Northern Territory Government
Department of Business, Industry & Resource Development

THE NORTHERN TERRITORY MANGO INDUSTRY

A SOCIO-ECONOMIC PERSPECTIVE

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Executive Summary

Purpose of the study

This study was commissioned by the Horticulture Division of the Department of Business, Industry and Resource Development (DBIRD) to provide a situational analysis of the mango industry in respect to social and economic issues.

Background

The mango industry in the Northern Territory is undergoing a period of structural change. Historically the industry has consisted of a large number of small enterprises managed by semi-retirees or part-time growers. Over the last ten years the industry has expanded rapidly and become increasingly commercially focussed with production increasingly concentrated on a small number of medium to large-scale commercial farms, located in the outer rural areas of Darwin and Katherine.

In response to profitability pressures, some growers have significantly expanded their tree numbers while other growers have removed trees, chose not to pick fruit or sold the property. Industry changes have left some segments of the industry disenfranchised and to a lesser degree have resulted in social hardship.

This study analyses the impacts of these changes on growers, their decision making and consequently how the industry may continue to change over time.

Methodology

The study consisted of five major components:

1. Industry consultation was carried out initially to develop focus issues and key questions for the study to address. Later in the project two industry consultation forums where held to gather industry feedback and prioritise issues emerging from the *grower survey* and *economic analysis* components of the project.

2. A survey of growers was undertaken to obtain research data on social and economic issues in the industry.

3. An existing economic model was utilised to analyse the economics of mango enterprises of various sizes, productivity and locations.

4. A system map of the Northern Territory mango production sector was constructed to improve understanding of the structure of the sector and the behaviour it can produce.

5. Agribusiness interviews were conducted and secondary data was analysed to investigate specific issues and provide an overview of the operating environment in economic and social terms.

Major Findings

The mango industry in the Northern Territory is on the threshold of becoming a vibrant commercially focussed industry, with reasonable profits being achievable by those businesses that are focussed on growing and marketing of good quality mangoes.

However a concerted unified effort between all members of the mango industry supply chain is required to address the key limiting factors of market oversupply, labour availability and logistical capacity.

In response to commercial pressures more part-time, retiree and small growers will exit the industry. The transition will bring increasing dissatisfaction and some hardship, particularly to the retiree segment of the industry.

Mangoes, with an annual gross value of production of between $30 to $36 million, are the mainstay of the horticulture industry in the Northern Territory. They make up on average 37% of the gross value of horticultural production. It is projected that by 2010 mango production will triple from the current level of around 1.8 million trays up to 5.5 million trays.

This increase in production will pose particular challenges for industry. Based on current market demand, projections have shown that average mango prices ranging from $19.29 down to $13.20 per tray will be likely in the future.

Small, low yielding enterprises face marginal profitability.

Many small mango enterprises are already facing marginal profitability due to the absence of economies of scale. Part-time farming can also result in distracted management and poor timeliness of field operations, delivering lower yields and poorer quality.

Lower prices in the future coupled with the increased time and cost commitments of doing business in an increasingly commercial industry will see more small growers, particularly those who take a hobby approach to running their mango business leave the industry. Seventy-seven percent of mango blocks in the Northern Territory have less than 500 trees.

Modest returns can be realised from medium-sized enterprises and economies of scale ensure the profitability of large enterprises, even at low yields.

Medium sized enterprises are financially challenged.

While long-run profitability is possible for medium-sized enterprises, many find servicing start-up debt or accessing additional finance problematical. The stage of development of most medium-size mango businesses means that they are still unproven business entities with an asset value that is largely untested and difficult to value. These factors diminish the confidence of lenders and limit access to fiance.

Hobby growers are out of sync with a commercial industry.

The response of individual growers to profitability and financial pressures differs based on the approach to their mango business. The *grower survey* found that in response to profitability pressures a grower with a commercial farming attitude will implement an improvement strategy; however, a grower with a hobby farming attitude, who typically has off-farm income, is more likely to reduce work effort or stop farming mangoes.

Many hobby growers went into mango growing with little research, unrealistically low expectations of the workload and an inflated profit outlook. The reality of mango farming has resulted in increasing dissatisfaction amongst hobby growers and some hardship particularly for retiree or semi-retiree growers for whom mangoes make up a higher proportion of their household income.

A commercially focussed industry will eventuate.

Almost half of the growers interviewed in the grower survey were categorised as having a hobby-farming attitude. Thirty-nine percent of the hobby farmers in the grower survey did not see themselves farming mangoes in five years time. When extrapolated to the rest of the mango grower population this could mean over 200 growers have plans to leave the industry.

The end point of this industry adjustment will be a more concentrated, commercially focussed mango production sector. However, if the industry is to realise its potential, a unified approach will be needed to address the major issues limiting individual business and industry success.

Economic losses of up to $26 million are possible due to labour shortages.

Harvest labour and transport shortages have already restricted the quantity of fruit reaching retail shelves in some seasons. With the forecast increase in production, economic losses valued up to $26 million are possible due to labour shortages.

Concern about the marketing system was the only issue given comparable priority by growers as labour shortages. In addition to the need for more market development and market promotion to address oversupply pressure, growers were also concerned about unethical behaviour of market agents and the power of supermarkets in the marketing system.

Growers are exposed to manipulation by the marketing system.

Growers who were most unhappy with the marketing system took a “black box” approach to marketing, having few or no market relationships. When coupled with inferior quality fruit, this left them exposed to manipulation by the marketing system with resulting lower than average product prices.

Industry cohesion is lacking.

The unity required to tackle industry-wide market coordination and logistics issues will not be easily achieved. The composition of the industry does not lend itself easily to cohesion. It was hoped that the introduction of a national industry levy in 2003, and the subsequent investment planning will provide a clear direction for industry and generate the willingness for unity and coordination that is required to address major industry issues.

1 Introduction

1.1 Background and context of the study

The mango industry in the Northern Territory is undergoing a period of structural change. Historically the industry has consisted of a large number of small enterprises managed for the most part by semi-retirees or part-time growers. Over the last ten years the industry has expanded rapidly and become increasingly commercially focussed. While there are still over 1,000 mango blocks in the Northern Territory, over 30% of planted trees are on just 25% of the largest blocks.

In response to profitability pressures some growers have significantly expanded their tree numbers while other growers have removed trees or chosen not to pick fruit. Industry changes have left some segments of the industry disenfranchised and to a lesser degree have resulted in social hardship.

Production and the value of the crop are expected to increase substantially within the next five to ten years as more trees reach full production and new plantings continue. Unless markets are developed, there will be increased pressure on prices due to over supply.

This study was commissioned by the Horticulture Division to provide an analysis of the impacts of these changes on growers, and provide an insight into how the industry may change over time.

The study was undertaken between February and July 2004.

1.2 About this report

This report documents the findings of the study. These findings are presented as:

- a snapshot of the mango industry in the Northern Territory;
- fictional grower case studies; and
- descriptions of the primary issues.

Each of the analyses carried out for the study are documented in Annexes to the report.

The findings of the *grower survey* are documented in a separate report *"Northern Territory Mango Industry - a socio-economic perspective, findings of a grower survey" (Technical Bulletin 318).*

2 Methodology

The study consisted of five major components:
1. Industry consultation.
2. Grower survey.
3. Economic analysis of enterprise profitability.
4. Mango production sector system analysis.
5. Agribusiness interviews and analysis of secondary data.

2.1 Industry consultation

Focus issues and key questions were developed through a series of discussions with leading growers, government officers and industry commentators. Discussions were based around a series of questions as follows:
"How do you see the future of the industry?"
"What are your concerns regarding the future of the industry?"
"What are the major constraints limiting the development of industry?"

Also asking the participants specifically, "What do you see as the major issues that this project needs to look at?"

Individual mind-maps documented during each discussion were used to construct composite mind-maps for each of the following major issue categories:
- economics;
- social;
- production;
- information;
- marketing;
- logistics; and
- industry.

The composite mind-maps can be found in *Annex 1 – Development of Focus Issues and Key Questions.*

Later in the project two industry forums were held to consult industry on issues emerging from the growers' survey and enterprise profitability analysis. The forums were held in Katherine on 9 June 2004 and in Howard Springs on 12 June 2004.

By the end of the workshop, participants had:
- Prioritised 11 issues previously described in a discussion paper.
- Described a "desirable future" for the Northern Territory mango industry.

A report on the industry forums can be found in *Annex 3 – Industry Consultation Forums.*

2.2 Grower Survey

The focus issues and key questions developed through consultation were utilised in the design of a survey questionnaire to obtain mainly qualitative information on issues faced by growers, their long term aspirations, their changed behaviour and their specific directions for their businesses in the next three to five years.

The prime survey instruments were interviews based on the questionnaire. The interviews were conducted with a stratified sample of growers in the Northern Territory. Thirty-seven telephone interviews were held with a further 25 in-depth interviews face-to-face with growers, giving a total sample of sixty-two growers.

The survey participants were categorised by property location, business size and farming attitude.
The property location categories used were:

- **Inner Rural** which incorporates the localities of Howard Springs, Humpty Doo, Bees Creek, Virginia and Mc Minns Lagoon areas.
- **Outer Rural** which incorporates Berry Springs, Darwin River, Dundee, Finnis River, Marrakai, Corroboree, Acacia Hills, Noonamah, Manton, Lambells Lagoon, Batchelor and Adelaide River.
- **Katherine** which incoorporates all properties in Katherine including Florina Road, the Venn and other outer lying properties.

The business size categories used were:

- **Small –** Fewer than 2,000 trees.
- **Medium –** 2,000 to 9,999 trees.
- **Large –** More than 9,999 trees.

Participants were also categorised as either having a "commercial attitude" to farming or a "hobby attitude" to farming. Commercial farmers where predominantly driven by profit, whereas hobby farmers while wanting to make money from their mangoes regarded it as more of a bonus.

The survey responses were analysed and have been documented in a separate report, *"The Northern Territory Mango Industry – A socio-economic perspective-findings of the grower's survey." (Technical Bulletin 318).* The executive summary of this report can be found at Annex 2.

2.3 Enterprise economics

A previously developed economic model (described in detail in DBIRD Technical Bulletin 301 "Profitability of Mango Production in the NT Top End") was used to analyse the economics of mango enterprises of various sizes (small - 600 trees, medium 3,000 to 5,000 trees and large - 10,000 trees and more), productivity and locations.

In an effort to model the range of picking and packing options utilised by growers; ten scenarios were developed for combinations of own picking, own packing, contract pick and pack and central packing.

A cost of production per tray was calculated for each of the ten scenarios at five yield points ranging from three trays per tree to 15 trays per tree.

The cost of production included all field maintenance costs, pick, pack, transport and agents, costs, semi-fixed costs plus an allowance for capital recovery.

Gross and net margins per tray were also calculated for each scenario based on an average yield of eight trays per tree.

A report on the analyses can be found in *Annex 4 – Enterprise Profitability Analysis.*

2.4 Systems analysis

The systems analysis for this study was conducted using causal-loop diagramming or system mapping. System mapping is a diagramming tool in which the essential components and interactions in a system are captured and can be communicated and understood quickly.

It was deemed that this was an appropriate tool for the purpose of this study that would:
- Enable change within the mango industry to be understood.
- Focus on how the behaviour of hobby and commercial growers interact and affect industry growth through feedback loops.
- Improve understanding of how other factors limit industry growth.

The observations of the analysis are presented firstly by describing the structure of the overall system, then the local loops which make up the system are described along with any limiting states. Finally interactions between the local loops are discussed.

A report on the systems analysis can be found in *Annex 5 – Systems Analysis*.

2.5 Secondary data and agribusiness interviews

Secondary data were required to provide an overview of the operating environment in economic and social terms. Information was collected in respect of the following issues:

- Trends in the sale price of rural real estate (source: Land Information Division of the Northern Territory Department of Infrastructure, Planning & Environment).
- DBIRD surveys of mango tree numbers (1992, 1997, 2002 and 2004).
- Trends in Northern Territory mango production and gross value of production (source: DBIRD).
- Historical and expected market throughput and prices (source).
- Input-output multipliers for the Northern Territory 1997-1998 and agricultural industry input-output multipliers for the Gascoyne Region of Western Australia.

The following projections were also updated by DBIRD to provide quantitative data on specific study issues:

- Projected Northern Territory mango production.
- Projected mango prices under various seasonal scenarios.
- Projected economic losses from lack of labour availability.

Interviews were conducted with members of the following agribusinesses to gain additional insights into study issues:

- Banks and finance institutions.
- Transport companies.
- Packers.
- Central market wholesalers.
- Real estate agents and valuers.

An analysis of rural property prices was carried out to gain some insight in movement in the real estate market for rural properties. A report on the analysis can be found in *Annex 6 – Analysis of property sales*.

3 Snapshot of the Mango Industry in the Northern Territory

There are now approximately 750-thousand mango trees in the Northern Territory

The mango industry in the Northern Territory has grown rapidly over the past decade with tree numbers increasing from an estimated 136,620 in 1993 to an estimated 748,535 in 2004 (source: DBIRD tree surveys). Before this expansion the Northern Territory mango industry consisted mainly of a large number of small block-holders or hobby farmers mainly around the Darwin region. As the industry has matured the bulk of the production has become concentrated with a small number of medium to large-scale commercial producers, located in the outer rural areas of Darwin and Katherine.

Table 1 Growth of the Northern Territory mango industry

Area	*1993*	*1997*	*2001*	*2004*
	Estimated number of trees ('000)			
Inner Rural				
Darwin/Berrimah	0.6	3.6	3.6	13.4
Howard Springs/Virginia	19.8	40.6	40.6	26.2
Humpty Doo/Bees Creek	24.0	64.7	64.7	68.2
Outer Rural				
Lambells Lagoon/Middle Point	2.5	33.0	168.2	180.1
Noonamah/Elizabeth Valley	6.7	15.2	16.5	21.3
Colton Rd/Acacia Hills	5.8	21.4	76.6	58.2
Berry Springs/Darwin River	36.7	75.4	75.4	136.9
Dundee/Finnis	0.0	10.0	23.4	23.0
Batchelor/Adelaide River	0.5	15.7	22.5	22.8
Katherine and region				
Daly River/Tipperary	0.0	8.0	8.0	8.0
Pine Creek	0.0	2.7	2.7	2.5
Katherine	40.1	85.1	165.0	184.6
Mataranka	0.0	0.0	0.0	2.8
Other	0.0	0.6	0.6	0.6
Total	136.6	376.1	667.7	748.5

Source: DBIRD Tree Surveys 1993 to 2004
Survey methods:
1993 - mail questionnaire and aerial photo interpretation (part of broader fruit tree survey).
1997 - mail questionnaire and aerial photo interpretation (part of broader fruit tree survey).
2001 - historical data plus road survey of Lambells Lagoon, Acacia Hills, Dundee. Finnis, Batchelor, Adelaide River.
2004 - aerial photo interpretation and ground truthing.

With a gross value of production of between $30 and $36 million mangoes make up 37% of the value of horticultural production in the Northern Territory.

With an annual gross value of production of between $30 to $36 million mangoes are the mainstay of the horticulture industry in the Northern Territory. They make up on average 37% of the gross value of horticultural production (Ngo 2001).

An estimated 1.26 million trays of mangoes were produced in the Northern Territory in 2003. The highest annual production was 1.8 million trays, in 2002.

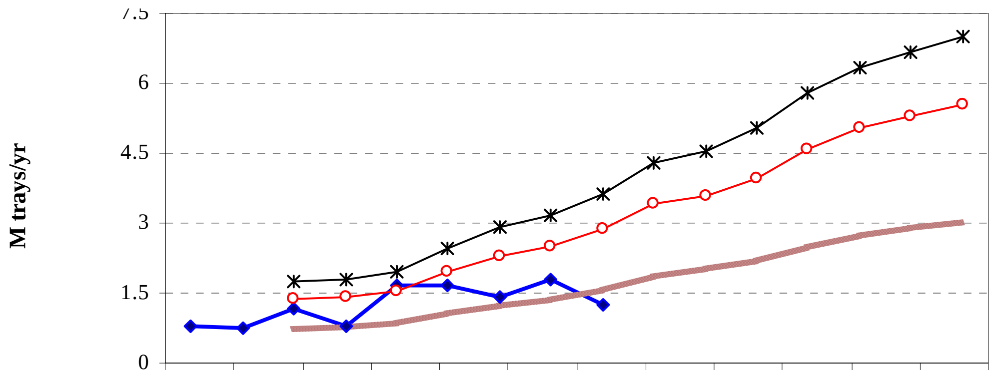
Table 2 Northern Territory mango production

Year	*Production (million trays)*	*Gross value of production ($'000)*
1993		13,740
1994		15,831
1995	0.80	19,672
1996	0.77	19,361
1997	1.17	26,680
1998	0.81	18,875
1999	1.64	35,914
2000	1.76	35,048
2001	1.40	31,401
2002	1.80	34,499
2003	1.24	30,158

Source: DBIRD, Greg Owens unpublished.

By 2010 Northern Territory mango production could triple, from its current level of 1.8 million trays to up to 5.54 million trays.

Based on the number of trees coming into production and estimates of new plantings it is projected that assuming low to medium yields between 2.19 to 3.97 million trays could be produced in 2006 extending out to 3.05 to 5.54 million trays in 2010.



	1995	1996	1998	1999	2000	2002	2003	2004	2006	2007	2008	2010
Actual	0.8	0.765	0.809	1.649	1.668	1.8	1.24					
Low			0.786	0.857	1.071	1.385	1.587	1.877	2.188	2.517	2.768	3.052
Medium			1.427	1.557	1.945	2.516	2.882	3.41	3.975	4.571	5.028	5.544
High			1.803	1.967	2.457	3.179	3.641	4.308	5.021	5.774	6.351	7.003

Years

Actual — Low — Medium — High

Note: Based on 1997 trees plus 5% annual increase from 2008 onwards.
Source: Projected Northern Territory Mango Production. DBIRD Huyn Ngo updated June 2004.

Figure 1 Projected Northern Territory mango production

Northern Territory mangoes are among the earliest on the Australian market with production starting in Darwin in late September. Between 5 and 7% of Northern Territory mangoes are exported mainly to Singapore and Hong Kong. Less than 1% are consumed locally and the remainder are sold interstate where most are distributed through central markets in the capital cities, mainly Sydney. Domestic market mango prices are high early in the season, and decline as the season progresses and more fruit becomes available (Ngo 2002).

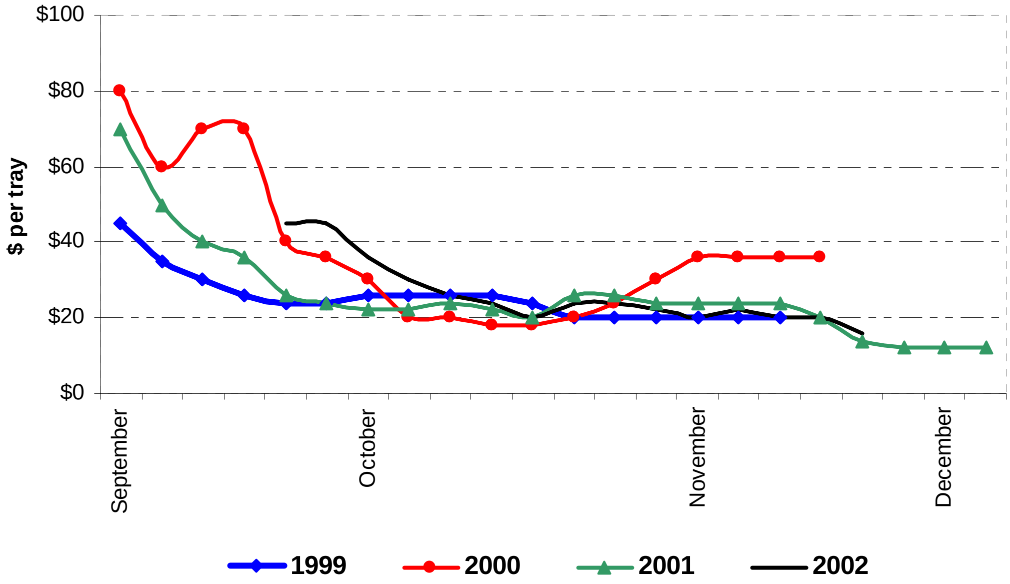
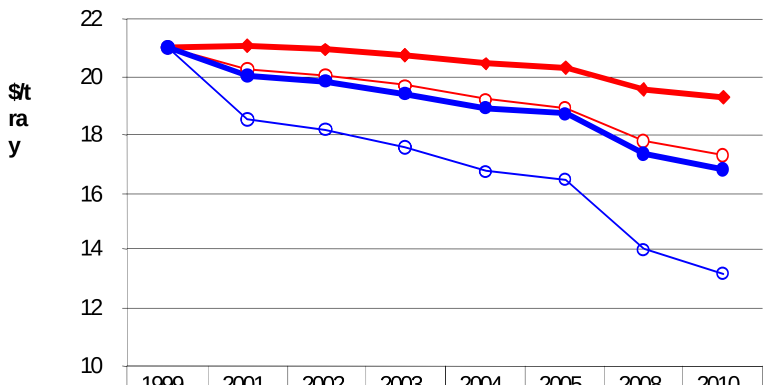


Figure 2 Sydney market mango prices (KP:1 Med 18-20)

DBIRD project average prices ranging from $19.29 down to $13.20 per tray as likely in the future.

