confidence to the client before addressing specific management tasks requiring support. Inter-personal skills will depend upon the client's response capabilities and behaviourial disposition.

Human nature can be explained in terms of a model of "triadic reciprocality" in which behaviour, cognitive and other personal factors, and environmental events all operate as interactive determinants of each other (Bandura, 1986). Bandura proposes a social cognitive theory, arguing that unique human capabilities include symbolising (the ability to process and transform transient experiences into internal models); forethought (having a future time perspective); precariousness (the capacity to learn by observation and experience); self regulation (much behaviour is regulated by internal standards and self evaluative reactions to their own actions); self reflection (the capability for reflective self consciousness). The self reflective capability is seen by Bandura to be the most human of any of the capabilities mentioned. This enables people to analyse their experiences and to think about their own thought processes. By reflecting on their varied experiences and what they know, people derive generic knowledge about themselves and the world around them. Social cognitive theory characterises human nature as a vast potentiality that can be fashioned by direct and observational experience into a variety of forms within biological limits.

Bandura's social cognitive theory is consistent with Tyler's concept of individuals as "possibility processing structures" (Tyler, 1978). Tyler was influenced by the philosophy of Whitehead (1961) on mind and nature, especially his doctrine of individuality (the separate occasions of experience) and doctrine of continuity (the identification and linkage of experiences from one occasion to another). Tyler has adopted the term "possibility processing structure" to describe individuals who control the selection of perceptions,

activities and learning situations. Any individual can carry out simultaneously or successively only a small fraction of the possible acts he has been biologically equipped to perform. Bandura's theory of human behaviour emphasises the importance of learning experiences to the formation and changing of attitudes and beliefs.

3.1.2 Values Attitudes and Beliefs

An attitude has been defined as "a relatively stable and enduring predisposition to behave and react in a certain way towards persons, objects, institutions or issues" (Chaplin, 1975). Attitudes typically imply a tendency to categorise or classify in a positive or negative response. A belief has been defined as "the subjective probability of the relationship between the object of the belief and some other object, value, concept or attribute" (Fishbein and Ajzen cited in Walker, 1982). Fishbein's definition implies that belief formation involves the establishment of a cognitive link (a mental link) between any two aspects of a person's perceived world. For example, the person may believe they have certain characteristics (eg honest, intelligent etc) or that a given behaviour will lead to certain outcomes (eg applying fertiliser will increase the rate of fruit sizing).

Gasson (1973) suggests instrumental, social, expressive, and intrinsic values capture the scope of farmers' orientations to their work. Instrumental values relate to securing an income and expanding the business. Social values identify with a sense of prestige as a farmer and belonging to the farming community. Expressive values relate to meeting challenges, achieving objectives and personal growth. Intrinsic values are associated with preferences for a healthy farming life and independence.

Gasson's pilot study found small farmers tended to value intrinsic aspects of farming more highly, while operators of medium and large farms placed greater emphasis on instrumental and social aspects, suggesting farmers

adapt to their situation and come to value its more favourable aspects while denying the importance of needs which are not gratified, thereby avoiding frustration and dissatisfaction. Farmers with larger businesses seemed to be more economically motivated although expansion appeared to be more salient than maximising the current income levels. Services could be modified to appeal to different farmer values. Current MSS services are currently targeted at clients with predominantly instrumental values. Social, expressive and intrinsic values could be served through consultants adopting complementary roles to that of the client. Consultants could contribute to the business management activities of farmers with high intrinsic values or emphasis discussion groups and regular social gatherings for farmers with high social values.

Farmers' value orientations are important at a policy level when a need for structural adjustments in agriculture are required (Kerridge, 1978). A study of farmers in the wheat/sheep zone in Western Australia was designed to relate the value orientation of farmers to farm performance variables and personal characteristics of farmers, with the aim of identifying factors influencing adjustment of resources within the rural sector. Kerridge used Gasson's classification of value orientations to analyse respondents in terms of farm size, debt levels, age, education and farm income. Discriminant analysis (a form of multi dimensional analysis) was used to explain the relationship between variables. Kerridge found that older farmers tended to hold more intrinsic values while younger farmers express instrumental values. Experience tended to have the opposite effect, more experienced farmers tend to hold instrumental values. The variables most important in discriminating between value groups were cropping area, net farm income, debt, farm size and efficiency. Quantifying relationships between physical input/output variables and farmers' attitudes and beliefs about these variables, may be of use in diagnosing farm performance. Measured differences in beliefs about or attitudes towards relationships could be debated between consultant and client when constructing management plans. Regular cognitive monitoring could be

as effective as physical and financial monitoring when analysing the causes of deviation from the management plan through the season

A study of New Zealand sheep farmers in Oxford county using projective questioning techniques and ten Likert scales, identified orientations towards increasing income, intrinsic aspects of farming, less work, social aspects of farming, and achievement (Greer, 1982). Farmers who expressed instrumental values were earlier adopters of practices than those who emphasised social, intrinsic, or expressive orientations to work. Knowledge of the practise was an important determinant of farmers' practice adoption. Many farmers had accepted incomplete or inaccurate information about the practices studied and believed that the costs of adoption outweighed the benefits. Farm performance was associated with farm size and farmers' management abilities but not with practice adoption or with the farmers' perception of the adequacy of their incomes or satisfaction. Greer concluded that extension officers need to review their communication techniques with farmers rather than assuming problems of poor adoption are associated with a lack of motivation by farmers. As practise adoption was not a prerequisite to farm performance, consultants may need to review their attitudes and beliefs about the relationships between variables in the farm system.

Measurement of attitudes can be a complex area. Lewin (1987) describes two basic forms of attitude measurement:

1. Scales of external prediction whereby the goal is to develop a set of questions which are reasonably effective in predicting some behaviour external to the scale itself;
2. Representational measurement, which is mathematically more challenging, requiring the items in the scale to be ordered numerically in such a way that mathematical functions operate correctly.

Lewin classes Thurstone's measurement of judgement (an ordinal scale used by respondents to judge the favourableness of items toward a topic) and the Likert scale as external prediction scales. The Likert scale is an answering format used by respondents to statements by an interviewer. For example;

1. strongly agree;
2. agree;
3. neither agree or disagree;
4. disagree:
5. strongly disagree.

The Guttman accumulative scale is a distance scale where a series of statements are written, each expressing a greater degree of some attitude than the preceding statement. Statements are worded so that a person accepting one statement should agree with all the statements lower in the hierarchy. Once the statement is rejected, all higher statements should also be rejected. Interpretation of attitudinal scales results requires considerable caution (Lewin, 1987). In particular, the meaning of a word can have a significant impact on the validity of research results.

This study is/attempts to identify the way clients select and arrange concepts, such that a model can be constructed allowing inferences to be drawn about client behaviour. Some form of representational measurement will therefore be required.

A lack of agreement between researchers exists concerning conceptual and operational definitions towards attitudes, behaviour and the related variables. "Clearly controversy still exists over the choice and nature of even central explanatory variables in the attitude behaviour literature" (McPhee and Cushman, 1980).

Joseph Woelfel's (1980) has proposed a method (Galileo) to select and arrange concepts to form a representational model from which inferences about human behaviour can follow. Woelfel uses multidimensional space to represent cognitive relationships. This approach has allowed the use of formulas in physical science to describe individuals' cognitive behaviour. Difficulties can occur with this research method when interpreting the meanings individuals give to concepts within space, and whether space itself is a correct model to explain cognitive patterns by individuals. Woelfel does not advocate a particular theory as such, but a method for empirically discovering theoretic propositions, allowing for the modification of theories through the identification of new variables and research areas. Woelfel's approach is particularly useful in the analysis of changes in attitudes and beliefs resulting from new learning experiences.

Galileo has been evaluated as a measurement system for quantifying the attitudes of a group of farmers with respect to high fecundity sheep management systems (Saunders, 1987). The relationship between attitudes and beliefs is illustrated in figure 3.1.

Figure 3.1 Diagrammatic Representation of the Conceptual
Behaviour Model Utilised by Galileo Theory

Act

Input Concepts
Concepts

Output

Self

peripheral beliefs ——·——·——
principal beliefs ——— ———
evaluative attitudes ————
overall attitude ======
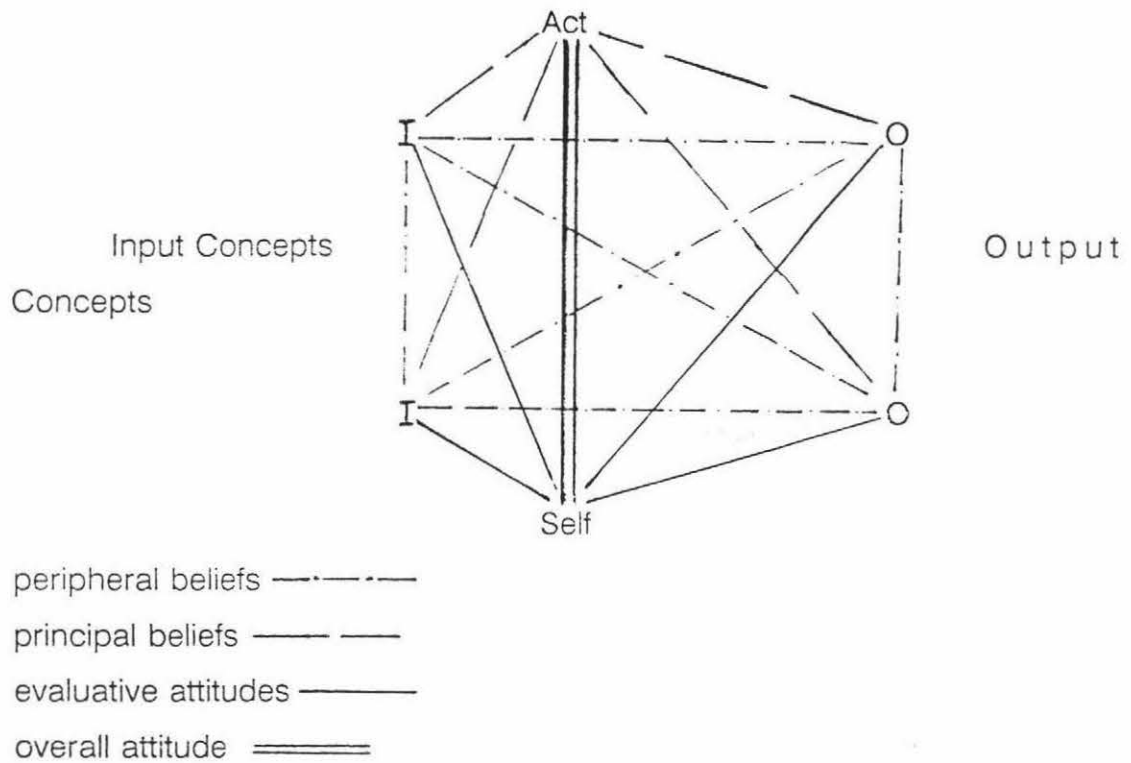
(from Saunders, 1987)

Peripheral beliefs describe relationships between various inputs and outputs in the respondent's mind. Principal beliefs describe relationships between the inputs and the act and outputs and the act. Evaluative attitudes describe relationships between inputs and self and outputs and self. Overall attitudes reflect the perceived link between act and self and are a function of the principal and peripheral beliefs and evaluative attitudes.

Saunders (1987) predicted that individuals would gain more knowledge (learn) if a higher proportion of their belief relationships were aligned with the real world position (often poorly defined). Although Saunder's study was static, he recognised the importance of the time dimension in providing insights to the

process of learning. An attempt was made to incorporate the time dimension by having a cross sectional sample of respondents varying in their level of experience. Saunders made a number of recommendations from his research. It was suggested the measurement task would be improved through a combination of both passive and interactive interview techniques to establish the reference concept lists. Measurement would also benefit from an act that was placed within a specified context prior to concept elicitation interviews. With regard to the measurement system, Saunders noted a number of respondents had considerable difficulty with the measurement system and suggested reversing the scale (zero equating to dissimilar and 100 units equating to total similarity). It was recommended that further research was required to examine the effects of the ordering of concepts within pairings.

Galileo has been used commercially in Australia to bring about attitude change in agriculture in the promotion of a dairy herd health service and the encouragement of a tree planting programme for land conservation (Cary, 1988), and in market research studies (Cary, 1989). Galileo software was unavailable in New Zealand at the time the present study was carried out. However, components of the methodology were considered useful for measuring the cognitive impact of consultants on clients (see section 4.1.0).

3.1.3 Learning Research

Learning has been defined as;
1.   acquisition of any relatively permanent change in behaviour as a result of practice or experience and;
2.   the process of acquiring responses as a result of special practice (Chaplin, 1975).

Furthermore, learning has been identified as an important determinant of farm performance (Jamieson and Lau, 1982).

Dewey (1925) claimed experiential learning (the connection of an act with something that is experienced in consequence) depended upon effective methods of learning. He suggested individual learning methods include a problem definition; collection and analysis of data; projection and elaboration of suggestions or ideas; experimental application in testing; the resulting conclusion or judgement. Similarities between experiential learning and the management procedures used by consultants ought to assist efforts to integrate learning strategies within farm management consultancy.

Bruner (1973) suggested learning was facilitated by the use of coding systems allowing individuals to apply given information to their unique environment and constructs. Bruner claimed learners required appropriate attitudes, a perceived need, a degree of learning mastery and diversity of training as pre-conditions to acquiring coding systems for learning. When discussing need states, Bruner suggests that very high or very low drive leads to an increasing concreteness of a cognitive activity, whereas a mild state of drive generates the strongest tendency towards generic learning. Bruner's research suggests learning research should focus on the nature of the coding system designed to gain an optimal generic grasp of subjects, emphasising conditions that maximise the transfer ability of learning. His hope was that researchers could concern themselves more with the utility of learning whereby, when a thing had been learned other things could be solved with no further learning required, thereby switching research from learning to a research on the psychology of problem solving.

Kolb

Kolb (1984) has drawn upon Dewey's insight in defining learning as "the process whereby knowledge is created through the transformation of experience". His definition emphasises adaption rather than content, and that knowledge is a transformation process involving continuous creation and recreation, not an independent entity to be acquired. It is experience that is being transformed requiring an understanding of the nature of knowledge.

An essential tenant of Kolb's work is that learning is an holistic process of adaption to the world similar to Jung's psychological types (Jung, 1976). His work recognises learning as a life long process, and high level learning is a skill to be acquired by learners.

Kolb emphasised the importance of individuality in learning experiences through the use of his learning styles concept. Learning styles equate with the possibility processing structures outlined by Tyler. "The complex structure of learning allows for the emergence of individual, unique possibility processing structures for styles of learning" (Kolb, 1984). Learning is conceived as a tension and conflict filled four stage process. New knowledge, skills or attitudes are achieved through confrontation of four modes of learning associated with each stage in the learning process. A learning styles inventory can be used to measure a person's relative emphasis on each of the four learning modes.

> Concrete experience, (being involved in experiences and dealing with immediate human situations in a personal way).
>
> Reflective observation (understanding the meaning of ideas in situations by carefully observing and impartially describing them).
>
> Abstract conceptualisation (using logic, ideas and concepts).
>
> Active experimentation (actively influencing people in changing situations).

The inventory comprises 12 questions with 4 possible responses to be ranked from 1 - 4. The results generate a learning profile appearing as a kite shaped representation of a learner's use of each mode in the experiential learning process. Profiles can be compared between clients and consultants to observe the differences in use of each mode when engaged in a learning experience.

Learning profiles show the relationship between the four adaptive learning modes in two dimensions. In one dimension abstract conceptualisation is opposed to concrete experience. In the second dimension, active

experimentation and reflective observation are opposed. The tension between modes is resolved by learners through transactions - prehension and transformation (see figure 3.2).

Figure 3.2 Structural Dimensions Underlying the Process of Experiential Learning and the Resulting Basic Knowledge Forms.
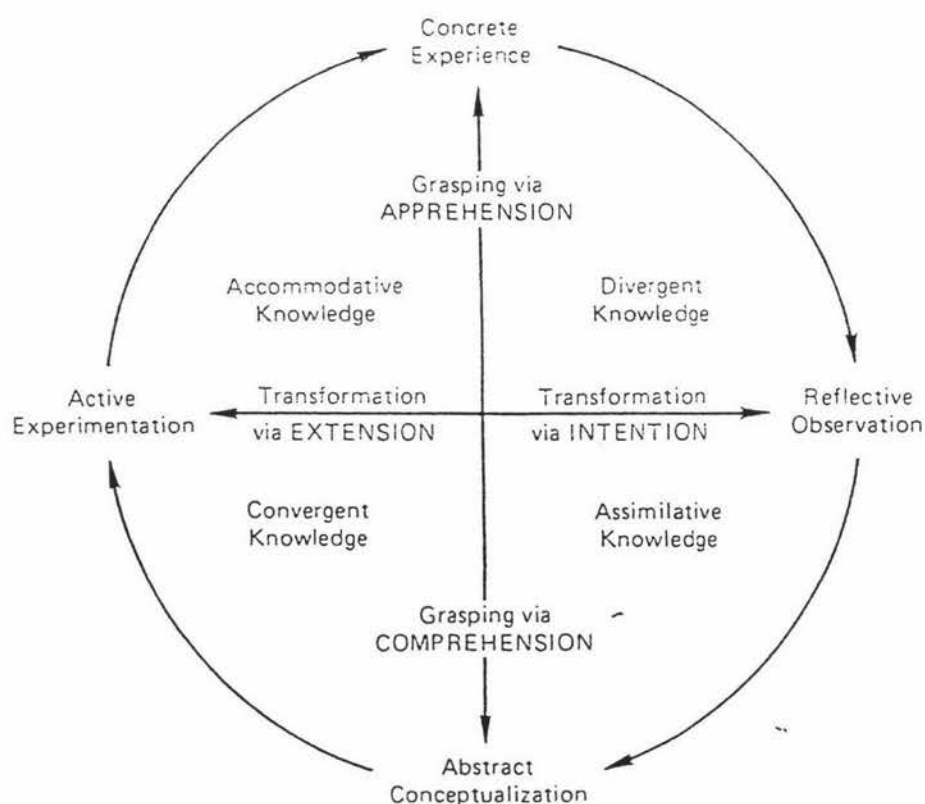
(From Kolb, 1984)

Prehension is the process of grasping experience and may involve use of conceptual interpretations (comprehension) at the abstract pole, or reliance on tangible experience (apprehension) at the concrete pole. Transformation involves manipulation of the grasped experience. Learners transform experience by internal reflection (intention) or active manipulation (extension). This structural perspective lead Kolb to define learning as a process creating knowledge by the transformation of experience.

Learning processes can therefore be used to determine clients' learning styles. When a client grasps experience through apprehension and transforms the captured experience through intention they behave as divergent learners. Clients who grasp experience through comprehension and transform it through intention use assimilative learner styles. When experience is grasped through comprehension and transformed through extension the client learns convergently. Finally, clients who grasp experience by apprehension and transform it by extension learn by a process of accommodation.

Fig 3.3 Similarities Among Conceptions of Basic Adaptive Processes: Inquiry/Research, Creativity, Decision-making, Problem-solving, Learning.

(From Kolb, 1984)

In figure 3.3 Kolb has applied the learning cycle to problem solving skills (as Bruner predicted would eventually happen). Individuals choose goals and compare these with reality, identifying any differences (which defines the problem), select the problem, consider the alternatives, evaluate the consequences of the solutions to these alternatives, and from there select a

solution before executing that solution. Using Kolb's classification accommodators are best at choosing models or goals and executing solutions, whereas the major strength of divergers rests with comparing goals and models with reality and identifying the differences between these. Assimilators are strong in selecting problems and considering alternative solutions, while convergers' strengths rest with their ability to evaluate the consequences of solutions, and select between solutions.

A client's desire to comprehend their personal development is one of the more difficult needs consultants may be required to support. If consultants possessed a knowledge of clients' learning styles they could design effective learning experiences as a means of satisfying client needs. Accommodators may want to develop more assimilator skills, therefore requiring experiences involving tasks that require the organisation and analysis of data, and testing of theories and concepts within their orchard management.

If learning styles information were available to consultants, learning experiences could be designed to employ the client's unique learning strengths. Furthermore, client and consultant attitudes and beliefs could be analysed using spatial maps of client's concepts (Woelfel and Fink, 1980). Therefore consultants require a method to direct, implement and evaluate changes in clients' attitudes and beliefs, utilising a knowledge of clients' learning styles. Action research (a form of soft systems research) may provide a means to direct changes in client thinking.

3.2.0   Soft Systems Research

Throughout the 20th century the scientific method has resulted in increasing specialisation of disciplines through an analytic approach to problem solving. As more complex problems were tackled interdisciplinary teams were required to approach problem-solving from several different perspectives.   The demands to combine various analysts' contributions to problems that could be only partially quantified, lead to initial thinking on systems research (Angyal, 1941).

A system can be defined as a complex set of related components within an autonomous framework, and an examination of the changes in that system is an integral part of systems research (Diprose, 1980). Systems are composed of subsystems which are linked together in a manner such that the whole system possesses a functional objective. The four general characteristics of a system are outlined by Dent and Blackie (cited in Diprose):

1.   A system is fully defined by a set of identifiable entities (or components), linkages between entities and by the limits to their organisational autonomy.

2.   A system is a hierarchical structure comprising a number of subsystems each capable of autonomous definition; in turn subsystems similarly embody the next layer of detail in autonomous subsystems.

3.   The most important characteristics of systems emerge over time, an understanding of systems requires consideration of time and rates of change.

4.   Systems are sensitive to unpredictable and variable environments in which they exist.

Consultants who adopt Dent and Blackies' concept of systems expect to effectively structure their diagnosis and problem-solving procedures in areas of orchard production systems and client service systems (MSS).

Checkland (1975) proposes progress in thinking and problem-solving will be achieved through defining a systems view of the world, develop ways of using systems ideas, changing perspectives on the use of systems as experience is gained and applying thinking systems in practice. Checkland's proposal intends mutual benefits to accrue to theory and practice in future.

Applications of Checkland's approach to MSS involves consultant agreement on theories of systems and a procedure for applying systems thinking to problems encountered in MSS. A client's orchard has been devastated by hail and a consultant is approached to determine the best response to the situation. The consultant confronts a production system and a human system in crisis. By diagnosing the situation, the consultant identifies a more useful level to analyse the human crisis - social, family and personal crises. Similarly subsystems of production are chosen as establishment, production, harvesting and marketing, to capture the implications of time on crop performance. The consultant derives a technical solution by further segregating system components (nutrition, canopy management etc) and estimating inputs required to achieve the outputs required of the production, having established client needs, based upon assumptions about input/output relationships. Soft systems thinking reveals a lack of knowledge in terms of perceptions, expectations and motivations within the human subsystems resulting in a mismatch between management behaviour and the consultant's predictions of system performance. By thinking holistically (systems thinking) the human component is identified as a barrier to practise applications in future. Further information on client perceptions becomes a priority to the consultant attempting to assist the client. This example illustrates optimal solutions are seldom encountered in soft systems thinking. However, the strength of the

approach is in its ability to act, reflect and react towards improved system performance in future.

Farming systems research emphasises the importance of collaboration between biological sciences and economists focusing on searches for relatively short term improvements that are better than the farmer's existing practices (Hart, 1982). However, improvements to farming practises need to address the human component involved in the adoption of new systems. Plucknett (1982) stressed that learning about the farmer and the farmer's system and having a conceptual framework in mind leads to a better understanding of the reasons different organisations conduct research differently. Improving consultants' knowledge of clients' management system perceptions is expected to direct developments in MSS in terms of communication and learning strategies, towards the satisfaction of clients' perceived needs.

3.3.0   Action Research

Action research is "designed to study basic psychological processes while also taking social action. Action research combines theory and application" (Lewin, 1987). Action research has been described as a triad of research, taking action and training. Both researchers and clients participate fully in all phases of the research. Decisions, setting objectives and measurement procedures (including data collection and interpretation of data) are usually made jointly. Action research can be described as a cycle (see figure 3.3).

Figure 3.4 A Model of Action Research
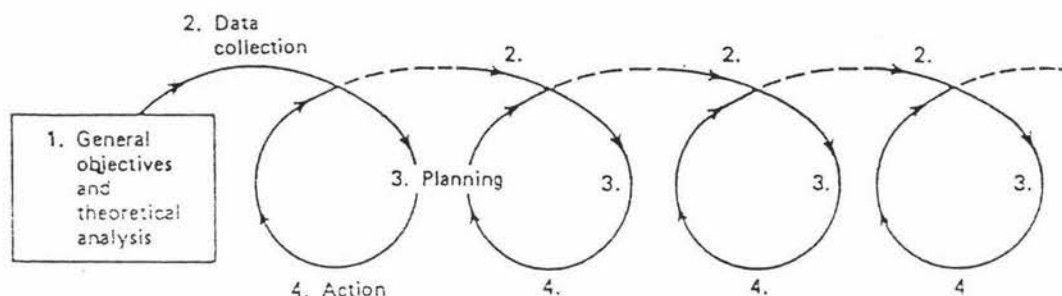
(from Lewin, 1987)

Step 1 includes theoretical analysis and data collection using a diagnostic framework.   Step 2 is a planning phase to define action and training requirements. Step 3 involves a commitment to actions and training. These phases repeat themselves through time as often as is needed to achieve the desired result.   Using action research techniques results in clients becoming aware of the researcher's needs, and researchers becoming aware of the client's requirements for action. The loss of researcher autonomy does not destroy the value of the research, and the cyclic approach allows for modification of actions as new information ensues.

Consultancy practise, involving assistance to clients' management activities, is comparable with action research procedures (analysis, planning and action). Action research could be used to introduce clients to trial developments in MSS procedures, such as the potential for using client learning, attitude and belief information during management planning activities.

Management research can be defined as "research which is necessary to resolve a real organisational problem and which leads, in the short or longer term, to action and change in an area of management" (Howard and Peters, 1990). This definition requires management research to be conducted within the business environment, undertaking research congruent with the objectives of the organisation used as the laboratory for investigations. It requires a client that is concerned about the outputs of research and involves communicating details of the research findings, often going so far as implementing the findings. Research information should contribute directly or indirectly to the decision making processes within the business. Action research, involving a recommendation and/or actual implementation of business changes, is particularly relevant to studies involving client:consultant relationships.

A first step in action research is diagnosis of clients' needs. Handy (1981) claims diagnosis is facilitated by client participation in planning change programmes. Through this strategy clients show a commitment to decisions because they participate in the decision making process. Furthermore, innovative decisions are valid because the system's power holders are involved in the planning process.

Research efforts by management consultants often begin with the practice of management and work back to theory - consistent with action research (Brown, 1965). The advantages of this approach includes access to data through the creation of a professional relationship while allowing problems to be studied in the context of the needs of individuals, groups, and communities.

In addition the researcher gains an understanding of the internal dynamics of the client. Researchers need to justify invading the freedom and privacy of clients. The research process may alter attitudes while providing clients with the satisfaction of seeing collected data put to practical use.

Brown is critical of action research, claiming research needs tend to be subordinated to the interests of the organisation under study and restricted to those needs preoccupying the client. Often data is difficult to isolate and control in a quantitative form. The organisation is likely to be unrepresentative of the study population. Objectivity is usually lost through a higher degree of emotional identification with respondents in their activities (though the feelings of the consultant and the disturbance his presence causes in the situation being studied are themselves to be regarded as data). Furthermore, studies starting with social problems may not necessarily be appropriate for solving theoretical problems. Problems can also occur with publication due to confidentiality requirements of clients. In situations where little comparative research work has been practised, there may be little contribution to a universal theory for sociological research.

Brown views the research consultant's role as not the most appropriate for examining management/worker, or employer/trade union relations, preferring the use of independent researchers using an analytical framework. Brown's criticisms are valid for basic research to validate postulated theories. However, management research can be viewed as a continuum from basic to applied studies (Howard and Peters, 1990). Applied research could be stifled by restricting studies to independent scientists using analytical research methods. The result could be greater confidence about relationships within a limited sphere of study which may or may not be relevant to real world problems confronting managers. Action research can define problems in such a way that pure researchers take an interest in practise problems confronting consultants (Powers et al, 1885). Basic and action research efforts can therefore compliment the each other in their quest for truth.

3.4.0   Research Criteria for the Study

The preceding review reveals several important criteria for a study towards the improved effectiveness of farm management consultancy services.

Methods used in the study need to compliment, or at least not disrupt, consultancy practise situations.   Clients need to perceive studies as being potentially beneficial.   Concepts involved in whole farm management need to be appreciated for their scope and complexity.   Consultant activities with clients should not be interrupted by the study process.

One aspect of the review has been an emphasis on the unique attributes of individuals as changeable problem-solvers in an environment full of choices. The study method needs to capture changes in clients attitudes, beliefs and learning needs. The exploratory nature of the study requires results capable laboratory verification, if contributions to theories of social research are anticipated.

3.5.0 Summary

Individuals can reflect, symbolise, plan and respond to their physical and social environment. Furthermore, descriptions of individuals in terms of behaviourial, cognitive or social boundaries are inadequate - each determinant interacting dynamically with the others. A concept of individuals as constantly changing processors of experience, accentuates the importance of regularly monitoring attitudes, beliefs (behaviourial determinants) and learning experiences. A soft system research procedure, termed action research, is capable of measuring intentional change in a practise setting. A spatial model of clients' cognitive processes provides a measurement system and learning style inventory can be used to analyse client learning preferences when designing change strategies.

Chapter 4 will discusses the selection and application of the study method, and data analysis.

CHAPTER FOUR:RESEARCH PROGRAMME

4.0.0 Introduction

This study proposes kiwifruit consultants in the Bay of Plenty are less effective at helping clients than they could be if they had more knowledge of clients attitudes towards and beliefs about kiwifruit management systems.

Details of the research procedures are provided, including concept elicitation, questionnaire design, change strategies and data collection.

Earlier chapters have indicated a need for knowledge of client perceptions of their management systems, to more effectively align support services. Furthermore, measurement and comparison of clients' and consultants' attitudes (predisposition towards an act) and beliefs (relationship between concepts and act), ought to assist the targeting of change strategies with clients. A knowledge of clients' learning styles can assist the implementation of change strategies. The research objective constructed in response to these issues was to explore the possibility of developing a framework for behaviourial change, within MSS practise, to support clients' acquisition of management skills.

More specifically the objective aimed to;

1. design a framework to assist consultants manage client behaviourial change;
2. implement change strategies consistent with clients' objectives;
3. monitor cognitive changes resulting from change strategies;
4. evaluate how effective the framework was in achieving cognitive changes predicted by consultants.

The hypothesis arising from the objective is that consultants can identify and manage clients' attitude and belief changes towards predicted outcomes using action research.

A second hypothesis is that the challenge of managing cognitive change in clients will effect changes in consultants' attitudes towards and beliefs about kiwifruit management, such that consultants will tend to align themselves more with kiwifruit management.

This research was undertaken within a commercial environment. Respondents were paying clients. All respondents considered there was a reasonable possibility of benefitting from participation in the research programme. The commercial environment introduced a number of external variables to the research setting. These included; changes in price expectations for kiwifruit payouts, climatic influences, financial marketing effects and industrial disputes. The research programme was designed to be potentially relevant to client needs.