Average prices for Northern Territory mangoes have been declining gradually over the last ten years as production increases. Historically, the weighted average price for Northern Territory mangoes has been around $20 per tray. (Ngo 2002). Based on the number of trees coming into production, domestic markets will face over-supply pressure unless alternative markets are found for the increasing quantities of produce. DBIRD projects average prices ranging from $19.29 down to $13.20 per tray as likely in the future, depending on seasonal conditions.



	1999	2001	2002	2003	2004	2005	2008	2010
Low yield 5.23t/ha 7 weeks season	21.00	21.07	20.95	20.75	20.46	20.30	19.57	19.29
Low yield 5.23t/ha 4 weeks season	21.00	20.24	20.05	19.72	19.24	18.98	17.77	17.30
Medium yield 9.5t/ha 7 weeks season	21.00	20.03	19.82	19.46	18.93	18.76	17.32	16.81
Medium yield 9.5t/ha 4 weeks season	21.00	18.53	18.19	17.58	16.71	16.43	14.05	13.20

Source: Projected mango prices. DBIRD Huyn Ngo revised June 2004.

Figure 3 Projected Northern Territory mango prices

Seventy-seven percent of mango blocks have less than 500 trees on them.

Production in the northern Territory is centred around Darwin and Katherine. The large number of small enterprises are concentrated in the Darwin rural areas while most of the large enterprises are situated in Katherine. Seventy-seven percent of mango blocks have fewer than 500 trees; however these blocks account for only 26% of the trees planted.

Table 3 Number of trees on mango blocks in the Northern Territory

	Darwin		*Katherine*		*Total*	
No. of trees on block	No. of blocks	% of blocks	No. of blocks	% of blocks	No. of blocks	% of blocks
Under 500	789	78%	80	67%	869	77%
501-1000	120	12%	10	8%	130	11%
1001-5000	87	9%	23	19%	110	10%
Over 5000	19	2%	6	5%	25	2%
TOTAL	1015		119		1134	

Source: DBIRD tree survey 2004

More than 50% of mango trees in the Northern Territory are not yet in full production.

More than 50% of the trees planted are still under six years old. Therefore the quantity and value of the crop are expected to increase substantially in the next five to ten years.

4 Grower case-studies

These case-studies are fictional characterisations developed from talking with a wide range of growers and industry participants over the course of the study. They are not real families but attempt to represent the various types of people that make up the mango growing community. They aim to provide an insight into typical issues faced by different sorts of growers.

4.1 Case-study 1: The retiree's dilemma

Frank and Mary set up their mango orchard to supplement their pension in retirement. Now they were not so sure their mango retirement dream was going to come true.

Frank and Mary picked their first commercial mango crop in 1998. They did not know much about marketing their crop, but earlier in the year an agent from the Sydney markets had dropped in and they had agreed to sell their fruit through him.

Some of the other mango growers had been complaining about there not being much fruit around, but this did not bother Frank and Mary. They were still getting used to all the work involved in picking the mangoes. They received a good price for their mangoes even though it took more than six weeks to get their cheque from the agent.

Frank was happy that there was finally some money coming in from the mangoes. They had put a lot of their savings into the farm. The house bore on the property could not supply enough water for the trees so they had to put in another bore just for the mango trees. Frank had also built a packing shed because he did not like the idea of paying someone else good money to pack the mangoes when he could do it himself for nothing.

Frank and Mary paid cash for their 20 acre property at Humpty Doo in 1990. Frank had worked hard most of his life as a mechanic in an auto repair workshop in town. Soon he would be able to leave his job as a mechanic and retire. The income from the mangoes would supplement their pension and give them the extra money they needed to go on a holiday each year.

Frank left his job in town shortly before the 2,000 mango harvest. It looked like it was going to be a bumper harvest, so he got his brother and his family up from down South to help with the harvest.

It was a rough harvest. All the fruit seemed to come at once. They worked 14 hours a day but managed to keep up. About half way through the harvest, they started having problems getting their fruit picked up by the transport company. Their agent was saying there was a glut of fruit on the market and that they should stop picking, but they needed the money to pay the bills so they kept on picking.

By the end of the season they were exhausted and disillusioned. They had no idea how much fruit had been sold and at what price. Their agent told them when the fruit arrived in Sydney it was not saleable and had to be dumped. This was not surprising considering how long the fruit had sat around in Darwin.

Sometime after Christmas a cheque for $5,000 arrived in the mail. After paying for the mango cartons and the freight there was little left.

Frank was starting to worry about what they had got themselves into. They did not have a lot of savings left, it had all been spent on getting the farm up and running. He had left his job in town in the belief that the mangoes would provide them the extra money they needed, as it was almost impossible to survive on the pension alone these days. If the mangoes could not pay enough, retirement was not going to be like they had dreamt it would be.

Luckily Frank had his brother and his family to help out with the harvest and he was not like some other poor growers who had to pay for pickers as well. Although he could not say how many more years his brother would be willing to help out, he was five years older than Frank and the harvest had really knocked him about, in fact he wasn't much use at all for the last week of the pick.

Anyway most of the talk around was that it was an unusual season, with so many mangoes in such a short time. Next year would be better.

4.2 Case-study 2: Stay-at-home-mum produces a niche product

Margaret is responsible for the day-to-day running of her and her husband's 2,000 tree mango orchard. She focuses on producing a top quality product that is sought after in niche markets.

The orchard is making a contribution to their household income, and it is still possible for Margaret to stay at home with the kids.

The opportunity to develop a source of supplementary income had attracted Peter and Margaret to Humpty Doo. Peter's family had a vineyard in South Australia and even though he had never really been involved in working the vineyard the idea of being a farmer, even a part-time one, appealed to him.

Margaret also came from a farming background, although not horticulture. Her family had a wheat and sheep farm in Western Australia. She and her sisters had always been hands-on on the farm until they went away to school. Even though her father joked about their "hobby farm", which was 40 acres compared to his 5,000 acre property, he helped them a lot with planning of the orchard, preparing a budget, and putting a business proposal together to present to the bank. He said it was important to be conservative when budgeting, that way you have some room to move if things do not go exactly to plan.

Peter and Margaret looked at a number of different crops before deciding to plant 2,000 mango trees. Mangoes were the only crop with any sort of proven potential in the Northern Territory. Margaret looked after the day to day management of the orchard it allowed her to contribute to the family income while still being at home for the kids. Peter had a good job with the Northern Territory government he received six weeks leave each year which he used to help out at harvest time.

Soon after planting Margaret joined the local mango growers association. The association regularly organised field days and training events for people in the horticulture industry. Her father had always been involved in industry groups in WA and it seemed the logical thing to do. Through attending these events Margaret built up a network of other enthusiastic growers who she could talk to about things going on in their mango businesses. Everyone had faced different challenges in growing and marketing mangoes and Margaret was keen to learn from their experiences.

She heard a lot of different stories about what was the best way to grow mangoes and it was sometimes difficult to know what to believe. It was only through keeping in regular contact with a few growers who were achieving good yields and quality that she was able to start working through the haze of information. She experimented with different growing systems in parts of the orchard and observed what happened.

It was obvious that many growers were not happy with the way their mangoes were marketed. Of all the aspects of running a mango business this seemed like a crucial factor. If marketing of their crop was not successful, it did not matter how many mangoes they were able to produce. All their work for the year would be for nothing.

Peter and Margaret had no experience in marketing mangoes. In Peter's family's vineyard they had agreements covering delivery of their product years in advance, with the wineries even determining which varieties of grapes they planted. Margaret's family was used to dealing with the single desk marketing of wheat, and the auction system for selling their wool. In both of these marketing systems the price they received was based on objective specification of the product.

To overcome their lack of knowledge they worked on developing a strong relationship with their wholesalers in the Sydney and Melbourne markets. Margaret learnt a lot about what factors affected the price of mangoes in the central markets. It was important that they could differentiate their product from the masses of other mangoes hitting the market floor at the same time.

As the profitability of many small growers had become marginal the quality of fruit supplied by them was also falling. Margaret knew her fruit had to stand apart from the rest if she was going to get a good price for it. So she focussed on producing fruit that was top quality and blemish-free.

Each year their fruit went to fill orders from the corner fruit shops in the better suburbs of Sydney and Melbourne. This seems to keep their produce separate to the masses of fruit competing to be purchased by one of the large supermarket chains. They always seemed to get a good price, usually above what other growers where getting.

It seemed that a lot of agents often received poor quality or green fruit from the Northern Territory and that they often discounted fruit just because it came from the Northern Territory. It was not only important that they produced a good quality mango, but that they could assure the end buyers of the quality of the mangoes. They decided to pursue accreditation under an HAACP based food safety and quality system as a way of demonstrating their commitment to quality. Both Peter and Margaret had to attend a course on safe handing of chemicals, as they both sprayed the orchard. Peter complained a bit about this as he had to take time off work, but Margaret explained that this was part and parcel of being a commercial mango grower.

Margaret knew what the important qualities were that the market required, and focussed their growing and picking practices to achieve them. The profit margins in the business were getting tighter, but she was still able to achieve a net income from the orchard of around $30,000 per year, which supplemented the income from Peter's job nicely.

4.3 Case-study 3: An opportunistic grower bows out

They got into mangoes in the hope of making a fortune. Things went well for a while, but now it seemed like everything was working against them. Colin and Julie had had enough.

Colin and Julie bought their block predominantly as a lifestyle block in the late 1980s. Friends who had a block in Knuckey's Lagoon had planted mangoes six years earlier and told them how the Vietnamese contractors were "knocking down their door" wanting to buy their crop for almost $1,000 per tree. All this sounded too good to be true, but they figured even if they planted 200 trees and got $200 per tree that would still give them a tidy $40,000 per year. That was more than Julie made each year working as a nurse.

As they were both working full-time it was easy to pay for the trees and reticulation to go in out of their own money. They hired a local bloke to do all the work and soon the trees were growing. Not a lot happened for the first few years, Colin chucked a bit of fertiliser around a couple of times a year and put the water on during the dry season and the trees grew. It all seemed so easy.

They had had some pretty good years with the mangoes, once they started getting a decent crop on them. It was just like their friends said, the contractors came knocking. They came soon after the trees flowered and took over all the orchard work from then on. All Colin had to do was turn the water on and run around with the mower a couple of times when he was doing the rest of the block.

A group of local blokes met at the pub on Wednesday nights for darts. As the year drew on talk always turned to mangoes. Colin did not understand half of what they were going on about, but they all seemed to get better yields than him, 20 trays a tree when he was only getting three trays a tree, not that he was going to tell them that. His contractor was also keen that he tried some of the things his mates talked about, so he agreed to give it a go.

He had a fantastic season that year. His contractor was over the moon, there was a lot of early fruit that year and his contractor got a top price for it. The contractor even left most of the late fruit on the trees. Colin took some time off work hired a couple of pickers and got some fruit to the shed of his own. He did not get that good a price for it (compared to what the blokes at the pub were getting), and the shed staff said that he had a high reject rate, but it was all a bonus to him; he already had the contractor's money in the bank.

Things never seemed to go well with the mangoes from then on. The next year his usual contractor did not show up as he had every other year. He chased up a couple of other contractors his pub mates had used but they were not interested in such a small number of trees. So he decided to go it alone again. He had done it last year with the late crop and it did not look like it was going to be a big crop this year anyway.

He had a bit more trouble with pickers this year. He went into the backpackers hostel in town and picked up a couple, one only did two hours work before he was complaining that he wanted to be dropped back in the city. The next day Colin contacted the local labour hire company. They said they would send some people around that afternoon. It was two days before someone turned up and then it was much the same situation, they worked for a couple of hours and then wanted to lie down. He had trouble getting the crop off with a lot of it falling on the ground. He did not know how his contractor ever managed it, it all seemed too much.

The next year was much the same with the pickers being unreliable, except now the owner of the shed he usually dealt with said they could not take his fruit any more. It seemed that no one gave two hoots about small growers any more. Everything was geared to the larger growers who had orchards of five and ten thousand trees.

Every year was something different. One year there was so much fruit around that most of it sat rotting at the transport company, another year there was a good flowering but all the fruit dropped on the ground. Julie started to dread the mango harvest coming around. Colin always got so angry at the sheds, the transporters, the agents, the government, the big growers, they had all wrecked the mango industry for the little guy.

After about three years Julie was able to convince Colin that it just was not worth the hassle. They did not need the money and sometimes they ended up putting in money from their wages to pay for the packing and transport. Colin agreed, he stopped spraying and fertilising the trees and slashed them once a year after the wet. They did pick one year, for some reason they seemed to have a good crop when no-one else did so they picked some of the early fruit to get the high prices, but left the rest for the birds.

4.4 Case-study 4: Small bickies get bigger

David and Jillian had expanded their mango orchard in an effort to remain profitable. They have a hard couple of years ahead of them while they wait for their trees to reach full production. It can not happen soon enough.

It was increasingly obvious to David and Jillian about five years ago that they needed to "get big or get out". Many of the small growers who had got into the industry at the same time as them were facing an uphill battle, fighting the increasing costs of doing business in an increasingly commercially focussed industry. Many had already sold their blocks and moved back to town, others who enjoyed the rural lifestyle had simply abandoned their orchards.

David and Jillian never really considered themselves small growers, they had 4,000 trees when plenty of their neighbours had less than 500 trees. But three or four large corporate firms had come into the industry in recent years, and in comparison to them they were small bickies.

So they made a decision to double the size of their mango orchard. They put a business case together and approached the bank. They did not think it would be as difficult as it was to get finance. They ended up having to go to three banks before they found someone who seemed to understand what they were trying to achieve.

Even so, the bank would only lend them 60% of the value of their assets, and the value that was put on their assets was well below their expectations. They had spent a lot of money developing the property properly with fencing, grafted trees and irrigation, but this did not seem to have added a lot to the value of their property.

The lending officer explained to them that commercial mango enterprises in the Northern Territory did not yet have any runs on the board, and that the bank was concerned about some big issues within the industry such labour availability and oversupply. He also said the value of their land and trees was a big unknown, there had been so few sales in recent times that there was nothing to support placing a higher value on the land and trees.

The new trees had been in five years now, and they had just completed the first harvest with any significant production. It was pretty obvious to David and Jillian that they would need to upgrade their packing line and put in another cool room if next season was going to go smoothly. They had just scraped through this year because it was such a poor yielding season. The use of picking aids was also becoming widespread in the industry. It seemed to be the only way to get the fruit off in a timely manner with the limited number of workers available for the harvest. They would need to get a couple of them and they were worth over $30,000 each.

David and Jillian were reluctant to take on any additional debt at this point in time. They had yet to start making principle repayments on their expansion loan, and had just managed to make the last two annual interest payments, because of the poor seasons.

Luckily they had a good relationship with their bank. They had had adequate resources to get started, and funding to carry them over the initial period, but what they really needed now was a couple of good years with their trees in full production so they could consolidate. Then they would be in a better position financially to upgrade their facilities. But it did not seem possible to get through the next couple of harvest seasons without the upgrade.

It felt like they were being squeezed from all directions. They could see a bright future on the horizon but could not figure a way to it. Perhaps David could pick up some consulting work in town, to bring in some extra money and bridge the gap until the trees were in full production. It was going to be a hard couple of years.

4.5 Case-study 5: The big-guns weigh-in

Arafura Tropical Fruit had one of the first large-scale commercial mango orchards in the Northern Territory. They hoped to gain advantage by being ahead of the pack, but now realised they would have to work with the pack for the long term good of the industry and their own business.

Though Arafura Tropical Fruit Company is now self-supporting, capital injections from the major shareholders were essential to keep the company afloat in the early days. The establishment costs for the orchard were high, well over $2 million and there was a long lead-time before commercial returns could be realised.

When the company was established and the land purchased the company intended to grow macadamias. Several of the directors, including the managing director, were already shareholders in a large-scale macadamia plantation in North Queensland and were convinced of the potential for a similar enterprise in the Northern Territory.

Unfortunately, for various reasons, mainly to do with the climate and diseases, the macadamia trees never flourished. Nevertheless, with so much capital already sunk into infrastructure, it was decided to push on with a different crop and try to realise some gain from the venture.

Over the next five years a planting program was undertaken to establish a 20,000 tree mango orchard. Growing mangoes on this scale was uncommon when Arafura established their orchard, but over the next few years the mango industry in the Northern Territory expanded rapidly. Where it was once uncommon for a mango orchard to have more than 500 trees, several 5,000 tree orchards were going in, including three down at Katherine. Arafura hoped to gain advantage by being larger and ahead of the pack.

By being so large they managed to keep their cost of production to below $15 per tray. With average mango prices of more than $20 a tray, they were making a tidy profit. They had established a line capable of packing 40,000 trays a week, and planned to pack for other growers until their own fruit came on-line; however the way things turned the packing business turned into a success in its own right.

Having had experience with macadamias in North Queensland the company knew that it was essential to tie up some key markets for their product, sooner rather than later. They started talking to the big supermarket chains, and were soon selling a large proportion of their own and other growers' fruit directly to supermarkets. Having access to other growers' fruit made it possible to establish a supply chain capable of handling large quantities of fruit. The shed manager was always on the ball to keep quality standards high, even if this meant lower pack-outs for the growers. Some of the growers grumbled about this, but they either improved their game or found another shed to pack their fruit.

Before each season the shed manager went on a recruiting drive in Queensland and signed up experienced packers for the coming season. They even paid their airfares to get them to and from Darwin. However getting enough labour for picking was emerging as a major issue. Not only was it difficult to get enough pickers it was difficult to find someone who could manage a work crew, or oversee harvest operations. With the seasonal nature of mango work it was difficult to retain any good staff from one season to the next. Anyone good they did come across was soon off looking for longer-term employment in other states.

As more and more mangoes came onto the market, the supermarkets put pressure on Arafura to supply the mangoes for a lower price. Arafura was now one of several large growers competing for a share of the limited domestic market. There was a lot of talk about developing export markets and processing but neither was a reality yet.

The directors agreed that the only way to address these issues was for the industry to pull together, similar to what had happened in the avocado industry. Avocado growers had a strong national peak body since 1973. They were one of the first industries to introduce a levy in 1989. The mango industry in the Northern Territory had become too fragmented, with Katherine growers criticising Darwin growers, big growers making disparaging remarks about small growers and vice versa.

Various directors started getting involved in industry boards and committees as much as possible. By getting industry talking and sharing knowledge and working towards a common goal they hoped they could overcome the barriers limiting their own company's long term profitability.

5 Primary issues

Seven primary issues have emerged from the grower survey and the various analyses conducted for this study. These issues highlighted by the case-studies above are explained in detail in this section.

5.1 Harvest labour shortages may limit industry growth

Labour availability was a common concern emerging from the *Grower Survey*. It was the second most frequently nominated issue by survey participants from both large and medium sized enterprises. It was also the highest ranking issue at the industry consultation forums held in both Darwin and Katherine.

It was the sixth most frequently nominated issue by small enterprises. Mangers of small enterprises have not been exposed to labour difficulties to the same degree as medium and large growers due to the high proportion of own labour used for harvest and utilisation of contractors for harvest.

The main labour related concerns are:
- *high turnover and poor reliability of casual labour,*
- *lack of skilled labour,*
- *limited availability of labour at harvest.*

Three main labour related concerns were highlighted by participants in the *Grower Survey*. These were,

- the <u>high turnover</u> and <u>poor reliability</u> of casual labour;
- the <u>lack of skilled labour</u> capable of managing a harvest labour crew, and;
- <u>limited availability</u> of labour at harvest.

The mango harvest usually ranges from six to eight weeks in duration. This presents a particular challenge as large numbers of workers are required for a short time. The peak of the season, when the bulk of mangoes come off, is usually a two to four week period in each growing region. This period is the most critical time when the largest numbers of workers are required. The harvest starts in Darwin and moves southward. There is usually only minimal overlap in the harvest periods of Darwin and Katherine.

Up to 4,000 workers will be required for the 2006 mango harvest.

Based on the number of trees coming into production, it is projected that between 2.19 to 3.97 million trays could be produced in 2006. Based on an industry average of one picker/packer per 1,000 trays this would equate to between 2,190 and 3,970 workers being required for the 2006 mango harvest.

Labour shortages are exacerbated either when harvest windows are shorter than average or when the harvest windows of Darwin and Katherine overlap. Labour shortage was a serious issue for the 2002 harvest when the mango crop was the largest on record but the harvest window was constricted to four weeks.

Economic losses of up to $26.1 million have been projected in 2006 due to lack of available labour

Labour shortages are potentially an issue that could limit further growth of the industry. Projections by DBIRD estimate economic losses in 2006 (including direct and indirect benefits) due to lack of labour, ranging from $5.8 million to $26.1 million depending on seasonal conditions.

Table 4 Projected economic losses in 2006 from lack of labour

Season	*$m*
Low Yield Scenario	
Normal six weeks season	5.8
Short four weeks season	11.5
Short four weeks season plus early Katherine mango production	14.4
Medium Yield Scenario	
Normal six weeks season	10.5
Short four weeks season	20.9
Short four weeks season plus early Katherine mango production	26.1

Source: DBIRD Huyn Ngo Revised June 2004

Growing regions in the Northern Territory are not on established "harvest trails" making them more reliant on locals and working holiday makers from overseas for seasonal labour.

Workers for the Northern Territory mango harvest are sourced from locals (~40%) permanent itinerants (~30%) and working holiday makers from overseas (WHMOs) (~30%). (Source: NTMIA). This is different to other fruit and vegetable growing regions in Australia where permanent itinerants represent the largest proportion of the seasonal labour force. Permanent itinerants tend to follow distinct harvest trails predominantly between locations in eastern Australia. Northern Territory growing regions are not well represented on existing harvest trails. This is thought to be due to the limited number of opportunities available in the Northern Territory and the distance between growing regions. However, growing fruit and vegetable industries in Ti Tree and Mataranka may increase flows of permanent itinerants between the north and east of Australia (Hanson 2003).

Australia wide there has been a decrease in the dominance of permanent itinerants as a proportion of the seasonal workforce with WHMOs and retirees steadily increasing in significance.

Immediately after the labour shortage problem in 2002 the NTMIA and other key stakeholders identified a number of issues impeding attraction of labour for the harvest including:

- Low and variable rates of pay.
- Poor work conditions including health and safety and staff management.
- Availability of accommodation on or near farms.
- Availability of transport to and from farms.
- Poor communication between labour service providers and stakeholders.
- Accurately predicting the size and commencement of harvest

(NTMIA: Proposal to Northern Territory DEET seeking funding to support the mango harvest, April 2004).

In 2004 a mango harvest labour strategy group (MHLSG) was formed, comprising key labour providers, Northern Territory DBIRD, NTMIA and the Northern Territory Horticulture Association. This group has established programs to address some of these issues, including recommending an industry minimum rate of pay, dissemination of harvest forecasts, training in mango picking and packing for local unemployed indigenous and non-indigenous people and occupational health and safety training for employers.

5.2 Growers are exposed to manipulation by the marketing system

In the *Grower Survey* the types of issues raised by growers about the marketing system were:

- unethical behaviour of market agents;
- the power of supermarkets in the marketing system;
- a lack of transparency in the marketing system;
- a lack of feedback from packing sheds; and
- the need for more market development and market promotion.

The concerns about the marketing system expressed by Northern Territory mango growers are consistent with those of small growers throughout Australia. These concerns are similar to those found in a recent review of the Retail Grocery Industry Code. (Neill Buck & Assoc 2003).

A review of the Retail Grocery Industry Code reported a continuing stream of anecdotal evidence that sections of the retail grocery industry do not trade in a fair and equitable manner

The Buck Review reported a continuing stream of anecdotal evidence that sections of the retail grocery industry do not trade in a fair and equitable manner, including:

- Misleading and deceptive conduct.
- Unconscionabileness.
- Harassment.
- Restrictive trade practices.

Prior to the release of this report the Commissioner of the Australian Competition and Consumer Commission in a presentation to the Australian Chamber of Fruit and Vegetable Industries Annual Conference gave specific examples of when conduct of wholesalers may be misleading or deceptive (Martin ACCC 2004). Many of these examples were similar to those stated by growers during the *Grower Survey* including:

- Where a wholesaler misrepresents the state of the market, for example, by stating an incorrect market price for produce.
- Where the wholesaler indicates that they can achieve a certain price when they have no basis for doing so.
- Where they create the impression that someone's produce is of a lower quality than it actually is.

Many growers have no way of knowing what price a wholesaler received for their product.

Central to the examples above is the fact that many growers are only informed by the wholesaler of the price paid to the grower and have no way of knowing what price the wholesaler received from the buyer.

This limited transparency of fresh market prices was also recognised in a recent report commissioned by the Commonwealth Department of Agriculture Forestry & Fisheries, "Price Determination in the Australian Food Industry (Spencer 2004). This report explained that most of the difference between prices paid to growers and the prices received by retailers can be attributed to transport and distribution costs, but it also recognised that there was still a problem of "limited transparency of market prices and costs through the wholesale market sector".

With regards to increasing market power of supermarkets in the supply chain, the report recognised that increasing concentration within the retail sector was providing retailers with greater bargaining power in negotiations with suppliers. With this greater bargaining power comes the increasing imposition of the costs of retailing and margin pressure on suppliers. Participants in the *Grower Survey* stated costs of demonstrating food safety and quality should be shared more evenly throughout the supply chain rather than growers bearing the bulk of the cost.

“Growers that have inferior quality, few or no market relationships or do not have their own source of market intelligence are exposed to manipulation by the trade.”

One important message emerging out of the price determination report is that “growers that have inferior quality, few or no market relationships or do not have their own source of market intelligence are exposed to manipulation by the trade.” In the example given in the report, a supplier with reliable top quality produce, who has a good personal relationship with their wholesaler could achieve an eight to twelve dollar per tray price premium over an average or poor quality supplier who relies on the wholesaler to achieve the best price possible (Spencer 2004).

The price determination report suggested that the source of most complaints about the fairness of market practices was from average or poor quality suppliers with few or no market relationships. This is supported by observations from the *Grower Survey* where many growers who identified the marketing system as being a constraint or difficulty to their business, did not actively participate in the marketing of their product. The growers who were most unhappy with the marketing system took a “black box” approach to marketing, where they put their product into the marketing system and took a wait and see approach to what returns came out of the system.

The NTMIA is attempting to address some grower concerns about the marketing system through its Endorsed Wholesaler and Code of Practice Programs.

Through the Endorsed Wholesaler Program wholesalers are included on the NTMIA’s list of endorsed wholesalers on the basis of paying a fee and agreeing to meet a series of requirements covering terms of trade, quality assurance systems, credit control, payment terms, provision of a receival advice and cool chain maintenance. The program has run in the major capital city markets for the past six years.

In order to address systemic problems within the mango industry that go beyond the relationship between growers and wholesalers the NTMIA initiated the development of a voluntary code of practice. The code is being prepared by a working group of mango growers, agents/merchants, retailers, packers, transporters, unloaders and others to:

- improve the commercial relationship between members of the supply chain from grower to retailer;
- provide formal communication processes promoting transparency, accountability and timeliness;
- establish best practice cool chain management; and
- resolve complaints and/or disputes.

5.3 Small, low yielding enterprises face marginal profitability

Economies of scale and per unit productivity are important drivers of enterprise profitability.

Most small enterprises are farmed on a part-time basis. This can result in distracted management and poor timeliness of field operations, delivering lower yields and poorer quality than medium and large enterprises.

Economic modelling shows that a small enterprise of 600 trees with a yield of five trays per tree has a break-even price of $23.89 per tray compared to a 5000 tree enterprise with productivity of eight trays per tree which had a break-even price of $14.87 per tray.

Table 5 Cost of production at various yields for typical enterprises.

	Darwin 600 trees contract harvesting	*Darwin* 600 trees own pick/pack	*Darwin* 600 trees own pick/ central pack	*Darwin* 3000 trees own pick/pack	*Katherine* 5000 Trees own pick/pack	*Darwin* 10000 trees own pick/pack	*Katherine* 20000 trees own pick/pack	*Katherine* 30000 trees own pick/pack
3 trays/tree	$30.92	$30.76	$31.37	$24.03	$23.05	$20.99	$21.65	$20.21
5 trays/tree	$23.89	$22.37	$23.44	$18.33	$17.81	$16.50	$16.94	$16.07
8 trays/tree	$19.94	$17.65	$18.98	$15.12	$14.87	$13.98	$14.35	$13.74
12 trays/tree	$17.98	$15.02	$16.50	$13.34	$13.23	$12.58	$12.81	$12.45
15 trays/tree	$16.86	$13.97	$15.51	$12.63	$12.58	$12.02	$12.22	$11.93

Source: Based on Technical Bulletin 301 "Profitability of Mango Production in the NT Top End"

Historically, the weighted average price for Northern Territory mangoes has been around $20 per tray (Ngo 2002). DBIRD has projected average prices ranging from $19.29 down to $13.20 per tray will be likely in the future, depending on seasonal conditions (Source: Projected mango prices. Huyn Ngo updated June 2004). As with labour shortages, pressures on prices are exacerbated by a constricted harvest season.

For growers using contract pick and pack a yield of 12 trays per tree is required to break-even at a price of $18 per tray.

Even at current prices, financial returns of small orchards, especially those using contract picking and packing, are poor. For those enterprises using contract pick and pack arrangements a yield of 12 trays per tree is required to break-even at a price of $18 per tray. For small enterprises picking or packing themselves the break-even yield is lower at around eight trays per tree. While this yield has been achieved by some small enterprises, it is certainly not typical for these size enterprises.

Modest returns can be realised from medium sized enterprises at prices above $18/tray and economies of scale ensure the profitability of large enterprises, even at low yields.

5.4 Medium sized enterprises are financially challenged

Participants in the *Grower Survey* from both medium and large enterprises revealed that the inconsistency in annual income typical of mango enterprises made servicing debt difficult, and that it was important to ensure that their financial institution had a good understanding of their business.

Medium and large enterprises have invested heavily in infrastructure and equipment. Capital costs in the first five years for these enterprises are high, between $700,000 and $850,000 for a medium size enterprise to over $2 million for a large enterprise. The total capital cost (excluding land) for various size enterprises are given in Table 6.

Table 6 Total capital cost (excluding land)

	Total capital cost ($/enterprise)
Small enterprises – 600 trees	
Contract pick & pack	$238,559
Own pick & pack	$334,449
Own pick & central pack	$264,447
Medium enterprises	
3 000 trees	$726,787
5 000 trees	$806,380
Large enterprises	
10 000 trees	$1,531,763
20 000 trees	$2,217,755
30 000 trees	$3,093,885

Source: Based on Technical Bulletin 301 "Profitability of Mango Production in the NT Top End"

Servicing start-up debt can be problematical for family based mango enterprises in the Northern Territory.

Most medium size mango enterprises in the Northern Territory are family based businesses and servicing a start-up debt of this size can be problematic. The work effort requirements of a medium size enterprise also restrict the time available for family members to generate income off-farm and thus debt servicing depends predominantly on income generated from the enterprise.

Financial institutions will loan between 50% and 70% of the value of secured assets. Loans are generally secured against farming assets, however off-farm assets may also be taken into consideration as security. In addition to security considerations finance institutions also take projected cashflow and management ability into account when assessing loan applications (finance institution interviews pers. comm.).

Often the value placed on a property by a property valuer is below the owner's expectation.

Medium sized enterprises are typically young business and have a large proportion of trees not yet in full production. The stage of development of these businesses means that they are still unproven business entities from a cashflow perspective. The asset value of a medium size mango enterprise is largely untested and difficult to value. Companies undertaking valuation work on behalf of finance institutions now prefer to value properties on case-by-case basis, taking into account varieties, geographic location, scale of enterprise, age of trees and management ability rather than using historical rules of thumb of $80 to $140 dollars per tree. (Property valuer interviews, pers. comm.). Often the value place on the enterprise by a property valuer is below the owner's expectations.

Banks are now more cautious about lending to mango growers than in the past, after a number of foreclosures following the 2000 and 2001 seasons.

Banks are also now more cautious about lending to mango growers than in the past, after poor seasons in 2000 and 2001 resulted in a number of foreclosures (finance institution interviews pers. comm.). All of these factors diminish the confidence of lenders and limit access to additional finance.

The dilemma is that a lack of funds prevents these growers from expanding their enterprises as desired and capturing economies of scale. Finance for packing, picking and farm machinery is more readily available through hire purchase agreements secured against the machinery.

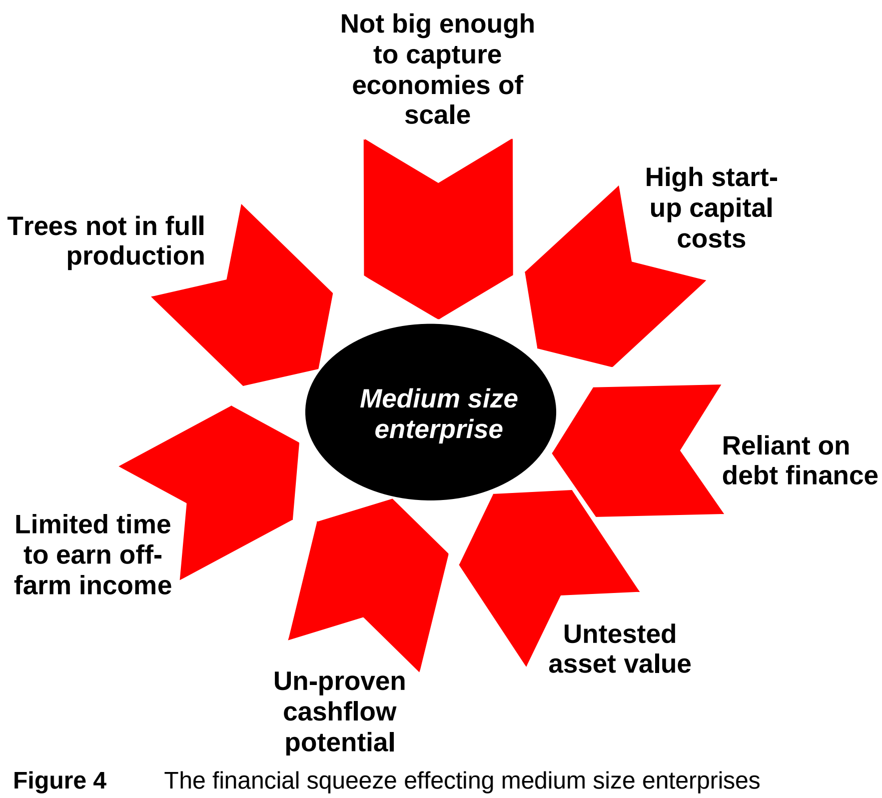


Figure 4 The financial squeeze effecting medium size enterprises

Some large enterprises use sophisticated equity finance arrangement and do not have the requirement to meet annual interest payments.

Larger enterprises face a similar set of circumstances but being larger have the ability to capture powerful economies of scale. Some also use sophisticated equity finance arrangements and do not have the requirement to meet annual interest payments.

A lack of appreciation in property values was also talked about by participants in the *Grower Survey* as a limiting factor. This was supported by an analysis of rural property sales in three rural hundreds since 1986 (Annex 6). This analysis was for rural property generally rather than for mango properties specifically; however sales of properties of less than 8 hectares were removed from the analysis in order to remove blocks that are primarily residential.

The sale price of properties in the three areas analysed had all increased in real terms during the analysis period, ranging from an annual appreciation equivalent to 2.1% in the Hundred of Cavanagh to 5.7% in the Hundred of Strangways.

There were strong periods of capital appreciation in mid to late 1990s in the Hundreds of Cavanagh and Strangways. The number of sales in each year had increased over time in the Hundreds of Cavanagh and Guy but had fell over time in the closer settled Hundred of Strangways.

The increase in property values observed in the Darwin rural area are comparable to historical appreciation for Australian real estate as a whole. However, considering the level of property development undergone during the analysis period it could be expected that increases in rural property values would have been comparably higher than for real estate in general.

The observed appreciation in rural property values are comparable to Australian real estate as a whole.

A separate analysis of the contribution of mango trees to the sale value of rural properties since 2002 was inconclusive. The volatility in sale prices due to other factors far outweighed the impact of mango trees on sale price.

5.5 Hobby growers are out of sync with a commercial industry

Almost half of the participants in the grower survey were categorised as having a hobby attitude.

Almost half of the growers interviewed in the 2004 G*rower Survey* were categorised as having a hobby attitude to farming. Typically a **hobby** farmer has a small enterprise in the inner rural area, has other full or part-time paid employment, devotes less than two days per week to farming mangoes, and often contracts out his/her mango harvest. Such people are usually older and do not come from a farming background.

On the other hand a **commercial** farmer has a medium or large mango enterprise in the outer rural or Katherine area, did not work off-farm in another paid employment, devoted at least two days per week to farming mangoes, and often grew other crops in addition to mangoes.

It is still possible for a grower with a small mango enterprise in the inner rural area to have a "commercial attitude" to farming mangoes.

Commercial farmers are predominantly driven by profit, whereas hobby farmers while wanting to make money from their mangoes regarded the income more as a bonus. Nonetheless it is still possible for a grower with a small mango enterprise in the inner rural area to have a "commercial attitude" to farming mangoes.

Only 13% of growers surveyed initially got into mangoes as the principal crop of a profit driven business venture, with mangoes often being grown for income in addition to paid employment, retirement income or income from other crops.

Many growers went into mango growing with little research, unrealistically low expectations of the workload and an inflated profit outlook.

The supplementary nature of many mango enterprises often meant growers went into the venture with little research or business planning. Their expectations of the workload were unrealistically low and their profit outlook was inflated, being based on historical product prices and contract rates rather than projections in line with industry growth.

The G*rower Survey* also found that the management plans of hobby growers and commercial growers were distinctly different.

Sixty-eight percent of growers classified as having a commercial attitude had a pro-active plan for the next three to five years involving one or more of the following measures:

- improve efficiency (perhaps through mechanisation);
- expand the enterprise;
- diversify or plant different varieties; or
- improve marketing strategies.

In contrast only 32% of growers classified as having a hobby attitude had a pro-active plan, with the remainder stating that they will keep going as is, reduce effort or exit the industry.

Profitability pressures on a hobby enterprise result in a continued spiralling downwards of work effort and profitability.

The systems analysis demonstrates that the result of a reduction of work-effort by hobby growers is a further reduction in the return to the enterprise. Consequently profitability pressures on a hobby enterprise will usually result in a continued spiralling downwards of profitability. This is shown diagrammatically by the reinforcing loop in Figure 5.