The study was limited by MAF resource constraints including financial outlay, software availability and time availability. Any system that was trialled needed to be capable of being implemented within the MAF consultancy system. Considerations of new system cost:benefits, use of existing facilities and ease of adoption by existing consultants needed to be addressed before any developments were applied in practise. Possible future developments had to complement existing MSS procedures (for example, be consistent with existing needs analysis and management planning procedures). Finally the outcomes from the research programme ought to have a reasonable chance of contributing to the future profitability of MAF Management Consultancy Services. This study is exploratory, attempting to identify and recommend potentially successful service developments. The design and implementation of a commercial delivery system is beyond the scope of this study.

4.1.0   Selection of Research Method

Woelfel and Fink (1980) provide a method (Galileo) for studying the effects of messages on clients. Extending MSS procedures to include targeted learning experiences for clients requires measurement of changes in client thinking. Galileo uses multidimensional scaling to measure changes in client cognitive behaviour resulting from new learning experiences.

Multidimensional scaling is a technique used to analyse and assist judgement of similarity between variables so that dimensionality (ordering in space) can be assessed. All techniques have in common methods that "determine the number and nature of the underlying variables among a large number of measures" (Kerlinger cited in Cohen and Manion, 1982).

Galileo has been described as a complete system of research methods involving interviews, questionnaire methods and a computer programme (Woelfel et al, 1977). The methodology was designed to measure beliefs, attitudes and changes in thought processes of groups and cultures through time. Woelfel et al (1977) contend Galileo is different from other cognitive mapping routines in several important areas.

1.   The concepts defining the domain are derived directly from the means of the participants.
2.   Galileo is the only scaling system designed for the analysis of groups.
3.   Interrelationships between concepts are measured by paired comparisons on ratio level scales.
4.   Because of points 1-3, fully metric multidimensional scaling algorithms can be used to generate the Galileo map.
5.   Because the system is metric it is not subject to degenerate solutions (distortions of the maps).
6.   The programme is specifically designed for inter-temporal analysis.

7.   Galileo has an automatic message generator (a routine that predicted the effects of possible combinations of messages sent out about the topic being analysed).

Galileo methodology draws upon research in physics and engineering using a spatial model to describe cognitive processes of individuals that requires consideration of both space and distance. Dimensionality of space can be discussed with respect to an axis and the projection of concepts onto this axis. Consideration of distance requires a theory relating distances between points to allow for observable relations between concepts. Any distance model needs to fit concepts in the created space consistent with the input distances.

Use of space requires a consideration of metric and non metric scaling. Metric scaling is cartesian, in that it obeys general geometric and trigonometric laws. Individuals may however, use imaginary coordinates which do not obey the triangle and equality rule for metric spaces. Woelfel and Fink (1980) refer to the Einstein and Minkowski mathematical representation of Riemann space in modern cosmology. A Riemann plane allows for non metric dimensions in the consideration of positioning of concepts and space. Consider for example a triangle ABC. In two dimensions all sides are straight. However, in three dimensions if side BC were intersected by a hill side viewed from an elevation perspective, side BC would be curvilinear. Eigenvectors are therefore used to represent the orthogonal axis of a cartesian coordinate system. Eigenvectors do not have a meaning independent of the projections of concepts on to them.

The Galileo methodology for establishing a coordinate reference frame can be summarised in several steps.

1. Identify a set of reference objects to be framed.
2. An arbitrary pair of objects from within the set is chosen and the separation between them is designated as a standard measure.
3. The separation among all pairs of the remaining objects are estimated as ratios of this standard separation.
4. The matrix of interpoint distances obtained from these steps is converted to a deviation matrix with an origin at either an arbitrary point (Young and Householder method) or at the centroid of all the points (Torgesen method). Galileo uses the Torgesen method to define the origin.
5. The deviation matrix is converted into a scalar products matrix (for Torgesen method) by multiplying it (through) by its transpose (since the scalar products matrix is symmetric, it does not matter whether we pre or post multiply).
6. The resulting scalar products matrix is then transformed to principal axes and the result is the desired matrix R within which each point A is represented as the end point of a position vector $R^{\mu(A)}(\mu = 1,2,3...R)$ from the origin projected on a set of r orthogonal base vectors of e_i.

Steps 4-6 are the general procedures for metric multidimensional scaling (Woelfel and Fink, 1980).

When a consultant desires a change of behaviour in clients, their recommendations can link two or more concepts and be considered as linear forces, represented as position vectors using vector algebra, to predict cognitive change with respect to an act (Saunders, 1987).

The resulting geometric pattern, that corresponds to the interrelationship between the concepts, can be compared between individuals and through time. To achieve this a two step procedure is required.

1. Transformation of both reference frames which minimises the discrepancy between the two or more spaces while preserving the separation between each concept. These distance preserving transformations are called "rigid motions and consist of rotations and translations of the coordinates" (Woelfel and Fink, 1980). First an arbitrary point is chosen and its position vector subtracted from the position vectors of all concepts in the space to achieve the null vector (the point from which all other points are centred).

2. The coordinate frames are rigidly rotated to a least squares best fit on each other. This is achieved by pair-wise rotations of the eigenvectors until the total squared distances of the concepts and their counterparts are minimised (Woelfel and Fink, 1980). Intertemporal transformations require similar rotations to the translations described for comparisons between individuals, or groups.

Study procedures are discussed in detail in section 4.3. However, an example using three concepts is presented here to illustrate the metric multidimensional scaling procedure employed to generate two dimensional representations of respondents' concept associations.

The principal axes of a configuration are given by the eigenvectors associated with the scalar products matrix. The first largest eigenvector corresponds to the largest eigenvalue representing the principal direction of the configuration (accounting for the most variance: the sum of squared distances of points from origin). The second largest eigenvector represents the longest extent of the configuration perpendicular to the first eigenvector. The third largest eigenvector represents the largest span of the configuration perpendicular to the plane of the first two eigenvectors and so on (Woelfel, 1980). Factor

loadings are like correlation coefficients indicating the correlations between the items or concepts.

Figure 4.1 Representation of a Point in Three Dimensions
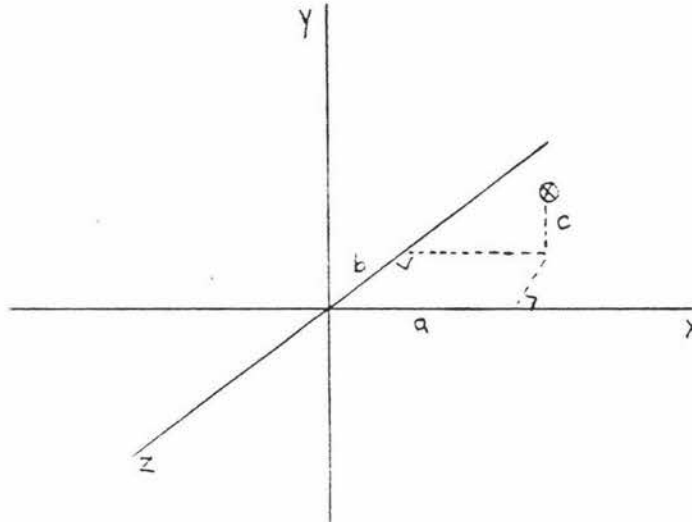
To determine the distance from x to the centroid (origin), multidimensional analysis (MDA) represents the first dimension using the Y axis corresponding to the largest eigenvector. The second dimension is represented along the X axis, at right angles to the Y axis, and corresponds to the second largest eigenvector. The third dimension is represented along the Z axis and intersects the other two axes at right angles. The distance in three dimensions (d_3) of point x from the centroid can then be measured as:

$$d_3 = \sqrt{a^2 + b^2 + c^2}$$

If four dimensions were involved then the distance in four dimensions (d_4) would be measured by:

$$d_4 = \sqrt{(\sqrt{a^2 + b^2 + c^2})^2 + d^2}$$

Consider association scores made by respondents to three concepts (in three

dimensions).

1	100		
2	50	100	
3	25	40	100

To convert the association to a distance measurement, the square root of twice the reversed distance was calculated. For example, the score for the association between concepts 2 and 1 was 50. This is converted to:

$$\sqrt{2(100-50)} = 10$$

The association matrix was therefore converted a distance matrix of

1	0		
2	10	0	
3	12.25	10.95	0

The distance matrix can be represented as a triangle (ie a two dimensional plot of three points). To simplify the calculations, locate point 1 at the origin, and point 2 on the x axis.

Figure 4.2 Representation of Three Points in Two Dimensional Space.
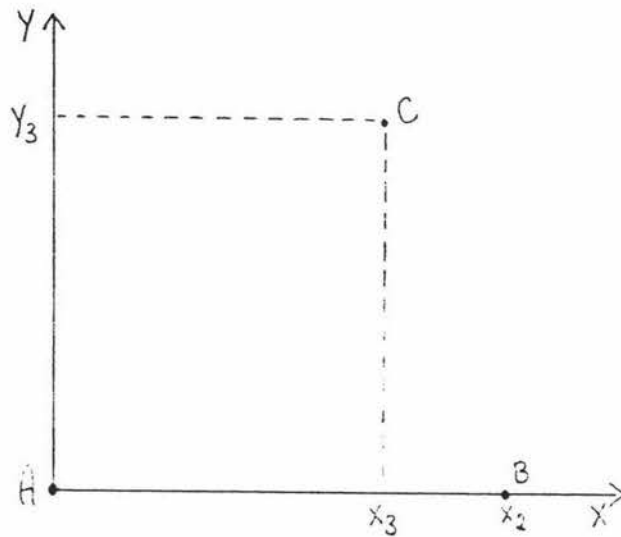
Let the coordinates of points B and C be $(x_2, 0)$ and (x_3, y_3).

The distance between points A and B is x_2, which want to be 10;
so $x_2 = 10$ (4.1)

The distance between points A and C is:
$\sqrt{x_3^2 + y_3^2}$, which want to be 12.25,
$x_3^2 + y_3^2 = 12.25^2 = 150$ (4.2)

And the distance between points B and C $(\sqrt{(x_2 - x_3)^2 + y_3^2})$ which want to be 10.95.
$(x_2 - x_3)^2 + y_3^2 = 10.95^2 = 120$ (4.3)

Equations 4.1 to 4.3 can be solved for x_2, x_3 and y_3, giving

$x_2 = 10$
$x_3 = 6.5$
$y_3 = 10.38$

The coordinates obtained by the MDA program are just these, with the origin shifted and the points rotated.

The best one dimensional fit is obtained as follows. Imagine drawing a line through the triangle, described by the coordinates above, and projecting the points onto this line. The best fit is the line that maximises the distances between the projected points. The direction of the line is given by the first eigenvector of the distance matrix. The MDA program orientates the triangle so that the first dimension (plotted along the vertical axis in figure 4.1) is the best one dimensional representation.

Using the computer routine, the following values were calculated from the same associations:

Concept		1	2	3
Latent Root (eigenvalue)		76.20	47.14	0.00
Percentage Variation		61.78	38.22	0.00
Latent Vectors (eigenvectors)	1	5.321	3.730	-0.001
	2	1.446	-5.489	-0.001
	3	-6.767	1.760	-0.001
Trace = 123.3				

The resulting two dimensional map generated by the analysis is presented in figure 4.3.

Figure 4.3 Representation of Distance Between Concepts Using MDA Program
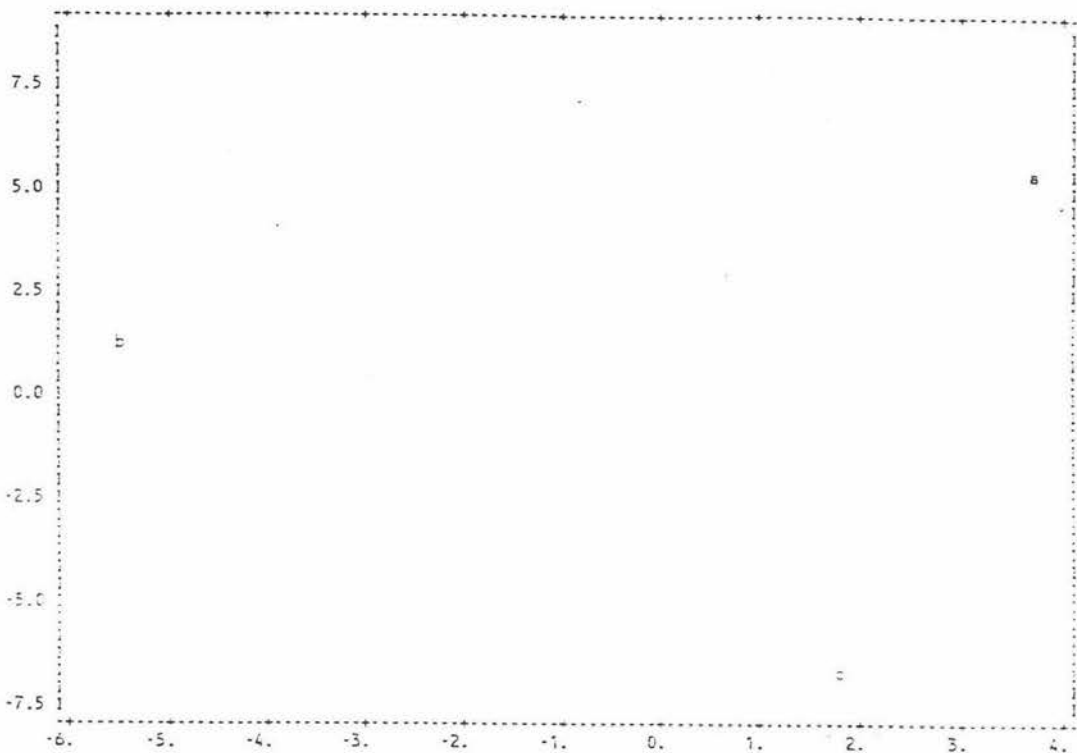

Legend: a = 1, b = 2, c = 3

The data indicates all separation between the points is fully explained in two dimensions (percentage variation for concept three is zero). The square root of the trace (11.104) gives the total distance in the map. If the number increases over time, respondents consider the concepts are more different.

The program calculated the distance matrix as:

1	0.000		
2	10.000	0.000	
3	12.247	10.954	0.000
	1	2	3

When comparing different groups, or the same group over different time periods, it may be necessary to reflect, rotate, centre and/or rescale maps (procrustes rotation) to ensure valid comparisons can be made between the groups.

Figure 4.4 Procrustes Rotation
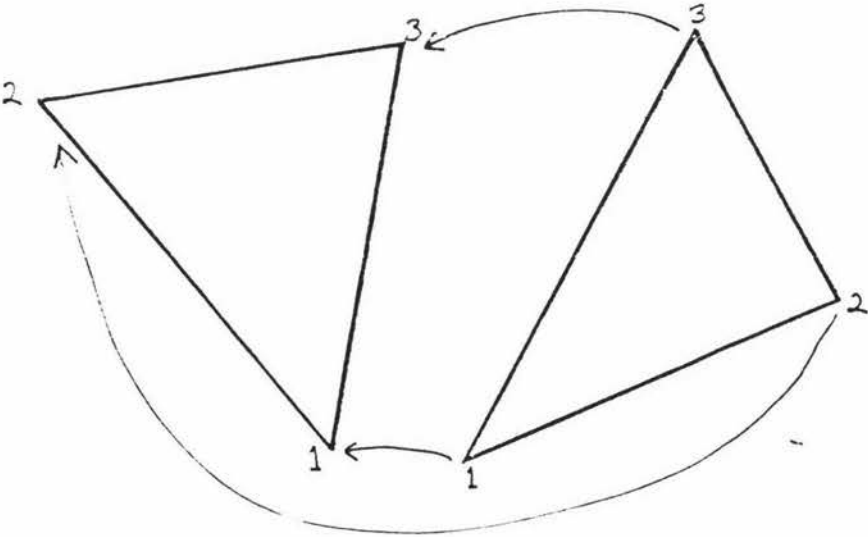
In this study, rotations were centred on the average consultant at the start for all individuals and groups across both time periods.

4.2.0 Research Schedule

In Preparing to study the attitudes, beliefs and learning processes of MSS clients, it was necessary to document what consultants actually do with clients (chapter 2). A supervisors' visit to the Bay of Plenty was arranged in October 1990 to design the study considering its relevance to clients, time and financial constraints. Supervisors visited 3 clients with the consultant. The consultant delivered MSS services to the clients while the supervisors observed. A discussion was later held between the consultant and supervisors, concluding the problem could be addressed at two levels. At the first level the issue is one of design - requiring the identification of criteria necessary for an ideal product. At another level, an existing service (such as MSS) may need to be modified or developed to more effectively service existing clients and/or be more attractive to current non-users. A decision was made to focus on the further development of MSS, particularly in the area of identification and servicing of client needs.

A literature review searched databases in horticulture, management, psychology and economics for studies into client behaviour in a commercial servicing setting.

Consultant meetings were held, when required, to provide more focus to service development needs or brainstorm new approaches to current service procedures.

A pilot study (see section 4.3.1) helped develop interview procedures, design and trial questionnaires, and develop and trial the MDA program for data analyses. The results of the pilot study were written up as a workshop paper (Paine, 1990). The pilot study and research procedures were critiqued by a supervisor before designing the main study programme (see section 4.3.2).

The main study programme involved the use of interviews to elicit client concepts of profitable kiwifruit production systems. These concepts were then used to design a questionnaire used by respondents in December 1990 and again in February 1991. In the time between the completion of the questionnaires, respondents and consultants participated in activities to change their attitudes and beliefs about profitable kiwifruit production.

The schedule was designed to run from July 1990 to October 1991.

4.3.0   Research Procedures

Clients were current users of a MSS.   In addition, a change agent (the consultant involved with all growers) and consultants (all those consultants delivering MSS in kiwifruit production) were analysed separately.

Clients

A group of current MSS clients were used to record the change in attitudes and beliefs occurring with clients after exposure to new change strategies (learning experiences).   The group comprised seven clients each having varying circumstances in terms of business size, location, level of service, objectives, personality and managerial characteristics. Clients received MSS services from the change agent to minimise the effect of different consultant delivery styles and simplify comparative case study reporting.

Data was collected from clients, during regular MSS visits, and results from questionnaires were incorporated within change strategies using action research procedures.   Specific targets were set with each client after the analysis of the client's and consultant's (change agent) cognitive maps from the first questionnaire, and learning style inventories. The frequency of change agent visits was similar to that under regular MSS.

Change Agent

The change agent was a consultant who held a professional relationship with all the clients, and was undertaking the study programme. The change agent also acted in a staff development role among consultants. Other consultants had no involvement with the study client group.

Consultants

A group of 6 horticultural consultants were involved in the delivery of kiwifruit MSS in the Bay of Plenty. Consultants participated in the study using a group change procedure to manage learning experiences and attitude and belief changes.

4.3.1 Pilot Study

A pilot study was used to elicit concepts clients use when managing kiwifruit orchards. The pilot study provided an opportunity for development and testing of concept elicitation interviews, cognitive measurement procedures using questionnaires and the MDA program.

Concept Elicitation

Clients' attitudes and beliefs are directed towards an "act". Initially reference concepts associated with the act, had to be accessed from the minds of respondents. Reference concepts are the notions respondents conceive in their minds when referring to the act. The pilot study defined the act as "Economically sustainable kiwifruit production" which was further defined as "generating a return sufficient to cover all expenses and investment requirements". The act represented a challenge to clients as managers, in terms of management system performance, yet was applicable to unique client objectives.

Respondent clients (n=5) were selected from among the client group participating in the main study, as they were receiving no feedback from pilot study results and it was thought participation in the pilot study would not affect results in the main study. Interviews were conducted in late August and early September 1990. Five interviews were required to capture a range of words and phrases used by respondents, yet achieve enough repetition of important words from among the group. Concepts were elicited with respect to the act using open question interviewing. This procedure involved respondents being asked to comment on what they thought were important considerations to achieving economically sustainable kiwifruit production. Once respondents began expressing their thoughts, they were left to exhaust their discussion with no interruptions from the interviewer. When the respondent ceased talking, the interviewer would prompt for further responses using words and phrases such as "how", "why" etc. The respondent would then continue with no interruptions from the interviewer until responses again ceased. The interviewer continued the process, exploring the range of issues raised by the respondent until it was considered no further concepts were being elicited.

Each interview lasted approximately one hour. All interviews were recorded on dictaphone and later typed into a word processor (Wordperfect, Version 5.1). Use of a dictaphone allowed the interviewer to concentrate on the respondent's comments and ensured no information was lost (a possibility when interviewers only take notes). A total of 17,868 words were generated from the interviews.

To elicit the reference concepts, an attempt was made to summarised the transcripts before analysing for the most frequently used words and phrases. Important phrases can be lost through these summaries, and they were discontinued in preference to the analysis of entire transcripts, after deleting the interviewer's questions. Transcripts were sorted using a database to rank words from most frequently to least frequently used. Interviews averaged 3000

words in length. Frequently occurring words included I (236), think (109), production (55), people (45), management (45), know (43), Decisions (41). After ranking, words were grouped into what the interviewer perceived to be twelve common concept areas. The concept areas were: problem-solving; production practises; orchard features; staff management; management practises; industry; seasonal effects; research; economics; family; people other than staff; a self concept. The categorisation and frequency of words are tabled in appendix 5. Information arising from the interviews was used to construct the questionnaire to measure clients' attitudes and beliefs.

Questionnaire Design and Use

Each concept area provided a foundation for building the pairwise comparison questionnaire. Only those words used by respondents were included in concept definitions associated with economically sustainable kiwifruit production. Concept area word lists were analysed by prioritising the most frequently occurring words in each area and constructing phrases that captured the meaning within each area.

The resulting list of concepts and their definitions became:

Act: Economically Sustainable Kiwifruit Production

CONCEPTS:

Understanding and Reasoning
refers to commonsense, new ideas and gaining increased knowledge, experience and ability

Plant Husbandry
refers to pruning, pollination, hicane, irrigation, fertiliser and spraying to maintain the leaves and roots for the production of fruit and fruit size

Orchard Features
the place of production including situation, land area, blocks and bays

Staff Skills and Application
refers to the labour: the people, their work and training

Business Management
refers to making decisions, solving problems, guiding and directing the business, the planning and control of the business to achieve desired results.

Marketing and Industry
refers to the NZKMB, packhouses, coolstores, politics, national production and the world scene

Timeliness and Seasonal Effects
refers to the effect of time and seasons

Technology
refers to scientific services, new findings and programmes

Costs and Prices
refers to money markets, exchange rates, interest rates, costs and prices

My Personal Attitudes
refers to how favourably inclined towards or against the practises you are

The Needs of My Family
refers to the preferred family lifestyle and survival

The People I Associate With
refers to the affects of people other than yourself

The questionnaire was designed to provide a scale to measure associations between the act and concepts. To provide a scale it was necessary to establish a criterion pair.

Criterion Pair

Under Galileo methodology, respondents are required to measure a distance between an act and a concept in a similar manner to a respondent measuring a distance using a ruler. A close association results in a short distance being measured, a long distance represents a poor association between concepts. To make a measurement, respondents require a scale. Under Galileo, this is provided in the form of a criterion pair. A criterion pair are two concepts that are relevant to the respondent audience, self explanatory, distinct in their meaning and representing no similarity. A distance of 100 is commonly used in Galileo studies to represent no similarity, however respondents are free to use distances greater than 100 units. The criterion pair used in the pilot study was apple consumption and furniture production equals 100 units.

An exhaustive pairwise comparison of concepts was made and trialled with four respondents not associated with the study. All respondents found it difficult to make associations using distance measures and tended to reverse the scale (ranking) part way through the questionnaire. The scales were therefore reversed (following Saunders, 1987) with 0 representing no association and 100 absolute association between concepts.

A pilot test of the questionnaire was conducted with clients (n=5) and consultants (n=5). Respondents completed the pairwise comparisons in the presence of the interviewer who was available for any points of clarification. Each questionnaire took approximately half an hour to complete. Data were checked at the end of each interview to ensure respondents had used the scale correctly and then all data were collated, copied and analysed using the MDA program. After completion of the questionnaire, respondents were asked to critique the questionnaire. Common criticisms were that concepts were too broad and general, with the possibility of ambiguity. Some concepts were too diverse, and not easily comparable and there were too many concepts to associate. These criticisms provided criteria for the design of the main study questionnaire.

Data Analysis

Questionnaire design, data collection and data analysis was completed late October 1990. Respondents pairwise comparisons provided base data for building the MDA program using Genstat. Procrustes rotations (rotated to consultant average) were used to achieve common scales for comparison between individuals. Genstat was not capable of reproducing the automatic message generating functions available on Galileo and was therefore limited in its ability to predict the success of extension messages in changing client behaviour. Program outputs provided two dimensional individual and group average respondent cognitive maps. Information on the trace, warp, percentage variation explained in two dimensions and distance measures between concepts was also available. Distances between the act, self and concepts indicated the strength of attitudes and beliefs. A three dimensional cognitive map, represented by continuous rotation of points around three axes on a computer screen, increased the explanation of variation from approximately 50% in two dimensions to 70% in three dimensions.

Issues Arising From Pilot Study

The pilot study established a procedure for measuring clients' attitudes and beliefs while raising several issues significant to the main study.

The MAF communication training programme (Question, Listening and Feedback) provided skills essential for the elicitation of concepts.

Analysis of words and phrases needed to be more systematic. Determining the frequency of words used was an effective procedure for prioritising important words however, phrases were not analysed sufficiently. A more extensive screening of phrases would have produced more concise and comparable concepts.

Respondents comments on the questionnaire provided clear guidelines to reduce the number of concepts and reverse the measurement scale. Using a separate definition sheet from the scoring sheet proved too cumbersome and wearying to respondents. Concepts need to be fully described in a phrase on the scoring sheet.

MDA program outputs were sufficient for analyses required in the main study.

4.3.2 Main Study

The main study was concerned with the measurement of clients' attitudes and beliefs towards kiwifruit production. Attitudes and beliefs were measured at the start of the study, and again at the end of the study, after implementing new procedures proposed for MSS with a select group of clients. The direction and magnitude of change in attitudes and beliefs indicated how effective the new procedures might be. Furthermore, an understanding of the different perceptions clients and consultants had about kiwifruit production was sought. The study therefore involved the collection of time series data from client and consultant groups, using a change strategy (developed for the unique needs of individual clients using their learning styles and cognitive maps).

Timing was considered important to measuring the cognitive impact of new consultant procedures (the change strategy) on clients. An attempt was made to minimise the impact of market returns, distractions from production tasks, and weather risks. For example, preoccupation with completing winter pruning in time for hicane applications might emphasize the importance of timing, staff training and work quality and ignore most other input concepts. The same client could yield a cognitive map indicative of more stable attitudes and beliefs to kiwifruit management at a time of the season more conducive to reflection over the seasons' management practises. Changes in clients' thinking over the period of the study, with respect to kiwifruit production, should therefore

result from the impact of the change strategy. The general trend in market returns was known by December and most of the production tasks critical to seasonal performance were completed by mid December. Weather risks included drought damage from December to April. Significant changes to New Zealand's economic policy were considered unlikely from the latter part of December through January due to national holidays. For these reasons, the timing of the first questionnaire was planned for the middle of December and the second questionnaire towards the end of February.

Concept Elicitation

Five clients and one consultant were interviewed on 11 December 1990. Responses were taped, following the same procedure as the pilot study (see Section 4.3.1), to elicit concepts associated with the act. The act was altered from "economically sustainable kiwifruit production" to "long term profitable kiwifruit production" which was again defined as "generating returns sufficient to cover all expenses and investment requirements". These changes were intended to remove ambiguous terms (economically and sustainable) when combined with the explanatory phrase, while retaining the accent on production management. The act was sufficiently broad to accommodate clients' unique objectives. Before commencing interviews, respondents were questioned on the challenge and relevance of the act to themselves. All respondents acknowledged relevance and challenge were embodied in the act.

Transcript word analyses followed the same procedure as that used in the pilot study. However, in addition to word analyses, transcripts were also analysed for key phrases used by respondents to describe concepts associated with the act. Interviews were approximately 30 minutes duration and 2-3,000 words in length. Word sorting reduced the word number to 426 different words used four or more times. The text analysis revealed 198 different phrases.

Questionnaire

Development of the questionnaire used the same procedure as the pilot study working from the word list rankings to construct concept areas. Frequently occurring words included think (105), business (86), people (57), management (42). A total of nine different concept areas were identified. Concept definitions were constructed from each concept area word list. Significant transcript phrases were complied on a separate file (see appendix 6). Each concept definition was evaluated against the significant phrases list to ensure concept definitions were exhaustive and consistent with respondents' statements. Several concepts were modified following comparisons with the significant phrase list. A separate definitions page was removed allowing pairwise comparisons from the concept definitions.

The nine concepts were:

1. Financial management (Being profit driven and cashflow management);
2. Task performance (Doing the right jobs in the right way in the right time);
3. Whole farm/systems approach (Thinking with an overall view of the business);
4. Decision-making (Ability to weigh up the pros and cons);
5. Monitoring (Monitoring and information gathering);
6. Consultants (Using outside expertise);
7. Knowledge (Gaining an understanding of the processes from husbandry through to marketing);
8. Job satisfaction (Being happy and enjoying my work);
9. External/uncontrollable factors (Weather risks).

As no difficulties were encountered with pilot study criterion pairing and the reversed scales, they were retained for the main study. Some respondents completed pairwise comparisons and a learning styles questionnaire at the start of the study.

Use of The Learning Styles Inventory

Consultants and clients completed pairwise comparisons and learning style inventories (see Section 3.1.3) before experiencing change strategies. Learning styles questionnaires (see appendix 7) were completed to provide additional information for the change strategies. The first change strategy visit with clients analysed their learning styles in collaboration with their cognitive maps.

Data Collection

Pairwise comparisons were completed under the supervision of the change agent to clarify any misunderstandings with respect to questionnaires. Instructions were given to not complete any part of the questionnaire if any ambiguity or difficult with measurement was encountered, and to discuss the difficulty with the change agent before continuing the questionnaire. No respondents reported any difficulties in understanding and completing the questionnaire. All questionnaires were completed and returned to the consultant within the week ending 21 December 1990. Data was checked for accuracy and completion before analysis. Two respondents were questioned further to ensure they had understood the use of the measurement scales.

The second data collection phase was completed in the week ending 1 March. This was considered sufficient time for change strategy to have a measurable influence on clients' attitudes and beliefs while minimising the impact of external factors (market returns and Government policy). All respondents were mailed the pairwise comparison. No learning style inventories were involved as they were only used to assist in the formulation of the change strategy with the respondent. All pairwise comparisons were completed by respondents and returned within a week of mailing.

A number of respondents commented on the difficulty of scoring associations when the concepts seemed to be interrelated. Several respondents also considered the learning styles questionnaire, in particular, had caused them to reflect on their preferred learning style.