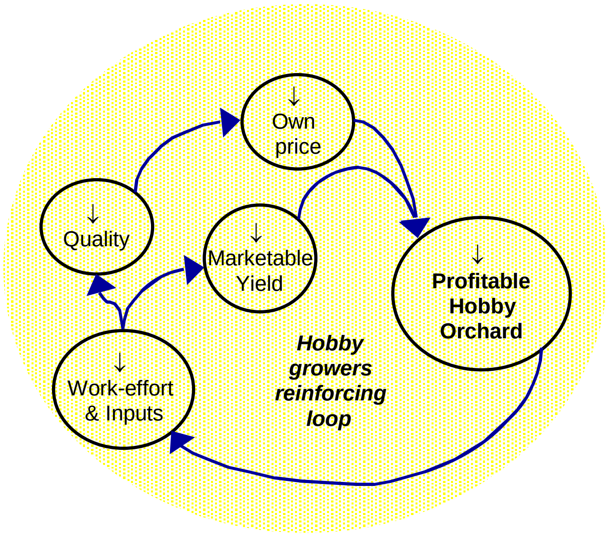


Figure 5 **The hobby growers reinforcing loop**

The number of neglected orchards has increased in the inner rural area of Darwin in recent times.

Neglected orchards pose an increased risk for spread of pests and diseases.

Neglected orchards

Eventually decreasing returns to hobby mango growers can result in orchards being neglected or minimally maintained. The DBIRD officer who conducted the 2004 mango tree survey reported an increased number of neglected orchards in the inner rural area of Darwin (Gerry McMahon, pers. comm.).

It is generally accepted that neglected orchards pose an increased risk for spread of pests and diseases. Under both the current *Plant Disease Control Act (2000)* and draft provisions of new plant health legislation in the Northern Territory the owner of an orchard may be served a notice if a declared disease or pest is likely to be spread because an orchard is habitually neglected. The orchard may be destroyed if the matter is not attended to and the cost payable by the owner.

Where pests or diseases are endemic control is largely the responsibility of individual enterprises. Some participants in the *Grower Survey* attributed more frequent spraying on their properties to an increased number of neglected orchards in their neighbourhood.

Poor quality fruit marketed

In an effort to maximise returns growers send poor quality or green fruit to the central markets. Market wholesales interviewed for this study attributed most of this behaviour to hobby growers. (Market wholesaler interviews pers. comm.). Both wholesalers and participants in the G*rower Survey* felt that this had the effect of depressing the market for other growers, through negatively impacting on the reputation of all Northern Territory fruit. A number of participants in the G*rower Survey* felt that there should be more regulation to control what product was placed on the market floor.

Increasing impost of "red-tape"

Many participants in the G*rower Survey*, particularly part-time growers were concerned about the increasing time and cost requirements of partaking in a more commercially focussed mango industry. Participants referred to the need to participate in a range of quality assurance and chemical certification programs such as the Interstate Quarantine Certification (ICA) and Freshcare quality assurance programs. They also talked about the cost impost of the new national Mango Industry levy introduced on 1 July 2003.

For hobby farmers, the amount of "red-tape" is not proportionate to the scale of enterprise.

It was felt that while not burdensome individually, all the minor committments add up to a major time and cost commitment, that was not proportionate to the scale of their enteprises.

5.6 A commercially focussed industry will eventuate

The mango industry in the Northern Territory has grown rapidly over the past decade.

Increased industry concentration

In its early days the mango production sector was based primarily on a large number of small block-holders or hobby farmers, especially around the Darwin area.

However, as the industry matures, medium to large-scale commercial producers account for a larger share of production. This is due to both an influx of new large enterprises and smaller enterprises leaving the industry in response to market pressures and the need to become more efficient.

Many small growers, particularly part-time growers or growers for whom mango growing is part of a retirement (or semi-retirement) plan have plans to leave the industry.

While concentration in the production sector is increasing, the largest 25 mango blocks still account for less than 40% of trees planted, which based on economic benchmarks, classes the level of industry concentration as low.

Concentration within the packing sector is high, with the top four public packing sheds responsible for more than 50% of the public packing capacity. This level of concentration may have significant implications for competition. (Hayes et al. 1999).

The structural change going on within the mango production sector is likely to continue with many small growers, particularly part-time growers or growers for whom mango growing is part of a retirement (or semi-retirement) plan, having plans to leave the industry.

Thirty-nine percent of hobby farmers did not see themselves farming mangoes in five years time.

Hobby growers

Thirty-nine percent of the participants classified as having a hobby attitude in the *Grower Survey* did not see themselves farming mangoes in five years time. There was only one participant from a large enterprise who did not plan to still be farming mangoes.

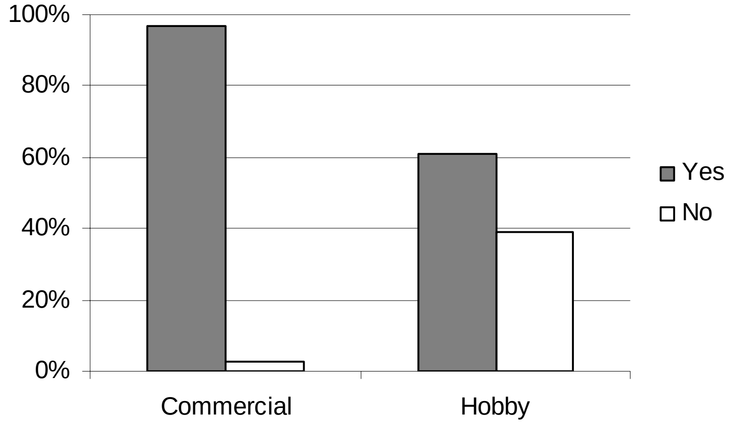


Figure 6 Do you still see yourself farming mangoes in five years time?

Retiree growers

For 21% of participants in the *Grower Survey* mangoes were intended as the primary source of income in retirement. These growers typically have small enterprises of less than 2,000 trees.

The income variability, typical of mango enterprises, was a critical issue for these growers. Poor years, either in terms of prices or yields have already resulted in average prices falling below the full cost of production for small enterprises. Increased pressure on prices in the future could easily see prices falling below the direct costs of production (direct costs include all field and pick, pack and marketing costs). This would result in growers having to put cash into their mango enterprises from off-farm income sources. For retiree or semi-retiree growers for whom mangoes makes up a higher proportion of their household income, successive poor years will impact on their standard of living.

Many growers who got into mangoes as part of a retirement plan are discovering that they either cannot physically manage or generate sufficient income from their orchard in full retirement.

Additionally, many growers who got into mangoes as part of a retirement plan are discovering that they either cannot physically manage a 2,000 tree enterprise as they get older; or that a smaller property cannot generate sufficient income in full retirement.

There will be increasing dissatisfaction and some hardship amongst the retiree/semi-retiree segment of the industry.

Many are looking to sell their properties but are unable to realise sufficient capital return on their initial investment. The analysis of rural property sales over the past 15 years found that appreciation in property prices was not commensurate with the additional investment in development of rural properties that has occurred over the same time period.

With 80% of growers interviewed being older than 50 and approaching retirement, there will be increasing dissatisfaction and some hardship amongst this segment of the industry.

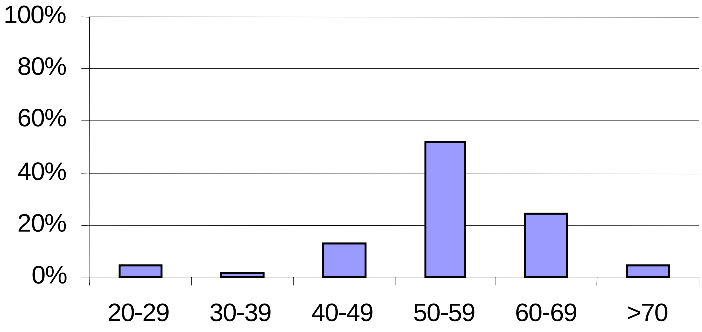


Figure 7 Age of survey participants

Small farms

Small mango farms in the Northern Territory are facing similar structural issues as small farmers in Australian agriculture as a whole.

In regions dominated by small farms, such as the Darwin rural area, the path to productivity increase is blocked by the amenity based land values.

The capture of productivity improvements is crucial to remain ahead of the terms of trade. A number of research studies have shown that productivity improvements are more likely to be captured by larger farms. Farm businesses must generally be large enough to general a surplus that can be used to fund expansion. In regions dominated by small farms, such as the Darwin rural area, the path to productivity increase is blocked by the amenity based land values with few small farm businesses able to create a surplus that would fund business expansion. Also reliance on off-farm income by small farmers has the effect of reducing the pressure to follow an expansionary strategy (Cary, 2002).

Industry growth

Economic principles state that unless barriers to entry exist there will be new entrants into any industry where profits are visible. The economic analysis conducted for this study showed that medium and in particular large size mango enterprises can generate reasonable profits in the Northern Territory.

However, the systems analysis highlights the importance of addressing a number of key factors limiting the profitability of commercial enterprises and slowing the growth of the Northern Territory mango industry.

Each $1 million of growth in the mango industry generates an estimated additional output in the rest of the Northern Territory economy of $422,000. For each additional $1 million of production 3.7 jobs are created within the industry itself with a further 1.3 jobs created in other sectors[1], including the services to the agriculture sector (e.g. contractors) and the wholesale and retail trade sector (e.g. packing materials, farm inputs) (Murti 2001).

In the fullness of time, more part-time, retiree and small growers will exit the industry, leaving an increasingly commercially focussed, pro-active industry.

DBIRD projections show that production is set to triple by 2010. Industry growth beyond this will be limited unless additional markets can be developed. Limited market demand will put significant downward pressure on prices. It is therefore likely that eventually, more part-time, retiree and small growers will exit the industry, leaving an increasingly commercially focussed, pro-active industry.

5.7 Industry cohesion is lacking

If the industry is to reach its potential, a unified approach will be needed to address the major issues limiting further development. Lack of industry unity was identified as a concern by 35% of participants in the *Grower Survey*.

Labour and transport availability, transparency of the marketing system, supermarket dominance, product oversupply and lack of market coordination are all recognised problems within the industry (Mango Industry Advisory Committee 2004). In the Northern Territory availability of harvest labour, packing facilities and transport and lack of marketing coordination have restricted the quantity of fruit reaching retail shelves in various seasons.

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[1] Note: These multipliers are for the "Other Agriculture sector" of which horticulture is a component, and hence the potential output and employment generated in the economy by an investment in the mango industry should be regarded as maximum values.

A concerted, unified effort between all members of the mango industry supply chain is required.

Without a concerted, unified effort between all members of the mango industry supply chain similar circumstance will arise again.

The composition of the industry, (a lot of small part-time growers) does not lend itself easily to cohesion. Coordination of a large number of small growers is problematic especially when participation in industry organisations and attendance at industry events is low.

The NTMIA is the peak industry body representing mango growers and packers in the Northern Territory. It has approximately 160 members. In 2004 three meetings were required before a quorum was achieved for the association's general meeting.

A number of participants in the *Grower Survey* mentioned that they had become disenfranchised with the industry representative body in the past and no longer attended meetings or industry events. There was also a large contingent of participants who had always "kept to themselves" and had no desire to get involved in broader industry issues.

A culture of secrecy, confusion and misinformation currently pervades the industry.

A number of growers referred to a culture of secrecy, confusion and misinformation pervading in the industry, particularly in relation to prices received for product and growing practices. Many growers are reluctant to share their knowledge and ideas and others are genuinely unaware of opportunities to do so.

The mango industry has also been fragmented at the national level in the past. The Australian Mango Industry Association Ltd (AMIA) is the peak industry body for Australian mango producers. Membership is open to any individuals / producers or other associated agribusiness connected with the Australian mango industry.

In June 2003 after some opposition a national research and development and promotion levy was introduced. A nationwide ballot in April found in favour of a 25 cent levy. But afterwards growers opposed the plan, saying ballot participation was too small to adequately represent growers and that some voters were uninformed and misguided. Subsequently it was decided to halve the levy to 12.5 cents. The AMIA will administer the funds on behalf of industry.

Table 7 Factors contributing to industry cohesion

Factor	*Avocado Industry*	*Mango Industry*
Representative body	Australian Avocado Growers Federations established in 1973. Changed representative structure in December 2003 to Avocado Australia Limited.	AMIA established in 1999
Levy	Levy in place since 1989. Set at 8 cents per tray for R&D 15 cents per tray for marketing.	Levy introduced in 2003 after considerable opposition. Set at 5.25 cents per tray for R&D 7 cents per tray for marketing.
Leadership	Same chairman of industry representative body for past eight years	
Communication	Quarterly journal publication sent to all members for 15 years.	Quarterly “Mango Matters” Weekly “Blush” Newsletter
Industry composition	Many part-time and retiree growers have left the industry over the past 10 years in response to aging grower population and amenity value of property in main growing areas.	Many part-time and retiree growers are starting to leave industry in response to poor returns and aging grower population.

The Australian Mango Industry Association believes the future of the mango industry depends on the new levy, with subsequent investment planning providing a clear direction for industry.

The avocado industry is similar in make-up to the mango industry, but exhibits considerably more unity. The foundation of this industry’s unity appears to be strong national leadership and communication with grassroots members, underpinned by an established levy that shows demonstrable benefits to growers (Antony Allen IDO Avocados Australia pers. comm.).

AMIA believes the future of the mango industry depends on the new levy, with subsequent investment planning providing a clear direction for industry (Warren Everingham ABC Country Hour 28/05/03).

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Annex 1

DEVELOPMENT OF FOCUS ISSUES AND KEY QUESTIONS

Introduction

This consultation process was carried out to feed into a study of social and economic issues within the Territory's mango industry. The aim of the consultation was to involve industry stakeholders in the generation of focus issues and key questions for the study to explore.

Methodology

The focus issues and key questions were developed through a series of discussions with leading growers, government officers and industry commentators.

The participants were informed that the purpose of this consultation was to identify key issues for a study into social and economic issues within the Northern Territory mango industry. They were also told that they were one of a number of people being consulted in the process.

The discussions were based around a series of questions as follows:
"How do you see the future of the industry?"
"What are your concerns regarding the future of the industry?"
"What are the major constraints limiting the development of industry?"

As well participants were specifically asked, "What do you see as the major issues that this project needs to look at?"

In addition to the individual discussions staff of the Horticulture Division of DBIRD met to discuss the project on 30 January 2004. The project was also discussed at the special meeting of the NTMIA held on 17 February 2004. A preliminary list of focus issues was presented to the meeting for discussion.

Each of the individual discussions was documented as a mind-map. The individual mind-maps along with input from the meetings was then used to construct composite mind-maps for each of the following major issue categories:

- Economics.
- Social.
- Production.
- Information.
- Marketing.
- Logistics.
- Industry.

Individual interviews (in order of interview)

Lee Berryman	Darwin grower	in person	2/2/04
Huyn Ngo	DBIRD economist	in person	4/2/04
Peter Cavanagh	Darwin grower	in person	5/2/04
Ian Golding	Katherine grower	by phone	5/2/04
John Naylor	Katherine grower	in person	6/2/04
Phil Vivian	Darwin grower	in person	11/2/04
Peter Delis	Chairman NTMIA & Darwin grower	in person	12/2/04
Wayne Roscarel	Darwin grower	by phone	12/2/04
Trevor Dunmall	Industry development manager, AMIA	in person	17/2/04
Tom Harris	Chairman NTHA and Darwin grower.	in person	25/2/04

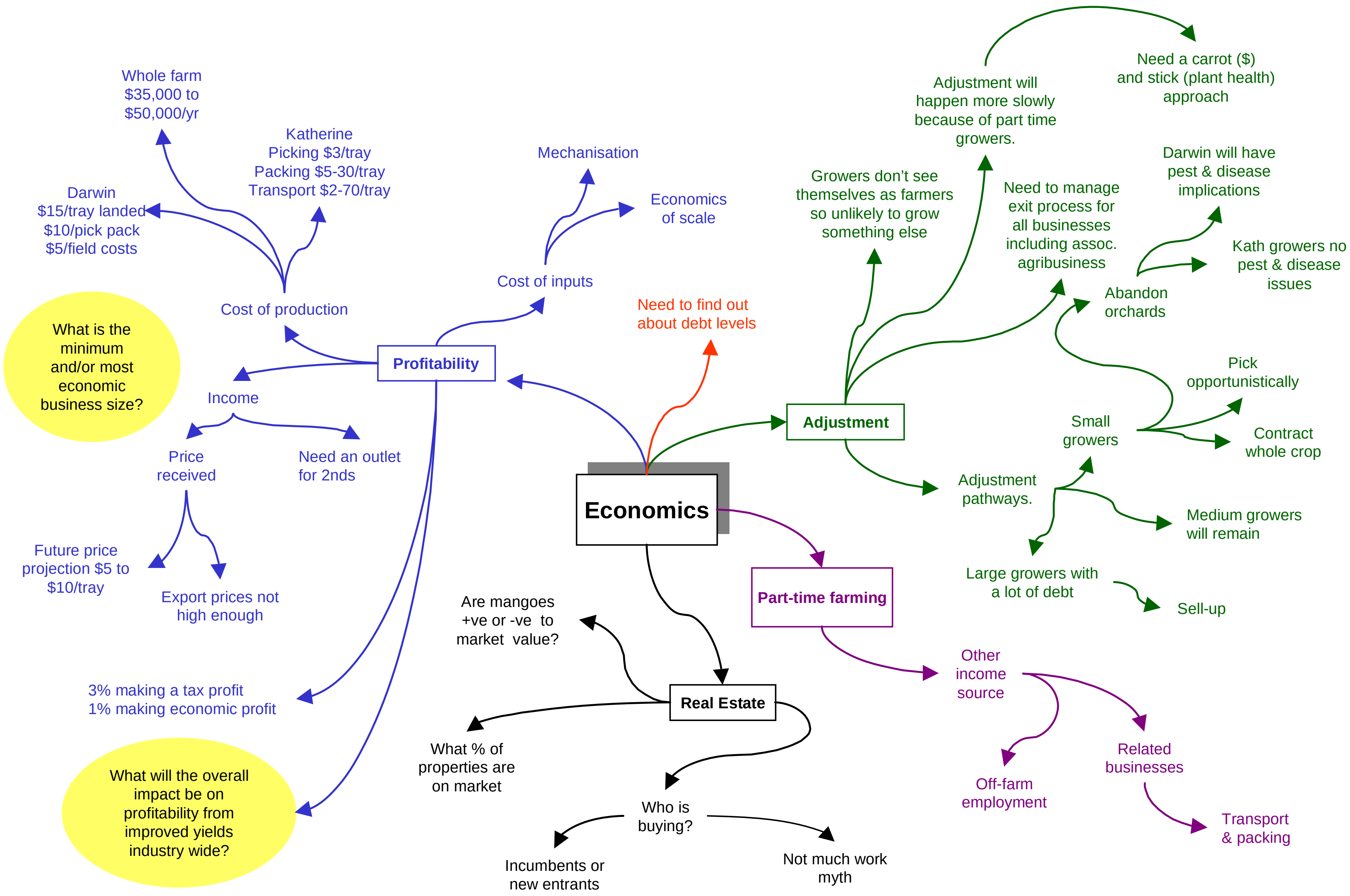
Observations

The participants were generally positive about the project and saw the need for the project, with some participants commenting that it was “over-due”.

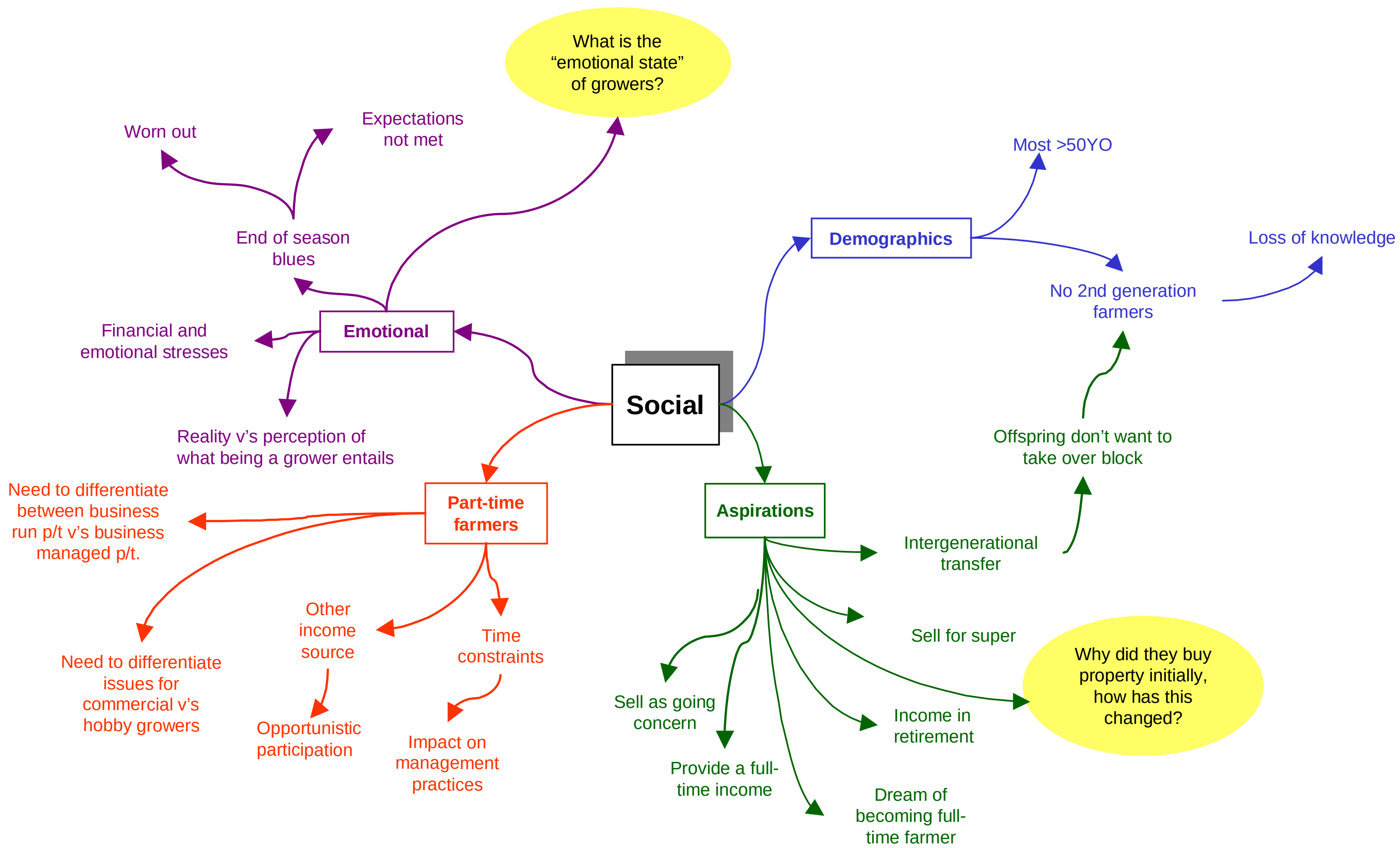
There was a lot of commonality between participants about what issues the project needs to explore however opinion often differed on the detail of the issue.

The need for the study to clearly differentiate between grower types was a recurring idea. This included differentiating between large versus small growers and commercial versus weekend / retiree growers.

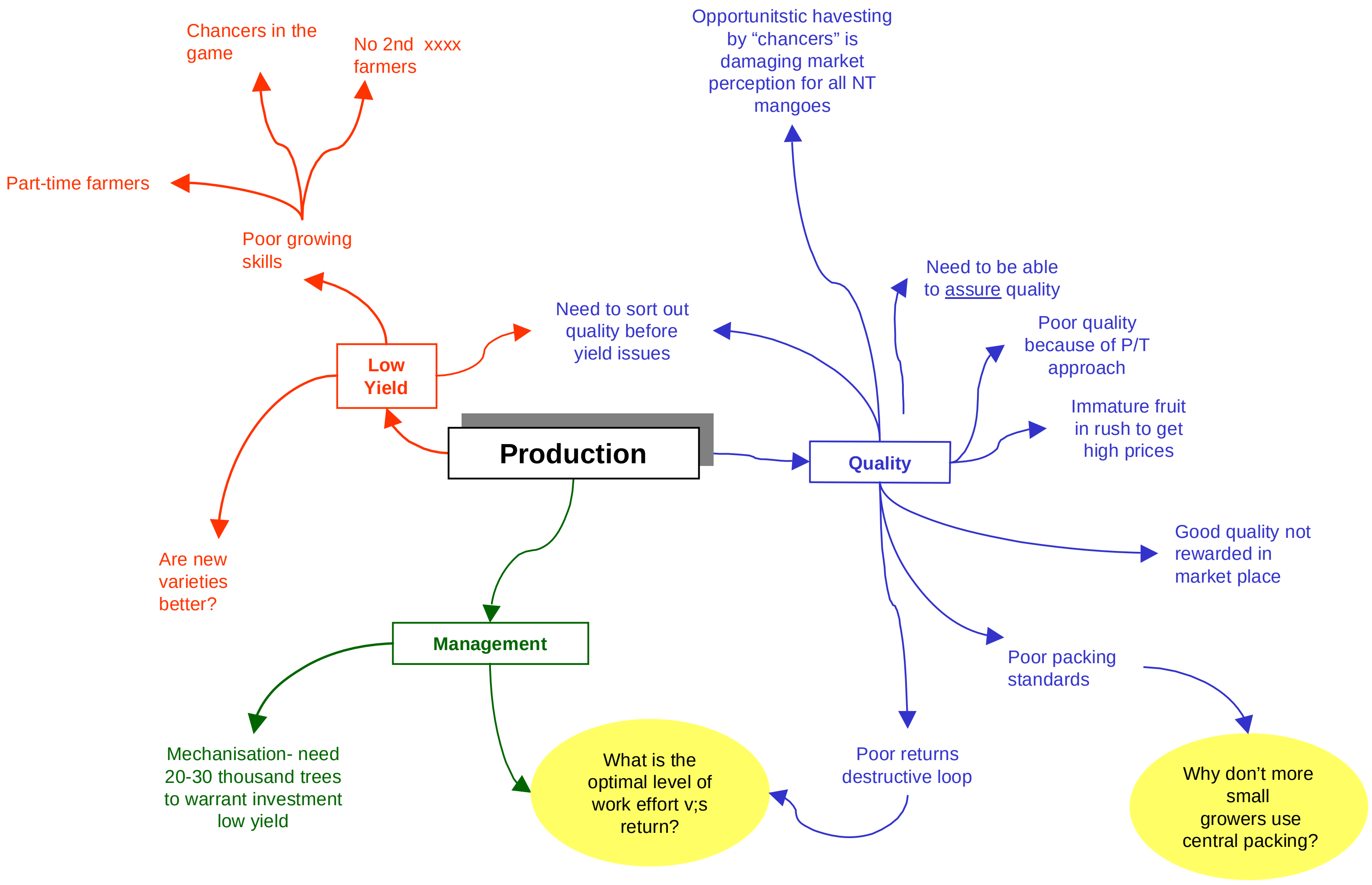
FOCUS ISSUES & KEY QUESTIONS



FOCUS ISSUES & KEY QUESTIONS



FOCUS ISSUES & KEY QUESTIONS



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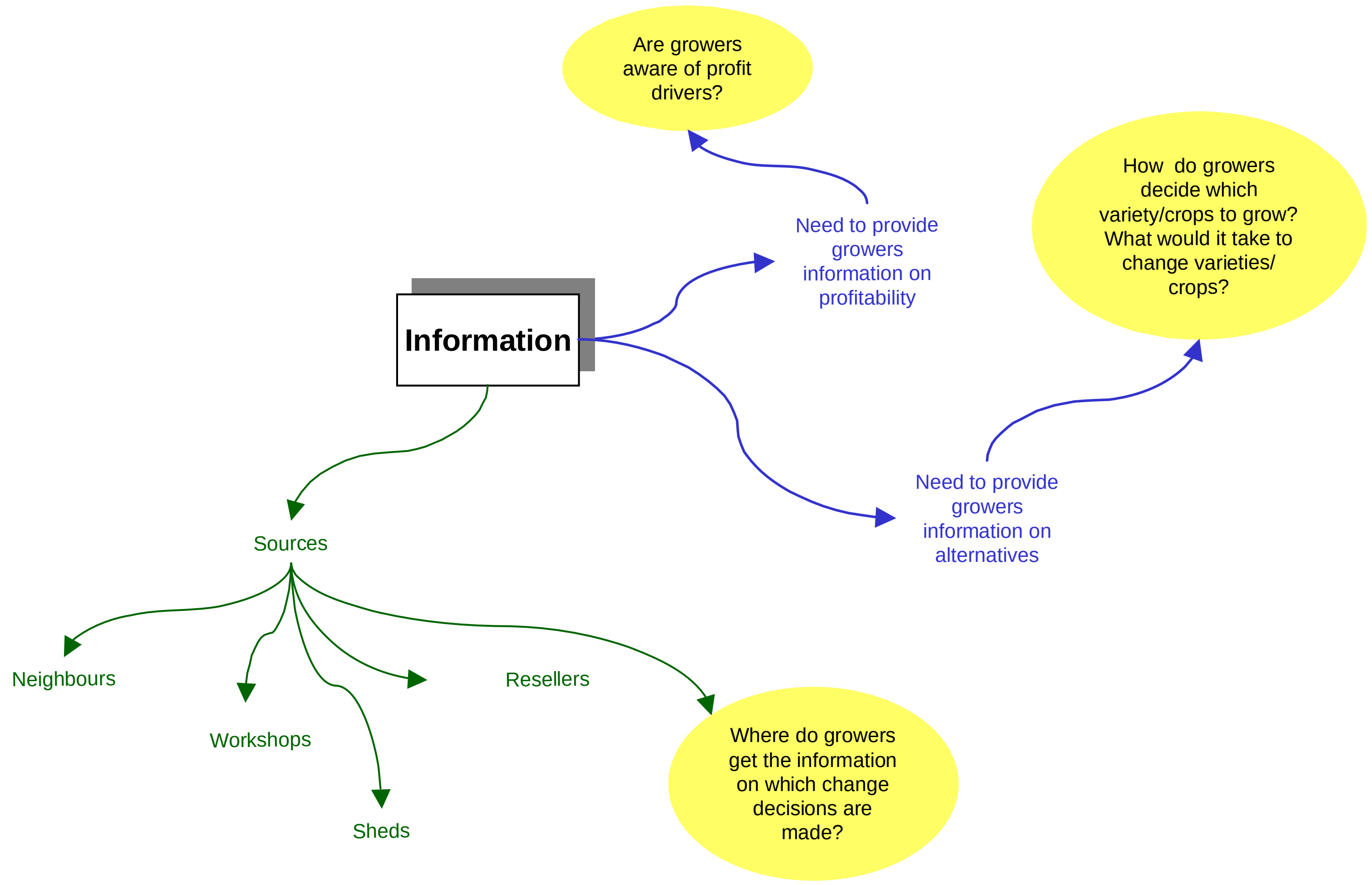

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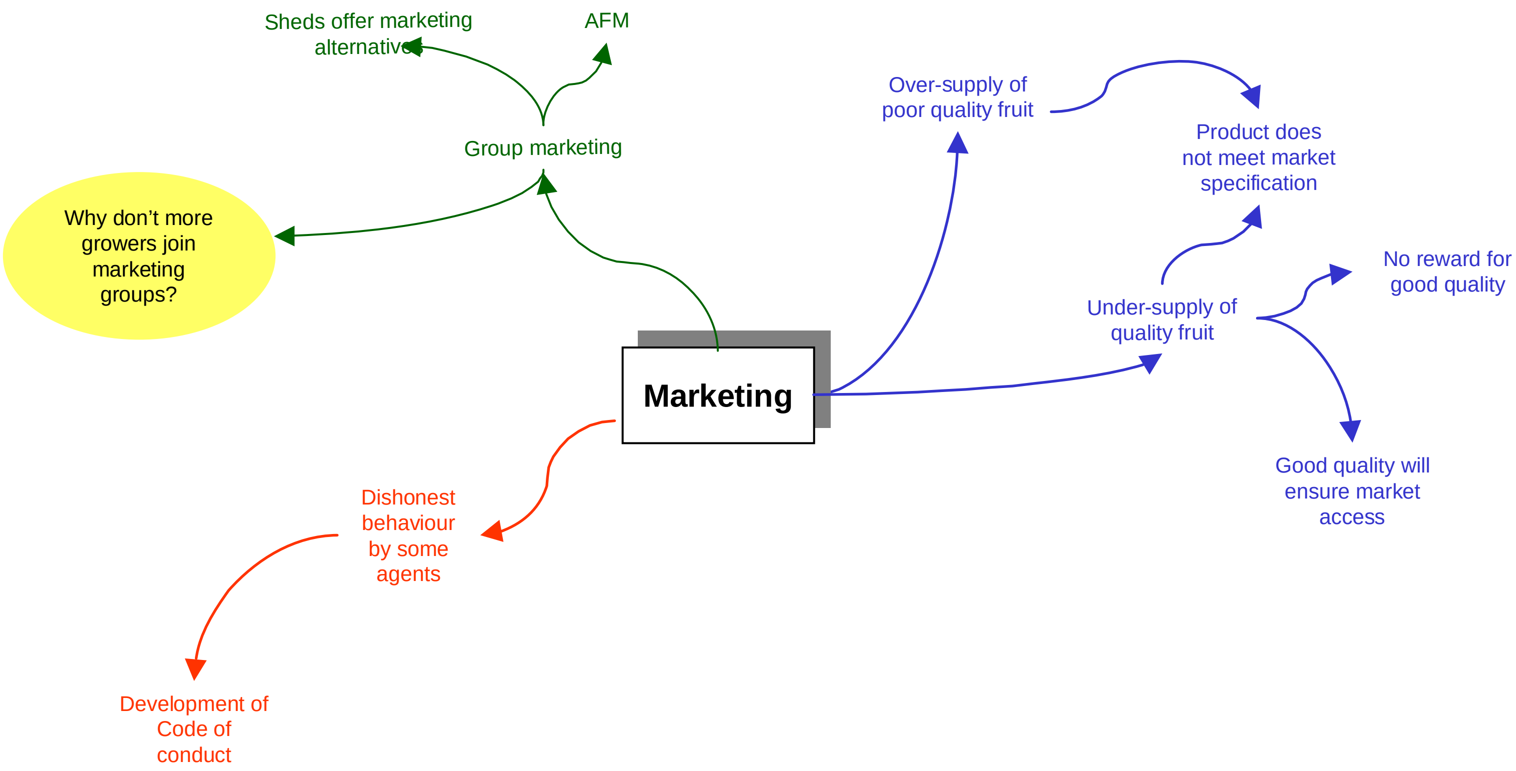

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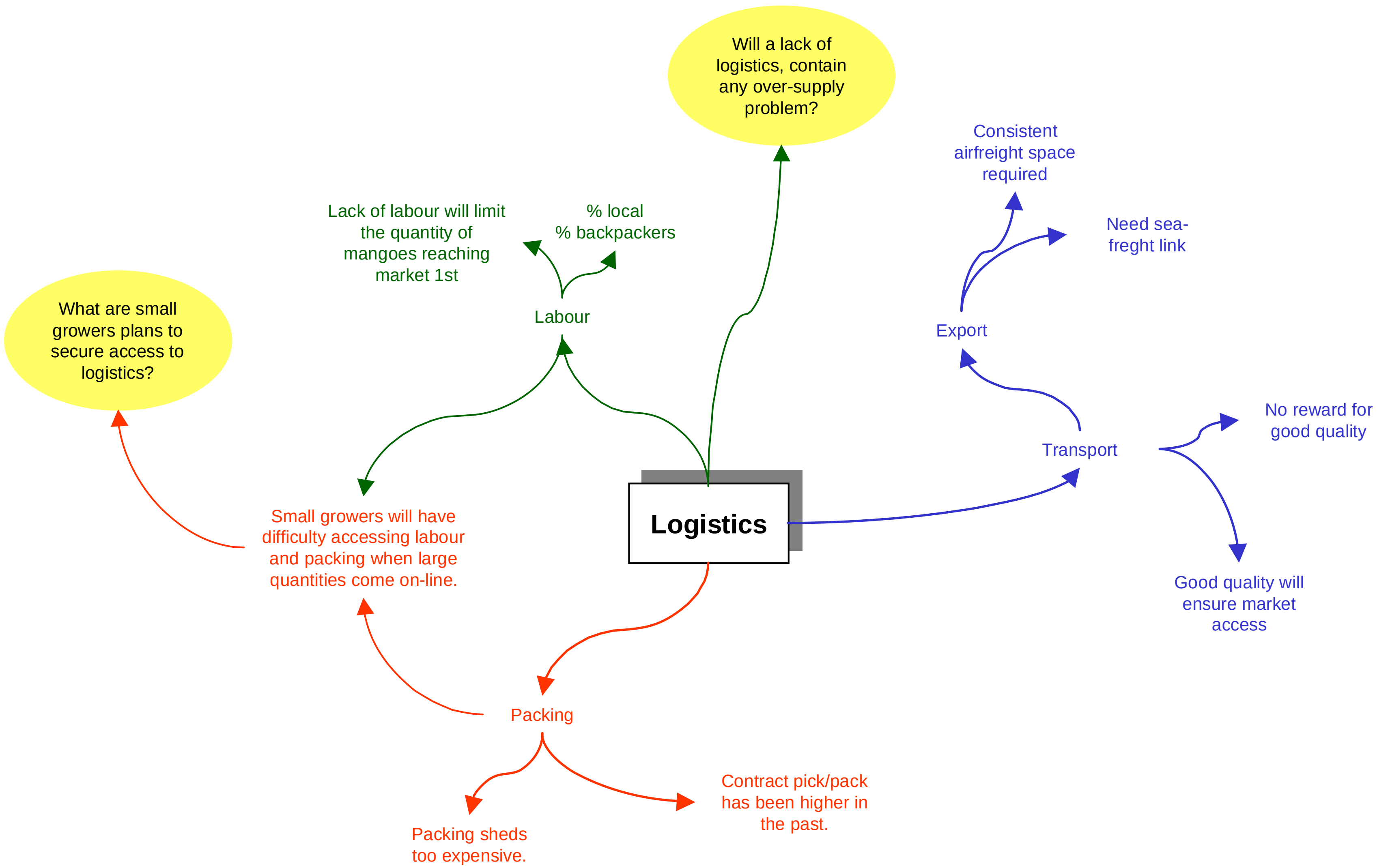

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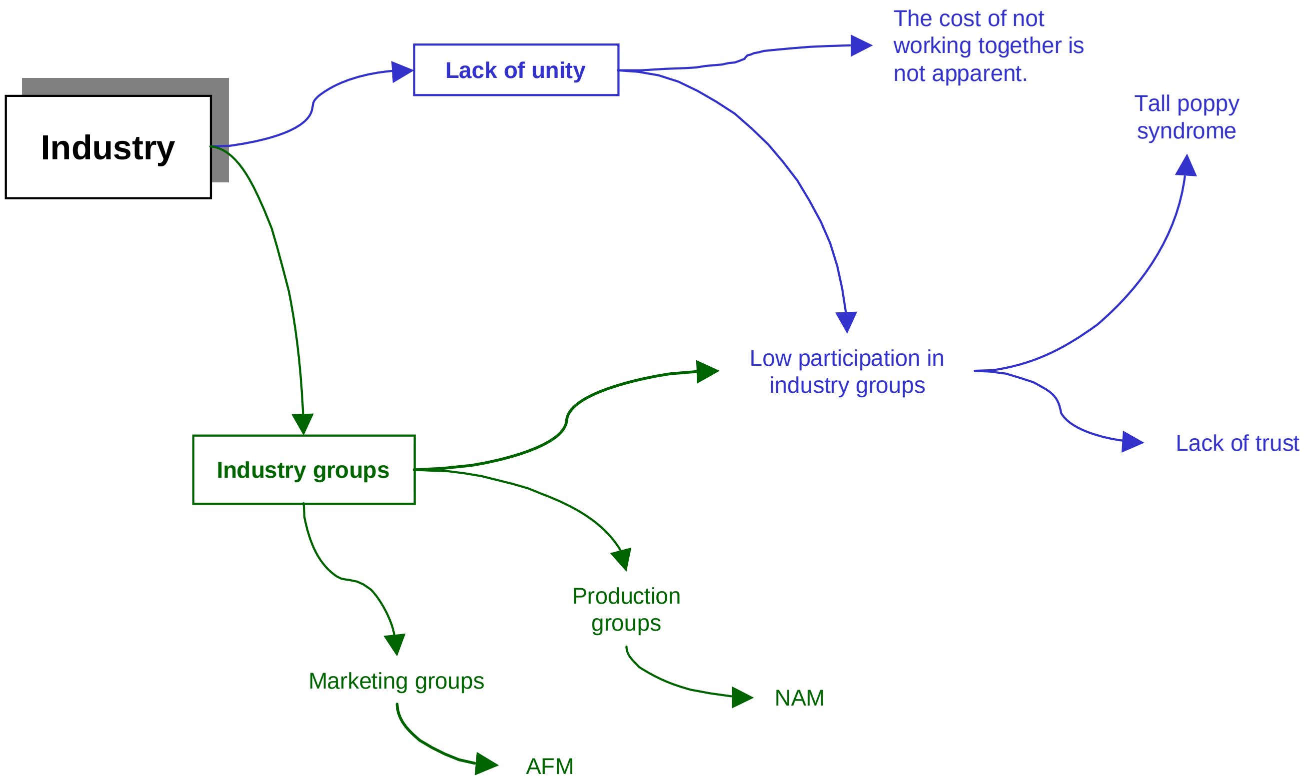


Annex 2

FINDINGS OF THE *GROWER SURVEY* – EXECUTIVE SUMMARY

A survey of mango growers was carried out by the Department of Business, Industry and Resource Development (DBIRD) during March and April 2004. The survey was part of a broader socio-economic study of the Northern Territory mango industry that aims to reveal how the industry may change over time.