Data Analysis

Data was analysed using the MDA program developed for the pilot study. Two dimensional cognitive maps were produced by spatially arraying concepts around the centroid of all the points. Figures 4.5 and 4.6 illustrate the outputs from the MDA program for the change agent at the start of the study. Maps were produced for each respondent and as group averages by rotating around the average consultant's map.

Figure 4.5 Cognitive Map, in Two Dimensions, from MDA Program.

Legend

1	s = Self
2	w = Weather
3	h = Job Satisfaction
4	u = Knowledge
5	e = Consultants
6	i = Monitoring
7	r = Decision-making
8	b = Whole Farm/Systems Approach
9	j = Task Performance
10	p = Financial Management
11	a = Act (Long Term Profitable Kiwifruit Production)
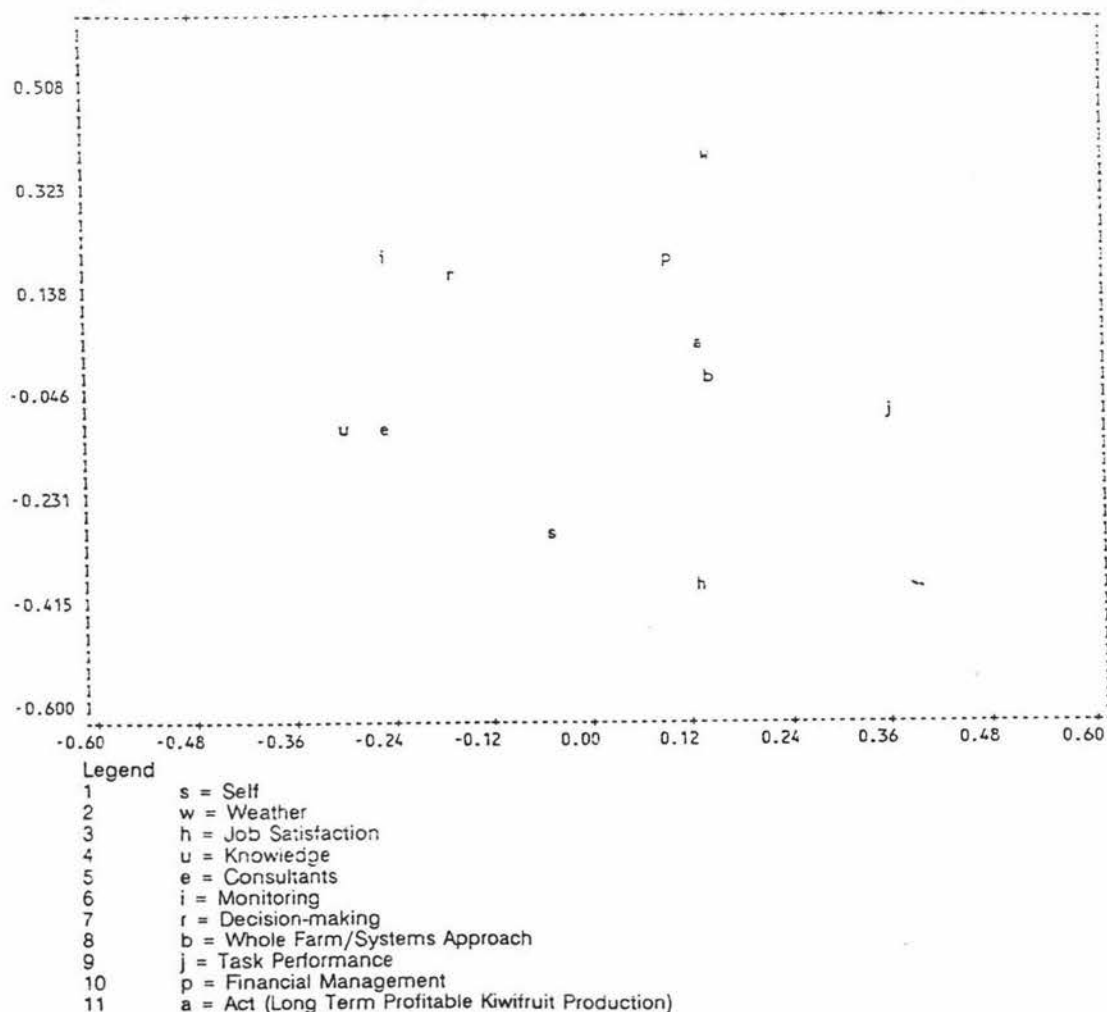
The MDA program output for the cognitive map illustrated above (see figure 4.6) provides the respondent's associations at the top of the sheet followed by the latent roots (eigenvalues) and latent vectors (eigenvectors) which describe the spatial model.

Figure 4.6 MDA Program Output Sheet

```
 1   100
 2    20  100
 3   100   20  100
 4   100   60   80  100
 5    90   30   50  100  100
 6    65   75   40  100   80  100
 7    90   90   40   75   90  100  100
 8   100   90   90   60   70   80  100  100
 9    80   75   80   40   60   40   40   90  100
10    70   70   30   60   50   85   75   60   85  100
11    75   60   60   50   70   60   80   90   70   80  100

       1    2    3    4    5    6    7    8    9   10   11
```

41...
....

***** Principal coordinates analysis *****

*** Latent Roots ***

```
              1         2         3         4         5         6         7         8         9
10
          146.22    125.30     57.52     51.63     23.52     13.75      0.00     -4.35    -24.72
35.88
             11
          -56.62
```

*** Percentage variation ***

```
              1         2         3         4         5         6         7         8         9
10
           49.34     42.28     19.41     17.42      7.94      4.64      0.00     -1.45     -8.34
12.11
             11
          -19.11
```

*** Trace ***

    296.4

* Some roots are negative - non-Euclidean distance matrix *

*** Latent vectors (coordinates) ***

```
              1         2         3         4         5         6
 1        -4.824    -0.878    -0.770     0.890     0.914     1.580
 2         6.404     2.317     2.998    -1.788    -0.940    -0.555
 3        -6.580     2.165     2.012    -1.526     1.311    -0.815
 4        -1.801    -4.885     0.299    -3.116    -0.001    -1.048
 5        -1.888    -4.178    -1.469     1.456    -3.344    -0.175
 6         3.155    -4.054     0.075    -1.434     1.225    -0.042
 7         2.968    -2.695     1.547     2.756     0.379     1.255
 8        -0.282     2.394     3.281     1.795     0.276     0.875
 9        -1.082     6.025    -1.458    -1.750    -2.077     0.680
10         3.397     1.553    -4.860    -1.274     1.530     0.671
11         0.532     2.237    -1.654     3.991     0.727    -2.429
```

* Vectors corresponding to zero or negative roots are not printed *

*** Distance matrix ***

```
 1    0.000
 2   12.649     0.000
 3    0.000    12.649     0.000
 4    0.000     8.944     6.325     0.000
 5    4.472    11.832    10.000     0.000     0.000
 6    8.367     7.071    10.954     0.000     6.325     0.000
 7    4.472     4.472    10.954     7.071     4.472     0.000     0.000
 8    0.000     4.472     4.472     8.944     7.746     6.325     0.000     0.000
 9    6.325     7.071     6.325    10.954     8.944    10.954    10.954     4.472     0.000
10    7.746     7.746    11.832     8.944    10.000     5.477     7.071     8.944     5.477     0.000
11    7.071     8.944     8.944    10.000     7.746     8.944     6.325     4.472     7.746     6.325
        1         2         3         4         5         6         7         8         9        10
11    0.000
       11
```

The length of axes used to define multidimensional space are given by the square roots of the corresponding eigenvalues. In the example, the length of axis in the first dimension is 12.09 units. Eigenvalues are the sums of squares of the coordinates of the corresponding eigenvector. All eigenvectors sum to the trace giving total sum of squared lengths used to separate concepts (the trace equals the total variance in the matrix). In this example the trace is 296.4 at the start of the study. An increase in the trace indicates the respondent perceives a greater separation between concepts (ie he makes more distinction between concepts) resulting from the impact of the change strategy.

The warp (the ratio of the sum of the positive latent roots to the trace) indicates the proportion of non-euclidian space used by each respondent to make their associations. In the example given, the warp is 1.41. Furthermore, the number of real dimensions and imaginary dimensions can be identified (imaginary dimensions having negative latent roots or eigenvalues) as eight real and three imaginary dimensions. The percentage variation accounted for in each dimension is given by expressing each eigenvalue as a percentage of the trace. The variance explained by the map is determined by the sum of the percentage variation of each dimension (ignoring negative variations) used in the map. For the two dimensional map used in figure 4.5, 62.69% of the variation is explained in two dimensions. This could be considered an adequate image of the respondents spatial separation of concepts. However, caution would be required in interpreting inter-concept differences from this map as a point appearing close to the act in two dimensions may in reality be a considerable distance away (along the axis perpendicular to the X and Y axes, towards or away from the observer's eye).

Distance matrices are derived from the association matrices being the square root of twice the reversed association:

$$d_i = \sqrt{2}*(100-a_i)$$

where

d_i = distance of the ith concept association

a_i = respondent association of ith concept

An overall attitude is measured as the distance between self and act (7.071 in the example). Evaluative attitudes are given as distances between concepts and self (for example, 4.472 for consultants). Principal beliefs are measured as distances between concepts and the act (for example, 7.746 for consultants). The first hypothesis for this study is that clients will work to eliminate inconsistencies between their objectives and their attitudes and beliefs about kiwifruit management. Often consultants are working to impart confidence to clients and encourage them to exert more control over the environment they are managing. Clients who determine to take more control of their management systems would present cognitive maps with stronger overall attitudes (decrease in distance between act and self). Observations of evaluative attitudes indicate concepts respondents associate closely with themselves and may be useful to the development of a change strategy. Similarly, those concepts believed by the respondent to be important to achieving the act are observed to be closely grouped around the act. These beliefs may provide targets that need to be altered (strengthened or weakened) in the changes strategy, or may provide consultants with new perspectives on strategies to achieve the act.

The same pairwise comparison questionnaire used in period 1 was used in period 2. Procrustes rotations were used to analyse individual and intertemporal differences. Rotations were pivoted on the average consultant's map at the start of the study. The period 2 data analysed the change in trace, warp, real and imaginary dimensions, the percentage variation explained in the first two dimensions, overall and evaluative attitudes, and principal beliefs resulting from the impact of the change strategy.

Change Strategy

Change strategies were used to implement what were considered by the client and change agent to be desirable changes in attitudes and beliefs towards kiwifruit production. Desirable changes were identified through discussions between clients and the change agent, using the cognitive maps and learning styles information from questionnaires used at the start of the study.

The change strategy used an action research approach provoking respondents to reflect on the learning processes they use in their management. How this was achieved in practise is discussed in more detail later in this section.

Consultants used a team meeting (as part of regular staff development meetings) format to effect their change strategy. At the team meeting consultants received their first period responses to both the learning styles questionnaire (see section 3.1.3) and their two dimensional cognitive maps. Each consultant determined his/her learning style and formulated relevant learning strategies to expand their range of learning skills. By estimating distances between concepts on their cognitive maps, consultants categorised concepts as either highly significant, significant or slightly significant with respect to themselves and the act. After comparing and prioritising concepts in terms of attitudes and beliefs, consultants expressed surprise at the significance placed on some concepts to achieving the act. This did not imply they did not agree with the map's portrayal of associations, but that they had not confronted the problem of act attainment using so many concepts at once. There were however, no statements of disbelief regarding the validity of the cognitive map in representing consultant thinking.

The procedure for using learning and cognitive information was similar to that used in previous consultant meetings that used technical and financial information at the management centre. A general outline of the procedure included the tabling of information, which was analysed and discussed as a

group, before being summarised by the chairperson who drew together a plan of action to follow up any issues arising from the meeting. Having analysed themselves in terms of learning styles, attitudes and beliefs, each consultant was assigned one or two clients arbitrarily, to analyse the relationship between themselves and the client in terms of learning styles and cognitive maps. Analysis involved prioritising important attitudes and beliefs towards concepts and comparing these with the consultants attitudes and beliefs to identify any differences. Differences were discussed as a group before consultants finalised which client and consultant attitudes and beliefs would be targeted for change. Between 3 to 5 cognitive targets were identified by each consultant, to keep the task manageable within the time available for the exercise.

After identifying the targets, consultants were asked to construct strategies to more effectively communicate with the client and meet the client's needs. To fulfil this task, consultants brainstormed alternative approaches to communication, learning, planning, monitoring and evaluation procedures and compared the resulting list of approaches with their attitudes and beliefs and those of clients. Selection of those procedures expected to have a higher chance of success with the client were structured into a service for delivery. For example, a client may believe monitoring of flower numbers is important to achieve the act yet not associate a monitoring concept with self. A consultant may (assuming they too believe the concept is important to the act) structure a service that trains subordinate staff (if a larger property is involved) or use MAF support staff to monitor for the client. This raises the issue of service cost:benefit requiring the consultant to study the client's attitudes and beliefs to concepts one and four. The process continued until the consultant was satisfied a systematic approach to servicing the client need had been established.

All the consultants concluded the process was valuable and marked a significant step in the next level of MSS analysis and delivery. In particular, they commented on the need to reflect on the concepts clients use to think about the systems they are managing, and the importance of determining the relative significance of those concepts in terms of the client's decision-making behaviour. Exposing consultants to cognitive information on clients and themselves, and requiring them to use this in a practise exercise was expected to strengthen their overall attitude and increase their trace.

Change strategies with clients involved comparing client and change agent learning styles cognitive maps while discussing the client's objectives. Clients analysed their learning styles to provoke an experience of learning "discovery". Differences between maps and learning styles were discussed and agreement reached on suitable targets for change. To reach agreement, it was often necessary to clarify the meaning of words used by the consultant and the client and elaborate on the perceptions of both parties. This contributed a new level of consultant understanding of client needs. The exercise with the consultant preceded the development of change strategies with clients. This provided an opportunity to explore approaches to the use of the data before developing change strategies with clients.

General strategies were discussed with regard to improving communication in future, after exposure to the new information. For example, if the change agent was a convergent learner and the client a divergent learner, the change agent would attempt to be more skilled at generating a wide range of ideas and brainstorming sessions, while the client would attempt to reflect more on the possibilities of various theories and ideas being applied in his management practise. An expected outcome from this strategy would be more balanced learning skills being adopted by both parties. Balanced learning skills were expected to assist the effective use of support to management and improve management performance (see Section 3.1.3). General strategies adopted towards learning styles followed those recommended by Kolb (1984) of:

1. Developing supportive relationships.

2. Improving the match between learning style and life situation.

3. Becoming flexible learners.

Two dimensional cognitive maps were compared, during the change strategy, observing, clarifying and discussing the meaning of concept space differences. Clients had no difficulty, after assistance from the change agent, in interpreting the visual representation of relationships between concept, the act and self. The relevance of the act to the respondent was again checked before discussing the comparisons.

Clients prioritised the concepts, with regard to self and act, using the same procedure as consultants. These were then compared with the change agent's prioritising and a discussion held on what objectives to set for the next two visits in the light of the conceptual similarities and differences between client and change agent. In-field consultancy reinforced the change strategies agreed upon between the client and the change agent during these meetings. For example, a client may have considered it important to emphasise the relationship between financial management and self. In this case, discussions on orchard practises such as thinning would emphasise the use of partial budgeting procedures to determine the marginal benefits from thinning, accounting for changes to grade standards by NZKMB. Partial budgets of the thinning exercise caused the client to reflect on input/output relationships. For example, the exercise required estimates of fruit size benefits, reductions in reject rates (increasing the export crop volume and decreasing packhouse penalty charges), extra costs of labour and changes in work methods resulting from various thinning techniques. Monitoring methods were then aligned with thinning decisions to determine whether or not planning assumptions had been valid when determining economic gains from thinning. If thinning was considered to be profitable, both the timing and thinning technique would be discussed in more detail.

All target clients received two visits, similar to a typical MSS visit schedule addressing seasonal issues. The first visit (mid-December) incorporated analyses of learning styles and cognitive maps into a conventional MSS visit. The second visit (mid-February) reinforced change strategies agreed upon in the first visit, dealing with the strategies as aspects of the MSS.

4.4.0 Summary

It is hypothesized that consultants could more effectively support clients in . their farm management by augmenting the consultants' knowledge of clients with measures of attitudes, beliefs and learning styles. Effective support can be measured in terms of clients' attainment of their objectives. Furthermore, consultants attitudes and beliefs will alter as they are challenged with new information demanding a review of their management system concepts.

Difficulties with the dynamics of cognitive change can be dealt with using a spatial model, representing movements in attitudes and beliefs as changes in distances (measured by reference to a criterion pair) between concepts over time. Analyses, using multidimensional space, are required when several concepts are involved.

A pilot study was used to trial concept elicitation, measurement and analysis procedures. Consequently, fewer input and output concepts were used. Concepts that were used were redefined to reduce ambiguity.

The main study involved change strategies based on the general action research model and utilising cognitive data derived from prior questionnaires to design activities appropriate to each client's unique needs. Attitude and belief changes were measured as the movement in concept distances, relative to act and self, subsequent to change strategy experiences.

Chapter 5 presents the results and analyses of change strategy impacts on clients and consultants from mid December 1990 to late February 1991.

CHAPTER FIVE:RESULTS AND DISCUSSION

5.0.0 Introduction

Results from the study described in chapter 4 are analysed and discussed in terms of changes in respondents' cognitive structures after the use of change strategies. Chapter 2 explained consultants' involvement with clients in terms of a management process applying technology and economic analyses to solve client problems. Objectives established with MSS clients centred on management systems and consequent production outcomes. This study attempts to advance an understanding of processes used by clients when managing their orchard systems, and facilitate the acquisition of additional management skills by clients through learning experiences using an action research framework (Kolb, 1984). To this end, clients' cognitive information was collected to describe and predict changes in clients' attitudes and beliefs about kiwifruit management. Strategies, responsible for cognitive changes in clients, evolved as clients and consultants explored possible uses of cognitive maps and learning styles (see Section 4.3.2). Data was interpreted by observing the movement of input and output concepts relative to concepts of act and self. Multidimensional cognitive maps (see Figures 5.2. and 5.3) provided only poor images of actual concept association changes. Although cognitive maps were used to evolve change strategies, they were not used during the final analyses. As a result, associations between input and output concepts had to be analysed directly from clients' distance matrices (see *were* Appendix 1). Figure 5.1 summaries the studies' action research activities, indicating where data was sourced from respondents.

Figure 5.1 Study Schedule With Clients
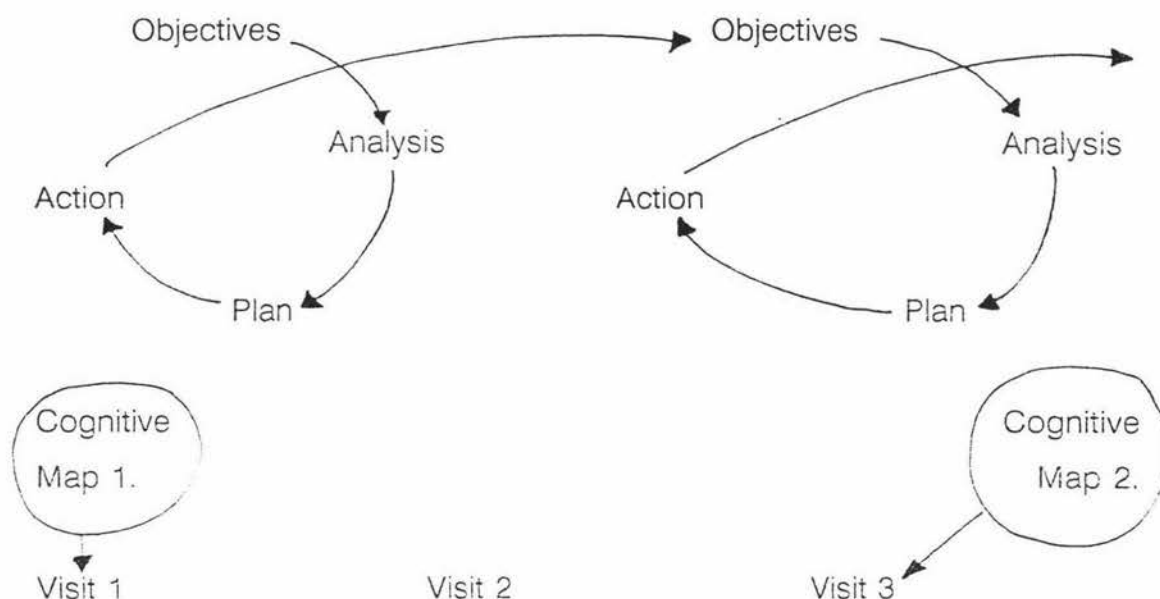
The strength of a respondent's overall attitude was determined using the distance between the concept of self and the act. Evaluative attitudes were measured as the distance from input and output concepts, to the self concept. The strength of principal beliefs were determined from distances between the act and input/output concepts. Analyses of the changes in the attitudes and beliefs of respondents, over the period of the study, are also provided.

Apart from the respondents concepts of themselves and kiwifruit management, nine other concepts were identified from open questioning interviews. The range of concepts covered:

1.   Financial management (Being profit driven and cashflow management) - input concept;

2.   Task performance (Doing the right jobs in the right way in the right time) - input concept;

3.   Whole farm/systems approach (Thinking with an overall view of the business) - input concept;

4.   Decision-making (Ability to weigh up the pros and cons) - input concept;

5.   Monitoring (Monitoring and information gathering) - input concept;

6.   Consultants (Using outside expertise) - input concept;

7.   Knowledge (Gaining an understanding of the processes from husbandry through to marketing) - input concept;

8.   Job satisfaction (Being happy and enjoying my work) - output concept;

9.   External/uncontrollable factors (Weather risks) - input concept.

All concepts were input concepts except for job satisfaction. Pairwise comparisons of these concepts, including the self and act concepts, were made using the criterion pair, furniture production and apple consumption equals 0 (no association) and the closest association being 100. These scores were converted to distances by taking the square root of twice the difference between 100 and the association. Output data included changes in cognitive maps, traces, warps, variances explained, attitudes and beliefs over time (see Section 4.3.0).

Respondents commented on the difficulty of the pairwise comparison process. In particular, the task of measuring associations between a number of concepts that were all considered important to the act. Respondents were asked to check they were satisfied their final pairwise comparisons expressed their thinking.

Clients commented they found the learning styles inventory caused them to reflect on themselves as learners within their managerial roles. Learning styles and cognitive maps were used to set objectives in terms of property management and personal development. Action research steps of objective setting, analysis, planning and implementing plans were undertaken using the data during two visits by the change agent to each target client.

Each respondent is briefly introduced (more detailed profiles are available in appendix 3) before describing the objectives and change strategy adopted by the respondent and change agent. Data is analysed in terms of changes in attitudes and beliefs towards objectives set in the action research process. Implications for MSS developments, arising from the changes, are discussed after individual analyses.

5.1.0 Change Agent

Consultant K1 acted as the change agent to target clients. In his role as change agent, the consultant continued delivering MSS while conducting the study. The change agent was available to clarify concepts and assist with the pairwise comparison process.

The change agent preferred to learn using an assimilator style (see Section 3.1.3). Changes occurred to the change agent's conception of kiwifruit management over the period of research. Using client cognitive data, by a process of reflecting and interacting with clients, the change agent's overall attitude strengthened (reducing from 7.1 to 6.3 units, see Appendices 1 and 2). At the start of the study, important concepts to the change agent included job satisfaction, knowledge and using a systems approach (see Figure 5.4). Strong evaluative attitudes were also held towards the use of consultants and decision-making. The change agent derived job satisfaction (output concept) primarily from being perceived as an effective support to clients' management activities.

Figures 5.2 and 5.3 Change Agent Cognitive Maps

(Start)
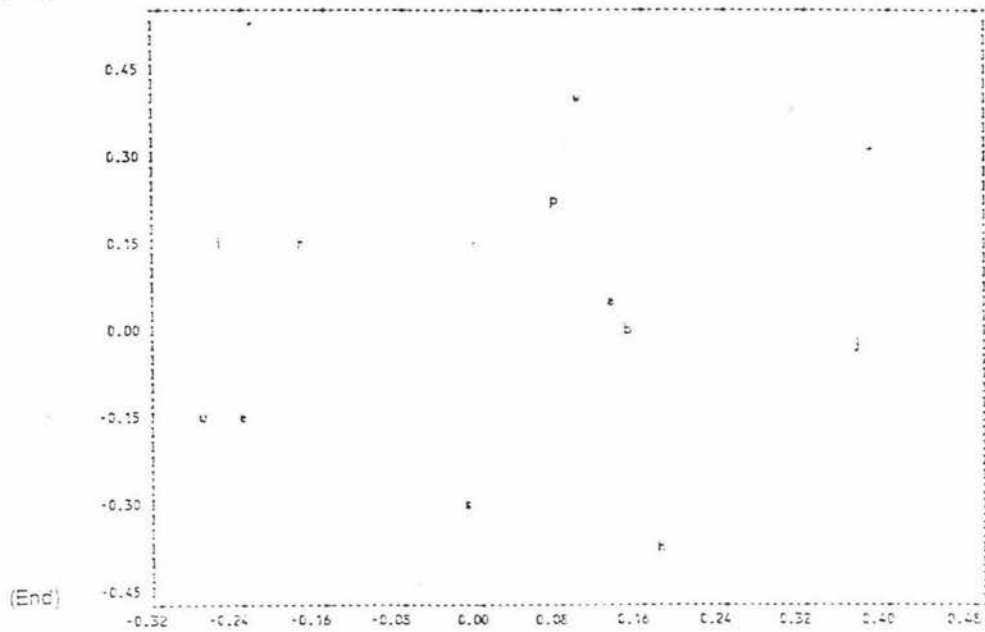
(End)
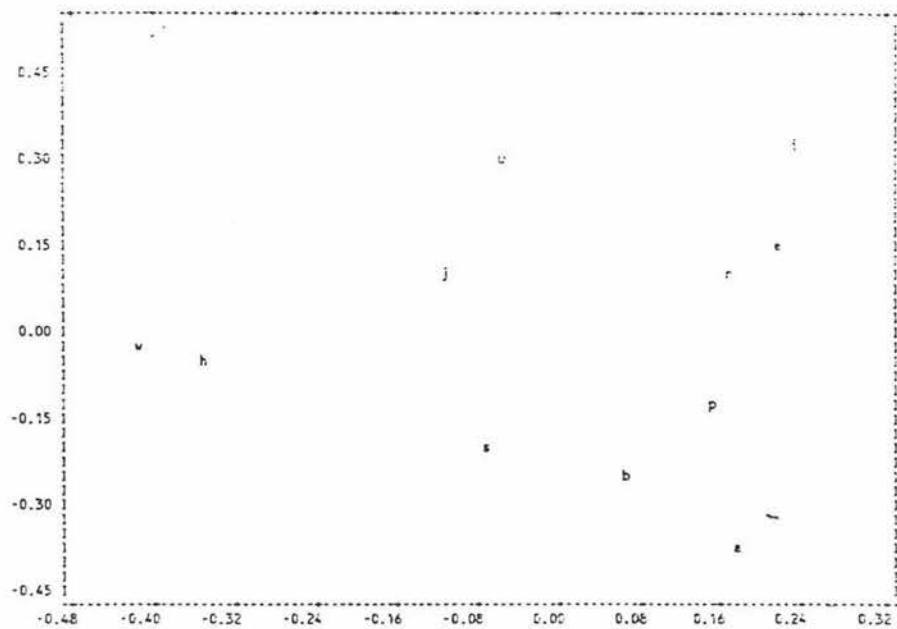
Legend

1	s = Self
2	w = Weather
3	h = Job Satisfaction
4	u = Knowledge
5	e = Consultants
6	i = Monitoring
7	r = Decision-making
8	b = Whole Farm/Systems Approach
9	j = Task Performance
10	p = Financial Management
11	a = Act (Long Term Profitable Kiwifruit Production)

Table 5.4 Changes in Change Agent's Attitudes and Beliefs
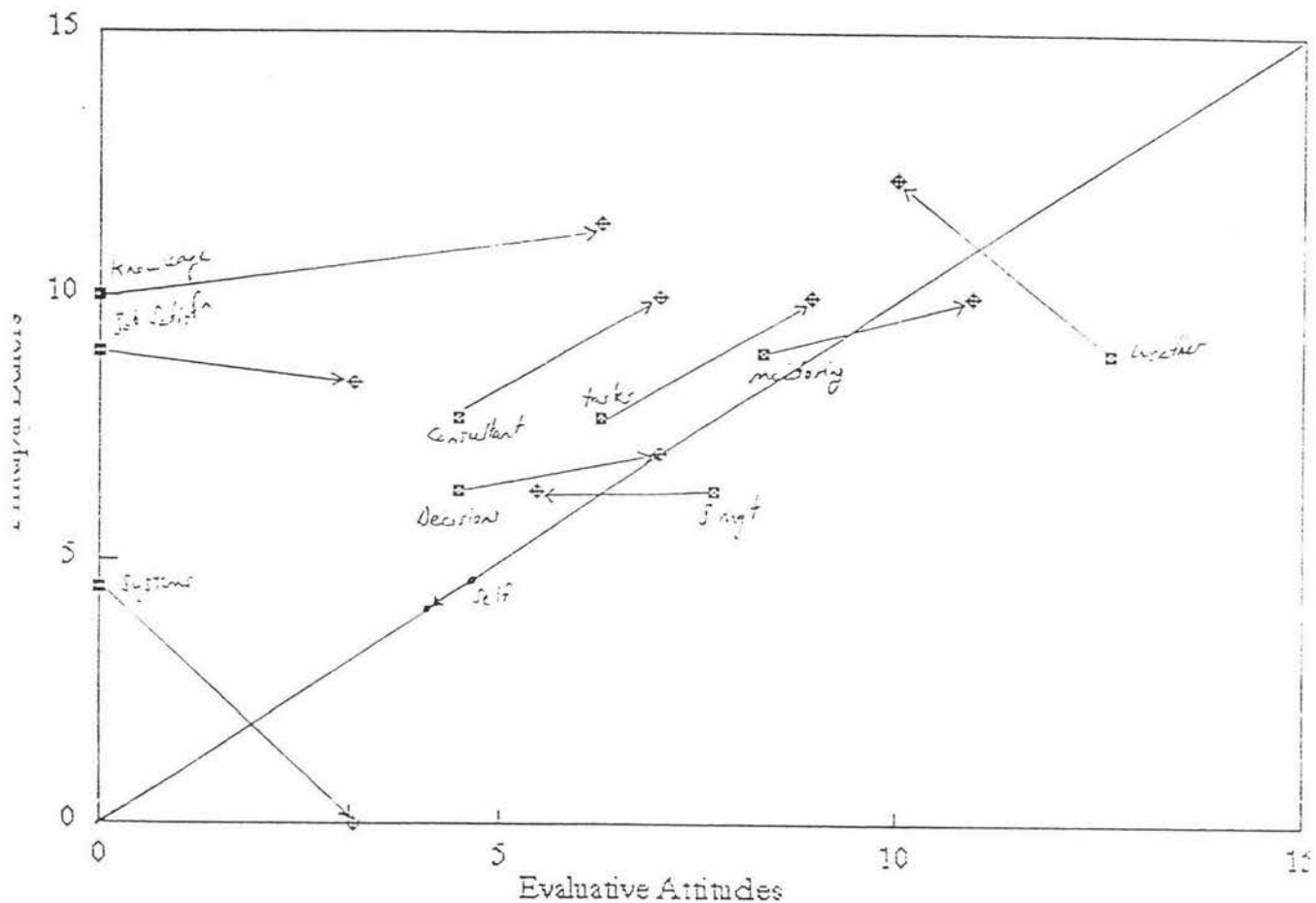
Analysing the change agent at the end of the study revealed a weakening of evaluative attitudes towards job satisfaction, knowledge and a systems approach. However, job satisfaction and using a systems approach remained the most important concepts to the change agent (see figure 5.4). Financial management became an important concept to the change agent over the period of the study. Furthermore, attitudes to financial management *f υ‹a·ʰ‹* strengthened while weakening towards other concepts.