Sixty-two growers were interviewed including 25 face-to-face in-depth interviews. The survey questions centred on issues faced by growers, their long term aspirations, their changing behaviour and their specific directions for their businesses in the next three to five years.

Consistent annual income and the marketing system were the most frequently mentioned issues. A lack of skilled labour was a widespread issue particularly for large and medium enterprises, and a lack of industry unity was an issue frequently mentioned by small growers.

Only 10% of growers initially got into mangoes as the principal crop of a profit driven business venture, while mangoes were often grown for income in addition to paid employment, retirement income or income from other crops.

Thirty-nine percent of participants felt that they were now more focused on, or had expanded their mango enterprises beyond their original plans. Twenty-four percent of the participants aspirations for their mango enterprise had changed to the point where they were now putting in less effort; with the remaining 37% saying that there had been no significant change to their original intentions.

The most common types of change participants made were to field management, including 18% of participants who had changed to a low chemical system. The next most common changes were to increase mechanisation and diversify varieties.

Nineteen percent of participants did not see themselves still farming mangoes in five years time. It was more likely that farmers with a hobby farming attitude had plans to leave the industry compared to farmers with a commercial farming attitude.

Of those participants planning to stay in the industry there was a low level of preparedness to act with 44% having no specific plans for the next three to five years.

Two areas of particular concern emerged from the interviews. The first was the semi-retiree's dilemma. Many of these growers are discovering that they either cannot physically manage a medium size enterprise as they get older, or that a smaller property cannot generate sufficient income in full retirement. Many are looking to sell their properties but are unable to realise sufficient capital return on their initial investment. With 80% of interviewed growers older than 50 this will soon be a more common issue.

The second area of concern was the financial squeeze affecting medium size enterprises. These enterprises have invested heavily in infrastructure and equipment, with many at the limits of their financial capacity. Meanwhile their trees are still not in full production.

Given the low level of preparedness to act by growers, it is likely that any industry adjustment in response to these concerns is likely to be slow.

Annex 3

INDUSTRY CONSULTATION FORUMS

Context

Two industry forums were held to consult industry on issues emerging from the Northern Territory Mango Industry Socio-economic study.

The forums were held in Katherine on 9 June 2004 from 6:00 until 8:30 p.m. and in Howard Springs on 12 June 2004 from 10:00 until 12:30 p.m.

Purpose

The purpose of the forums was to:

- communicate the findings of the growers’ survey and enterprise profitability analysis components of the Northern Territory Mango Industry socio-economic study; and
- determine from an industry perspective (as distinct to an individual business perspective) which are the critical issues that have emerged from the study to date.

Outcomes

By the end of the workshop, participants had:

- Prioritised 11 issues previously described in a discussion paper.
- Described a “desirable future” for the Northern Territory mango industry.

Summary

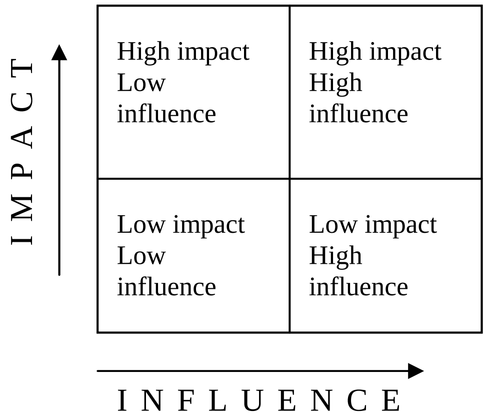
The top priority issues at both industry forums were: “Widespread grower concern about the marketing system”, and “Not enough skilled staff or labour”. This was followed by “There is a high level of variability in annual income”.

In Darwin the next highest priority issue was “Enterprises with low productivity are unprofitable”. In Katherine a priority issue was “There is a lack of industry unity” especially as it related to a co-ordinated industry approach to addressing marketing and labour concerns.

Methodology

Session 1 - Prioritisation of issues

Prior to the forum commencing, participants received a discussion paper with a description of 11 issues that had emerged from the study so far. These issues were prioritised by placing them on an impact and influence chart.



Participants were asked to rate each issue firstly on its level of impact on the mango industry, ranging from having no impact to having a lot of impact. They were then asked to rate the issue based on whether any thing could be done to influence the issue, ranging from not a lot that could be done to a lot that could be done. Based on these ratings the issue was plotted on the impact anf influence chart.

The plotting was to be done in three lots:
- Logisitics and marketing issues.
- Economics issues.
- Industry and social issues.

Prior to each plotting there was a presentation on each of the issues to be discussed which highlighted key information generated by the study, either from the growers' survey or economic analysis.

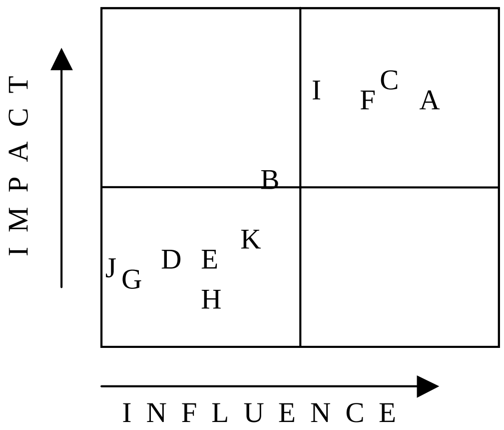
Session 2 – Desirable future

Based on all the discussion to date the group was asked to make a list of dot points that describe the industry as it is now. They were then asked for each of the points to give a corresponding dot point that described what they desired for that point in the future. It was stressed that this was to be a desired future as distinct from what they thought would happen. These future points when put together describe the "desirable future".

KATHERINE FORUM – Wednesday 9 June 2004

Facilitators *- Julie Bird & Karen White* ***Scribe*** *- Chris Wicks*

Participants
Ken Barnes, Grower
Ken Rayner, Grower
Bernie Tomlin, Grower
Miriam Golding, Grower
Pancho Jack, Grower
Bill Davy, Grower
John Denbow, Grower
Steve – Refrigeration business
Mark Riddle - Katherine Times
Kate Sieper, ABC - reporter
Golam Azam, DBIRD



Issues key :

A	Labour
B	Red Tape
C	Marketing
D	Financial squeeze
E	Poor productivity/profitability
F	High income variability
G	Industry adjustment slow
H	Maturing industry
I	Lack of industry unity
J	Hobby attitide
K	Not a profit driven venture

Output session 1 – Katherine

Participants' comment on the issues
Issue A: - There is not enough skilled staff or labour
Get the workers here (especially East Timorese).
Issue harvest visas.
Improve worker facilities e.g. accommodation.

Issue B: - Small growers are finding "red tape " onerous
Stream line auditing (merge auditing and single schemes).
Single QA scheme, single national standard, single export standard.
Transfer cost to consumers.

Issue C: There is widespread grower concern about the marketing system
Growers need to study value-chain and markets for themselves.
Develop relationships in the marketing system.
Demand transparency.
Understanding of the marketing system is essential for industry development and growth.
Marketing groups are hard work and need commitment.

Issue D: The financial squeeze is affecting medium size enterprises
Every cent/tray saved = $/ha profit.
Medium size farms cannot afford to get out.
Katherine properties are larger.
Need farm ownership turnover to truly assess farm-value in Katherine.

Issue E: Small enterprises with low productivity are unprofitable
Cost of production is the grower's responsibility.
Options to improve are available.

Issue F: There is a high level of variability in annual income
Income variability is linked to farm productivity.

Issue G: Industry adjustment will occur naturally although it is likely to be slow
Mango industry is still rationalising.
Expect casualties but industry will survive.

Issue I: There is a lack of industry unity
Katherine has some unity.
Open communication does occur.
Unity is about trust.
If the industry does not hang together, they could hang separately.
The observations in the report are symptoms of a lack of industry unity.

Issue J: A large proportion of growers have a hobby attitude to farming mangoes
80% trees from 20% of growers – majority of trees are grown for profit.
Large operations can influence markets and industry; they need to be good operators for the sake of industry.

Output session 2 - Katherine

We would like to move from an industry that is:
- juvenile;
- financially challenged;
- fragmented by low participation; and
- has an aging demographic.

That is:
- made up of a range of business sizes with a range of productivity;
- based on limited markets;
- with few freight options; and
- where labour is limited.

Where there is:
- high risk to growers;
- an inequity of technical knowledge between industry members; with
- little turnover in farm ownership and an untested market value of properties.

To an industry that is:

- mature and still growing;
- more unified and harmonious working towards a common goal;
- prosperous;
- made up of a range of business sizes with high productivity and consistent product quality;
- made up of energetic, physically capable, innovative people who participate in industry;
- knowledge sharing and there is continuous improvement in knowledge.

With:

- global markets for industry product;
- more freight options based on better seasonal forecasting of freight requirements;
- more labour channels, a return labour force, and improved labour conditions.

Where:

- labour is tied in with other local industries and other growing regions via the harvest trail;
- risk is shared throughout the supply chain; and
- there is a healthy level of property turnover.

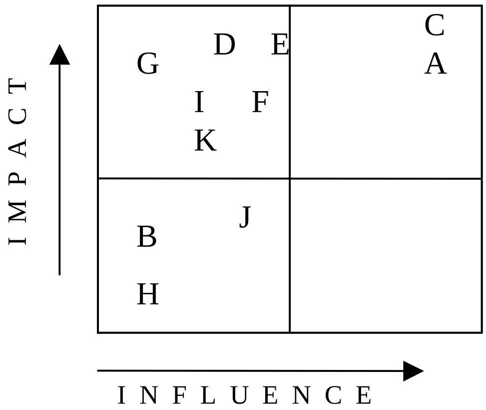
DARWIN FORUM – Saturday 12 June 2004

***Facilitators** – Lee Berryman & Karen White* *__Scribe__ – David Hamilton*

Participants

Ian Baker, Grower
Wayne Saunders, Grower
Kevin Blackburn, Grower
Mike Poffley, Grower
Mick Malady, Grower
Eric Philp, Grower
Kim Sears & partner, Growers
Rebecca Marney, Grower
John Marney, Grower
Kean Loke, Grower
Peter Cavenagh, Grower
Chris Lugg, Grower
Wayne Roscarel, Grower
Muy Hount Ma & partner, Growers
Gerry Hemphill, Grower
Peter Harrison, Consultant

Output session 1- Darwin



Issues key :

A	Labour
B	Red Tape
C	Marketing
D	Financial squeeze
E	Poor productivity/profitability
F	High income variability
G	Industry adjustment slow
H	Maturing industry
I	Lack of industry unity
J	Hobby attitude
K	Not a profit driven venture

Participants' comments on the issues

Issue A: - There is not enough skilled staff or labour
Improve employment conditions.
Improve facilities i.e. accommodation.
Improve management of labour.

Issue B: - Small growers are finding "red tape " onerous
Systems to improve.
Groups / members need to work together to have any influence.
Reduce overlap – pull out core components of each system.

Issue C: - There is widespread grower concern about the marketing system
Organise growers to lobby.
Direct grow input to codes etc.
Advertise product to consumers.

Issue D: - The financial squeeze is affecting medium size enterprises
Improve productivity.
Improve marketability at retail – price per kg instead of price per fruit.

Issue E: - Small enterprises with low productivity are unprofitable
Balance costs against production.

Issue F: - There is a high level of variability in annual income
Utilise risk management practices as done in other agricultural industries.

Issue G: - Industry adjustment will occur naturally although it is likely to be slow
Needed to ask if you could sell would you, instead of do you plan to still grow mangoes?

Output session 2 - Darwin

We would like to move from an industry that has:

- too many trees;
- a poor return on assets;
- a downward spiralling profit / input cycle;
- low per hectare productivity;
- no unity or cohesion within industry, and low participation by growers.

Is made of growers that:

- are part-time;
- don't have a commercial attitude;
- have a poor understanding of industry economics;
- have poor growing practices;
- lack motivation to improve;
- don't understand the market system; and
- are not empowered to deal with markets, quality assurance or government.

With a product that:

- has no product identity;
- is sold into a dysfunctional market system;
- and is not matched to market requirements

To an industry that has:

- a stable number of trees as the basis of a sustainable industry;
- where production = market demand;
- a return on assets of 15% including risk margin;
- active + vibrant industry participation;
- increased unity in marketing, through a smaller number of marketing desks thereby maintaining product quality and achieving a "Territory Mango" product identity.

Where more growers:

- are empowered;
- have a commercial attitude, even if they are part-time growers;
- understand industry economics;
- utilise best practice growing;
- have access to technical extension services;
- grow mango varieties with increased productivity or have increased the productivity of Kensington Pride;
- have improved production efficiency and business management.

With a product:

- that is more widely consumed;
- whose price increase is in line with increased input costs;
- that is marketed in a market system that is accountable, transparent and based on fair and open trading including cool chain management;
- that is matched to consumer product requirements;
- and sold on a $ per kilogram basis.

Annex 4

ENTERPRISE PROFITABILITY ANALYSIS

Introduction

A previously developed economic model (described in detail in DBIRD Technical Bulletin 301 "Profitability of Mango Production in the NT Top End") was used analyse the economics of mango enterprises of various sizes (small - 600 trees, medium 3,000 and 5,000 trees and large - 10,000 trees and more), productivity and locations.

The economic model is based on an orchard with a tree spacing of 166 trees/ha or 10 m x 6 m. Small and medium enterprises are assumed to be located in Darwin while larger orchards are assumed to be located in Katherine.

In an effort to model the range of picking and packing options utilised by growers; scenarios were developed for combinations of own picking, own packing, contract pick and pack and central packing.

The cost of own labour was not included in three of the scenarios in order to gain an insight into the costs on which some growers judge the success of their mango enterprises.

All together ten scenarios were analysed:

600 trees	Contract harvesting and marketing	Labour costed
600 trees	Own pick & packing	Labour not costed
600 trees	Own pick & packing	Labour costed
600 trees	Own pick & central pack	Labour not costed
600 trees	Own pick & central pack	Labour costed
3 000 trees	Own pick & pack	Labour costed
5 000 trees	Own pick & pack	Labour costed
10 000 trees	Own pick & pack	Owner's labour and management not costed
20 000 trees	Own pick & pack	Labour and management fully costed
30 000 trees	Own pick & pack	Labour and management fully costed

Method of analysis

A <u>cost of production</u> per tray was calculated for each of the above scenarios at five yield points ranging from three trays per tree to 15 trays per tree.

The cost of production comprised of:

- all field maintenance costs;
- pick, pack transport and agents costs;
- semi-fixed costs;
- plus an allowance for capital recovery.

Gross and net margins per tray were also calculated for each scenario based on an average yield of eight trays per tree.

Gross margin is defined as the difference between income and variable costs where variable costs include all field costs, pick, pack, transport and agents costs.

Net margin is defined as the gross margin minus the semi-fixed costs and an allowance for capital recovery, but before interest and income tax.

Information and Assumptions Used in the Analysis

Field Maintenance Costs

Annual field maintenance costs include all weed and pest control, fertilisers, irrigation running costs, flowering and canopy management.

Field maintenance costs used in the Katherine scenarios were lower than in Darwin scenarios due to fewer number of sprays and lower fertiliser cost given that no lime is required.

Picking, Packing Transport and Marketing Costs

Scenarios were developed for combinations of own picking, own packing, contract pick / pack and central packing.

- Hired casual labour for picking and packing: $13.50 per hour.
- For own picking and packing rate of five trays per hour, is assumed.
- For own picking only, a rate of 25 trays per hour, at $13.50 per hour, is used.
- For central packing and transport, the current rate is $8.50/tray.
- For contract picking. packing and transport, the current rate is $11.10/tray.
- Road freight cost: $300 per pallet (128 trays).
- Agents' commission of 12.5% of the sale value is used.

Allowance for capital recovery

The allowance for capital recovery was equal to the sum of the annual depreciation on all capital items. Annual depreciation was calculated via the straight-line depreciation method where depreciation is equal to the initial cost minus the trade-in value divided by the item's estimated life.

Capital items included all capital inputs necessary for the planting, maintenance and harvesting of the orchard, such as fencing, bore and irrigation system, tractor(s) and associated implements, vehicles and storage / workshop. For scenarios where fruit was packed on-farm, capital costs included forced air cool room and cold storage room and packing shed facilities commensurate with the size of the enterprise. Land and house cost was not included in the capital recovery allowance.

The total capital cost (excluding land) for the various enterprises are given in Table 1.

Table 1 Total capital cost excluding land ($/enterprise)

Small enterprises Darwin – 600 trees		Medium enterprises		Large enterprises	
Contract pick & pack	$238,559	Darwin 3 000 trees	$726,787	Darwin 10 000 trees	$1,531,763
Own pick & pack	$334,449	Katherine 5 000 trees	$806,380	Katherine 20 000 trees	$2,217,755
Own pick & central pack	$264,447			Katherine 30 000 trees	$3,093,885

Semi-fixed Costs

Semi-fixed costs include costs such as permanent labour/on-site manager, telecommunications, general repairs and maintenance, office expenses, book-keeping/accounting, insurance, registration fees etc.

For the 3,000 trees enterprise one part-time employee was costed. For the 5,000 trees enterprise one full-time employee was costed. For the 10,000 trees enterprise scenario one full-time paid employee was costed, however own management labour (including spouse's labour) was not costed in this scenario.

In the 20,000 trees enterprise, four full-time employees were costed including a full-time manager, mechanic, office worker and one field operator. In the 30,000 trees scenario, five full time employees were costed including a full-time manager, mechanic, office worker and two field operators.

Results of Analysis

Results of the analysis are presented in Table 2 below. Yield is a large determinant of cost of production on a per tray basis. Table 2 presents the cost of production for each scenario based on an average yield of eight trays per tree. Table 2 also presents the gross and net margins per tray and per enterprise at two sets of average prices. Firstly $18 per tray for Darwin and $19.50 per tray for Katherine and secondly $16.50 per tray for Darwin and $18 per tray for Katherine. Historical prices show that Katherine mangoes command a price premium over Darwin mangoes of around $1.50 per tray.

Table 2 Production costs and return of Northern Territory mango enterprises at various sizes

	Small enterprises					Medium enterprises		Large enterprises		
	Darwin 600 trees contract harvesting	*Darwin 600 trees own pick/pack*	*Darwin 600 trees own pick/pack*[4]	*Darwin 600 trees own pick/ central pack*	*Darwin 600 trees own pick/ central pack*[4]	*Darwin 3,000 trees own pick/pack*	*Katherine 5,000 Trees own pick/pack*	*Darwin 10,000 trees own pick/pack*[5]	*Katherine 20,000 trees own pick/pack*	*Katherine 30,000 trees own pick/pack*
Total number of trays produced @ trays/tree/yr	4,800	4,800	4,800	4,800	4,800	24,000	40000	80,000	160,000	240,000
1. Cost of Production per tray										
Field production cost/tray [1]	$2.42	$2.42	$2.42	$2.42	$2.42	$2.53	$2.33	$2.57	$2.28	$2.24
Pick, pack, transport and agent's fees/tray [2]	$13.35	$10.02	$10.03	$11.79	$11.50	$10.02	$10.22	$9.85	$9.93	$9.91
Total Direct/Variable cost $/tray	**$15.77**	**$12.44**	**$12.45**	**$14.21**	**$13.92**	**$12.55**	**$12.56**	**$12.42**	**$12.22**	**$12.15**
Overhead Cost	$1.98	$1.98	$1.98	$1.98	$1.98	$1.50	$1.49	$0.76	$1.49	$1.00
Capital Recovery Cost	$2.19	$3.22	$3.22	$2.79	$2.79	$1.07	$0.83	$0.80	$0.64	$0.60
Total cost $/tray (including capital cost recovery and overhead) [3]	**$19.94**	**$17.64**	**$17.65**	**$18.98**	**$18.69**	**$15.12**	**$14.87**	**$13.98**	**$14.35**	**$13.74**
2. Margin per tray:										
@$18/tray (Darwin) or $19.50/tray Katherine										
Gross margin per tray	**$2.23**	**$5.56**	**$5.55**	**$3.79**	**$4.08**	**$5.45**	**$6.94**	**$5.58**	**$7.28**	**$7.35**
Net Margin per tray	**-$1.94**	**$0.36**	**$0.35**	**-$0.98**	**-$0.69**	**$2.88**	**$4.63**	**$4.02**	**$5.15**	**$5.76**
@$16.50/tray (Darwin) or $18.00/tray Katherine										
Gross margin per tray	**$0.73**	**$4.06**	**$4.05**	**$2.29**	**$2.58**	**$3.95**	**$5.44**	**$4.08**	**$5.78**	**$5.85**
Net Margin per tray	**-$3.44**	**-$1.14**	**-$1.15**	**-$2.48**	**-$2.19**	**$1.38**	**$3.13**	**$2.52**	**$3.65**	**$4.26**
3. Cost of production per enterprise										
Establishment cost	$10,012	$10,001	$10,002	$10,001	$10,001	$50,381.91	$83,672	$167,948	$305,858	$458,786.55
Total capital cost (first 5 years)	$238,559	$334,447	$334,449	$264,447	$264,447	$726,787	$806,380	$1,531,763	$3,930,785	$3,093,885
Total investment cost required (Peak debt)	$300,000	$374,035	$386,234	$326,550	$320,241	$782,506	$1,063,949	$1,890,116	$3,150,785	$4,070,720
Investment required per tree	$500	$623	$644	$544	$534	$261	$213	$189	$158	$136
Field maintenance cost	$11,698	$11,633	$11,664	$11,633	$11,633	$60,674	$93,311	$205,794	$354,791	$537,190
Picking, packing, transport and Marketing	$120,150	$48,090	$48,137	$56,596	$56,596	$240,511	$408,932	$787,925	$1,589,307	$2,378,407
Overhead cost	$20,250	$9,500	$9,500	$9,500	$9,500	$36,000	$59,500	$60,500	$239,000	$239,000
4. Margin per enterprise										
@$18/tray (Darwin) or $19.50/tray Katherine										
Gross margin per enterprise	**$10,704**	**$26,677**	**$26,630**	**$18,170**	**$19,565**	**$130,815**	**$277,758**	**$446,281**	**$1,165,259**	**$1,764,404**
Net farm income per enterprise	**-$9,312**	**$1,707**	**$1,660**	**-$4,700**	**-$3,305**	**$69,094**	**$185,210**	**$321,735**	**$823,961**	**$1,381,262**
@$16.50/tray (Darwin) or $18.00/tray Katherine										
Gross margin per enterprise	**$3,504**	**$19,477**	**$19,430**	**$10,970**	**$12,365**	**$94,815**	**$217,758**	**$326,281**	**$925,259**	**$1,404,404**
Net farm income per enterprise	**-$16,512**	**-$5,493**	**-$5,540**	**-$11,900**	**-$10,505**	**$33,094**	**$125,210**	**$201,735**	**$583,961**	**$1,021,262**

Source: Adapted from Tech Bulletin 301 " Profitability of Mango Production in the NT Top End"

Notes: 1. Fuel cost: $0.62/L (after a rebate of $0.37/L), Labour cost: $13.50/hr plus 15% on-cost, Agents fee: 12.0- 12.5% of market value, Mango price: $18/tray (Darwin) and $19.50/tray (Katherine), Transport cost $300/pallet 128 trays.

2. Pick and pack rate (without any major harvesting aids): 5 trays/hr Picking rate: 30 bins of 42 trays/bin by 5 staff over 10 hours using harvesting aids = 25 trays/hr.

3. Capital recovery cost excludes land and house cost.

4. Labour not costed.

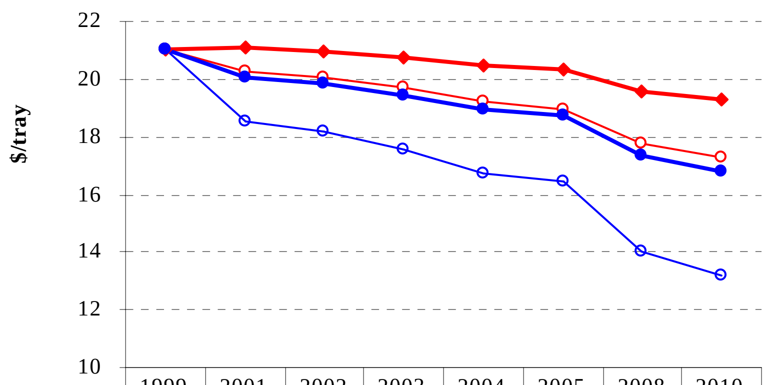
5. For the 10,000 tree orchard, general picking and packing labour was costed. However, management by the husband and wife as manager is not costed

Table 3 below summarises the total cost of production per tray (including capital cost recovery and semi-fixed costs) at yields ranging from three trays per tree up to 15 trays per tree to demonstrate the effect of yield on cost of production.

Table 3 Cost of production at various yields

	Darwin *600 trees contract harvesting*	*Darwin* *600 trees own pick/pack*	*Darwin* *600 trees own pick/ central pack*	*Darwin* *3,000 trees own pick/pack*	*Katherine* *5,000 trees own pick/pack*	*Darwin* *10,000 trees own pick/pack*	*Katherine* *20,000 trees own pick/pack*	*Katherine* *30,000 trees own pick/pack*
3 trays/tree	$30.92	$30.76	$31.37	$24.03	$23.05	$20.99	$21.65	$20.21
5 trays/tree	$23.89	$22.37	$23.44	$18.33	$17.81	$16.50	$16.94	$16.07
8 trays/tree	$19.94	$17.65	$18.98	$15.12	$14.87	$13.98	$14.35	$13.74
12 trays/tree	$17.98	$15.02	$16.50	$13.34	$13.23	$12.58	$12.81	$12.45
15 trays/tree	$16.86	$13.97	$15.51	$12.63	$12.58	$12.02	$12.22	$11.93

Historically, the weighted average price for Northern Territory mangoes has been around $20 per tray. (Mango Technical Bulletin 301). Based on the number of trees coming into production, domestic markets will face over supply pressure unless alternative markets are found for the increasing quantities of product. DBIRD has projected average prices ranging from $19.29 down to $13.20 per tray will be likely in the future, depending on seasonal conditions.



	1999	2001	2002	2003	2004	2005	2008	2010
Low Yield 5.23t/ha 7 weeks season	21.00	21.07	20.95	20.75	20.46	20.30	19.57	19.29
LowYield 5.23t/ha 4 weeks season	21.00	20.24	20.05	19.72	19.24	18.98	17.77	17.30
MediumYield 9.5t/ha 7 weeks season	21.00	20.03	19.82	19.46	18.93	18.76	17.32	16.81
Medium Yield 9.5t/ha 4 weeks season	21.00	18.53	18.19	17.58	16.71	16.43	14.05	13.20

Figure 1 Projected mango prices
Source: DBIRD Huyn Ngo Revised June 2004

Small enterprises (600 trees, Darwin)
Even at current prices, financial returns of small orchards, especially those using contract picking and packing are poor, and at the prices used in the analysis negative, with the exception of enterprises where own picking and packing is utilised. For those enterprises using contract pick and pack arrangements a yield of 12 trays per tree is required to break-even at a price of $18 per tray. For small enterprises picking or packing themselves the break-even yield is lower at around eight trays per trees. While this yield has been achieved by some small enterprises it is certainly not typical for this size enterprise.

Given the poor returns it is remarkable that the level of dissatisfaction amongst small growers is not higher. However in considering the criteria on which many growers judge success it is understandable. Small growers often do not take into account in their "back of the envelope" calculations of cost of production hidden costs such as depreciation of capital items, overhead costs or the value of unpaid own or family labour.

For a 600 tree enterprise with an average yield of 5 trays per tree there are nearly $8 per tray of hidden costs including depreciation of $3.22 per tray, overhead costs of $1.98 per tray and own labour valued at $2.77 per tray. Consequently, if growers accounted properly for the full cost of production their judgement about the success of their enterprises would be very much different.

Medium size enterprises (3,000 trees, Darwin and 5,000 trees, Katherine)
Reasonable returns can be achieved by medium sized enterprises ($3.22 per tray for 3,000 trees, Darwin and $5.15 per tray for 5,000 trees, Katherine) at average prices of $18 per tray and $19.50 per tray respectively.

At $18 per tray a 3,000 trees enterprise in Darwin could break even with an average yield of just over five trays per tree. At $19.50 per tray a 5,000 trees enterprise in Katherine could break even with an average yield of under 5 trays per tree. Neither enterprise would break even at a yield of three trays per tree at these prices.

Large enterprises (10,000 trees, Darwin and 20,000 trees and 30,000 trees, Katherine)
All large enterprises showed good returns even at average prices of $16.50/tray, Darwin and $18.00/tray Katherine. With the exception of the 10,000 trees enterprise in Darwin, all enterprises would break even at yields of less than five trays per tree at these lower prices.

The scale of these enterprises results in large net farm incomes. At an average yield of eight trays per tree net farm incomes for large enterprises ranged from $109,054 for a 10,000 tree enterprise in Darwin based on an average price of $15/tray to $1,464,858 for a 30,000 tree enterprise in Katherine using on an average price of $19.50/tray.

Conclusions

When all costs are accounted for small enterprises appear unprofitable unless yields above eight trays per tree can be reached or alternatively prices higher than industry averages ($18/tray Darwin, $19.50/tray Katherine) can be achieved.

Modest returns can be realised from medium sized enterprises at prices above $18/tray, however capital costs in the first five years for these enterprises are high, between $700,000 and $800,000 per enterprise. Servicing a debt of this size will be a critical constraint until trees reach full production, as the time requirements of an enterprise this size restrict the time available to generate income off-farm.

Economies of scale ensure the profitability of large enterprises, even at low yields. Capital costs are substantially high ranging from $1.5 to $3 million. However enterprises of this size usually utilise equity finance arrangements and consequently servicing debt is not such a critical issue.

Annex 5

SYSTEMS ANALYSIS

Introduction

This analysis was carried out to feed into a study of social and economic issues within the Territory's mango industry. The aim of the analysis was to increase understanding of the dynamics of the mango production sector and how the sector may change over time.

Methodology

The systems analysis for this study was conducted using causal-loop diagramming or system mapping. System mapping is a diagramming tool in which the essential components and interactions in a system are captured and can be communicated and understood quickly.

It was deemed that this was an appropriate tool for the purpose of this study that would
- Enable change within the mango industry to be understood.
- Focus on how the behaviour of hobby and commercial growers interact and affect industry growth through feedback loops.
- Improve understanding of how other factors limit industry growth.

Basic introduction to systems mapping

Most people think in linear, non-feedback terms as shown in figure 1. However a far more realistic view is that given in figure 2, when a problem leads to an action that produces a result that creates future problems and actions, that is, there is no beginning or end. (Forester, System dynamics and K-12 teachers).

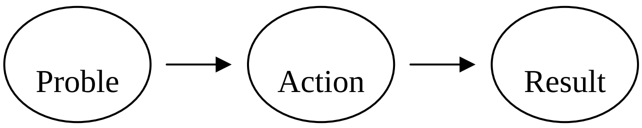


Figure 1 Open loop view of the world

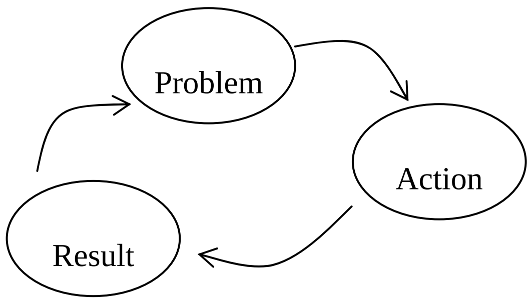


Figure 2 Closed loop view of the world

This closed relationship between elements is what is referred to in systems thinking as a feedback loop. Systems thinking is based on the premise that all action takes place within a series of nested feedback loops.

Feedback loops are usually classified as being either reinforcing or balancing. A **reinforcing loop** is a loop which feeds on itself to produce growth (benign loop) or decline (vicious loop). Reinforcing loops are also commonly referred to positive loops.

Alternatively a **balancing loop** is a structure where the result of an initial change creates further change but in the opposite direction to the initial change, thus having a balancing effect. These types of loops are also referred to as negative or goal seeking loops.

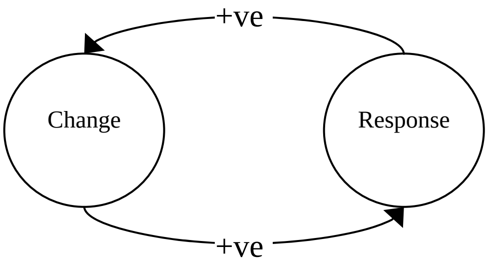


Figure 3 Reinforcing loop

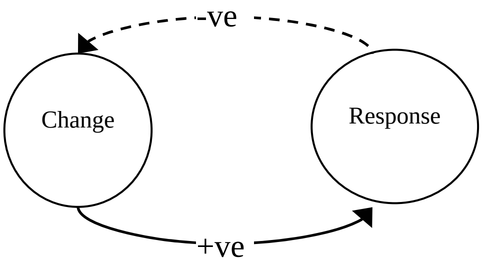


Figure 4 Balancing loop

Note: For the purpose of this paper, negative links are represented as dotted lines, and positive links as continuous lines.

In addition to the expected response to an initial change there may also be **unintended consequences**. These are unplanned or unexpected results of changes that can impact on feedback loops in either a reinforcing or balancing manner.

Factors that are external to the system being analysed that have the effect of limiting the growth or decline of the system are called **limiting states**.

Observations and Discussion

The observations of this analysis are presented firstly by describing the structure of the overall system being investigated, then the local loops which make up the system are described along with any limiting states. Finally interactions between the local loops are discussed. The system in its entirety is presented in Appendix 1.

Structure of the system

In this system the actions of hobby growers and commercial growers are represented as two individual local loops, the hobby grower loop is a reinforcing loop and the commercial grower loop is a balancing loop. The two local loops both have unintended consequences which result in the creation of two global balancing loops which limit the growth of the system and progress of each of the local loops towards their desired states.

The unintended consequences of each of the local loops impacts not only on the achievement of the desired state within their own local loop but also the achievement of the desired state in the other local loop.

Additionally limiting states impact on each of the local loops and the global loop further disrupting progress towards the desired states of each loop and growth of the overall system.

This system is represented conceptually by figure 5.

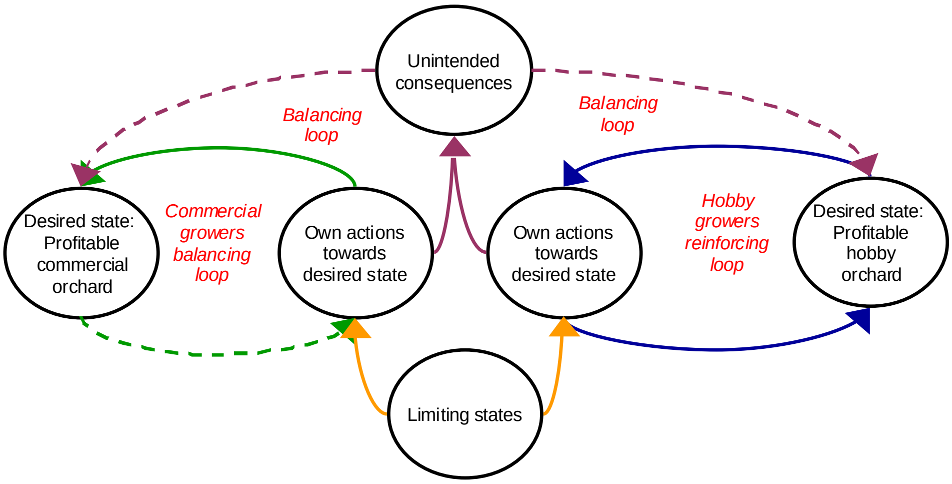


Figure 5 Conceptual model of the system

Commercial growers balancing loop

Findings of the grower survey demonstrated the response to profitability pressures by hobby growers and commercial growers were distinctly different.

Commercial growers' behaviour is represented as a balancing loop. The desired state for commercial growers is a profitable orchard. In response to a profitability position less than the desired state a commercial grower will enact one or more of the following measures:

- improve efficiency (perhaps through mechanisation);
- expand the enterprise;
- improve marketing strategies;
- increase work effort or inputs.

These actions through links to yield, quality, cost of production and own price have the effect of increasing the profitability of the enterprise, which will continue until the desired state is reached and the impetus for further action is removed.

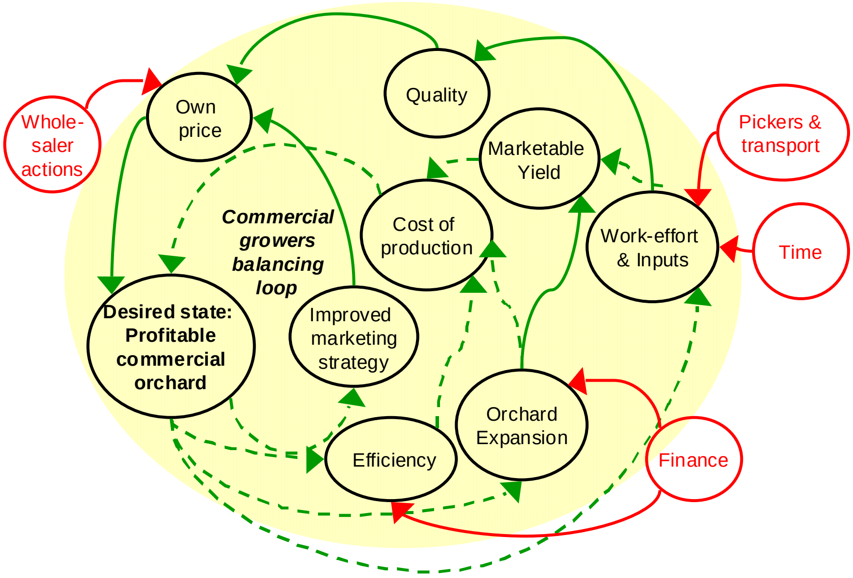


Figure 6 The commercial growers balancing loop

Limiting states in the commercial growers balancing loop

Progress towards the desired state will be slowed or stopped if limiting states come into play. The degree to which the commercial grower can improve efficiency or expand the orchard is limited by access to finance, and the extent to which additional work-effort (own or paid) can be put into the enterprise is limited by available time and finance. The price received for their own product may be limited by the actions of their wholesaler.