At the start of the study the change agent believed using a systems approach, decision-making skills and financial management were the most important inputs to achieving profitable kiwifruit production. By the end of the study the change agent believed using a systems approach was synonymous with achieving long term profitable kiwifruit production (a significant increase of 4.5 units) followed by financial management (no change). The change agent believed skills in decision-making were less significant to kiwifruit management after the study. Strong job satisfaction attitudes were retained by the change agent over the period of the study.

The substantial increase in the change agent's trace (from 296 to 378) indicated the change agent considered concepts became more distinct from each other over the period of the study. The warp also decreased over this period of time, due to the increase in the use of real dimensions (from 7 to 8), suggesting a trend towards a more conventional (euclidean) use of space when associating concepts.

The change agent therefore held relatively strong and stable attitudes and beliefs about the importance of using a systems approach to manage kiwifruit. Effective financial management was also considered an important input to achieving long term profitable kiwifruit management. Job satisfaction was the most influential concept to the change agent throughout the study. This concept could be explored in terms of its impact on consultant job performance and stability. Over the period of the study financial management became increasingly important to the change agent. This may have been in response to poor returns received by clients, being a more mechanistic input than other concepts associated with kiwifruit management.

5.2.0 Clients

Client T1

Client T1 is an owner/manager of a large orchard, packhouse and coolstore complex. He used an assimilator learning style with particular skills at problem selection and analysis. Initially, client T1 placed a high value on job satisfaction, knowledge, use of consultants and monitoring (see figure 5.5) when managing kiwifruit. Comparing cognitive maps and learning styles of client T1 and the change agent involved an exploratory discussion of the client's aspirations and perceptions of his business. Concerns for the future success of the business were disclosed as the client reflected on how the members of the family contributed to the business. Differences between the values attributed to concepts by the change agent and client, accompanied by a mutual respect for opposing perspectives, forced each individual's associations to be questioned to better understand the client's management system. While questioning associations with the client, the change agent glimpsed the power and hazards of accessing and using client cognitive information in consultancy practise. Client T1 was an experienced and politically successful grower, thriving on challenges to conventional thinking and personally secure in his perspectives of kiwifruit management. Access to cognitive information on this client inspired the change agent to regulate objectives according to the change agent's values. Objectives, initially thought to be agreed between client and consultant, derived from action research procedures focused on developing objective setting skills which involved a need to improve his organisation of information and evolve his conceptualisation of kiwifruit management. Predicted attitudinal changes included:

1. A move to a more positive overall attitude.

2. A preference for financial management.

3. Strengthened attitudes and beliefs towards the use of a systems approach.

Analyses and actions taken with respect to the objectives included discussions concerning the client's aspirations after exposure to the learning inventory and cognitive information (objective one), review the debt structure, account codes, and use of cashflows (objective two) and coolstore loss analyses from previous monitoring data (objective three).

Although client T1 started with a high trace (431.8) this increased still further resulting in the highest trace recorded by any client in the study, exceeded only by consultant K3 at the end of the study. This result suggests the client made a substantial distinction between concepts, act and self. Objective one was not fulfilled (client T1's overall attitude weakened) and no change occurred regarding objective three (see Figure 5.5). The evaluative attitude towards financial management (objective three) strengthened over the period of the study. Discussions did not appear to be effective in changing client T1's overall attitude in the desired direction. Attempts at designing change strategies commenced with client T1. As a consequence, the change agent's inexperience with the information may have resulted in little more than a manipulated discussion towards predetermined objectives held by the change agent. Client T1 probably agreed with the objectives to appease a benefactor, rather than express his aspirations.

Client T1 believed a systems approach in farm management was more important to profitable kiwifruit management by the end of the study however, he did not alter his attitude towards it. This may suggest attitudes take longer to change than beliefs about concepts considered to be important by clients. Consultants and the use of monitoring information were considered less important inputs to kiwifruit management after the change strategy. The change strategy experience may have induced the client to reflect on causes of personal and business success, and provoked more detailed planning for the business. Failure to effectively support the client during change strategy meetings may have estranged the consultant further from aspects of the planning process than would have occurred under conventional consultancy

practises. Cognitive analysis may be a two edged sword in the hands of unskilled consultants.

Figure 5.5 Attitude and Belief Changes in Client T1
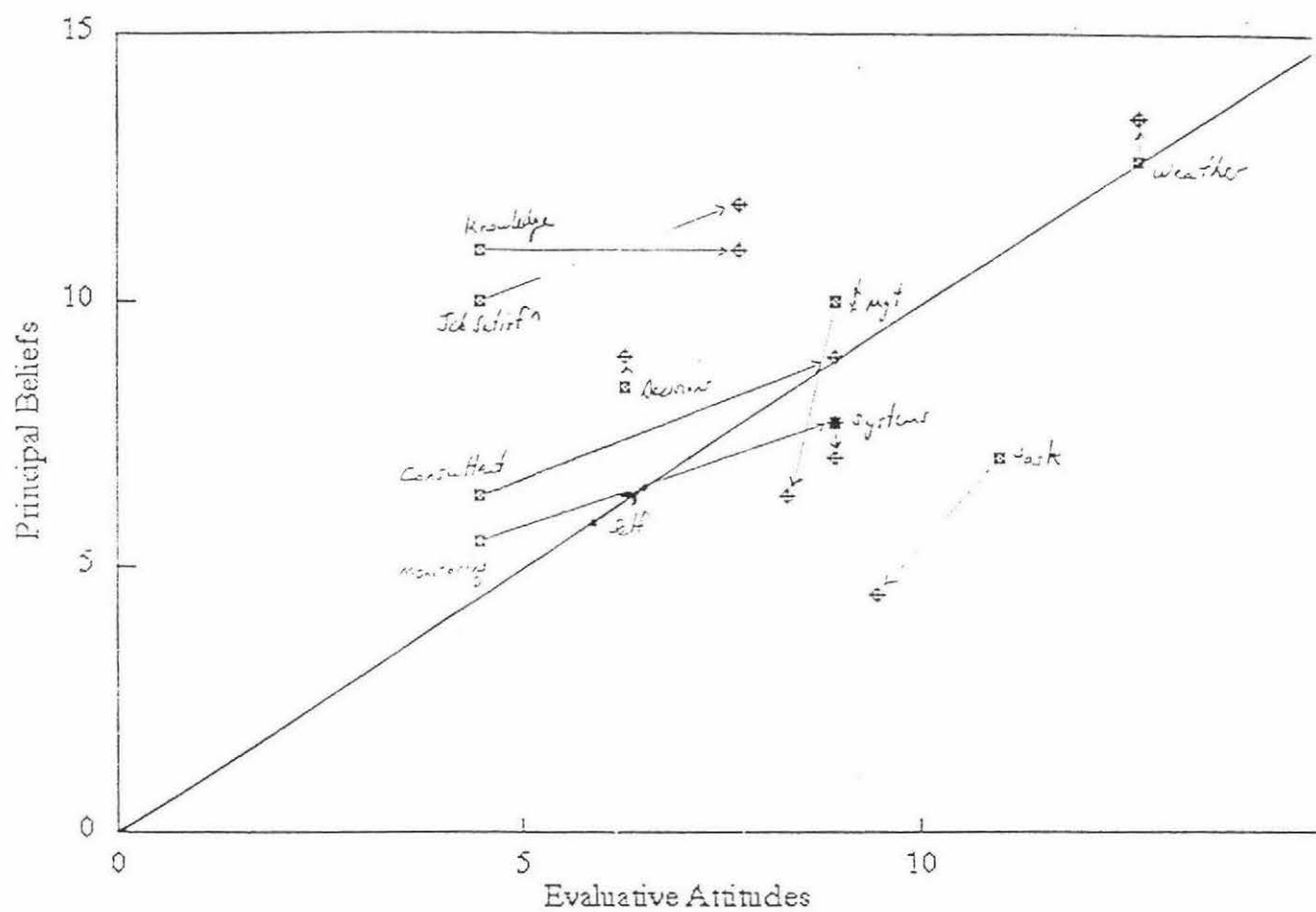
Client T2

Client T2 was in his early 70's and a recent entrant to the kiwifruit industry, having previously established and developed a substantial engineering company. He used a converger learning style with management strengths in problem solving and decision-making tasks. His cognitive map indicated a high trace (485.5) and low warp (1.0) at the start of the study. A high trace resulted from beliefs about the relatively low importance of the concepts to the act, and indifferent attitudes to concepts.

Initially, client T2 did not hold strong preferences for any concept however, financial management was important to him (8.9 units). He believed using a systems approach (6.3) was required to achieve profitable kiwifruit production. After discussing the management implications arising from client and change agent cognitive maps and learning styles, objectives were set to improve problem identification and objective setting skills. The predicted cognitive change arising from these objectives included the formation of a stronger overall attitude and stronger attitudes towards financial management.

Actions that followed from these objectives included the preparation of cashflow budgets and a review of the strategic plan over the next three years for the property. The MSS had been primarily technical prior to this research work. Previously, consultancy was supplied in the form of reports and orchard walks with orchard staff and the owner. With the adoption of financial management within client T2's MSS, meetings were held in the evenings with the client and his partner, excluding orchard staff. Confidentiality of financial information was important to the client. Although the change agent considered financial planning to be an integral part of MSS, he was unsure why it had not been adopted earlier by the client. Confidentiality and a belief that cost control was being achieved using the partner's manual system may have limited earlier orchard planning discussions to more short term technical discussions.

By the end of the study client T2's overall attitude to kiwifruit management strengthened (see Figure 5.6). Client T2 was more confident of his role within the management system and considered he had more control of his farms productive performance. Farm profitability was perceived to be a relatively uncontrollable output to the client over the study period. Product prices for export kiwifruit were less than anticipated for the second consecutive season.

Attitudes towards the concept of using a systems approach to kiwifruit management were not targeted for change however, this strengthened by 4.5 units (see Figure 5.6). Client T2 did not alter his belief about the importance of effective financial management. The client had a stronger preference for consultants and knowledge. Weather risks became more important to the client. Decision-making and job satisfaction were believed to be more important in managing kiwifruit. This may reflect the impact of using more formal decision-making techniques with client T2.

A consequence of the change strategy was the client aligned his attitudes and beliefs by strengthened his evaluative attitudes (see Figure 5.6). However predicted attitude changes set for the study were not achieved. The client appears to have reviewed his thinking and preferred a cluster of concepts involving decision-making, using consultants and a systems approach, believing these were important to kiwifruit management. Some individuals require more time to conceptualise and experiment with associations before expressing overall attitude changes. Consultants ought to consider differences between individuals in terms of time required to experiment and conceptualise behaviour change. With client T2, the consultant became part of an evolving change process that required client support as a stronger overall attitude developed towards the act, involving tasks that were new to the client in financial management, decision-making and work methods.

Figure 5.6 Attitude and Belief Changes in Client T2
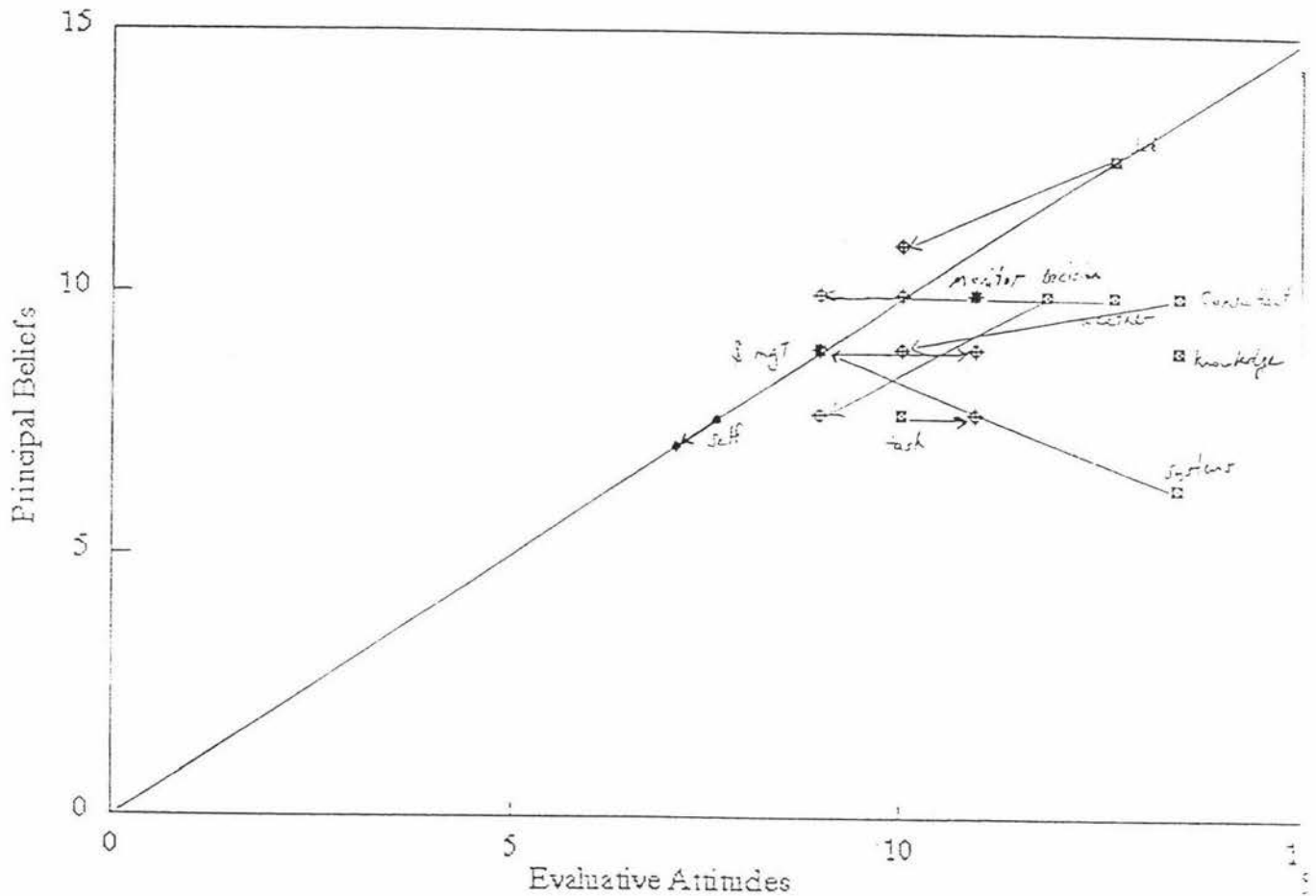
Client T3

Client T3 manages a large packhouse and coolstore operation involved in contract management to several kiwifruit orchards. At the start of the study client T3 valued job satisfaction and was relatively indifferent towards all other concepts. Client T3 believed financial management was the most important input to achieve profitable kiwifruit production. He also believed monitoring, having knowledge of the system and effective decision-making were necessary to achieve the act. Attitudes are formed and modified through continual interactions between personal preferences, expressed behaviour and environmental influences (Bandura, 1986). Discussions with Client T3 focused on communication with staff and his need for attitude changes. Objectives cannot be expressed in terms of attitude and belief changes as attitudes and beliefs represent a statement of the client's conception of his life, rather than

his aspirations for some desirable new system to interpret his world. However, this client recognised a need to adopt a more positive co-operative attitude towards his employees, and review his knowledge of kiwifruit management. Objectives were agreed between the change agent and Client T3 to improve communication with staff to enhance their job satisfaction. This involved reflection on the role of knowledge and consultants when managing kiwifruit. The importance of weather to determining farm performance was debated and agreement was reached to rethink its impact on the act and self. Attitudes and beliefs were expected to strengthen towards knowledge of the system and the use of consultants, and weaken towards weather.

Change strategies involved regular technical consultancy, and the change agent acting as a facilitator between the manager and his staff in the settling of disputes regarding work plans.

Measurement at the end of the research period indicated the trace decreased by 44.6 units with no change in overall attitudes. The acquisition and use of knowledge became more important to client T3 (objective one) though no change was observed in attitude towards the use of consultants (objective two). Client T3 believed the use of consultants became a more important input to kiwifruit management over the period of the study. Attitudes to the concept of weather risks weakened (objective three). Beliefs about the importance of task performance and using a systems approach to kiwifruit management strengthened over the period of the study.

Using cognitive maps and learning styles within the change strategy resulted in several beliefs being held more strongly about concepts of consultants, systems, task performance and monitoring, however only knowledge became more important to T3 consistent with objective one. Attitudes appeared to be more difficult than beliefs to alter under MSS.

Figure 5.7 Attitude and Belief Changes in Client T3
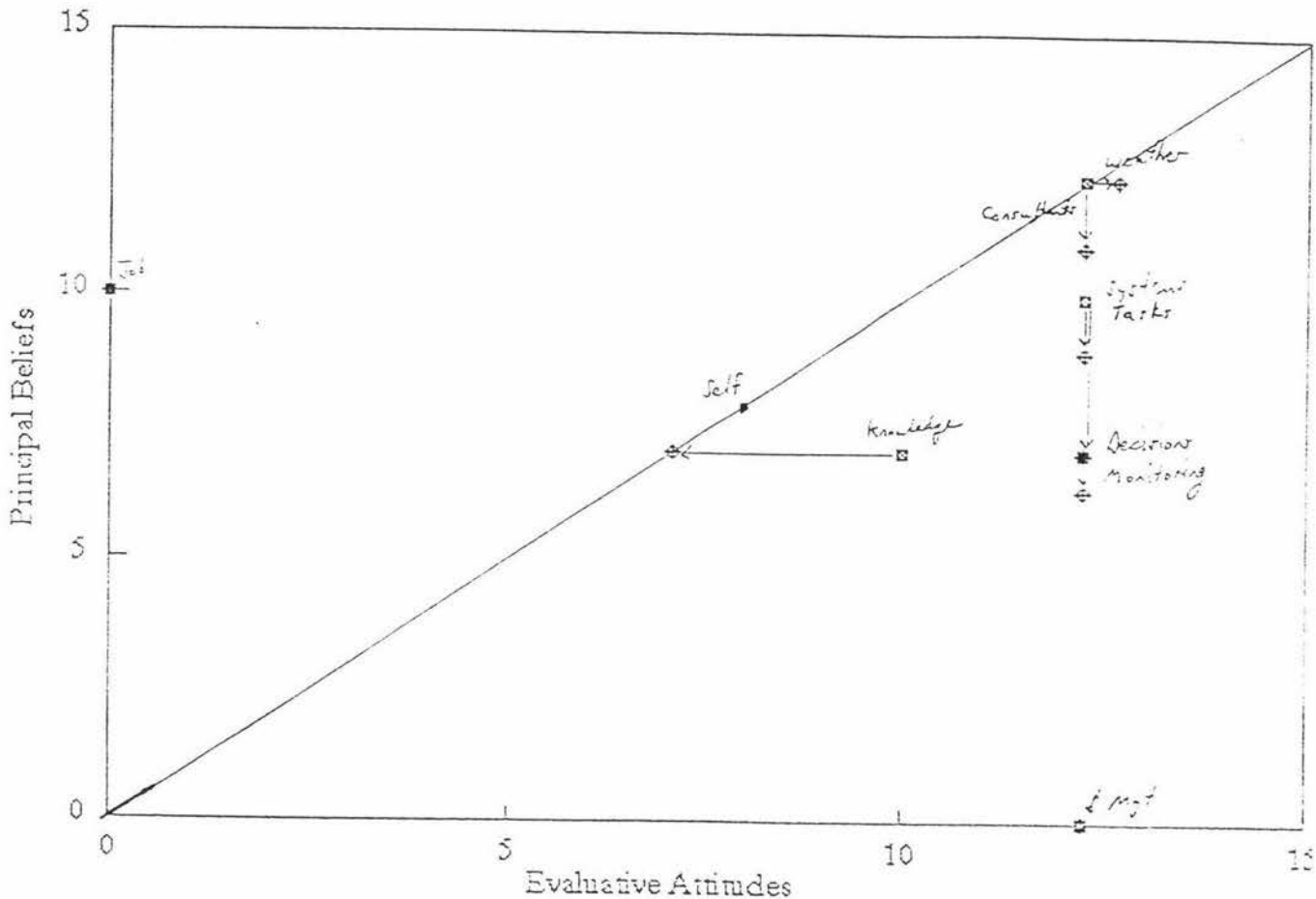
Client T4

Prior to investing in kiwifruit, Client T4 was an experienced pipfruit grower who had achieved a world record apple yield in Hawkes Bay, through a close association with the local research station. He preferred to use an assimilator learning style, enjoying the process of reflecting on various solutions to problems. Client T4's overall attitude measured 10 units with a trace of 310. At the start of the study the most important concept to him was weather risks. He had suffered severe losses to hail damage three seasons prior to the study. This Client believed task performance was the most important input concept to achieving profitable kiwifruit management. Client T4 and the change agent interpreted their concept associations to each other as a basis to direct objective setting. Objectives were set to improve recording and

delegation skills. Predicted cognitive changes included a strengthening of the overall attitude and attitudes and beliefs towards decision-making and consultants.

Client T4 had two sons working on the property, however the father made most technical and resource allocation decisions. Change strategies involved the continuation of technical and financial support using MSS, while attempting to broaden the scope of management discussions to include the sons in more firm planning and decision-making tasks.

At the conclusion of the study Client T4 aligned himself more with profitable kiwifruit management, as evidenced by a substantial reduction in the overall attitude from 10 to 5.5 units (objective one). Concepts of weather risk, job satisfaction, and knowledge also became more important to client T4. Client T4 believed financial management, decision-making (objective two), and using a whole farm approach to kiwifruit management were more important following the experiences of the change strategy. Attitudes and beliefs towards consultants strengthened considerably (objective three).

By involving his sons in more orchard planning and decision-making tasks, Client T4 became more confident of his role in kiwifruit management (indicated by the strengthening in the overall attitude). Accurate predictions of cognitive changes were made, and substantial attitudinal changes occurred across a number of concepts following change strategy experiences.

Figure 5.8 Attitude and Belief Changes in Client T4
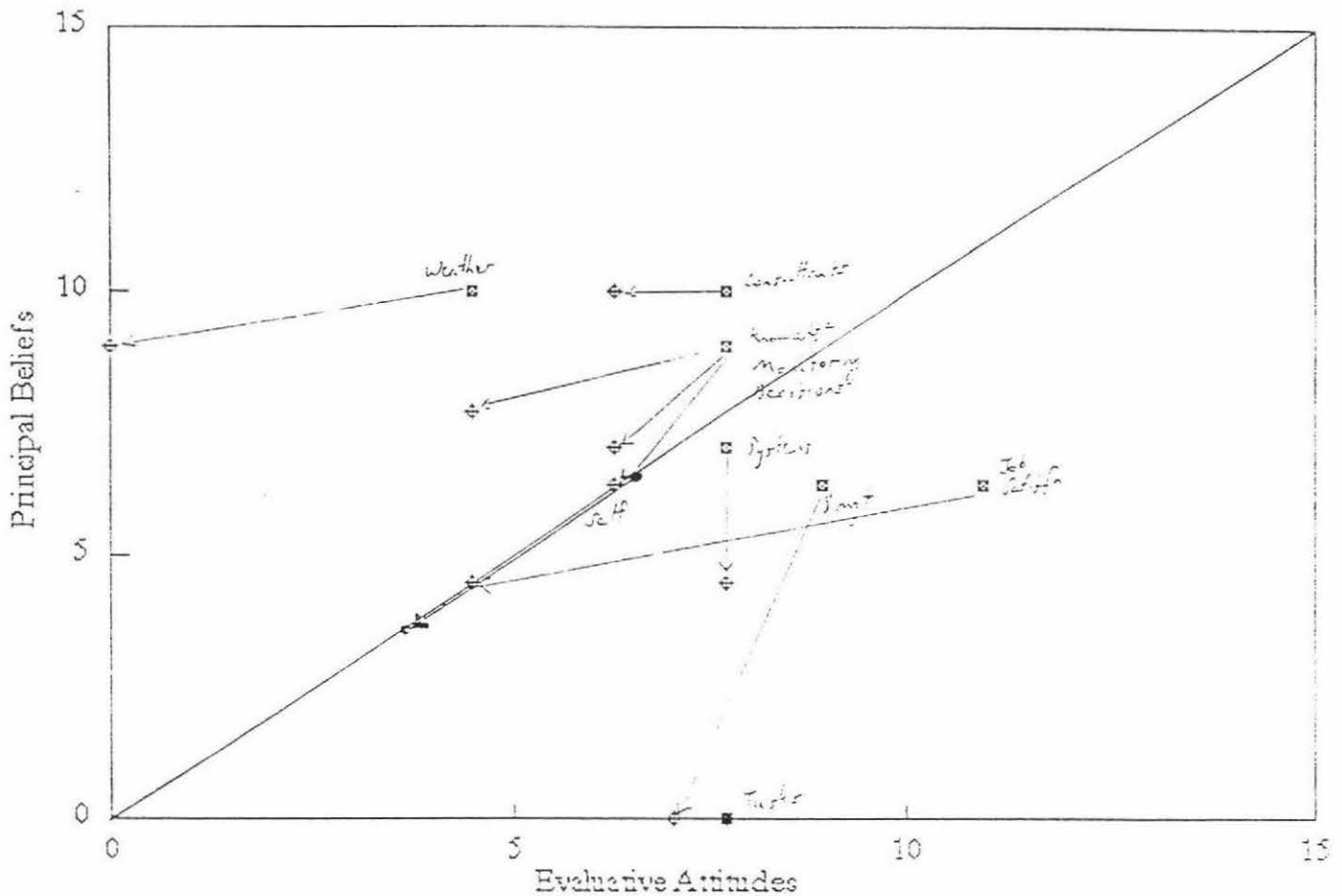
Client T5

Client T5 was in his late 30's, managing a family orchard. He had a preference for divergent learning, often comparing current performance with previous seasons or other growers to identify performance problems. His orchard suffered hail damage three seasons prior to the study and as a consequence, he held strong feelings towards this concept. Job satisfaction was also important to him. The change agent questioned Client T5 further in terms of his attitudes to weather risks. He explained, "if the weather is fine I am happy in my work, therefore the weather has a strong influence on my work". This client identified himself with consultants and task performance in his role as a kiwifruit manager. At the start of the study, Client T5 believed

weather, task performance and financial management were significant inputs to kiwifruit management.

After cognitive map and learning style comparisons and discussions, between the change agent and client T5, objectives aimed to improve evaluation and decision-making skills. Predicted cognitive changes included the client becoming more inclined towards, and more holistic in his thinking about, kiwifruit management.

The change agent dealt primarily with client T5 (who was only partially involved in the financial management of the orchard) when delivering MSS. The MSS was therefore only partially involved in financial planning tasks associated with the orchard. The change strategy involved integrating more financial planning considerations into technical decisions made by client T5. An illustration of the way in which this was achieved involved an assessment of the need to thin. Discussions concerning thinning included considerations of physiological effects on crop volume and fruit size along with work methods and breakeven analyses of thinning on a block by block basis. A similar approach was taken with other seasonal tasks.

Measurement at the end of the study indicated the overall attitude strengthened by 1.1 units (objective one) and using a systems approach and monitoring were more important to client T5 after the study. Attitudes and beliefs were more aligned in terms of using a systems approach in kiwifruit management, task performance and financial management. Weather was considered a less important concept with respect to long term profitable kiwifruit management at the end of the study.

Cognitive change expectations were realised within the period of the study. An interesting observation indicated this client believed consultants became of less importance to his management of kiwifruit. Discussions with client T5 indicated he had gained an increased confidence in his management system and had a clearer perspective of his management in future.

Figure 5.9 Attitude and Belief Changes in Client T5
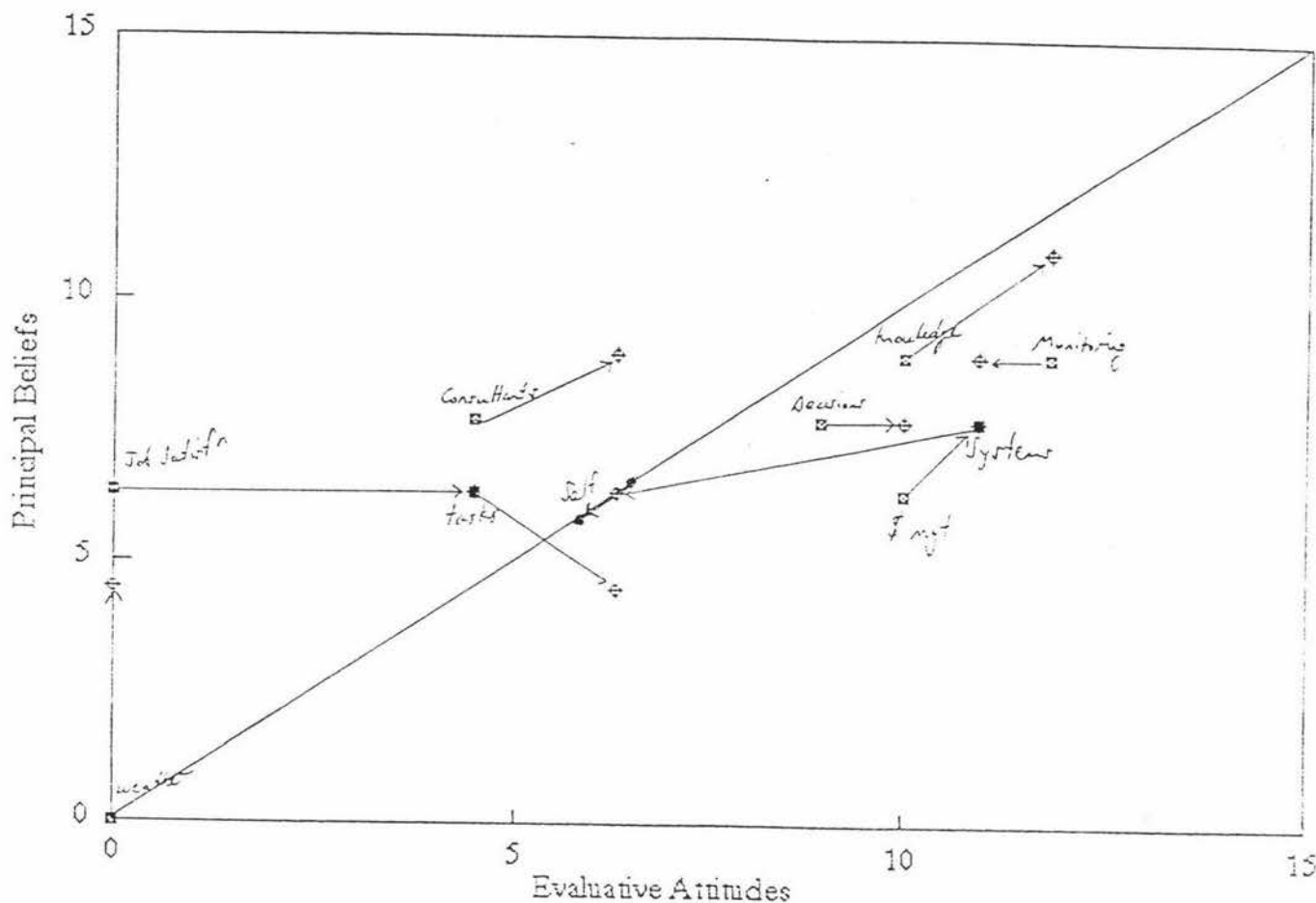
Client T6

Client T6 was a relatively recent entrant to the kiwifruit industry, previously owning and operating a dairy farm. He used a divergent learning style with an ability to recognise opportunities and empathise with people. Initially he made little distinction between concepts, having the lowest trace of any clients (250 units). This appeared as relatively short distances between concepts, himself and the act (see Figure 5.9). Client T6 had the strongest overall attitude of any respondent in the initial period (4.5 units). Job satisfaction was important to the client, and he perceived his managerial role as primarily a decision-maker (in conjunction with his wife). Client T6 believed profitable kiwifruit management relied upon the use of a systems approach, knowledge and consultants.

Objectives were designed to solve problems using more informed judgement. Following the change strategy, the client was expected to align more with kiwifruit management, be more inclined to financial management and the use of a systems approach to farm management, believing these inputs to be critical to kiwifruit management.

To achieve these objectives a change strategy involving the evaluation of various marketing options was used. Subjective probabilities were used to assist decision-making, given the price expectations for his current crop. Options evaluated included: Selling on the vine; leasing the orchard and working fulltime off-farm; continuing to market with the NZKMB while working part-time off the orchard.

After the study the trace decreased by 63.4 units giving the lowest trace recorded by any respondent throughout the entire study and suggesting the client had difficulty determining his predisposition towards the concepts.

Client T6 became more inclined to kiwifruit management (objective 1) along with all other concepts. He believed effective financial management was more critical to kiwifruit management after the study (objective 2).

Cognitive changes were in accordance with expectations subsequent to change strategy experiences. Further action was taken after the study to revise the financial system being used on the orchard and apply subjective probabilities to other decisions involving risk.

Figure 5.10 Attitude and Belief Changes in Client T6
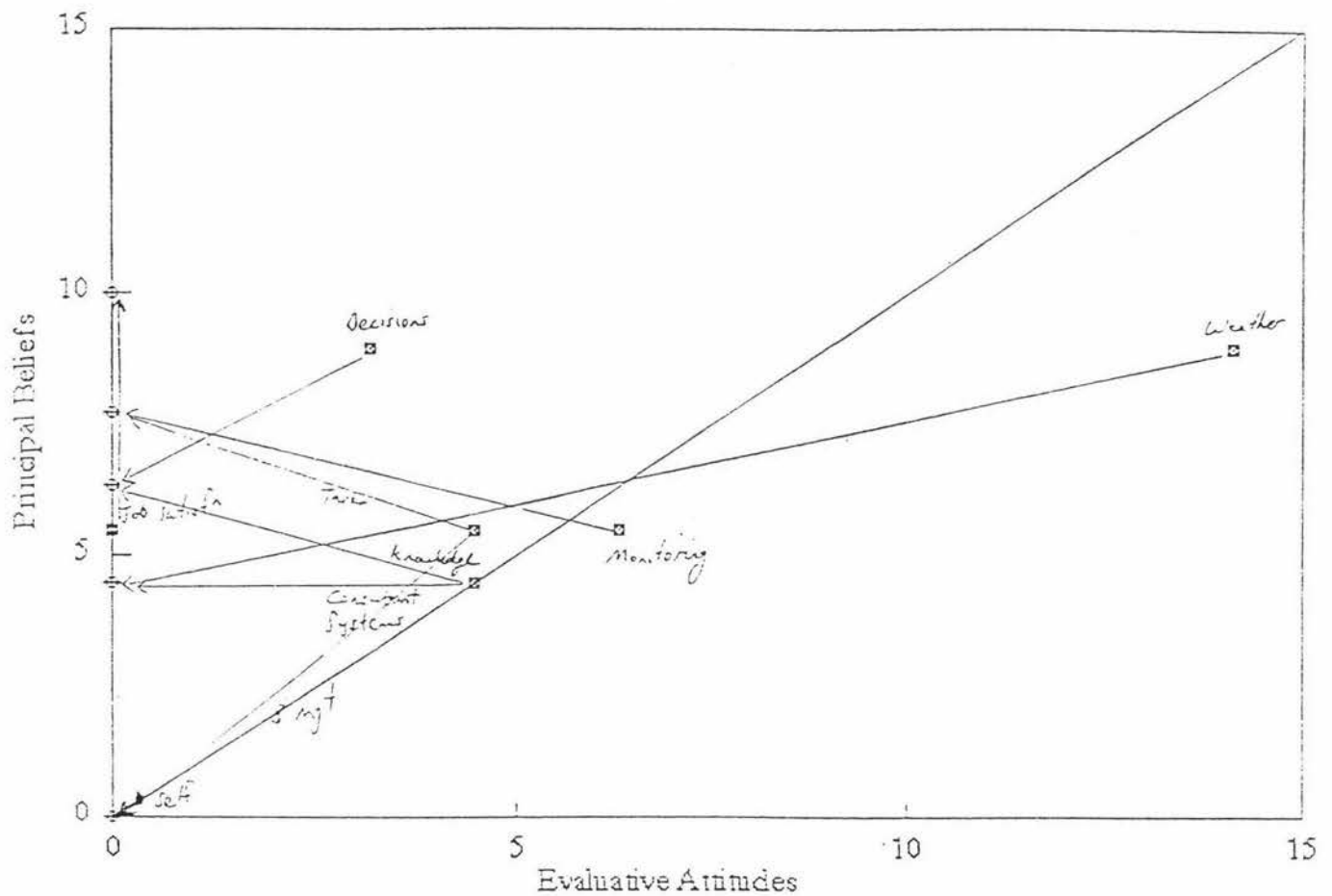
Client T7

Client T7 was in his late 30's and managed a large kiwifruit orchard, packhouse and coolstore complex. Client T7 used an assimilator learning style and enjoyed searching and testing ideas. His first cognitive map had a trace of 298.2 and an overall attitude of zero (he associated himself fully with profitable kiwifruit management). This Client had strong positive attitudes towards all concepts except weather risks. He believed that using a systems approach, effective financial management and task performance were the most important inputs in kiwifruit management.

Objectives were designed to improve commitment to targets and complete tasks. Predicted attitudinal responses, following his change strategy

experiences, included less alignment with the act and more alignment with monitoring and task performance. The change strategy used the establishment of packhouse and coolstore management systems to emphasize the importance of delegation and quality control of completed tasks. These systems included both human resource management and financial monitoring systems.

Client T7 was less disposed to kiwifruit management and task performance and did not change towards monitoring. However, this client believed monitoring was critical to profitable kiwifruit management. Predictions were therefore partially correct, although the disassociation with task performance implied the client distinguished between task activity and task accountability, stressing the importance of unambiguous concept definitions.

The study of Client T7 was influenced by his enlarged management responsibilities, beyond that of orchard manager (he accepted the role of general manager half way through the study). The client was assisted by the change agent to acquire time management and delegation skills, necessary for his new role in the firm. Consequently a knowledge of the system and task management became less important to him and he believed monitoring was more important to manage kiwifruit.

Figure 5.11 Attitude and Belief Changes in Client T7
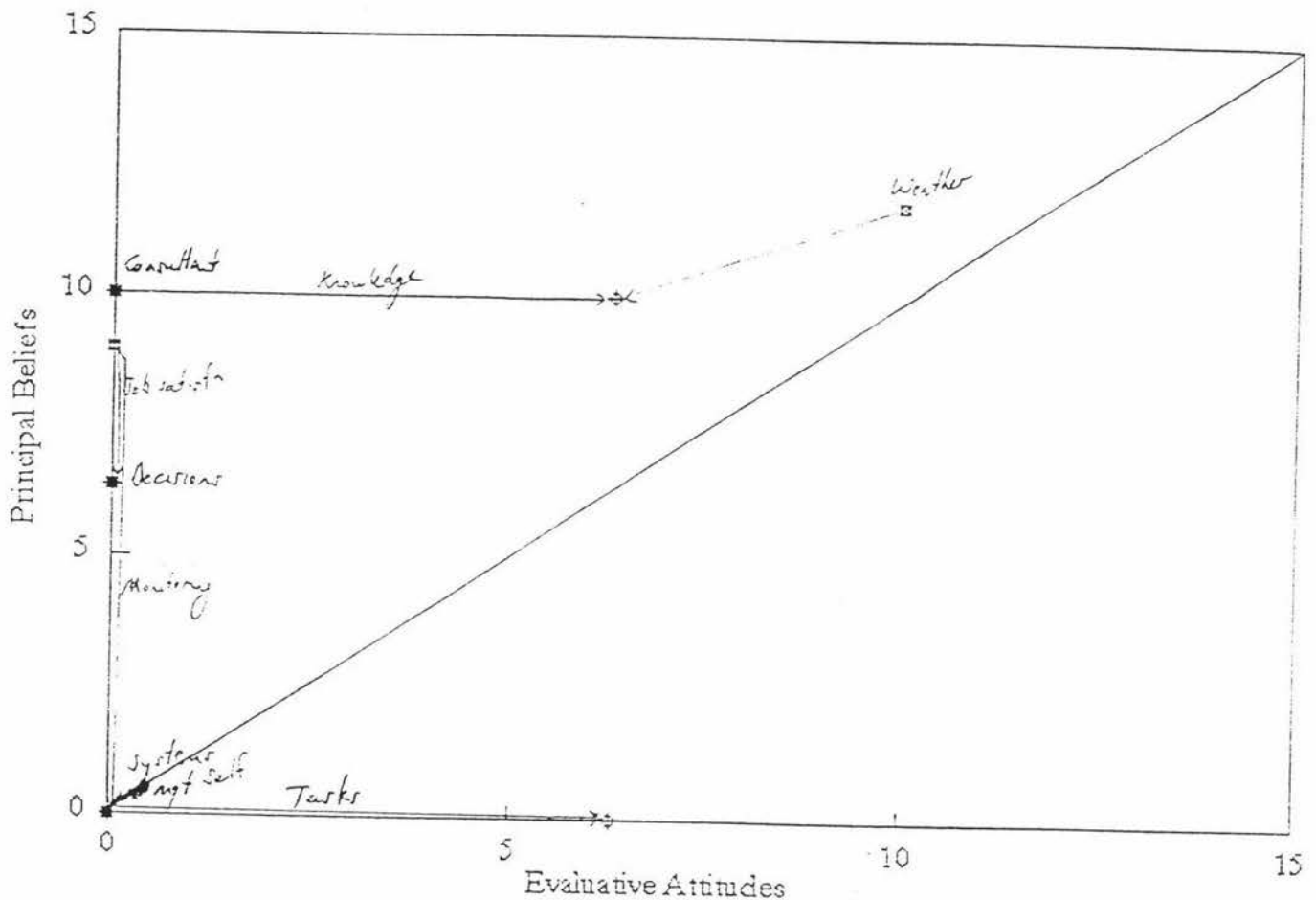
Summary of Client Observations

Analyses of individual clients revealed several important considerations for the further development of MSS. The action research framework using learning styles and cognitive maps stimulated a new level of client thinking and problem-solving not previously observed by the change agent. Cognitive maps and learning style inventories could be interpreted and discussed at a client level. This was probably due to predominantly visual data presentations.

Often the information provided the change agent with an entry point into management areas that were previously inaccessible to change (as in the case of client T2). Further developments in MSS could explore the possibilities of using the measurement of attitudes and beliefs as a consultant tool to change management behaviour towards previously defined objectives. Consultants

need to be cautious when performing needs analyses and objective setting tasks with clients using cognitive information. Experiences with client T1 illustrate how mishandled information can be ineffective at best, or worse, psychologically damaging.

The use of communication and learning research techniques for the development of consultancy delivery systems requires caution with respect to the validity of attitude and belief measurements. Assuming the spatial representation of cognitive processes is valid (McPhee and Cushman, 1980) care must be taken in ascertaining concepts used by clients in terms of kiwifruit management. Often clients used different portions of the measurement scale (client T6 used very low distances and client T2 used very large distances) to represent their attitudes and beliefs about concepts. Using a ranking measurement system as a double checking procedure may be beneficial for any system used to further develop a consultancy delivery system. However, ranking does not provide a measure of distance necessary to the arrangement of concepts in multidimensional space. A revision of the criterion pair and instructions for measurement may prove to be of more benefit. Concept definitions need to be clear, concise and unambiguous if accurate predictions of cognitive change are to be achieved (Client T7).

Personality differences may have to be considered in more detail. The time frame used in the study was probably insufficient for certain personalities (theory X, power motivated assimilator learners such as clients T1 and T3) yet sufficient for other personality types (theory Y, affiliative motivated divergent learners such as clients T5 and T6). The interaction of personality type, change strategies and time between cognitive measurements can influence the success of the consultancy system.

It was important to identify relevant management tasks (as in the case of client T4) to effect the client's desired changes in attitudes and beliefs. This process required familiarity with the client and his challenges, and an ability to explore

a range of issues (sometimes confidential) while retaining the confidence and commitment of the client. When formulating the change strategy, it was necessary to retain a record of the catalysts for change while maintaining the momentum and enthusiasm of the experience with the client. The process can become more demanding when the change agent is dealing with a husband and wife partnership, requiring recognition and retention of change catalysts for both individuals.

It is possible the magnitude and rate of change in overall attitude, evaluative attitudes and principal beliefs may be correlated to certain personality types. This may be the subject of further research, exploring the causes behind the impacts of change strategies on attitude and belief changes, in an attempt to design more effective change strategies for individuals. These case studies indicate learning experiences can be directed to enhance management skills sought by clients, using action research techniques. Consultants can be reasonably accurate in their measurement, prediction and evaluation of clients' cognitive changes if concept elicitation and change strategy procedures focus on client perceptions, needs and preferences.

Job satisfaction was a consistently important output concept to clients (except Client T2). A specific study of this concept could explore the possibility of using job satisfaction as a predictive index of client stability within the industry. Furthermore, identification of sources of job satisfaction may suggest new strategies for managing behaviourial change.

5.3.0   Consultants

Changes in consultant attitudes and beliefs were influenced by organisational and market factors. The Bay of Plenty consultancy group had undergone a team building programme throughout 1988 and 1989 resulting in a cohesive and profitable business that was often used as an example for other offices to follow. With a downturn in the kiwifruit industry and redefinition of individual

roles in the team, the group lost its sense of cohesiveness. Throughout the period of the study, major restructuring changes announced (and rumoured) also influenced individuals' attitudes and beliefs. Furthermore, the time of the year for the study, though relatively constant for clients' management tasks, is a quiet time for kiwifruit consultancy and many individuals take annual leave at this time - a period when individuals may distance themselves from the act if motivation is low.

The consultancy sample involved four young (late twenties) female consultants and two more experienced male consultants.

Consultants were analysed according to the second hypothesis, the challenge of managing cognitive change in clients will effect changes in consultants' attitudes and beliefs towards kiwifruit management.

Exercises in managing client cognitive changes were handled within regular staff development meetings (see Section 4.3.2).

The consultant group had a lower mean trace (300) and stronger mean overall attitude (7.6) than the client group at the start of the study. This would be expected of a group in an advisory role (Saunders, 1987). The advisors would be expected to be more confident about the importance of concepts associated with the act and associate themselves more with the act than the group they were supporting.

Initially consultant and client groups placed the same value on the importance of job satisfaction. Consultants were more predisposed to using a systems approach, knowledge and decision-making than clients. Both groups believed using a systems approach and task performance were significant inputs to kiwifruit management. Furthermore, consultants initially believed decision-making was an important input whereas the client group believed financial management was a more important input to kiwifruit management.

Figure 5.12 Attitude and Belief Changes in Consultant Group
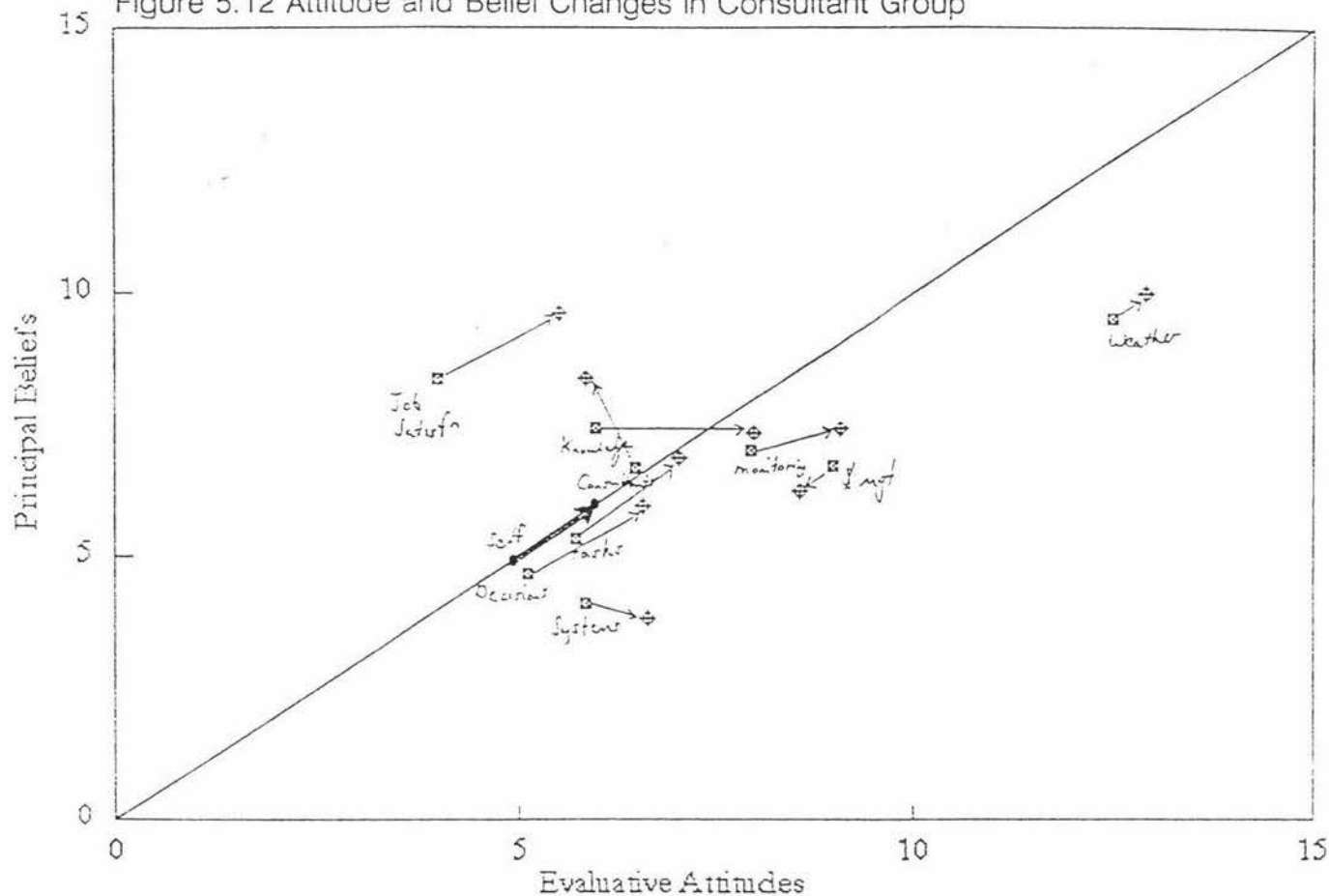
Figure 5.13 Attitude and belief Changes in Client Group
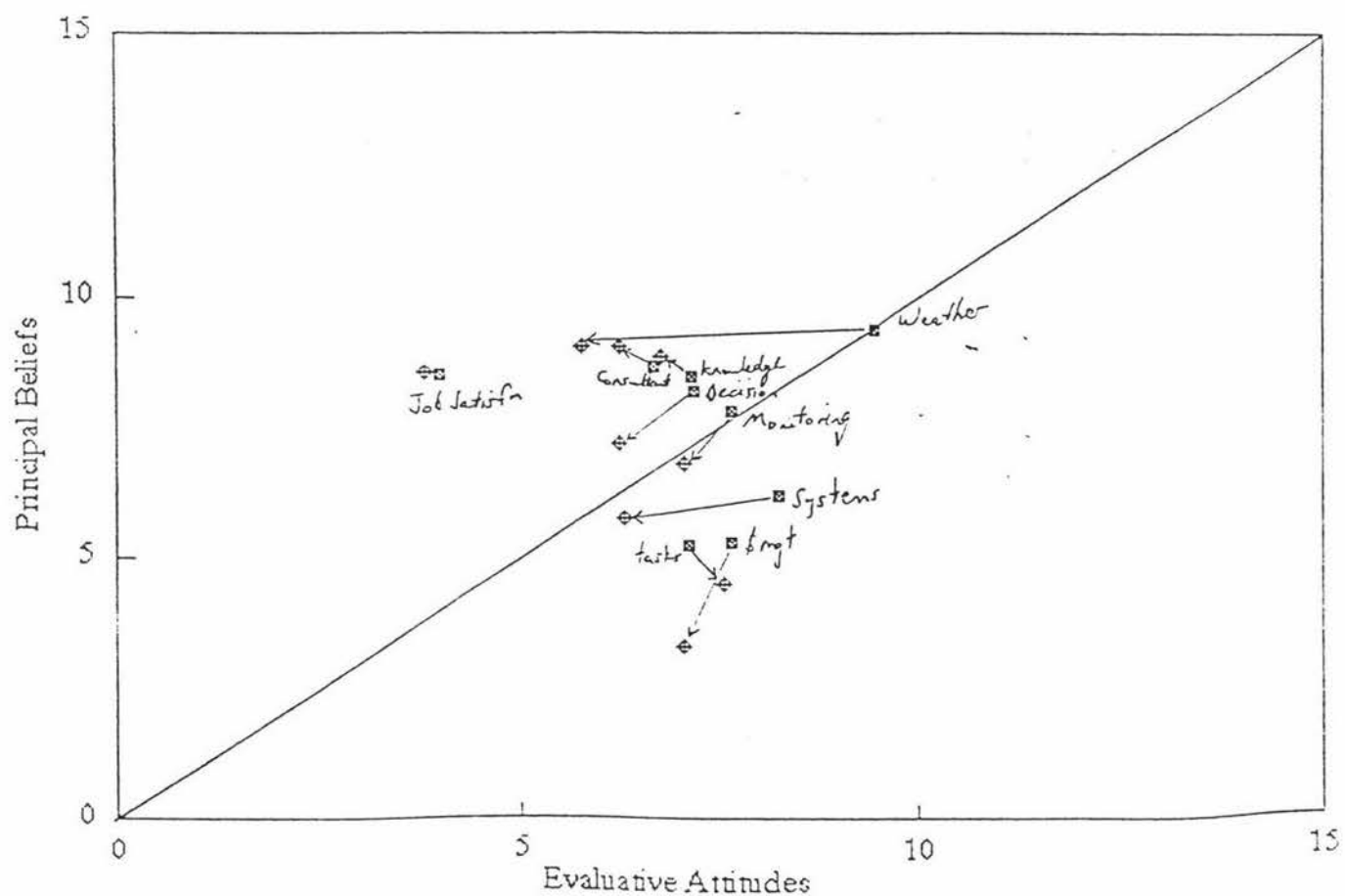
After the study the consultants increased their mean trace and were less aligned with the act. This was possibly due a loss of confidence in handling new client information, which requiring the design of different practise procedures. As they went through the procedures (see Section 4.3.2), several consultants commented on the way the information challenged their attitudes and beliefs.

As a result of the group process, consultants aligned themselves more with the use of consultants and financial management similar to that of the client group's initial position. This was probably due to a perceived opportunity for themselves in managing clients' cognitive information to advance client management skills.

The experience with cognitive information lead consultants to believe financial management and systems approach inputs were more important to kiwifruit management than originally thought. Consultants tended to align their thinking about the role of decision-making while becoming more disparate in their beliefs about task performance. These changes probably resulted from role clarifications ensuing from experiences with the data.

Throughout the study clients were highly predisposed to job satisfaction. Consultants attitudes to job satisfaction may have been as a consequence of only partially met needs within their employment (Porter et al, 1975).

Consultants held stronger beliefs about the need to use a systems approach in kiwifruit management, after the group meeting. Although some consultants may receive some exposure to systems in undergraduate study; consultants receive little applied training through MAF. Existing training programmes may need to review their course contents in future. Furthermore, regular monitoring of consultants attitudes and beliefs could be incorporated into consultant training programmes to assist trainers and trainees in targeting personal development tasks and assist in communication between

experienced and inexperienced consultants.

Changes in consultants' conception of kiwifruit management were at variance to those predicted in the second hypothesis. Information that challenged previous concepts of kiwifruit management resulted in consultants considering themselves less significant within clients' kiwifruit management systems. The dynamic nature of cognitive and production management systems means consultants will be continually monitoring, attempting to manage and alter their conceptions of kiwifruit management. As experience is gained through this process, consultants may align themselves more closely with the act over time.

Concept Comparisons

Concepts can be compared between different groups to analyse the direction and extent of movement in concepts relative to the act and self. Two important concepts include the output concept of job satisfaction and the input concept of using a systems approach.

Job Satisfaction

At the start of the study, client and consultant groups placed a similar value on the concept and considered it was not very important to kiwifruit management. The concept was valued more than either group by the change agent. The change agent believed the concept was relatively unimportant (similar to client and consultant groups) in kiwifruit management.

Over time the change agent aligned his attitudes and beliefs about the concept with those of the client group, by valuing job satisfaction less. Minor changes in the client group's attitudes and beliefs were observed. The consultant group valued the concept less and considered it was less important to achieving the act over the period of the study.

Clients therefore remained relatively stable in their thinking about job satisfaction over the period of the study, while consultants experienced a substantial change in attitudes and beliefs towards the concept.

Figures 5.14 and 5.15 Concept Comparisons by Group

Whole Farm/Systems Approach

Job Satisfaction
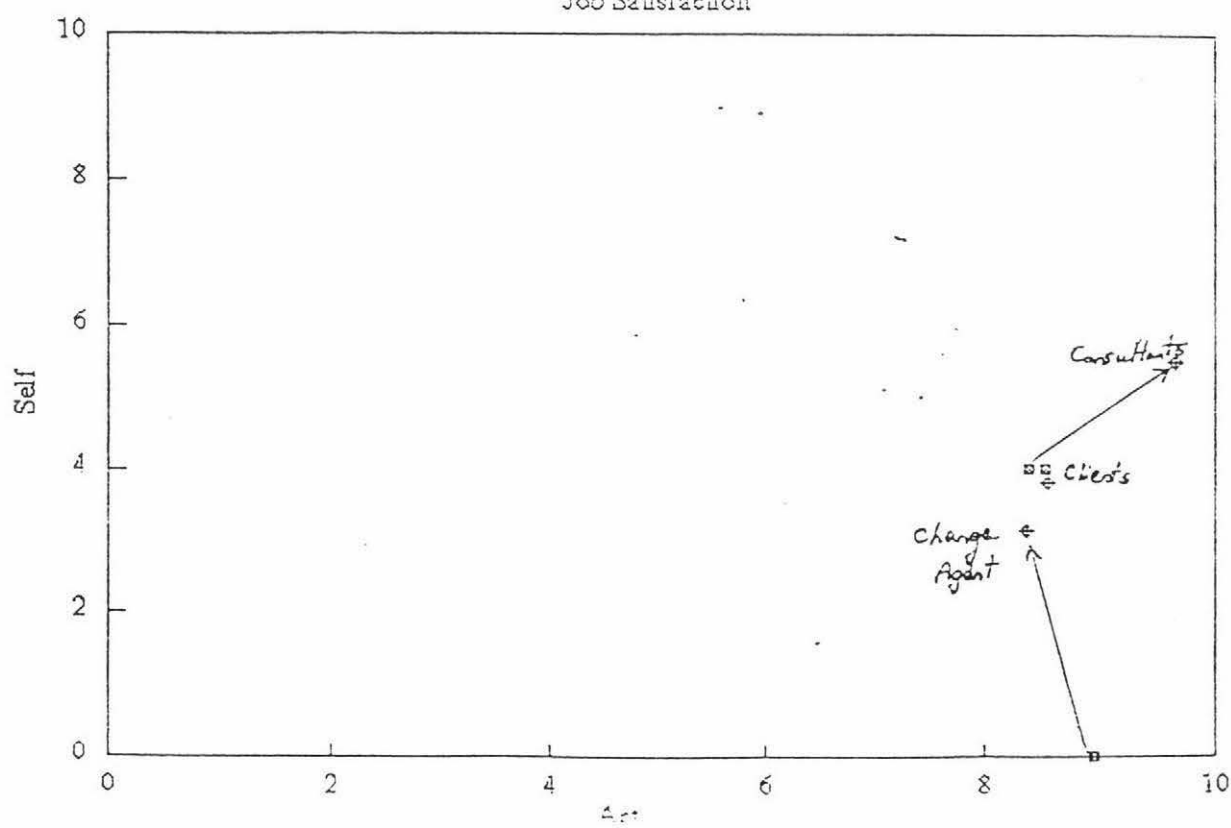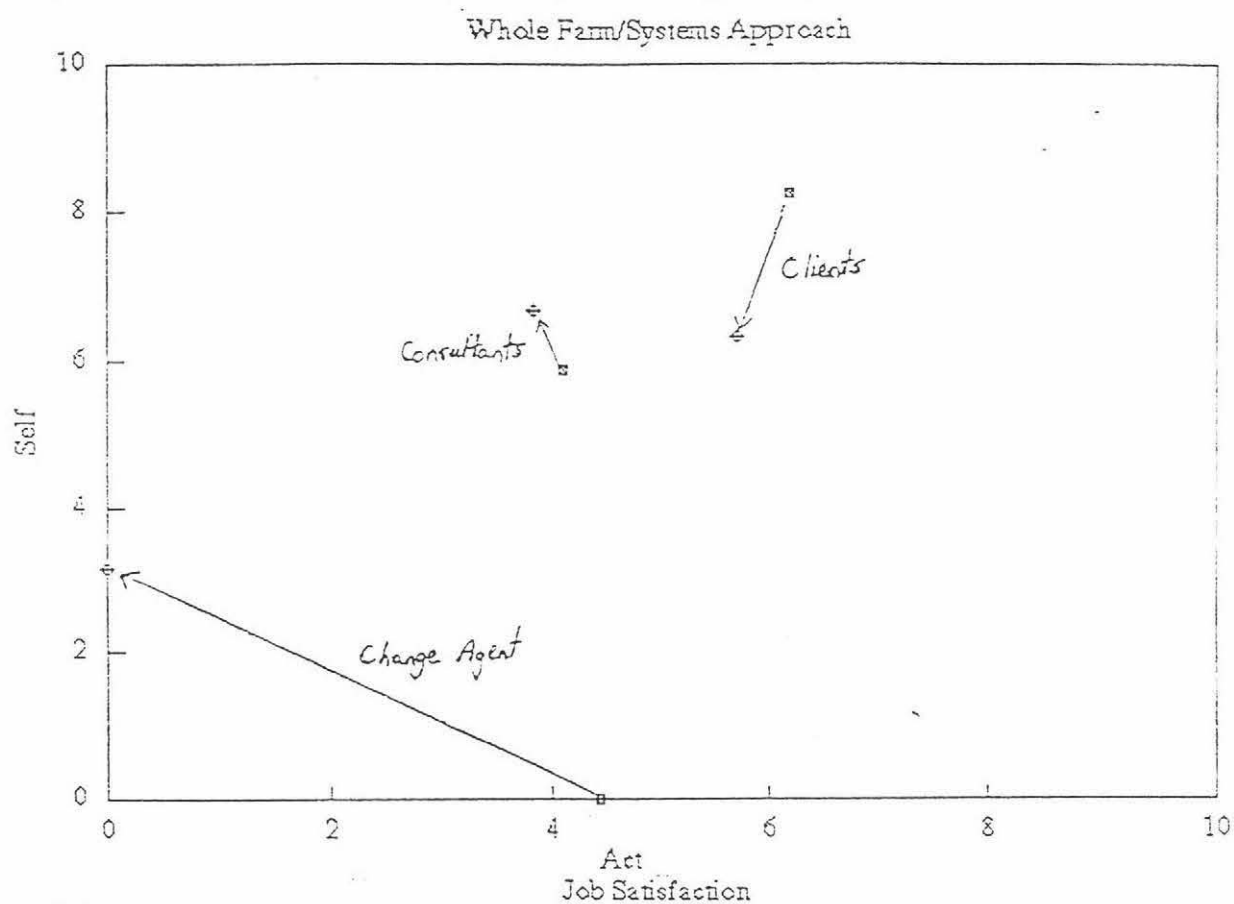
Whole Farm/Systems Approach

At the start of the study, consultants were more inclined to the concept and believed using a systems approach was substantially more important to achieving the act than the client group. The change agent held similar beliefs about the concept as the consultant group, yet was highly disposed to using a systems approach in kiwifruit management.