Hobby growers reinforcing loop

The response to a less than desirable profitability state by a hobby grower is quite different to that of a commercial grower. Rather than enact an improvement strategy a grower with a hobby attitude will reduce work-effort and inputs. This action through links to yield, quality and own product price has the effect of further decreasing profitability and by the nature of the vicious reinforcing loop results in further decline in work-effort and inputs and so-on and so-forth. Consequently profitability pressures on a hobby enterprise result in a continued spiralling downwards of profitability.

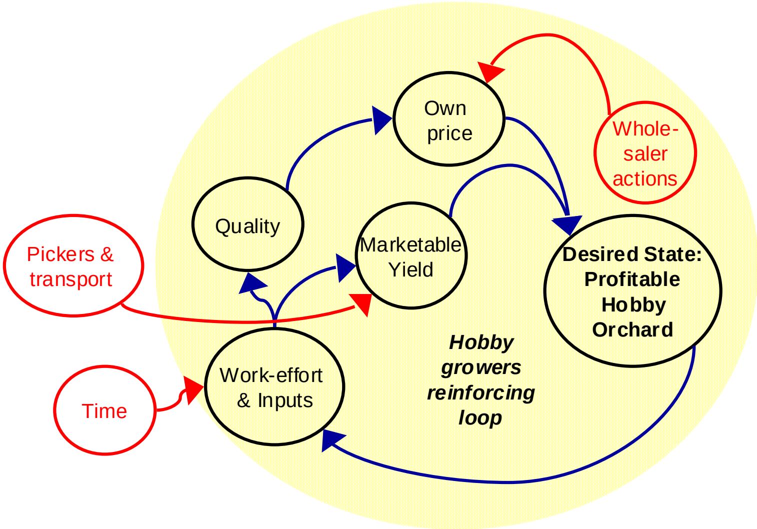


Figure 7 The hobby growers reinforcing loop

Limiting states in the hobby growers reinforcing loop

The opposite situation of a spiralling upwards in profitability is unlikely to continue for long because a limiting state of available time will come into play.

Unintended consequences

In addition to the feedback links and limiting states within their own local loops, achievement of desired states by commercial and hobby growers are also slowed by unintended consequences.

The major unintended consequence of action towards the desired state is the decrease in market price that results from increased market supply, given that a limiting state of market demand is present. A decrease in market price has a positive link to own price and through this to orchard profitability.

In the commercial grower loop increases in market supply will result from increase in orchard size or an increase in marketable yields. In the hobby grower loop improvement in marketable yields would result in an increase in market supply.

However, in addition to action with the local loops, responses in the global system to increased profitability also result in increases in market supply. Economic principles state that unless barriers to entry exist there will be new entrants into any industry where profits are visible. While there is a substantial lag due to the long lead-time to a commercial crop, new entrants to the mango industry will eventually result in increased market supply and decreases in market prices, unless the limiting state of market demand can be removed.

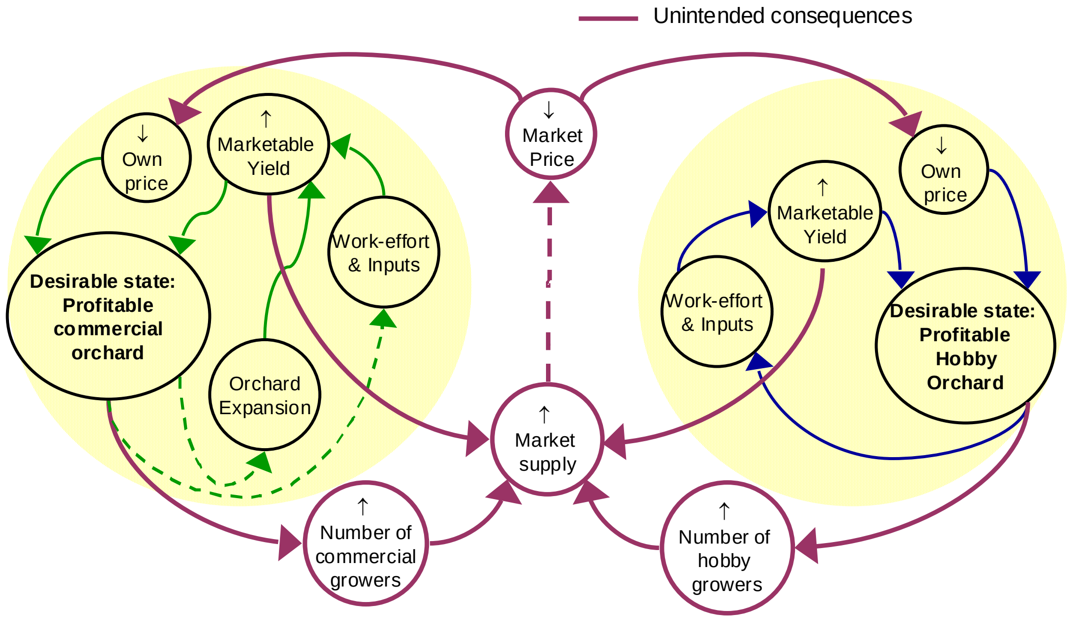


Figure 8 Unintended consequences – Decrease in market price

Commercial growers activity towards hobby growers

The unintended consequence of reduced market prices is main impact the activities of commercial growers has on hobby growers.

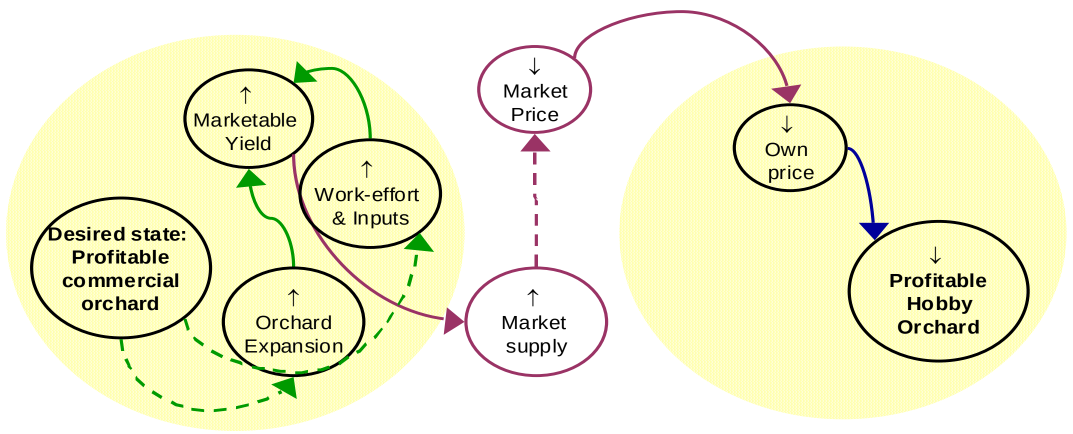


Figure 9 Commercial growers' activity towards hobby growers

Hobby growers activity towards commercial growers

In a benign reinforcing loop the same could be said for the impact of hobby grower behaviour on commercial growers, except the limiting state of time would limit hobby growers' ability to improve yields to any great extent. Also the impact of yield improvement by hobby growers on commercial growers would be minimal due to their small share of industry production.

However, in a vicious reinforcing loop the spiralling downwards of work-effort and inputs as discussed earlier will result in decreased product quality of hobby growers, this linked through poor perception of all Northern Territory fruit would decreased market price and eventually decrease own price for commercial growers.

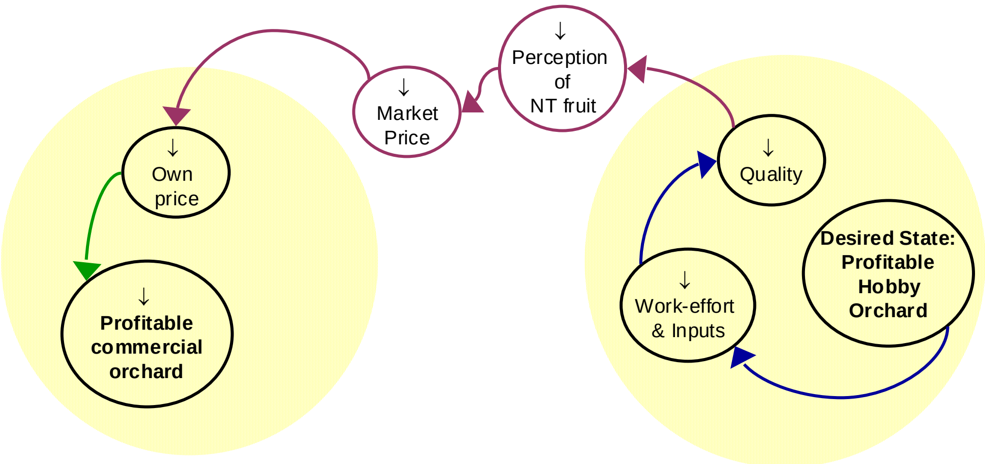


Figure 10 Hobby growers' activity towards commercial growers

Conclusions

The systems map allows us to illustrate observed goings-on within the Northern Territory mango industry.

- Growth within the mango industry through new entrants and expansion of commercial orchards has a negative impact on the profitability of hobby growers.
- Hobby growers' typical response to profitability pressures is an inevitable downward spiraling of profitability.
- The consequence of profitability pressures on hobby growers, while unintended, nevertheless is a negative impact on the profitability of commercial growers.

For the future the following observations from the system are important to note:

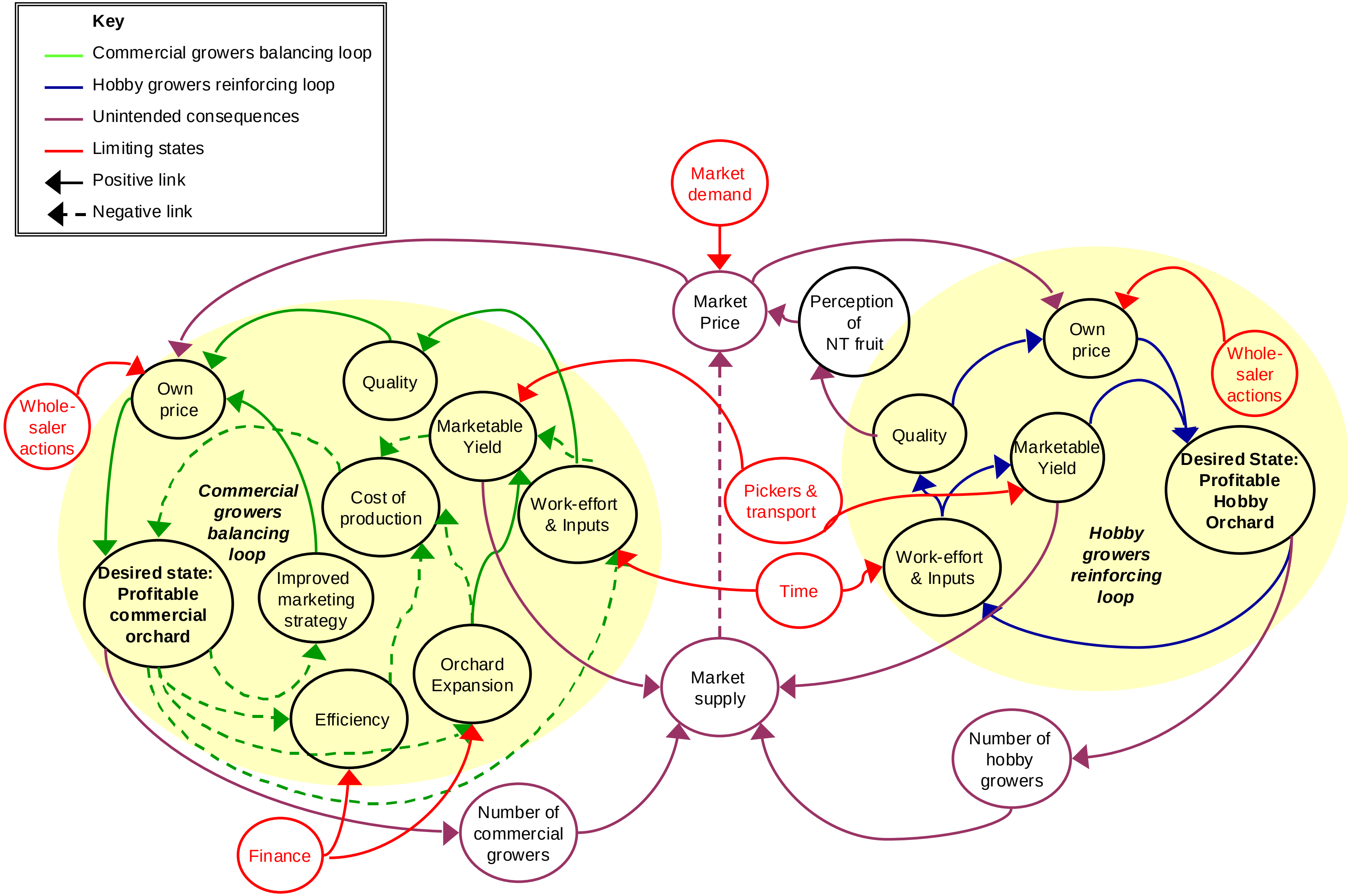
- Commercial growers progress towards their desired profitability state will be slowed by access to finance, availability of pickers, transport and time, and market demand. All of these limiting states will need to be addressed in the interest of individual business profitability.

- Overall industry growth (growth of the system) will be restricted unless the limiting state of market demand can be overcome.

- If the limiting states can be overcome, further industry growth is assured. This expansion will happen through by incumbents striving to achieve their desired state of profitability and through new entrants when observable profits are evident in the industry.

- Once a hobby grower is under profitability pressure, his/her profitability will continue to spiral downward until he/she exits the industry. Given profitability pressures currently evident in the hobby grower sector, it is expected that remaining hobby growers will continue to exit.

NORTHERN TERRITORY MANGO PRODUCTION SECTOR SYSTEM



Annex 6

ANALYSIS OF PROPERTY SALES

Introduction

Rural property sales during the period 1986 through 2003 were analysed in three hundreds to gain some insight in movement in the real estate market for rural properties. It was not possible to determine land use from the data available so conclusions are for rural properties generally rather than for mango properties specifically.

Sale data was sourced from the Land Information Division of the Northern Territory Department of Infrastructure, Planning & Environment for three hundreds in the rural area of Darwin:

- **Hundred of Cavanagh** (which includes the locations of Berry Springs, Darwin River and Livingstone).
- **Hundred of Guy** (which includes the locations of Lambells Lagoon and Middle Point).
- **Hundred of Strangways** (which includes the locations of Virginia, Humpty Doo, Mc Minns Lagoon, Noonamah, Bees Creek, Girrawheen and Herbert).

Method of analysis

Anomalous sales were culled from the data by removing:

1. Sales with other considerations.
2. Sales to family members.
3. Sales with no purchasers name.
4. Sales of properties less than eight hectares (to remove blocks that are primarily residential).
5. First sales from a new subdivision.
6. Sales where required data for analysis was missing.
7. Sales where other parcels were included in the sale.
8. Sales where the vendor was the Northern Territory Public Trustee.

In the Hundred of Cavanagh 646 sales were culled leaving 810 of the 1456 sales for the analysis period. In the Hundred of Guy 117 sales were culled leaving 132 of the 249 total sales for the analysis period. In the Hundred of Strangways 5279 sales were culled leaving 474 of the 5753 total sales for the analysis period. Being a closer settled area the majority of property sales were culled on property size criteria.

For sales remaining in each data set, a sale price per hectare was calculated. This value was indexed to 1990 dollars using the all group-weighted average of 8 capital cities CPI (source: ABS).

Results of Analysis & Discussion

Hundred of Cavenagh

Year	*Average sale price $ per hectare (1990 dollars)*	*5 year rolling average sale price (1990 dollars)*	*% change from previous rolling average*	*Number of sales analysed*
1986	3937			25
1987	5794			26
1988	4463			26
1989	4086			45
1990	4400	4536		43
1991	4084	4566	1%	31
1992	5029	4413	-3%	52
1993	4917	4503	2%	66
1994	5607	4807	7%	63
1995	6174	5162	7%	73
1996	8221	5990	16%	52
1997	7541	6492	8%	47
1998	8413	7191	11%	49
1999	8894	7849	9%	32
2000	8915	8397	7%	39
2001	7675	8288	-1%	27
2002	8573	8494	2%	47
2003	9342	8680	2%	47

Overall appreciation in 5 year rolling average equivalent to 4.7% annually

The five-year rolling average sale price increased from 1990 $4536 in 1990 to 1990 $8680 in 2003. This is equivalent to a 4.7% annual appreciation in sale price. There was a period of stronger appreciation in the late 1990s returning to low appreciation in 2001. The number of sales annually increased in the early to mid 1990s but has fallen since.

In the Hundred of Cavenagh separate analyses were also carried out for land only sales and land plus house sales. Similar to the combined analysis these showed a 5.6% annual appreciation in the five-year rolling average sale price for land only sales and a 4.8% annual appreciation in the five-year rolling average sales price for house and land sales.

Hundred of Guy

Year	*Average sale price $ per hectare (1990 dollars)*	*5 year rolling average sale price (1990 dollars)*	*% change from previous rolling average*	*Number of sales analysed*
1986	11722			7
1987	7387			6
1988	5554			1
1989	11457			6
1990	7846	7538		3
1991	7055	7396	-2%	6
1992	7433	7869	6%	10
1993	12128	8384	7%	5
1994	9628	8019	-4%	6
1995	8889	8227	3%	6
1996	9349	8686	6%	7
1997	8262	8852	2%	6
1998	7678	8761	-1%	9
1999	9320	8700	-1%	13
2000	9813	9160	5%	16
2001	10327	9356	2%	5
2002	8146	9333	0%	10
2003	11417	10081	8%	10

Overall appreciation in five year rolling average equivalent to 2.1% annually.

There five-year rolling average sales price increased marginally from 1990 $7538 in 1990 to 1990 $10081 in 2003. There is no apparent period of strong growth in property prices but substantial fluctuation from one year to another resulting in an overall appreciation equivalent to 2.1% annually. The number of sales in each year has increased slightly over time.

Hundred of Strangways

Year	*Average sale price $ per hectare (1990 dollars)*	*5 year rolling average sale price (1990 dollars)*	*% change from previous rolling average*	*Number of sales analysed*
1986	7373			29
1987	9801			19
1988	7042			25
1989	5308			18
1990	4833	6871		41
1991	5717	6540	-5%	25
1992	7441	6068	-7%	43
1993	7288	6117	1%	38
1994	9447	6945	14%	28
1995	10995	8178	18%	22
1996	12276	9489	16%	23
1997	16221	11245	19%	24
1998	14552	12698	13%	23
1999	18726	14554	15%	25
2000	15078	15371	6%	21
2001	14850	15886	3%	24
2002	13677	15377	-3%	14
2003	12258	14918	-3%	18

Overall appreciation in five year rolling average equivalent 5.7% annually.

The five-year rolling average sales price increased from $6871 to $14918 in 2003 (in 1990 dollar terms). This is equivalent to a 5.7% annual appreciation in sale price. The was a period of strong appreciation in the late 1990s which has since fallen with the percent change in the five-year rolling average being negative in the last two years of analysis. There was a downward trend in the annual number of sales in the Hundred of Strangways, from around 30 per year in the early 1990s to around 20 per year in the early 2000s.

Conclusion

The sale price of properties in the three Hundreds analysed had all increased in real terms during the analysis period, ranging from an annual appreciation equivalent to 2.1% in the Hundred of Cavanagh to 5.7% in the Hundred of Strangways.

There were strong periods of capital appreciation in the mid to late 1990s in the Hundreds of Cavanagh and Strangways. The number of sales in each year had increased over time in the Hundreds of Cavanagh and Guy but had fallen over time in the closer settled Hundred of Strangways.

These increases in property value are comparable to historical appreciation for Australian real estate as a whole. As a guide, average capital appreciation for Australian real estate is nominally between 6% and 8%t (equivalent to a real appreciation of between 3% and 5%) (Source: www.isnet.com.au/~dann/realestate/).

While the real estate market for rural properties in the Hundreds analysed is not strong, especially in recent years, over the long run capital appreciation has been comparable with other Australian real estate.