After the change strategy the client group adopted attitudes similar to the consultants, believing the concept was more important, than previously thought, to achieving profitable kiwifruit management. The change agent believed using a systems approach was substantially more important after being involved in the change strategies, and still valued the concept more than other groups.

5.4.0 SUMMARY

MSS involves individuals communicating as client and consultant in learning environment. Analyses of this relationship provided important insights for further developments in MSS.

In particular, analyses of individuals in the client group emphasized the importance of identifying clients' unique objectives and needs within MSS, often requiring different change strategies to satisfy the identified needs. Not all the adopted change strategies were successful in achieving individual objectives. Sufficient success was achieved however, to suggest measurement of clients' attitudes, beliefs and learning preferences provides consultants with an opportunity to support clients in their pursuit of improved management skills. Action research provided a framework for implementing change strategies with clients. Multidimensional maps proved to be too incomplete in their representation of individuals' concept associations. Two dimensional beliefs:attitudes maps were useful for analysing real concept distances from self and act, however interpoint distances could not be

analysed in this way. Reference to individual distance matrices provided this additional information.

It may appear unusual for all individuals to have associated more closely with the output concept job satisfaction (a strongly held evaluative attitude) while believing more important inputs to kiwifruit management were instrumental factors such as financial management, using a systems approach and decision-making skills. This response was however, consistent with Herzberg's (1966) theory of hygiene:motivator factors. Motivators, such as intrinsic values associated with job satisfaction, can be used by clients who are not succeeding economically to justify their continuation with kiwifruit management (Gasson, 1977).

In future MSS ought to supply the tools, techniques or services to meet hygiene needs, while satisfying motivational needs for individuals at work through ensuring they have a sense of achievement, happiness, enjoyment, recognition or praise for their work. In particular more research should centre on beliefs about using a systems approach and attitudes towards job satisfaction. The study suggests there may be more evidence of self determination amongst the client group (lower trace and more strongly held evaluative attitudes to concepts). This raises the issue of further clarifying the "ideal" that clients can move towards (as measured by their cognitive maps) over time. Identifying cognitive maps of "ideal" managers is likely to be an evolutionary process however, effective research planning may accelerate the task in future.

Costs and Benefits

Time recording on the study has indicated a total of 326 hours were spent interviewing, preparing questionnaires, collating and analysing data and implementing change strategies. This represents approximately 19 hours per respondent. Time allocations could be reduced to those indicated in table 5.1 for a commercial service emphasizing improved problem diagnosis and strategy formulation beyond conventional consultancy services.

Table 5.1 Resource Allocations for Cognitive Analysis of Clients

	Time (hrs)	Travel (km)	Computer (S)	Fax/Copy (S)
Interview	1	50		5
Questionnaire	.25		5	5
Programming	.1		5	
Analysis	1			15
Change Strategy	5	150	25	25
Total	8.25	200	35	50
Costs ($)	620	120	35	50

Development costs involve program development and questionnaire design. A nominal fee of $10/client for development expenditure has been estimated (set against computer costs) giving a commercial service fee of approximately $1000/client. This fee would alter depending on the level of inputs required for the change strategy. Management Consultancy Services (MCS) could market unique client services, accentuating formal needs analyses to provide plans that are intellectually comfortable to the client and that yield more effective management performance by clients issuing from managed learning experiences.

Current consultancy practise computer equipment could be adapted to perform these analyses initially involving no additional software expenditure. If more accurate multidimensional pictures can be generated in future, several commercial statistical packages for personal computers are available to generate cognitive maps.

Development costs associated with consultant training are likely to be the most expensive component of any service development proposal contemplated by MCS.

Changes in consultants, over the period of the study, suggests the traditional consultancy role of industry expert should be replaced with a concept of management support. A soft system perspective of consultancy practise stresses a role of support to clients attempting to define and manage their needs. Cognitive measurement procedures and action research techniques provide consultants with new tools to define and effect the changes clients seek within themselves as managers. Additional responsibilities accompany the use of these tools with individuals. Consultancy codes of ethics, that emphasize the tenets of science and the preeminence of clients' needs, may be required to avoid manipulation and exploitation of clients by unscrupulous consultants.

CHAPTER SIX:CONCLUSIONS AND RECOMMENDATIONS

6.0.0   Introduction

A concept of individuality, derived from a review of cognitive studies, provides a framework for client analyses and recommended changes in management consultancy services. Suggested changes to research procedures endeavour to improve the reliability of prospective soft system farm management studies. This chapter concludes with proposed applications of soft system studies to policy, research and marketing organisations.

6.1.0   Individuals

6.1.1   A Concept for the Study of Individuals

Farm management consultants are usually involved in the support of individual clients. Individuals function by confronting a large number of choices in life (of which only some are selected) and continually forming new personal entities by creatively choosing future possibilities. Attitudes, beliefs, values, interests and prejudices are structures designed to assist the screening of perceptions and the process of selection among numerous possibilities.

6.1.2   Perspectives on Individuals Involved in Farm Management

Consultants are concerned to identify the methods clients use to select and arrange concepts.   Cognitive information from clients can be modelled spatially, allowing inferences to be made about client behaviour. Consultants' inferences of behaviour enables planned learning experiences, that are implemented and evaluated with clients, supporting clients' needs to adapt and live fulfilled lives.

Evaluating the effectiveness of farm management consultancy services is complicated by client's unique objectives and needs, requiring specific change strategies. Case studies of clients in a practise environment enables consultancy effectiveness to be measured in terms of the attainment of clients' objectives, while revealing cognitive foundations to client behaviour.

6.2.0   Conclusions and Recommended Research Procedures for Subsequent Studies

This study proposed the development of a consultancy framework to manage client behaviourial change, to more effectively align support services with clients' needs. Results from case studies of kiwifruit clients in the Bay of Plenty conclude spatial modelling of clients' attitudes and beliefs, aligned with a knowledge of clients' preferred learning styles, can assist with the design and implementation of change strategies. Evaluation of the framework's effectiveness in managing behaviourial change involved comparisons between actual and predicted cognitive change following change strategy experiences. Several clients did not respond as predicted, however sufficient success was achieved with several clients to suggest accurate predictions of behaviourial change could be achieved in future.

These exploratory case studies suggest the hypothesis, that consultants can identify and manage clients' attitude and belief changes towards predicted outcomes using action research, be accepted. However, the second hypothesis, that consultants will tend to align themselves more with kiwifruit management when using an action research framework, is rejected as consultants' overall attitudes weakened through study experiences.

The study determined two dimensional attitude and belief maps provide more useful images of cognitive change than those generated from multidimensional analyses. Changes in clients' attitudes and beliefs probably vary with seasonal activities, therefore regular mapping could be used to build a dynamic cognitive picture of clients' adaption processes involved in managing changing environments. Attitude:belief maps can be produced using existing MCS computer equipment, providing an opportunity to regularly survey clients and consultants at a reasonable cost.

In future, refinement of the criterion pair, and the measurement system could generate more useful multidimensional maps. The criterion pair could have been more easily comparable and more practical instructions on ruler measurement systems would have avoided the need for data transformations. With experience, concept definitions could be more clear, concise, unambiguous and easily comparable. Concept words ought to be reviewed periodically, if repetitive surveys are contemplated, as words can acquire new meanings over time. The meanings individuals attribute to words, when describing their thinking, has a profound effect on the conclusions drawn from cognitive studies.

Foundational research is required to validate the use of spatial representations of cognitive processes. Miller's (1960) work on the planning process provides an alternative perspective of cognitive mechanisms used by individuals. Johnson-Laird (1988) has extended a theory of the mind modelling cognitive processes using comparative robotics. Further studies, that generate alternative cognitive process theories, ought to provide useful insights to interpret the cognitive origins of effective change strategies derived by consultants and clients.

Clients' reasoning responsible for pairwise comparisons needs to be explored further. More structured procedures are required to extract clients' concepts from interview transcripts. Language analysis techniques may be available to interpret and organise phrases used by clients. Methods to ease the strain on respondents making numerous concept comparisons could include dividing questionnaires into concept groups.

An important activity within the behaviourial change framework is identification of catalysts for change within clients' comments. Systematic cognitive observation procedures, determining the origins of different change strategies, need to be developed for consultants in future. To identify which strategies have a high chance of success with clients may require consultants to be studied in a competitive information environment, with consultants seeking methods to strengthen their position within clients' thinking. This concept would require further analyses of the processes clients' use to filter, select and act on selected information.

Consultants' professional development meetings could benefit from improved communication emanating from periodic comparisons and deliberations of cognitive observations. For example, using a systems approach to farm management was a consistently important concept to clients and consultants. A review of consultant training in systems theory can be considered vital to the further development of MSS.

Concepts of job satisfaction and using a systems approach require specific studies to better understand their implications for the industry. For example, the output concept of job satisfaction may be a useful predictive index of client stability within the kiwifruit industry.

Personality tests may provide useful additional information to consultants interpreting the underlying causes of attitude and belief changes that are at variance to predicted change strategy responses. McCelland's (1962) need theory tests are particularly relevant examples to the management environment.

At some point in future, sets of "ideal" cognitive maps may be described which correlate individuals' conceptions of their management systems with results deemed desirable by new clients. As a consequence, consultants could compare and discuss cognitive data with new clients and expect to be more efficient and successful in designing and implementing new change strategies.

6.3.0   Service Recommendations

6.3.1   Developments to MSS

Attitude, belief and learning style surveys complement existing needs analyses and service evaluation procedures within MSS. More holistic and formal analyses of needs are possible by observing clients' cognitive changes in response to services. Client needs, other than instrumental needs, could be served as consultants understand the basis for clients' social, expressive and intrinsic needs.

Current evaluation procedures focus on the use of information systems in MSS. For example, the physical measures of production or financial measures of profit have been compared with target levels set in management plans to evaluate whether or not the system has been successful in delivering desired outcomes to clients. Behaviourial measures, using cognitive maps and LSI, can be incorporated within targeting procedures, arising from clients' objectives, to be used for evaluative purposes in future. Behaviourial milestones could be included in management plans, bestowing recognition as an integral component of MSS, while requiring a similar scheduling of activities

as physical and financial planning and evaluation procedures.

If field studies are complemented with rigorous laboratory research, it may be possible to describe a production function that quantifies the relative contribution to farm performance derived from cognitive inputs. If such a production function could be developed it would provide a valuable predictive and evaluative role in farm management research and development.

Consultancy practise has traditionally had difficulty valuing the return on investment generated from its input to farming systems. Services specifically designed to improve clients' management processes could expect to have even more difficulty in substantiating economic benefits from $1,000 service fees, if production functions cannot be calculated. However. if change strategies, to enhance client management skills, are integrated with effective management systems, monitoring changes in the management system performance could provide data to estimate clients' return on investment and possibly derive production function relationships.

6.3.2   Commercial Development Considerations

For MCS to enhance existing services or develop new services utilising cognitive research techniques will require investment in staff training. Consultants have usually come from a science education with little or no training in psychology. Psychological literature contains a diversity of theories often communicated using specialised technical terms. Training programmes involving cognitive measurement techniques will therefore be more demanding than traditional staff development courses.

Potential competitors to MCS could include tertiary institutions - with their skills and resources to provide professional training - and Crown Research Institutes. Private consultants are unlikely to be a significant threat in the short term, due to their limited access to technical support and training facilities.

Accountancy firms and legal advisers could be well placed to complement their existing management planning services to clients with a cognitive framework assisting clients acquire new management skills.

Service benefits to clients could be promoted as improving confidence in management abilities, adaptability to new challenges and learning skills to create and organise effective management systems. These benefits are likely to appeal most to managers with a preference for formal management systems.

Although this study involved case studies of individuals, using soft systems studies to analyze groups could benefit large organisations. Research institutes could be supported by MCS, to evaluate research programmes and review research priorities. Attitude, belief and learning surveys of science user groups could identify barriers to technology adoption. Furthermore, user groups could express their research needs more explicitly to research organisations. It is often assumed that researchers have a more "correct" model of management tasks confronting science users. In this context, cognitive research may provide assistance to researchers attempting to understand why growers believe conclusions from trial results yet fail to change their management practices. Distinguishing between attitudinal barriers, or problems of belief, could provide useful guidelines to the development of extension programmes designed to educate potential users of the benefits arising from new technologies. Potential users could be exposed to new experimental findings (for example the carbohydrate modelling work of kiwifruit vines and the resulting recommendations on leaf canopies) and then surveyed with respect to their attitudes and beliefs towards this research. The results would can then assist scientists with the task of presenting research results to achieve more effective contributions to industry.

Soft systems studies could also assist producer boards analyze consumer purchasing behaviour and grower responses to policy initiatives, by identifying

cognitive barriers to the adoption of behaviour patterns preferred by the organisation. Government agencies could also benefit from soft system studies, predicting and monitoring industry sector behaviourial responses to policy directives from Government.

APPENDIX 1.0

DISTANCE MATRICES

Client T1

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	12.6	0.0									
3	4.5	12.6	0.0								
4	4.5	13.4	10.0	0.0							
5	4.5	13.4	10.0	7.7	0.0						
6	4.5	13.4	10.0	11.0	6.3	0.0					
7	6.3	13.4	11.8	10.0	7.7	4.5	0.0				
8	8.9	11.0	12.6	10.0	6.3	4.5	7.7	0.0			
9	11.0	8.9	11.8	12.6	6.3	4.5	7.7	10.0	0.0		
10	8.9	11.8	10.0	11.0	6.3	4.5	5.5	7.1	7.7	0.0	
11	8.9	12.6	10.0	11.0	6.3	5.5	8.4	7.7	7.1	10.0	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	12.6	0.0									
3	7.7	13.4	0.0								
4	7.7	13.4	10.0	0.0							
5	8.9	13.4	10.0	7.7	0.0						
6	8.9	11.8	10.0	7.7	8.4	0.0					
7	6.3	13.8	10.0	11.0	8.9	7.7	0.0				
8	8.9	12.6	9.5	10.0	7.7	7.1	8.4	0.0			
9	9.5	11.8	10.0	11.0	8.4	7.7	8.9	10.5	0.0		
10	8.4	13.8	11.8	11.0	8.9	7.7	10.0	6.3	8.4	0.0	
11	10.0	13.4	11.8	11.0	8.9	7.7	8.9	7.1	4.5	6.3	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	0.0	0.0									
3	3.3	0.8	0.0								
4	3.3	0.0	0.0	0.0							
5	4.5	0.0	0.0	0.0	0.0						
6	4.5	-1.6	0.0	-3.2	2.0	0.0					
7	0.0	0.4	-1.8	1.0	1.2	3.3	0.0				
8	0.0	1.7	-3.2	0.0	1.4	2.6	0.6	0.0			
9	-1.5	2.9	-1.8	-1.7	2.0	3.3	1.2	0.5	0.0		
10	-0.6	2.0	1.8	0.0	2.6	3.3	4.5	-0.7	0.6	0.0	
11	1.1	0.8	1.8	0.0	2.6	2.3	0.6	-0.7	-2.6	-3.7	0.0

Client T2

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	12.6	0.0									
3	12.6	10.0	0.0								
4	13.4	8.9	12.6	0.0							
5	13.4	10.0	11.8	7.7	0.0						
6	11.0	10.0	11.8	7.7	7.7	0.0					
7	11.8	7.7	11.8	8.9	7.7	7.7	0.0				
8	13.4	8.9	11.8	8.9	7.7	8.9	8.9	0.0			
9	10.0	7.7	11.0	8.9	10.0	10.0	8.9	6.3	0.0		
10	8.9	10.0	11.8	8.9	7.7	6.3	7.7	7.7	6.3	0.0	
11	11.8	10.0	12.6	8.9	10.0	10.0	10.0	6.3	7.7	8.9	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	8.9	0.0									
3	10.0	8.9	0.0								
4	10.0	7.7	8.9	0.0							
5	10.0	8.9	10.0	6.3	0.0						
6	11.0	8.9	10.0	8.9	7.7	0.0					
7	8.9	10.0	10.0	7.7	8.9	7.7	0.0				
8	8.9	10.0	10.0	8.9	10.0	7.7	7.7	0.0			
9	11.0	10.0	11.0	8.9	10.0	10.0	8.9	6.3	0.0		
10	11.0	10.0	11.0	8.9	10.0	10.0	7.7	8.9	7.7	0.0	
11	11.0	10.0	11.0	8.9	10.0	10.0	7.7	8.9	7.7	8.9	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	-3.7	0.0									
3	-2.6	-1.1	0.0								
4	-3.4	-1.2	-3.7	0.0							
5	-3.4	-1.1	-1.8	-1.4	0.0						
6	0.0	-1.1	-1.8	1.2	0.0	0.0					
7	-2.9	2.3	-1.8	-1.2	1.2	0.0	0.0				
8	-4.5	1.1	-1.8	0.0	2.3	-1.2	-1.2	0.0			
9	1.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
10	2.0	0.0	-0.9	0.0	2.3	3.7	0.0	1.2	1.4	0.0	
11	-0.9	0.0	-1.7	0.0	0.0	0.0	-2.3	2.6	0.0	0.0	0.0

Legend

1	s =	Self
2	w =	Weather
3	h =	Job Satisfaction
4	u =	Knowledge
5	e =	Consultants
6	i =	Monitoring
7	r =	Decision-making
8	b =	Whole Farm/Systems Approach
9	j =	Task Performance
10	p =	Financial Management
11	a =	Act (Long Term Profitable Kiwifruit Production)

Client T3

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	12.2	0.0									
3	0.0	12.2	0.0								
4	10.0	12.2	0.0	0.0							
5	12.2	10.0	12.2	0.0	0.0						
6	12.2	7.1	12.2	0.0	0.0	0.0					
7	12.2	10.0	12.2	7.1	7.1	0.0	0.0				
8	12.2	12.2	12.2	7.1	12.2	0.0	0.0	0.0			
9	12.2	10.0	12.2	7.1	12.2	7.1	0.0	12.2	0.0		
10	12.2	12.2	12.2	7.1	12.2	7.1	0.0	0.0	7.1	0.0	
11	12.2	12.2	10.0	7.1	12.2	7.1	7.1	10.0	10.0	0.0	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	12.6	0.0									
3	0.0	10.0	0.0								
4	7.1	12.2	0.0	0.0							
5	12.2	10.0	10.0	0.0	0.0						
6	12.2	7.1	10.0	0.0	0.0	0.0					
7	12.2	10.0	12.2	6.3	7.1	0.0	0.0				
8	12.2	12.2	12.2	4.5	12.6	0.0	0.0	0.0			
9	12.2	10.0	12.2	6.3	12.2	7.1	0.0	10.0	0.0		
10	12.2	12.2	12.2	4.5	11.0	6.3	0.0	0.0	4.5	0.0	
11	12.2	12.2	10.0	7.1	11.0	6.3	7.1	8.9	7.1	0.0	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	0.4	0.0									
3	0.0	-2.2	0.0								
4	-2.9	0.0	0.0	0.0							
5	0.0	0.0	-2.2	0.0	0.0						
6	0.0	0.0	-2.2	0.0	0.0	0.0					
7	0.0	0.0	0.0	-0.7	0.0	0.0	0.0				
8	0.0	0.0	0.0	-2.6	0.4	0.0	0.0	0.0			
9	0.0	0.0	0.0	-0.7	0.0	0.0	0.0	-2.2	0.0		
10	0.0	0.0	0.0	-2.6	-1.3	-0.7	0.0	0.0	-2.6	0.0	
11	0.0	0.0	0.0	0.0	-1.3	-0.7	0.0	-1.1	-2.9	0.0	0.0

Client T4

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	4.5	0.0									
3	11.0	8.9	0.0								
4	7.7	7.7	6.3	0.0							
5	7.7	8.4	7.7	7.7	0.0						
6	7.7	7.7	7.7	8.9	7.7	0.0					
7	7.7	8.9	7.7	7.7	6.3	4.5	0.0				
8	7.7	8.9	6.3	7.7	7.7	7.7	7.1	0.0			
9	7.7	7.7	4.5	8.9	8.9	8.9	6.3	4.5	0.0		
10	8.9	10.0	8.9	8.9	8.9	10.0	7.7	6.3	0.0	0.0	
11	10.0	10.0	6.3	8.9	10.0	8.9	8.9	7.1	0.0	6.3	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	0.0	0.0									
3	4.5	10.0	0.0								
4	4.5	10.0	4.5	0.0							
5	6.3	10.0	6.3	7.7	0.0						
6	6.3	10.0	6.3	8.9	10.0	0.0					
7	6.3	10.0	6.3	8.9	10.0	10.0	0.0				
8	7.7	10.0	7.1	11.0	10.0	10.0	8.9	0.0			
9	7.7	10.0	7.1	11.0	10.0	10.0	10.0	7.1	0.0		
10	7.1	10.0	7.1	10.0	10.0	11.0	8.9	6.3	7.1	0.0	
11	5.5	8.9	4.5	7.7	10.0	7.1	6.3	4.5	0.0	0.0	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	-4.5	0.0									
3	-6.5	1.1	0.0								
4	-3.3	2.3	-1.9	0.0							
5	-1.4	1.6	-1.4	0.0	0.0						
6	-1.4	2.3	-1.4	0.0	2.3	0.0					
7	-1.4	1.1	-1.4	1.2	3.7	5.5	0.0				
8	0.0	1.1	0.7	3.2	2.3	2.3	1.9	0.0			
9	0.0	2.3	2.6	2.0	1.1	1.1	3.7	2.6	0.0		
10	-1.9	0.0	-1.9	1.1	1.1	1.0	1.2	0.0	7.1	0.0	
11	-4.5	-1.1	-1.9	-1.2	0.0	-1.9	-2.6	-2.6	0.0	-6.3	0.0

Legend

1	s	= Self
2	w	= Weather
3	h	= Job Satisfaction
4	u	= Knowledge
5	e	= Consultants
6	i	= Monitoring
7	r	= Decision-making
8	b	= Whole Farm/Systems Approach
9	j	= Task Performance
10	p	= Financial Management
11	a	= Act (Long Term Profitable Kiwifruit Production)

Client T5

Start

```
 1   0.0
 2   0.0   0.0
 3   0.0   0.0   0.0
 4  10.0  10.0  10.0   0.0
 5   4.5  10.0   6.3   4.5   0.0
 6  11.8  10.0  11.0   7.7   0.0   0.0
 7   8.9   8.9   8.9   8.9   4.5   7.7   0.0
 8  11.0  10.0   7.1   7.7   4.5  10.0   6.3   0.0
 9   4.5  11.0   6.3   7.7   6.3   6.3   6.3   7.7   0.0
10  10.0  10.0   8.9  11.0   8.9   8.9   7.7  10.0   6.3   0.0
11  10.0   0.0   6.3   8.9   7.7   8.9   7.7   7.7   6.3   6.3   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

End

```
 1   0.0
 2   0.0   0.0
 3   4.5   0.0   0.0
 4  11.8  11.8  11.8   0.0
 5   6.3   7.7   6.3   7.7   0.0
 6  11.0  10.0  11.8   8.9   0.0   0.0
 7  10.0  11.8   4.5   7.7   6.3   6.3   0.0
 8   6.3  12.6   6.3   8.9   6.3   7.7   7.7   0.0
 9   6.3   4.5   7.7  11.8   8.9  11.0   6.3   4.5   0.0
10  11.0   4.5  11.8  11.0   8.9  10.0   8.9   6.3   7.7   0.0
11   8.9   4.5   6.3  11.0   8.9   8.9   7.7   6.3   4.5   7.7   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Change

```
 1   0.0
 2   0.0   0.0
 3   4.5   0.0   0.0
 4   1.8   1.8   1.8   0.0
 5   1.9  -2.3   0.0   3.3   0.0
 6  -0.9   0.0   0.9   1.2   0.0   0.0
 7   1.1   2.9  -4.5  -1.2   1.9  -1.4   0.0
 8  -4.6   2.6  -0.7   1.2   1.9  -2.3   1.4   0.0
 9   1.9  -6.5   1.4   4.1   2.6   4.6   0.0  -3.3   0.0
10   1.0  -5.5   2.9   0.0   0.0   1.1   1.2  -3.7   1.4   0.0
11  -1.1   4.5   0.0   2.0   1.2   0.0   0.0  -1.4  -1.9   1.4   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Client T6

Start

```
 1   0.0
 2  14.1   0.0
 3   0.0  14.1   0.0
 4   4.5  11.8   6.3   0.0
 5   4.5  10.0   7.7   0.0   0.0
 6   6.3  10.0   7.7   6.3   5.5   0.0
 7   3.2   7.7   6.3   6.3   3.2   6.3   0.0
 8   4.5  10.0   8.9   5.5   3.2   5.5   7.7   0.0
 9   4.5   7.7   0.0   3.2   3.2   4.5   6.3  11.0   0.0
10   4.5  12.6  11.0   5.3   3.2   3.2   8.9   5.5   8.9   0.0
11   4.5   8.9   5.5   4.5   4.5   5.5   8.9   4.5   5.5   5.5   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

End

```
 1   0.0
 2   0.0   0.0
 3   0.0   4.5   0.0
 4   0.0   6.3  11.0   0.0
 5   0.0   6.3  11.0   0.0   0.0
 6   0.0   6.3  12.6   4.5   6.3   0.0
 7   0.0   6.3  11.8   4.5   7.7   6.3   0.0
 8   0.0   6.3   8.9   6.3   4.5   6.3   4.5   0.0
 9   0.0   4.5   6.3   4.5   4.5   6.3   6.3   0.0   0.0
10   0.0   4.5  11.8   6.3   4.5   6.3   7.7   0.0   7.7   0.0
11   0.0   4.5  10.0   6.3   4.5   7.7   6.3   4.5   7.7   0.0   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Change

```
 1    0.0
 2  -14.1   0.0
 3    0.0  -9.7   0.0
 4   -4.5  -5.5   4.6   0.0
 5   -4.5  -3.7   3.2   0.0   0.0
 6   -6.3  -3.7   4.9  -1.9   0.8   0.0
 7   -3.2  -1.4   5.5  -1.9   4.6   0.0   0.0
 8   -4.5  -3.7   0.0   0.8   1.3   0.8  -3.3   0.0
 9   -4.5  -3.3   6.3   1.3   1.3   1.9   0.0 -11.0   0.0
10   -4.5  -8.2   0.9   1.0   1.3   3.2  -1.2  -5.5  -1.2   0.0
11   -4.5  -4.5   4.5   1.9   0.0   2.3  -2.6   0.0   2.3  -5.5   0.0
       1     2     3     4     5     6     7     8     9    10    11
```

Legend

1	s =	Self
2	w =	Weather
3	h =	Job Satisfaction
4	u =	Knowledge
5	e =	Consultants
6	i =	Monitoring
7	r =	Decision-making
8	b =	Whole Farm/Systems Approach
9	j =	Task Performance
10	p =	Financial Management
11	a =	Act (Long Term Profitable Kiwifruit Production)

Client T7

Start

```
 1   0.0
 2  10.0   0.0
 3   0.0  10.0   0.0
 4   0.0  11.8   8.9   0.0
 5   0.0  11.8   8.9   8.9   0.0
 6   0.0  11.8   8.9  11.8   6.3   0.0
 7   0.0   6.3   6.3  11.8  11.8   0.0   0.0
 8   0.0  12.6   6.3   6.3   6.3  10.0   0.0   0.0
 9   0.0   8.9   6.3  10.0   6.3   6.3   0.0   0.0   0.0
10   0.0  12.6   8.9   8.9  10.0   8.9   8.9   0.0   0.0   0.0
11   0.0  11.8   8.9  10.0  10.0   8.9   6.3   0.0   0.0   0.0   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

End

```
 1   0.0
 2   6.3   0.0
 3   0.0   8.9   0.0
 4   6.3  12.6  11.8   0.0
 5   0.0  13.4   8.9  10.0   0.0
 6   0.0  11.0   8.9   8.9   0.0   0.0
 7   0.0   8.9   6.3   8.9   6.3   0.0   0.0
 8   0.0  13.4   6.3  11.8   0.0   0.0   6.3   0.0
 9   6.3   6.3   6.3  11.0   6.3   0.0   6.3   0.0   0.0
10   0.0  13.4   6.3  11.8   8.9   6.3   6.3   0.0   0.0   0.0
11   6.3  10.0   6.3  10.0  10.0   0.0   6.3   0.0   0.0   0.0   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Change

```
 1   0.0
 2  -3.7   0.0
 3   0.0  -1.1   0.0
 4   6.3   0.8   2.9   0.0
 5   0.0   1.6   0.0   1.1   0.0
 6   0.0  -0.9   0.0  -2.9  -6.3   0.0
 7   0.0   2.6   0.0  -2.9  -5.5   0.0   0.0
 8   0.0   0.8   0.0   5.5  -6.3 -10.0   6.3   0.0
 9   6.3  -2.6   0.0   1.0   0.0  -6.3   6.3   0.0   0.0
10   0.0   0.8  -2.6   2.9  -1.1  -2.6  -2.6   0.0   0.0   0.0
11   6.3  -1.8  -2.6   0.0   0.0  -8.9   0.0   0.0   0.0   0.0   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Consultant K1 (Change Agent)

Start

```
 1   0.0
 2  12.6   0.0
 3   0.0  12.6   0.0
 4   0.0   8.9   6.3   0.0
 5   4.5  11.8  10.0   0.0   0.0
 6   8.4   7.1  11.0   0.0   6.3   0.0
 7   4.5   4.5  11.0   7.1   4.5   0.0   0.0
 8   0.0   4.5   4.5   8.9   7.7   6.3   0.0   0.0
 9   6.3   7.1   6.3  11.0   8.9  11.0  11.0   4.5   0.0
10   7.7   7.7  11.8   8.9  10.0   5.5   7.1   8.9   5.5   0.0
11   7.1   8.9   8.9  10.0   7.7   8.9   6.3   4.5   7.7   6.3   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

End

```
 1   0.0
 2  10.0   0.0
 3   3.2   8.4   0.0
 4   6.3  12.2   7.7   0.0
 5   7.1  11.8  10.0   4.5   0.0
 6  11.0  11.8  11.0   7.7   7.1   0.0
 7   7.1   8.9  11.0  11.0   4.5   4.5   0.0
 8   3.2   8.9  11.0   8.9   4.5  11.0   8.9   0.0
 9   8.9  10.0   6.3  10.0   8.9   7.7   6.3   6.3   0.0
10   5.5  11.0   7.7  11.8   6.3   6.3   8.9   8.9  10.0   0.0
11   6.3  12.2   8.4  11.4  10.0  10.0   7.1   0.0  10.0   6.3   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Change

```
 1   0.0
 2  -2.6   0.0
 3   3.2  -4.3   0.0
 4   6.3   3.3   1.4   0.0
 5   2.6   0.0   0.0   4.5   0.0
 6   2.6   4.8   0.0   7.7   0.7   0.0
 7   2.6   4.5   0.0   3.9   0.0   4.5   0.0
 8   3.2   4.5   6.5   0.0  -3.3   4.6   8.9   0.0
 9   2.6   2.9   0.0  -1.0   0.0  -3.2  -4.6   1.9   0.0
10  -2.3   3.2  -4.1   2.9  -3.7   0.8   1.9   0.0   4.5   0.0
11  -0.7   3.3  -0.6   1.4   2.3   1.1   0.7  -4.5   2.3   0.0   0.0
      1     2     3     4     5     6     7     8     9    10    11
```

Legend

1	s = Self
2	w = Weather
3	h = Job Satisfaction
4	u = Knowledge
5	e = Consultants
6	i = Monitoring
7	r = Decision-making
8	b = Whole Farm/Systems Approach
9	J = Task Performance
10	p = Financial Management
11	a = Act (Long Term Profitable Kiwifruit Production)

Consultant K2

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	14.1	0.0									
3	0.0	14.1	0.0								
4	7.7	8.9	6.3	0.0							
5	8.9	11.8	12.6	4.5	0.0						
6	7.7	6.3	8.4	5.5	7.7	0.0					
7	3.2	7.7	7.1	7.1	5.5	4.5	0.0				
8	6.3	7.7	7.1	6.3	5.5	4.5	4.5	0.0			
9	5.5	6.3	3.2	3.2	5.5	4.5	4.5	4.5	0.0		
10	6.3	7.7	8.9	4.5	4.5	4.5	5.5	4.5	3.2	0.0	
11	10.0	7.1	8.9	6.3	4.5	4.5	3.2	3.2	3.2	3.2	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	14.1	0.0									
3	0.0	14.1	0.0								
4	7.7	8.9	7.7	0.0							
5	11.0	10.0	8.9	7.7	0.0						
6	8.9	7.7	8.9	6.3	7.7	0.0					
7	6.3	7.7	7.7	8.9	7.7	6.3	0.0				
8	6.3	8.9	6.3	7.7	7.7	7.7	6.3	0.0			
9	6.3	10.0	6.3	7.7	8.9	4.5	6.3	4.5	0.0		
10	6.3	10.0	7.7	7.7	8.9	7.7	6.3	4.5	4.5	0.0	
11	10.0	10.0	8.9	6.3	7.7	6.3	7.7	4.5	4.5	4.5	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	0.0	0.0									
3	0.0	0.0	0.0								
4	0.0	0.0	1.4	0.0							
5	2.0	-1.8	-3.7	3.3	0.0						
6	1.2	1.4	0.6	0.8	0.0	0.0					
7	3.2	0.0	0.7	1.9	2.3	1.9	0.0				
8	0.0	1.2	-0.7	1.4	2.3	3.3	1.9	0.0			
9	0.8	3.7	3.2	4.6	3.5	0.0	1.9	0.0	0.0		
10	0.0	2.3	-1.2	3.3	4.5	3.3	0.8	0.0	1.3	0.0	
11	0.0	2.9	0.0	0.0	3.3	1.9	4.6	1.3	1.3	1.3	0.0

Consultant K3

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	14.1	0.0									
3	7.7	14.1	0.0								
4	7.7	14.1	11.0	0.0							
5	7.7	14.1	11.0	0.0	0.0						
6	7.7	14.1	12.6	0.0	6.3	0.0					
7	0.0	14.1	7.7	0.0	0.0	10.0	0.0				
8	7.7	13.4	6.3	0.0	7.7	8.9	0.0	0.0			
9	0.0	13.4	7.7	0.0	0.0	8.9	0.0	8.9	0.0		
10	10.0	11.0	11.0	7.7	10.0	0.0	0.0	0.0	7.7	0.0	
11	7.7	13.4	10.0	8.9	7.7	10.0	0.0	0.0	3.2	12.2	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	14.1	0.0									
3	12.6	14.1	0.0								
4	7.7	14.1	12.6	0.0							
5	0.0	14.1	12.6	0.0	0.0						
6	11.0	14.1	12.6	0.0	12.6	0.0					
7	7.7	14.1	12.6	10.0	12.6	0.0	0.0				
8	7.7	13.4	10.0	0.0	10.0	7.7	0.0	0.0			
9	7.7	10.0	10.0	10.0	12.6	6.3	0.0	0.0	0.0		
10	12.6	14.1	12.6	10.0	7.7	10.0	6.3	0.0	14.1	0.0	
11	13.4	6.3	11.8	0.0	10.0	7.7	0.0	0.0	6.3	6.3	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	0.0	0.0									
3	4.9	0.0	0.0								
4	0.0	0.0	1.7	0.0							
5	-7.7	0.0	1.7	0.0	0.0						
6	3.2	0.0	0.0	0.0	6.3	0.0					
7	7.7	0.0	4.9	10.0	12.6	-10.0	0.0				
8	0.0	0.0	3.7	0.0	2.3	-1.2	0.0	0.0			
9	7.7	-3.4	2.3	10.0	12.6	-2.6	0.0	-8.9	0.0		
10	2.6	3.2	1.7	2.3	-2.3	10.0	6.3	0.0	6.4	0.0	
11	5.7	-7.1	1.8	-8.9	2.3	-2.3	0.0	0.0	3.2	-5.9	0.0

Legend

1	s	= Self
2	w	= Weather
3	h	= Job Satisfaction
4	u	= Knowledge
5	e	= Consultants
6	i	= Monitoring
7	r	= Decision-making
8	b	= Whole Farm/Systems Approach
9	j	= Task Performance
10	p	= Financial Management
11	a	= Act (Long Term Profitable Kiwifruit Production)

Consultant K4

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	14.1	0.0									
3	4.5	12.6	0.0								
4	4.5	7.7	6.3	0.0							
5	0.0	11.8	11.0	4.5	0.0						
6	4.5	10.0	7.7	4.5	6.3	0.0					
7	6.3	11.8	7.7	4.5	6.3	0.0	0.0				
8	6.3	11.0	6.3	4.5	6.3	6.3	6.3	0.0			
9	8.9	8.9	8.9	4.5	4.5	4.5	7.7	4.5	0.0		
10	11.0	11.0	10.0	7.7	7.7	6.3	6.3	10.0	6.3	0.0	
11	6.3	11.8	7.7	4.5	4.5	4.5	4.5	4.5	4.5	4.5	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	14.1	0.0									
3	4.5	14.1	0.0								
4	11.0	12.6	12.6	0.0							
5	4.5	12.6	12.6	10.0	0.0						
6	10.0	11.8	12.6	10.0	8.9	0.0					
7	7.7	10.0	12.6	8.9	4.5	4.5	0.0				
8	8.9	8.9	12.6	11.0	10.0	6.3	6.3	0.0			
9	6.3	11.8	12.6	10.0	4.5	4.5	6.3	6.3	0.0		
10	11.0	12.6	12.6	11.0	10.0	7.7	7.7	7.7	7.7	0.0	
11	10.0	12.6	12.6	8.9	7.7	6.3	7.7	7.7	7.7	7.7	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	0.0	0.0									
3	0.0	1.5	0.0								
4	6.5	4.9	6.3	0.0							
5	4.5	0.8	1.7	5.5	0.0						
6	5.5	1.8	4.9	5.5	2.6	0.0					
7	1.4	-1.8	4.9	4.5	-1.9	4.5	0.0				
8	2.6	-2.0	6.3	6.5	3.7	0.0	0.0	0.0			
9	-2.6	2.9	3.7	5.5	0.0	0.0	-1.4	1.9	0.0		
10	0.0	1.7	2.6	3.2	2.3	1.4	1.4	-2.3	1.4	0.0	
11	3.7	0.0	4.9	4.5	3.3	1.9	3.3	3.3	3.3	3.3	0.0

Consultant K5

Start

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	10.0	0.0									
3	5.5	8.9	0.0								
4	8.4	10.0	8.9	0.0							
5	8.9	8.9	7.7	7.1	0.0						
6	9.5	8.4	7.7	6.3	7.7	0.0					
7	7.1	8.4	7.7	6.3	6.3	8.9	0.0				
8	7.1	7.7	5.5	6.3	5.5	5.5	3.2	0.0			
9	5.5	7.1	5.5	8.9	4.5	5.5	7.7	6.3	0.0		
10	8.4	8.9	7.7	6.3	5.5	5.5	4.5	4.5	4.5	0.0	
11	8.4	8.9	6.3	7.7	7.7	6.3	6.3	5.5	7.1	7.7	0.0

End

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	11.0	0.0									
3	4.5	10.0	0.0								
4	6.3	11.8	8.4	0.0							
5	6.3	11.0	7.7	8.4	0.0						
6	7.7	8.4	8.9	7.1	7.7	0.0					
7	5.5	7.7	8.4	8.4	7.7	4.5	0.0				
8	5.5	10.5	8.4	6.3	8.9	7.7	4.5	0.0			
9	5.5	8.4	8.9	3.2	7.7	5.5	4.5	4.5	0.0		
10	7.7	8.9	8.4	11.0	8.4	5.5	5.5	3.2	4.5	0.0	
11	7.1	10.0	7.1	8.4	7.7	7.1	5.5	4.5	5.5	5.5	0.0

Change

	1	2	3	4	5	6	7	8	9	10	11
1	0.0										
2	1.0	0.0									
3	-1.0	1.1	0.0								
4	-2.0	1.8	-0.6	0.0							
5	-2.6	2.0	0.0	1.3	0.0						
6	-1.7	0.0	1.2	0.7	0.0	0.0					
7	-2.9	0.0	0.6	2.0	1.4	-4.5	0.0				
8	-1.6	2.7	2.9	0.0	3.5	2.3	1.3	0.0			
9	0.0	1.3	3.5	-5.8	3.3	0.0	-3.3	-1.9	0.0		
10	-0.6	0.0	0.6	4.6	2.9	0.0	1.0	-1.3	0.0	0.0	
11	-1.3	1.1	0.7	0.6	0.0	0.7	-0.8	-1.0	-1.6	-2.3	0.0

Legend

1	s =	Self
2	w =	Weather
3	h =	Job Satisfaction
4	u =	Knowledge
5	e =	Consultants
6	i =	Monitoring
7	r =	Decision-making
8	b =	Whole Farm/Systems Approach
9	j =	Task Performance
10	p =	Financial Management
11	a =	Act (Long Term Profitable Kiwifruit Production)

Consultant K6

Start

```
 1   0.0
 2  10.0   0.0
 3   6.3  12.6   0.0
 4   7.7   8.4   7.7   0.0
 5   8.9  10.0  10.0   9.5   0.0
 6  10.0   8.4   8.4   8.4   7.7   0.0
 7   8.4   7.7  11.0   8.9   8.4   8.9   0.0
 8   7.7   8.9   8.4   7.7   7.1   8.9   8.9   0.0
 9   8.4   8.4   8.4   8.9   8.4   7.7   7.7   7.7   0.0
10  10.5   8.9   8.9   8.4   7.7   7.1   7.7   7.1   6.3   0.0
11   6.3   7.1   8.4   7.1   7.7   7.7   7.7   7.1   6.3   6.3   0.0

     1     2     3     4     5     6     7     8     9    10    11
```

End

```
 1   0.0
 2  14.1   0.0
 3   8.4  11.4   0.0
 4   8.9  11.0   8.9   0.0
 5   8.4  10.5   8.4  10.0   0.0
 6   7.1   8.4   8.4   8.9   7.1   0.0
 7   8.4   9.5   8.9  10.0   7.1   7.1   0.0
 8   8.4   9.5   8.4  10.0   7.7   7.7   8.4   0.0
 9   8.4  10.0   7.7   8.9   7.1   7.7   7.1   7.1   0.0
10   8.4   8.9  10.0   8.4   7.7   7.1   7.7   6.3   7.1   0.0
11   7.7   8.9   8.9   8.9   7.1   7.1   7.7   6.3   7.1   7.1   0.0

     1     2     3     4     5     6     7     8     9    10    11
```

Change

```
 1   0.0
 2   4.1   0.0
 3   2.0  -1.2   0.0
 4   1.2   2.6   1.2   0.0
 5  -0.6   0.5  -1.6   0.5   0.0
 6  -2.9   0.0   0.0   0.6  -0.7   0.0
 7   0.0   1.7  -2.0   1.1  -1.3  -1.9   0.0
 8   0.6   0.5   0.0   2.3   0.7  -1.2  -0.6   0.0
 9   0.0   1.6  -0.6   0.0  -1.3  -0.7   0.0  -0.7   0.0
10  -2.1   0.0   1.1   0.0   0.0   0.0   0.0  -0.7   0.7   0.0
11   1.4   1.9   0.6   1.9  -0.7  -0.7   0.0  -0.7   0.7   0.7   0.0

     1     2     3     4     5     6     7     8     9    10    11
```

Legend
1   s = Self
2   w = Weather
3   h = Job Satisfaction
4   u = Knowledge
5   e = Consultants
6   i = Monitoring
7   r = Decision-making
8   b = Whole Farm/Systems Approach
9   j = Task Performance
10   p = Financial Management
11   a = Act (Long Term Profitable Kiwifruit Production)

APPENDIX 2.0

ATTITUDE AND BELIEF TABLES

	CLIENTS' ATTITUDES AND BELIEFS							CHANGE.A
	T1	T2	T3	T4	T5	T6	T7	K1
TRACE.1	431.8	485.5	445.5	310.0	320.9	250.7	298.2	296.4
WARP.1	1.1	1.0	1.3	1.1	1.3	1.4	1.4	1.4
REAL.DIM.1	9.0	10.0	7.0	9.0	8.0	7.0	7.0	7.0
IMAGIN.DIM.1	2.0	1.0	4.0	2.0	3.0	4.0	4.0	4.0
% VAR RP 2D	53%	48%	49%	50%	44%	57%	45%	92%
OVERALL.A.1	8.9	11.8	12.2	10.0	10.0	4.5	0.0	7.1
EVALUT.A.1								
weather	12.6	12.6	12.2	4.5	0.0	14.1	10.0	12.6
job satisfacn	4.5	12.6	0.0	11.0	0.0	0.0	0.0	0.0
knowledge	4.5	13.4	10.0	7.7	10.0	4.5	0.0	0.0
consultants	4.5	13.4	12.2	7.7	4.5	4.5	0.0	4.5
monitoring	4.5	11.0	12.2	7.7	11.8	6.3	0.0	8.4
decisions	6.3	11.8	12.2	7.7	8.9	3.2	0.0	4.5
system approc	8.9	13.4	12.2	7.7	11.0	4.5	0.0	0.0
task perform	11.0	10.0	12.2	7.7	4.5	4.5	0.0	6.3
$ management	8.9	8.9	12.2	8.9	10.0	4.5	0.0	7.7
PRINCP.B.1								
weather	12.6	10.0	12.2	10.0	0.0	8.9	11.8	8.9
job satisfacn	10.0	12.6	10.0	6.3	6.3	5.5	8.9	8.9
knowledge	11.0	8.9	7.1	8.9	8.9	4.5	10.0	10.0
consultants	6.3	10.0	12.2	10.0	7.7	4.5	10.0	7.7
monitoring	5.5	10.0	7.1	8.9	8.9	5.5	8.9	8.9
decisions	8.4	10.0	7.1	8.9	7.7	8.9	6.3	6.3
system approc	7.7	6.3	10.0	7.1	7.7	4.5	0.0	4.5
task perform	7.1	7.7	10.0	0.0	6.3	5.5	0.0	7.7
$ management	10.0	8.9	0.0	6.3	6.3	5.5	0.0	6.3
TRACE.2	483.6	434.5	400.9	336.4	349.1	187.3	272.7	378.2
WARP.2	1.0	1.0	1.3	1.1	1.3	1.4	1.4	1.3
REAL.DIM.2	9.0	11.0	7.0	8.0	8.0	7.0	7.0	8.0
IMAGIN.DIM.2	2.0	0.0	4.0	3.0	3.0	4.0	4.0	3.0
% VAR RP 2D	47%	40%	47%	57%	41%	55%	54%	57%
OVERALL.A.2	10.0	11.0	12.2	5.5	8.9	0.0	6.3	6.3
EVALUT.A.2								
weather	12.6	8.9	12.6	0.0	0.0	0.0	6.3	10.0
job satisfacn	7.7	10.0	0.0	4.5	4.5	0.0	0.0	3.2
knowledge	7.7	10.0	7.1	4.5	11.8	0.0	6.3	6.3
consultants	8.9	10.0	12.2	6.3	6.3	0.0	0.0	7.1
monitoring	8.9	11.0	12.2	6.3	11.0	0.0	0.0	11.0
decisions	6.3	8.9	12.2	6.3	10.0	0.0	0.0	7.1
system approc	8.9	8.9	12.2	7.7	6.3	0.0	0.0	3.2
task perform	9.5	11.0	12.2	7.7	6.3	0.0	6.3	8.9
$ management	8.4	11.0	12.2	7.1	11.0	0.0	0.0	5.5
PRINCP.B.2								
weather	13.4	10.0	12.2	8.9	4.5	4.5	10.0	12.2
job satisfacn	11.8	11.0	10.0	4.5	6.3	10.0	6.3	8.4
knowledge	11.0	8.9	7.1	7.7	11.0	6.3	10.0	11.4
consultants	8.9	10.0	11.0	10.0	8.9	4.5	10.0	10.0
monitoring	7.7	10.0	6.3	7.1	8.9	7.7	0.0	10.0
decisions	8.9	7.7	7.1	6.3	7.7	6.3	6.3	7.1
system approc	7.1	8.9	8.9	4.5	6.3	4.5	0.0	0.0
task perform	4.5	7.7	7.1	0.0	4.5	7.7	0.0	10.0
$ management	6.3	8.9	0.0	0.0	7.7	0.0	0.0	6.3

INDIVIDUAL CONSULTANT ATTITUDES AND BELIEFS

CLIENT	CHANGE.A K1	K2	K4	K5	K6	K3
TRACE.1	296.4	231.8	281.8	262.7	350.0	378.2
WARP.1	1.4	1.3	1.1	1.1	1.0	1.3
REAL.DIM.1	7.0	8.0	7.0	9.0	10.0	8.0
IMAGIN.DIM.1	4.0	3.0	4.0	2.0	1.0	3.0
% VAR RP 2D	62%	65%	58%	41%	46%	49%
OVERALL.A.1	7.1	10.0	6.3	8.4	6.3	7.7
EVALUT.A.1	1.0					
weather	12.6	14.1	14.1	10.0	10.0	14.1
job satisfac	0.0	0.0	4.5	5.5	6.3	7.7
knowledge	0.0	7.7	4.5	8.4	7.7	7.7
consultants	4.5	8.9	0.0	8.9	8.9	7.7
monitoring	8.4	7.7	4.5	9.5	10.0	7.7
decisions	4.5	3.2	6.3	8.4	8.4	0.0
system appro	0.0	6.3	6.3	7.1	7.7	7.7
task perform	6.3	5.5	8.9	5.5	8.4	0.0
$ management	7.7	6.3	11.0	8.4	10.5	10.0
PRINCP.B.1						
weather	8.9	7.1	11.8	8.9	7.1	13.4
job satisfac	8.9	8.9	7.7	6.3	8.4	10.0
knowledge	10.0	6.3	4.5	7.7	7.1	8.9
consultants	7.7	4.5	4.5	7.7	7.7	7.7
monitoring	8.9	4.5	4.5	6.3	7.7	10.0
decisions	6.3	3.2	4.5	6.3	7.7	0.0
system appro	4.5	3.2	4.5	5.5	7.1	0.0
task perform	7.7	3.2	4.5	7.1	6.3	3.2
$ management	6.3	3.2	4.5	7.7	6.3	12.2
TRACE.2	378.2	310.9	476.4	283.6	364.5	485.5
WARP.2	1.3	1.1	1.1	1.1	1.0	1.4
REAL.DIM.2	8.0	8.0	9.0	9.0	10.0	7.0
IMAGIN.DIM.2	3.0	3.0	2.0	2.0	1.0	4.0
% VAR RP 2D	31%	56%	50%	47%	46%	33%
OVERALL.A.2	6.3	10.0	10.0	7.7	7.7	13.4
EVALUT.A.2						
weather	10.0	14.1	14.1	11.0	14.1	14.1
job satisfac	3.2	0.0	4.5	4.5	8.4	12.6
knowledge	6.3	7.7	11.0	6.3	8.9	7.7
consultants	7.1	8.9	4.5	6.3	8.4	0.0
monitoring	11.0	7.7	10.0	7.7	7.1	11.0
decisions	7.1	3.2	7.7	5.5	8.4	7.7
system appro	3.2	6.3	8.9	5.5	8.4	7.7
task perform	8.9	5.5	6.3	5.5	8.4	7.7
$ management	5.5	6.3	11.0	7.7	8.4	12.6
PRINCP.B.2						
weather	12.2	10.0	12.6	10.0	8.9	6.3
job satisfac	8.4	8.9	12.6	7.1	8.9	11.8
knowledge	11.4	6.3	8.9	8.4	8.9	0.0
consultants	10.0	7.7	7.7	7.7	7.1	10.0
monitoring	10.0	6.3	6.3	7.1	7.1	7.7
decisions	7.1	7.7	7.7	5.5	7.7	0.0
system appro	0.0	4.5	7.7	4.5	6.3	0.0
task perform	10.0	4.5	7.7	5.5	7.1	6.3
$ management	6.3	4.5	7.7	5.5	7.1	6.3

	CLIENTS				ANALYSIS OF GROUPS CONSULTANTS			
	n	mean	SD	SEM	n	mean	SD	SEM
TRACE.1	7.0	363.2	89.4	33.8	6.0	300.2	54.8	22.4
WARP.1	7.0	1.2	0.1	0.1	6.0	1.2	0.2	0.1
REAL.DIM.1	7.0	8.1	1.2	0.5	6.0	8.2	1.2	0.5
IMAGIN.DIM.1	7.0	2.9	1.2	0.5	6.0	2.8	1.2	0.5
% VAR RP 2D	7.0	49%	0.05	0.02	6.0	53%	0.1	0.0
OVERALL.A.1	7.0	8.2	4.4	1.7	6.0	7.6	1.4	0.6
EVALUT.A.1								
weather	7.0	9.5	5.2	2.0	6.0	12.5	2.0	0.8
job satisfac	7.0	4.0	5.6	2.1	6.0	4.0	3.3	1.3
knowledge	7.0	7.2	4.5	1.7	6.0	6.0	3.3	1.3
consultants	7.0	6.7	4.8	1.8	6.0	6.5	3.6	1.5
monitoring	7.0	7.7	4.5	1.7	6.0	8.0	1.9	0.8
decisions	7.0	7.2	4.5	1.7	6.0	5.1	3.3	1.3
system appro	7.0	8.3	4.7	1.8	6.0	5.9	2.9	1.2
task perform	7.0	7.1	4.4	1.7	6.0	5.8	3.2	1.3
$ management	7.0	7.7	4.1	1.5	6.0	9.0	1.8	0.7
PRINCP.B.1								
weather	7.0	9.4	4.4	1.6	6.0	9.5	2.6	1.1
job satisfac	7.0	8.5	2.6	1.0	6.0	8.4	1.3	0.5
knowledge	7.0	8.5	2.1	0.8	6.0	7.4	2.0	0.8
consultants	7.0	8.7	2.6	1.0	6.0	6.7	1.7	0.7
monitoring	7.0	7.8	1.8	0.7	6.0	7.0	2.3	0.9
decisions	7.0	8.2	1.2	0.5	6.0	4.7	2.8	1.1
system appro	7.0	6.2	3.2	1.2	6.0	4.1	2.4	1.0
task perform	7.0	5.2	3.8	1.5	6.0	5.3	2.0	0.8
$ management	7.0	5.3	4.0	1.5	6.0	6.7	3.2	1.3
TRACE.2	7.0	352.1	100.2	37.9	6.0	383.2	83.3	34.0
WARP.2	7.0	1.2	0.2	0.1	6.0	1.2	0.1	0.1
REAL.DIM.2	7.0	8.1	1.5	0.6	6.0	8.5	1.0	0.4
IMAGIN.DIM.2	7.0	2.9	1.5	0.6	6.0	2.5	1.0	0.4
% VAR RP 2D	7.0	49%	0.1	0.0	6.0	44%	0.1	0.0
OVERALL.A.2	7.0	7.7	4.2	1.6	6.0	9.2	2.5	1.0
EVALUT.A.2								
weather	7.0	5.8	5.8	2.2	6.0	12.9	1.9	0.8
job satisfac	7.0	3.8	4.0	1.5	6.0	5.5	4.4	1.8
knowledge	7.0	6.8	3.8	1.5	6.0	8.0	1.8	0.7
consultants	7.0	6.3	4.8	1.8	6.0	5.9	3.3	1.3
monitoring	7.0	7.1	5.2	2.0	6.0	9.1	1.8	0.7
decisions	7.0	6.3	4.8	1.8	6.0	6.6	2.0	0.8
system appro	7.0	6.3	4.7	1.8	6.0	6.7	2.1	0.9
task perform	7.0	7.6	4.0	1.5	6.0	7.1	1.5	0.6
$ management	7.0	7.1	5.1	1.9	6.0	8.6	2.7	1.1
PRINCP.B.2								
weather	7.0	9.1	3.5	1.3	6.0	10.0	2.3	0.9
job satisfac	7.0	8.6	2.8	1.1	6.0	9.6	2.1	0.9
knowledge	7.0	8.9	1.9	0.7	6.0	7.3	3.9	1.6
consultants	7.0	9.0	2.1	0.8	6.0	8.4	1.3	0.5
monitoring	7.0	6.8	3.2	1.2	6.0	7.4	1.4	0.6
decisions	7.0	7.2	1.0	0.4	6.0	6.0	3.1	1.2
system appro	7.0	5.7	3.1	1.2	6.0	3.8	3.2	1.3
task perform	7.0	4.5	3.4	1.3	6.0	6.8	1.9	0.8
$ management	7.0	3.3	4.2	1.6	6.0	6.2	1.2	0.5

APPENDIX 3.0

DETAILED PROFILES OF RESPONDENTS

Classifcation systems for the study of individuals have been proposed by workers in the fields of psychology and sociology (Gasson, 1973; Tyler, 1978; Powers et al, 1985), management (McGregor, 1960; Herzberg, 1966; McCelland,1970; Porter et al 1978; Handy, 1981), extension and learning (Rogers and Schumaker, 1971; Loftus and Cary, 1981; Kolb, 1984) and information systems (Alter, 1980; Ahituv and Neumann, 1982). The subsequent review of individuals draws upon the systems and theories of earlier researchers to profile the individuals from the perspective of the change agent. No attempt was made to validate these profiles in the study. The profiles do however, introduce a diversity of factors affecting the change process and to be considered by the change agent.

Client Group

Client T1

A white New Zealand male in his mid forties. Married with three children living in Katikati, client T1 owned a 14 canopy hectare orchard in partnership with his wife. He had 25 years experience in kiwifruit production and was a mechanical engineer before farming. He had secondary school education with trade training. He had a high discretionary income, derived primarily from kiwifruit, with an average debt loading on the business. Orchard productive performance was average for the district. Client T1 had a high level of political involvement in the industry (Kiwifruit Sector Committee Member) and a high profile in leadership with respect to adoption of management systems.

The change agent considered him to be a stage two adopter of new technology and stage 3 adopter of decision aids. His primary goals were instrumental and his information needs primarily of a business,type (sourced predominately through MAF). He was a theory X personality with low order needs who satisfied both motivation and hygiene needs. His predominant motivation was power achievement. Client T1 learnt at a factual level using an assimilator learning style. His information system was computer based, to which he refered frequently. The content and reliability of his information system was maintained to a high standard. Client 1 generally used informal decision making techniques and was technically orientated. His primary management strength was his ability to invest.

Client T1 used MSS to frequently apply specific new technology, while integrating planning within his overall management tasks. He frequently collected data which was central to the control of his management plans. He was strategic in his decision time frame (a minimum of a three year planning horizon), and most decision-making support to him was for unstructured decisions. The orchard increased its productive performance by 65% with an increase in estimated returns per tray from -42 cents before using MSS to 45 cents after two seasons on MSS. He requested little or no instruction with regards to specific tasks, and evaluated MSS by questioning why results were achieved to determine how to improve performance in future with respect to his objectives. Client T1 considers the research process to be of some relevance to him.

Client T2

He was a white New Zealand male in his early seventies living in a de facto relationship with two children. He owned an eight canopy hectare orchard in partnership with his companion at Tauranga. He had three years experience with kiwifruit. His past 45 years were spent managing his own engineering

company. Client T3 recieved education up to secondary school. He had a high level of income, primarily from off the orchard. There was no debt servicing on the orchard, which had produced above district average yields over the previous three to four seasons. Client T2 had a low leadership profile in industry politics and adoption. He was a stage two adopter of new technology and a stage one adopter of decision aids. His primary goals were intrinsic and his predominant information demand technical. His major source of business information was his wife and MAF.

The change agent considered client T2 was a theory X personality satisfying low order needs. He was motivated in his job, predominately through a need to achieve. Client T2 learnt at a factual level using a convergent style. He used a manual information system which was referred to infrequently and maintained to an average standard in terms of content and reliability. Client T2 used informal decision-making techniques. His major management strength was his ability to negotiate.

Client T2 used MSS occasionally for specific new information and frequently in the preparation of management plans. Little data gathering was used for his decision-making and control, and his planning time frame was usually seasonal. Decision-making was usually structured. MSS was frequently used for instruction and review of management tasks with respect to management plans. The orchard achieved a 75% increase in productive performance increasing estimated returns per tray from 42 cents to $1.11 after one season on MSS. Client T2 evaluated MSS performance by considering what results were achieved and whether MSS generated a return on investment. He considered the research to have some relevance to him.

Client 3
Was a white New Zealand male in his mid forties married with two children. He managed an orchard of 6 canopy hectares along with a large packhouse and coolstore complex. 70% of his time was be spent managing the packhouse and coolstore operation. He had 10 years experience with kiwifruit and a total of 24 years experience in horticulture. His background was primarily in nursery production. Client T3 completed a diploma in horticulture at Massey University. He had a moderate discretionary income sourced primarily from kiwifruit packing and storage. There was no debt servicing over the kiwifruit properties and only a low level of debt servicing on the packhouse and coolstore complexes. Orchard performances were lifted above district averages through the use of the MSS. Client T3 had a high political leadership profile and a moderate adoption leadership profile. He was a stage two adopter of new technology and a stage 3 adopter of new decision methods. His primary goals were instrumental and his primary information demand was technical. His predominant source of business information was his accountant.

The change agent considered client T3 a theory X personality with low order needs. He was a dissatisfied motivated personality with dominant power achievement needs. He learnt at a factual level using an assimilator learning style. He had a computer information system but depended mainly on his manual system which he refered to periodically. His information system was of an-average quality in terms of content and reliability. Client T3 used more formal decision-making techniques and had a power management orientation. His major management strength was his ability to set priorities.

Client T3 used MSS for frequent requests of specific new information, only occasionally referring to management plans. He periodically gathered data for planning and control. His decision-making time frame was seasonal and usually of a structured type. Client T3 frequently requested instructions on the

performance of tasks. The orchard chieved an 80% increase in productive performance, increasing estimated returns per tray from -16 cents to 60 cents after two seasons using MSS. He evaluated MSS by considering what results had been achieved before implementing services in future. Client T3 considered the research was of some relevance to him.

Client T4

Was a white New Zealand male in his late fifties. He was married with two children and owned a 15 canopy hectare orchard, operated as a family trust, located in Tauranga. He had 14 years experience with kiwifruit but over 40 years experience in fruit production. Client 4 produced the world record apple crop while living in Hastings. He had received secondary school education and received a moderate discretionary income derived primarily from kiwifruit. The business carried a moderate level of debt and achieved a high productive performance. His leadership profile in the industry was significant politically and highly significant in adoption. Client T4 was a stage 2 adopter of new technology and decision aids. His goals were primarily expressive, his major information demand being business information derived predominantly from MAF.

The change agent considered client T4 was a theory X personality with low order needs who was orientated towards satisfying his hygiene needs. He was motivated by achievement and learnt at a factual level using an assimilator style. His information system was manual (predominately diary records) which he refered to frequently. More recently a computer based system was installed to improve financial record keeping. Client T4 used informal decision-making techniques and was oriented towards the use of technology in his management systems. His management strength was derived from his awareness of his personal strengths and weaknesses.

Client T4 used MSS for specific new information, but a high emphasis was placed on planning as an integral part of business management. Regular data gathering was practised and used with regard to management plans. A seasonal decision-making time frame was used for predominantly structured decisions. There were little or no requests for instructions with respect to tasks. The orchard productive performance was increased by 75% and estimated returns per tray from 9 cents to $1.00 after three seasons of MSS. Client T4 evaluated MSS by considering what results were achieved before implementing MSS in subsequent seasons. Client 4 considered the research may have had some relevance to him.

Client T5

Client T5 was a white New Zealand male in his late thirties, married with three children. He managed an 8 canopy hectare orchard in Tauranga and had 10 years experience with kiwifruit. Prior to managing the kiwifruit property he was a plumber, having received secondary education and trade training. He received a moderate discretionary income derived primarily from kiwifruit. The orchard serviced a low level of debt and achieved above average district performance after adopting MSS. Client 5 had a low profile in industry politics and adoption.

Client T5 was a stage 2 adopter of new technology and a stage 1 adopter of decision aids. His primary goals were intrinsic with predominant demands for technical information. His main source of business information was his accountant. The change agent considered client T5 was a theory Y personality with low order needs. Client T5 was a motivated personality striving to satisfy motivation and hygiene needs. He had high affiliation needs. He learnt at a factual level using a divergent style. He uses a computer information system which was frequently maintained to a high standard in

content and reliability, and was often used for decision-making. Client 5 used primarily informal decision-making techniques and had a technical orientation to his management. His predominant management strength was in priority setting.

Client T5 used MSS occasionally for specific new information and frequently for seasonal planning. Data was frequently gathered and used with respect to plans. His decision-making time frame was usually seasonal. Most decisions were associated with structured problems and only occasional request were made regarding the implementation of tasks. The orchard productive performance increased by 45% and estimated returns per tray from 87 cents to $1.19 after two seasons using MSS. Client T5 evaluated MSS after reviewing MSS results and modifying existing services to meet new targets. Client T5 considered the research programme was significant to him.

Client T6
Was a white New Zealand male in his early forties, married with two children. He owned a 6 canopy hectare orchard in partnership with his wife in Te Puke which they had managed for three years. He had 5 years horticultural experience and 15 years in dairy farming. He had received secondary education and lived on a low discretionary income sourced primarily off the farm. The property serviced a moderate level of debt and was a poor performing orchard prior to implementing MSS. Client T6 had a low political and adoption leadership profile in the industry. Client T6 to be a stage 2 adopter of new technology and a stage 1 adopter of decision aids. His primary goals were instrumental and his information demands were primarily of a business type sourced mainly from MAF.

The change agent considered client T6 was a theory Y personality with low order needs. He was motivated in his work but had unsatisfied hygiene needs. He had high affiliation needs. Client T6 learnt at factual level using a divergent learning style. His information system was manual and was infrequently referred, though maintained to a adequate standard in both content and reliability. Client 6 used formal decision-making techniques and had a technical orientation to his management. His management strength was awareness of his strengths and weaknesses.

Client T6 used MSS for specific information occassionally and placed a high emphasis on planning as an integral part of the management process. Data was frequently gathered and used with respect to management plans which were generally of a strategic nature (three years or more in scope) and of a semi structured to unstructured type. Frequent requests were made for task instructions. The orchard productive performance increased by 140% and estimated returns per tray increased from -$1.61 to 58 cents after two seasons using MSS. Client T6 evaluated MSS by reviewing MSS results altering the content of a continuing service. Client T6 considered the research was had meaning relevance to his management performance.

Client 7
Was a white New Zealand male in his late thirties, married with three children. He managed a 60 canopy hectare orchard located in Te Puke with a packhouse and coolstore complex. He had 9 years experience with kiwifruit production, 5 of which had been as manager of this business. His previous employment was in the wildlife service. Client T7 was educated to a secondary school level. He received a moderate discretionary income, sourced primarily from kiwifruit. The orchard had a high level of indebtness and achieved high productive performance under a MSS. Client T7's leadership role in the industry was low politically but high in adoption. He was a stage 1 adopter of new technology and decision aids. His primary goals

were instrumental and his information demands were predominately for business management sourced from MAF.

The change agent considered client T7 was a theory Y personality with low order needs. He was highly motivated in his work, with high affiliation needs, but had not satisfied all his hygiene needs. He learnt at a response level, using an assimilator style. His information system was computer based, which he frequently referred to and maintained to a high standard of content and reliability. Client 7 used formal decision-making techniques and was primarily technical in his management orientation with strengths in priority setting.

Client T7 used MSS occassionally for specific new information, but placed a high emphasis on planning as an integral part of the management process. Data was frequently gathered and used with respect to management plans, and the decision time frame was usually strategic. The decision level requiring support was usually unstructured. Few requests were made for task performance instructions. The orchard productive performance increased by 215% and estimated returns per tray from -$2.77 to 95 cents after two seasons using MSS. Client T7 evaluated MSS by reflects on why results were achieved and questioned how to improve them with respect to objectives. He considers the research significant to himself.

Change Agent

The change agent was the consultant servicing the client group and practising the research. He was a white New Zealand male in his early thirties, married with no children. He had 12 years experience with kiwifruit and 15 years involvement in horticulture. He was employed as the senior consultant in Tauranga with MAF Technology and was studying part-time towards a Masters in Horticultural Science. He received a moderate discretionary income from consultancy.

The change agent considered himself a theory Y personality with high order needs. He had a motivation orientation, with unsatisfied motivation needs. He had high achievement needs. He learnt at a learning to learn level using a convergent style. His information system was computer based and referred to very frequently with a high maintenance input. The content and reliability of his information system was adequate for his occupation. The change agent frequently used formal decision-making techniques and had a technical orientation to his management with strengths in priority setting. He had developed above average skills at accessing information and had a high level of skill and experience in the preparation of management plans with clients. He had developed a high standard of service in the development of client specific management information systems and prefers to deal with problems of a strategic, unstructured nature. He had adequate skills and experience in the performance of manual orchard tasks and measurement procedures. He annually reviewed and redesigned services with respect to changing client needs. The study was highly relevant to him personally and professionally. The change agent was part of a group of six consultants under study.

Consultants

Consultant K2
Was a white New Zealand female in her late twenties, married with no children. She had six years experience with kiwifruit and a total of 10 years involvement in horticulture. Her university training was in science and statistical methods. She received a moderate discretionary income.

The change agent considered consultant K2 to be a theory Y personality with

high order needs. She had satisfied her hygiene needs and was motivated by affiliation needs. She learnt at a response level using an assimilator style. She used a computer information system to which she frequently refered. This information system was maintained to a high standard in terms of content and reliability. She has a preference for formal decision-making techniques with a management orientation towards the use of technology. Consultant K2's management strength was in priority setting. Her predominant skills in the delivery of MSS was her ability to access information for the client. Her decision supporting time frame was usually tactical, dealing with structured decisions. She had a reasonably low level of manual orchard skills and measurement procedures but a highly developed evaluation technique for MSS. She considers the research to be of some relevance to herself.

Consultant K3
Was a white New Zealand male in his mid forties married with three children. He had sixteen years experience in kiwifruit and 22 years in horticulture. He was previously a private consultant for 5 years and had come from a science training. He received a moderate discretionary income.

The change agent considered consultant K3 was a theory Y personality with high order needs, having a motivator personality with unsatisfied hygiene needs and high affiliation needs. He learnt at a response level using an assimilator style. He used a manual information system which he referred to frequently and maintained to an adequate level in content and reliability. Consultant K3 generally uses informal decision making techniques and had a technical management orientation. His predominant management strength was his awareness of personal strengths and weaknesses.

Consultant K3's MSS delivery was adequate in terms of information accessing skills, but was relatively undeveloped in management planning with clients. He had adequate skills in developing client specific information systems and generally dealt with tactical decisions of a structured type. He had highly developed skills in manual orchard tasks and measurement procedures, and uses informal review techniques for evaluation of MSS delivery to clients. He considered the research of some significance to himself.

Consultant K4
Was a white New Zealand female in her mid-twenties, single and based in Whakatane by herself. She had 4 years kiwifruit experience and 7 seven years involvement in horticulture with an orientation towards human resource management. She received a low discretionary income relative to other consultants.

The change agent considered consultant K4 was a theory Y personality with high order needs, a motivator personality with unsatisfied hygiene needs, and high affiliation needs. She learnt at a learning to learn level using a divergent style. She used a computer information system which was frequently referred to and maintained to an adequate quality in content and reliability. Her preference was for the use of formal decision-making techniques. She had a technological orientation to management and her management strength was in priority setting.

Consultant K4 MSS delivery was exceptional in information accessing for clients and in working with clients developing management plans. She had highly developed skills in her development of client specific information systems. She prefered to operate with clients using a strategic time frame, dealing with problems of an unstructured type. She had adequate skills in manual orchard tasks and used a formal review technique to evaluate her

delivery of MSS. She considered the research significant to herself.

Consultant K5
Was a white New Zealand female in her late 20's in a de facto relationship with no children. She had 5 years experience in kiwifruit and 8 years involvement in horticulture. Her training had been technological, achieving a first class honours degree. She received a low discretionary income.

The change agent considered consultant K5 had a theory Y personality, with low order needs orientated to hygiene factors that were satisfied, motivated by high affiliation needs. She learnt at a learning to learn level using an assimilator style. Consultant K5 uses a computer information system which she frequently refered to and maintained to a high standard for content and reliability. She had a preference for the use of formal decision-making techniques and was technologically orientated in her management. Consultant K5's predominant strength in management was her ability to set priorities. Her delivery of MSS was adequate when accessing information for client needs and preparing management plans with clients. She also had adequate skills developing client specific information systems. She generally operated at a tactical level with a preference for unstructured decisions. She had adequate skills in manual orchard tasks. Consultant K5 used a formal review procedure when evaluating her work with clients. She considered the study to be significant to her work.

Consultant K6
Was a white New Zealand female in her late 20's, married with no children. She had six years experience with kiwifruit and 10 involved in horticulture. Her tertiary training had an horticultural management orientation. She received a medium discretionary income.

The change agent considered consultant K6 had a theory Y personality with high order needs. She was a motivated personality with unsatified hygiene needs, motivated by high achievement needs. She learnt at a learning to learn level using an accommodative style. Consultant K6 used a computer information system which she refered to frequently and maintained to an adequate standard in terms of content and reliability. She had a preference for the use of formal decision-making techniques with a technology management orientation. Her management strength was in priority setting.

Consultant K6 delivered a poor standard of MSS when accessing information for clients (primarily due to poor timeliness of delivery) but had adequate skills in the preparation of management plans with clients. Consultant K6 was also adequate at developing client specific information systems. Her work was predominantly at a tactical decision level. Her preference was to deal with structured decision-making. Consultant K6 had developed a high standard of skills in manual orchard tasks and measurement procedures. She used informal and infrequent review procedures when evaluating her MSS deliver in terms of client needs. Consultant K6 considered the study was highly significant to her work.

PART TWO : INSTRUCTIONS

I would like you to give me your opinion about some practices relating to long term profitable kiwifruit production, ie generating a return sufficient to cover all expenses and investment requirements.

I am interested in exploring how closely you associate, in your mind, a number of practices that may contribute to long term profitable kiwifruit production. You are asked to score on a scale where

    0   = no association

    100   = the closest association

For example you may consider there is no association between apple consumption and furniture production. In this example you would give an association score of 0.

There are definitely no wrong answers. I only want your opinions and beliefs which will remain confidential.

Be careful not to score too highly at the start of the pairings.

Thankyou for your co-operation,

Mark Paine.

IN MY MIND THE ASSOCIATION BETWEEN:

LONGTERM KIWIFRUIT PROFITABLE KIWIFRUIT PRODUCTION AND

BEING PROFIT DRIVEN IN CASHFLOW MANAGEMENT IS : :
DOING THE RIGHT JOBS IN THE RIGHT WAY IN THE RIGHT TIME IS : :
THINKING WITH AN OVERALL VIEW OF THE BUSINESS IS : :
ABILITY TO WEIGH UP THE PROS AND CONS IS : :
MONITORING AND INFORMATION GATHERING IS : :
USING OUTSIDE EXPERTISE IS : :
GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS : :
BEING HAPPY AND ENJOYING MY WORK IS : :
WEATHER RISKS IS : :
MYSELF IS : :

BEING PROFIT DRIVEN IN CASHFLOW MANAGEMENT AND

DOING THE RIGHT JOBS IN THE RIGHT WAY IN THE RIGHT TIME IS : :
THINKING WITH AN OVERALL VIEW OF THE BUSINESS IS : :
ABILITY TO WEIGH UP THE PROS AND CONS IS : :
MONITORING AND INFORMATION GATHERING IS : :
USING OUTSIDE EXPERTISE IS : :
GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS : :
BEING HAPPY AND ENJOYING MY WORK IS : :
WEATHER RISKS IS : :
MYSELF IS : :

DOING THE RIGHT JOBS IN THE RIGHT WAY IN THE RIGHT TIME AND

THINKING WITH AN OVERALL VIEW OF THE BUSINESS IS : :
ABILITY TO WEIGH UP THE PROS AND CONS IS : :
MONITORING AND INFORMATION GATHERING IS : :
USING OUTSIDE EXPERTISE IS : :
GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS : :
BEING HAPPY AND ENJOYING MY WORK IS : :
WEATHER RISKS IS : :
MYSELF IS : :

THINKING WITH AN OVERALL VIEW OF THE BUSINESS AND

ABILITY TO WEIGH UP THE PROS AND CONS IS : :
MONITORING AND INFORMATION GATHERING IS : :
USING OUTSIDE EXPERTISE IS : :
GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS : :
BEING HAPPY AND ENJOYING MY WORK IS : :
WEATHER RISKS IS : :
MYSELF IS : :

ABILITY TO WEIGH UP THE PROS AND CONS AND

	UNITS	
MONITORING AND INFORMATION GATHERING IS	:	:
USING OUTSIDE EXPERTISE IS	:	:
GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS	:	:
BEING HAPPY AND ENJOYING MY WORK IS	:	:
WEATHER RISKS IS	:	:
MYSELF IS	:	:

MONITORING AND INFORMATION GATHERING AND

USING OUTSIDE EXPERTISE IS	:	:
GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS	:	:
BEING HAPPY AND ENJOYING MY WORK IS	:	:
WEATHER RISKS IS	:	:
MYSELF IS	:	:

USING OUTSIDE EXPERTISE AND

GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING IS	:	:
BEING HAPPY AND ENJOYING MY WORK IS	:	:
WEATHER RISKS IS	:	:
MYSELF IS	:	:

GAINING AN UNDERSTANDING OF THE PROCESSES FROM HUSBANDRY THROUGH TO MARKETING AND

BEING HAPPY AND ENJOYING MY WORK IS	:	:
WEATHER RISKS IS	:	:
MYSELF IS	:	:

BEING HAPPY AND ENJOYING MY WORK AND

WEATHER RISKS IS	:	:
MYSELF IS	:	:

WEATHER RISKS AND

MYSELF IS	:	:

APPENDIX 5.0
TRANSCRIPT WORD FREQUENCY AND CATEGORISATION BY CONCEPT

word	f	word	f	word	f	word	f	word	f	word	f	word	f	word	f	word	f	word	f	word	f	word	f
think	109	kiwifruit	61	orchard	42	people	45	mgt	45	board	40	year	33	research	39	money	33	I	236	family	7	they	119
know	43	fruit	44	place	28	staff	14	systems	40	industry	63	years	42	new	27	price	22	me	27	lifestyle	7	your	74
decisions	41	size	42	ranui	24	labour	20	change	31	mkt	28	time	38	mmf	24	economic	20	we	212	happy	6	them	36
informat	25	prodn	55	orchards	14	person	16	need	31	mkting	39	when	33	monitor	9	diffental	13	our	41	prefered	6	you	403
effect	15	trays	25	area	13	someone	11	control	22	packhouse	16	season	20	statistic	9	financial	18	us	26	life	5	he	30
relatnship	12	crop	23	areas	13	maurice	7	business	14	producers	13	terc	16	moniting	11	return	9	i'm	15	survival	5	their	22
believe	25	product	16	situation	12	guys	6	needs	15	govt	12	future	9	trac	11	debt	8	my	22	survive	4	you're	13
problem	25	number	15	land	9	training	4	changed	10	growers	22	period	8	target	9	rates	8	i'd	12			his	12
decision	20	canes	12	position	9	work	17	achieving	10	sell	12	before	7	involveme	7	cost	11	own	12			you've	15
probless	14	numbers	12	proprty	8	doing	24	influence	10	packaging	10	months	6	target	7	pricing	10	i've	11			themselve	8
basis	8	quality	19	bay	6	involved	17	manager	10	pack.h's	8	september	6	scientifi	6	efficent	8	we've	10			yourself	6
feel	9	growing	16	block	6	working	11	whole	12	grower	11	trees	6	services	5	dollar	7	mysel	9			somebody	6
consider	8	produce	13	field	4	job	10	achieve	11	producer	7	august	4	programme	4	profitabl	7	we're	10			everyone	5
read	9	pruning	13					changes	9	volume	7			tracking	4	rate	7					him	5
ideas	7	resource	12					implement	4	world	7					sustain	7					you'll	4
aware	6	yield	12					growth	7	national	6					exchange	7					she	4
certain	6	hort	11					increasin	7	sold	6					dollars	6						
confident	6	pears	11					implement	7	european	5					sustainab	6						
knowing	6	prune	11					pay	7	politics	5					costs	6						
reading	6	vine	11					profitabl	7	consumer	4					extra	7						
approach	6	varieties	9					result	7	country	4					margins	6						
perspectiv	6	pollin	11					systems	7	internatn	4					profit	6						
practical	6	trav	10					achieved	6	selling	4					bank	5						
idea	5	yields	9					benefits	6	storage	4					budget	5						
talk	5	inputs	9					operation	6	on-shore	4					economics	5						
concept	5	input	7					performan	6	packing	4					interest	5						
sense	5	stress	7					alan	6	products	4					buy	4						
ability	4	apples	6					manage	4	payment	4					economica	4						
understand	4	fertilise	6					scale	4	stock	4					value	4						
important	54	light	6																				
significan	4	crops	6																				
vital	4	equipment	6																				
challengin	8	wood	6																				
difficult	7	avocados	5																				
decide	4	canopy	5																				
considerat	4	hicane	5																				
experience	4	irrigatio	5																				
doubt	4	plants	5																				
focus	4	pollen	5																				
why	21	producing	5																				
how	75	water	5																				
what	223	cane	5																				
when	33	productiv	5																				
where	40	variety	5																				
which	20	apple	4																				
whether	15	harvest	4																				
another	14	picking	4																				
different	23	produced	4																				
between	14	roots	4																				
either	8	vines	4																				
within	9	leaf	4																				
difference	7	structure	4																				
therefore	11	weather	10																				
depends	7	winter	6																				
compared	6																						
who	10																						

| 1077 | 0 | 634 | 0 | 198 | 0 | 202 | 0 | 361 | 0 | 257 | 0 | 230 | 0 | 172 | 0 | 264 | 0 | 643 | 0 | 40 | | 762 | |

APPENDIX 6.0

TRANSCRIPT PHRASES FOR QUESTIONNAIRE DEVELOPMENT

Good business managers
Driven by profit
Do a better job
Like what I do
Enjoy
New ways of approaching things
Involved from top to bottom
Make the decisions
See every link in the chain
Have to plan
Be profitable
Work to a budget
Financial planning
Sell trays that you produce
See exactly what was going to happen
Manage staff, equipment, vines as the whole thing
I call myself a family mangager
Planning to achieve my aims
My children are more important
Education
Everything comes back to money
Information and computers
Changes going on around us
Read to learn
Happy with what I've got
The higher the learning, the higher the ability to learn
Get expertise from other business ventures
Aware of off-orchard influences
Wander through the packhouse
Figure out all the screeds from the Marketing Board
More objective outlook
80% sure, 20% unsure
Not the only one making the decisions
Take each year as it comes
Like the lifestyle
Continue to do things right
You can weather a storm or two but you can't take a battering all the time
The best business manager makes the best business decisions all of the time
A bit of luck involved
I learnt by asking and looking
Able to guess better
Major risk is weather, it is uncontrollable
People on the land
Knowledge you gather and evaluate
To get organised
Get the best of what is available now
Know where you are heading
The whole thing is planned
A numbers game
Because we counted
Did the basics
Do everything properly
Do things at the right time, in the right order
Feel good about our place

Be reasonably up to date
Should discuss it with someone
Business management and orchard management the same
Financial and production management the same package
Been well educated
Sound business practices
Been lucky
Doing what you want to do and coming out on the right side of the ledger
Happy
Have the lifestyle
Realise my weaknesses and find the right guy to make them up
Use someone elses brain
Have common sense
A good grafter
Put my heart and soul into
There every day
Planning in advance
Nipped in the bud
Get in touch with the guy at any time you need
Check with Mark
Monitoring is the real work
Learning so much by doing the accounting ourselves
Going along as a team
MAF building itself all the time
Trying to improve itself
Personal side is important
Like to know where I'm heading
Achieve the best per hectare production in our neighbourhood
Working to a management plan
The whole thing is wrapped up in one
Know the whole picture
Have control over the cheque book
Have the management plan to work to and discuss it with someone to make
sounder decisions
How you are driven
Resources in all stages
People
Vine structure and the land they are on
Breakdown to set procedures
Get good end results
Packing the fruit
Have a management process
Well slotted
Have checks and balances
A whole picture
It is a set process and a matter of meeting deadlines
Getting as big a picture as we can
Learning this skill
Info from Kiwi Flyer and off the orchard
On track with workload
Close enough to the figures
Have systems in place to see the whole picture at once
Good communicator
Think in all circles all the time
Finger on the pulse
Review things
Nothing is set in concrete, able to change i.e. flexibility
Driven by profitability
Make a decision

Comparisons and information system
Watch expenses
Learn by experience and formal education
Clear focus on the results
Challenge in the business
Be right on top of everything
Thinking out process using a white board
Computer system
Information gathering
Take stock of yourself regularly
Be on top of stress
Get fit
Have a balance
The financial part is how you measure
People, production, money in order of priority for profit
Lateral thinking
Open minded
Be thrifty
Be driven and always striving, fortitude
Total understanding from husbandry to marketing
Make business decisions
Reaction to products
Method of sale
Trade restrictions
Overall view of business
Ability to analyse various functions in the chain on a rational basis
Given all the information
Ability to weigh up pros and cons
Grey areas
Accept the risk in the decision
Good management reduces the amount of risk you are taking
Look at all aspects, pick out the weaknesses and strengths in the process of
decision making
Weak links in scenario that I protect myself against
Keep a good track of what is happening
Pick out factors contributing to greatest risk
Pick out the things that have the strength for us
Make the business decisions that someone else will implement
Thinking, analysing, planning, directing, delegating the task
Efficiency in the way the task is being done (time and cost)
Job is done correctly in the right time
Targets are very important
Setting deadlines for specific things
Keep to a timetable
Have solid objectives
Financial management becoming more important
Cash flow management from a timing point of view (time into and out of
overdraft)
When things are ordered and when things are paid for
Tighter economic restraints
Money not so easy to procure and very expensive
Management spending a bit more time in the office
A lot of expertise to call on
Get the right sort of people to advise
Rural Bank field officers
Spend time talking to bank managers
The bogie side of the business (banking and finance)
To get the best possible deal out of them is to actually work
with them

Integrate into the business
Important to have the ability to negotiate
Weigh up what is going on in the rest of the world, where do I
sit, if above average, get a better deal
Have facts to be able to negotiate
Common sense must prevail
Greatest source of facts is talking to the right people
Impact of computers is time-saving in processing (two people instead of six people)
In future computers to answer questions in analysis work, helping make decisions, thinking the decision making process through
Most important to be able to relate to staff
Be strong and familiar
Motivation should be self-generating
People are motivated if they enjoy, have pride in what they are doing
Unless you have the right environment aesthetically, people will never get motivated
Motivate people by continually giving them a sense of direction
Responsibility and accountability with certain areas
Have to have the right environment with the right management to make a go of it
The luck has gone out of the business now
The good people have to be clearly identified and slotted into the areas where they have the most impact
Experience right through the whole spectrum of the industry
Target market
Retaliation
Stigma to overcome, ruthless in their operations
First requirement of farming the land is that you have a lot of love for the job you are doing
Farmers don't want to be impersonal, they don't want to be a cog in a wheel, e.g. fruit loss policy, grower responibility makes it more interesting and challenging
Rely on segments of the industry providing greatest in depth skills
Reliable statistical information
Research has to have a benefit (dollars)
Implement what results
Quick returns for dollars invested
If research becomes more short term, people become more interested, will influence things within their working life
No mistakes, no room for error

APPENDIX 7.0
LEARNING STYLES QUESTIONNAIRE

The Learning-Style Inventory describes the way you learn and how you deal with ideas and day to day situations in your life. We all have a sense that people learn in different ways, but this inventory will help you understand what learning style can mean to you. It will help you understand better.

- how you make career choices
- how you solve problems
- how you set goals
- how you manage others
- how you deal with new situations

INSTRUCTIONS

On the next page you will be asked to complete 12 sentences. Each has four endings. Rank the endings for each sentence according to how well you think each one fits with how you would go about learning something. Try to recall some recent situations where you had to learn something new, perhaps in you job. Then, using the spaces provided, rank a "4" for the sentence ending that describes how you learn best, down to a "1" for the sentence ending that seems least like the way you would learn. Be sure to rank all the endings for each sentence unit. Please do not make ties.

Example of completed sentence set:

Q. When I learn:　　　__4__ I am __1__ I am __2__ I am __3__ I am
　　　　　　　　　　　　　happy.　　fast.　　logical.　　careful.

LEARNING - STYLE INVENTORY

1. When I learn:	___	I like to deal with my feelings.	___	I like to watch and listen.	___	I like to think about ideas.	___	I like to be doing things.
2. I learn best when:	___	I trust my hunches and feelings.	___	I listen and watch carefully.	___	I rely on logical thinking.	___	I work hard to get things done.
3. When I am learning:	___	I have strong feelings and reactions.	___	I am quiet and reserved.	___	I tend to reason things out.	___	I am responsible about things.
4. I learn by:	___	feeling.	___	watching.	___	thinking.	___	doing.
5. When I learn:	___	I am open to new experiences.	___	I look at all sides of issues.	___	I like to analyse things, break them down into parts.	___	I like to try things out.
6. When I am learning:	___	I am an intuitive person.	___	I am an observing person.	___	I am a logical person.	___	I am an active person.
7. I learn best from:	___	personal relationships.	___	observation.	___	rational theories.	___	a chance to try out and practice.
8. When I learn:	___	I feel personally involved in things.	___	I take time before acting.	___	I like ideas and theories.	___	I like to see results from my work.
9. I learn best when:	___	I rely on my feelings.	___	I rely on my observations	___	I rely on my ideas.	___	I can try things out for myself.
10. When I am learning:	___	I am an accepting person.	___	I am a reserved person.	___	I am a rational person.	___	I am a responsible person.
11. When I learn:	___	I get involved.	___	I like to observe.	___	I evaluate things.	___	I like to be active.
12. I learn best when:	___	I am receptive and open minded.	___	I am careful.	___	I analyse ideas.	___	I am practical.

TOTAL the scores from

each column: ☐ Column 1 ☐ Column 2 ☐ Column 3 ☐ Column 4

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