

MAPPING THE EXTENSION CAPABILITY OF THE GOULBURN VALLEY FRESH PEAR SECTOR

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Cover photo

Angie Grills (DPI) talking to a grower. DPI image library.

Acronyms

APAL	Apple and Pear Australia Limited
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
FGA	Australian Fruit Growers
FGV	Fruit Growers Victoria Limited
HAL	Horticulture Australia Limited
SPCA	Shepparton Preserving Company (SPC Ardmona)
VFF	Victorian Farmers Federation

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Executive summary

This study set out to map extension capability (information and advice) used by pear growers in the Goulburn Valley to support their decision making about the future of their pear orchards. Better understanding of the network can help policy makers (DEDJTR), industry stakeholders and growers target limited resources more effectively to support growers and the pear value chain grow and be profitable.

Social network analysis was based on an existing data set of 25 pear growers (Seymour and Longley, 2013). Findings suggest that current network strengths include information sharing within close social relationships for example between growers and their direct connections (family, staff and proximate neighbours). Fruit Growers Victoria and marketing agents are an important source of marketing information. Consultants and private advisers are important for some growers (20% in the study sample) and these growers also use a range of other information sources. Several growers take the initiative to learn through their own travel. DEDJTR and APAL provide important strategic guidance for the network (linking social capital). Overall growers' most commonly used information source is media including the internet, news and journals.

Network weaknesses include very limited information sharing connections between growers and both the financial (bankers, accountants) and commercial (input and service providers) sector. There are also limited connections between growers and researchers (although plant breeders were mentioned).

Opportunities to strengthen the fresh pear network of the Goulburn Valley include active support by government and industry organisations (including DEDJTR, FGA and APAL) for networking opportunities between growers and with other value chain participants and opportunities for growers to meet and learn from people with specific expertise (i.e. researchers, policy or biosecurity officers, overseas experts). In addition ongoing support is needed for growers' own on-orchard experiments – as individuals and groups, formal and informal grower discussion groups and walks, for growers to meet with local and export marketers, development of study travel opportunities and for building connections between growers and specialist advisers, researchers and financial advisers through forums, field days and discussion groups.

Introduction

The Goulburn Valley is Australia's leading pear production region however declining opportunities for canning and local fresh pears along with rising costs and diminishing returns leaves growers facing major decisions whether or not to expand production and plant new varieties given current uncertainty over market returns and orchard viability.

Growers also need to factor in the potential for emerging opportunities to supply fresh pear exports to Asian markets that could potentially underpin the future profitability and sustainability of this industry in the Goulburn Valley.

Whatever decisions are made growers must be well informed about the requirements of new marketplaces including market opportunities, consumer preferences, biosecurity and export protocols along with technologies and practices required to access and supply these markets.

A recent national program found that 35% of the fruit and vegetable growers surveyed had found new markets for their produce, 31% had changed the type of produce they were growing, and 48% said their farms were in high financial stress (Schirmer et al., 2015). These growers listed the top five barriers to their farm development as: rising input costs, electricity costs, drought, falling prices and red tape (p97).

All of which means that growing fruit is a competitive and challenging profession where access to a network that provides current market, production and technical information, problem solving, and practical and emotional support to make and implement sound decision making is increasingly critical. This process often occurs formally and informally through growers' everyday interactions with the growers, advisers, service providers and marketing professionals in their network. This bears directly on their subsequent production and marketing decisions (King and Nettle 2014).

A network is group or system of interconnected people or things. A social network maps social interactions and personal relationships (Cross et al. 2015). Having networks provides people with social capital. Social capital refers to: 'the collective value of all social networks (who people know) and the inclinations that arise from these networks to do things for each other (Better together 2013).

In this project social network mapping (SNA) is used to explore the advisory networks of the pear industry within the Goulburn Valley. SNA allows the myriad of relationships that can either facilitate or impede knowledge creation and transfer to be visualised and understood (Cross and Parker 2004). How does information flow within an industry? Who do people turn to for advice? Using SNA the strengths and weaknesses of the current information and knowledge network are explored, including identification of the most commonly accessed information sources, and who are the 'brokers' and 'champions' that facilitate access to these.

Theoretical and conceptual framework

Social capital as an enabler for accessing information and knowledge

A social network is a group or system of people or things connected by at least one relationship (Marin and Wellman, 2011). A social network maps relationships between individuals or organisations based on a specified relational question (Cross and Parker, 2004). Within social networks participants may access social capital by sharing resources (Lin, 2001). Social capital refers to: ‘the collective value of all social networks (who people know) and the inclinations that arise from these networks to do things for each other (Better together, 2013; Schirmer et al., 2005).

The concept of ‘social capital’ is used to explain how people and groups access resources, including information and knowledge, through their relationships, or social ‘networks’ (Putnam, 1995; Lin, 2001; Burt, 2004; High et al., 2005). Information and knowledge sharing are relational processes that occur within social networks and are enabled by effective intermediation, bridging or brokering processes between groups and individuals within networks (Howells, 2006; Scott, 2013; King, 2014).

The central premise of social capital, therefore, is that social networks have value, and having social capital and networks provides an individual with ‘a wide variety of quite specific benefits that flow from the trust, reciprocity, information, and cooperation associated with social networks. Social capital creates value for the people who are connected’ (Better together, 2013). In agriculture, people’s social capital has been found to be a determinant of their wellbeing, resilience and adaptive capacity (Schirmer et al., 2015).

Within a network there are types of social capital. **Bridging social capital** provides access to resources beyond an immediate network. For example production, management and marketing information provided to growers through advisers. **Linking social capital** is accessed through relationships between different networks such as between pear growers and industry (for example APAL) or government organisations (for example DEDJTR). Social relationships differ in terms of their mutual strength, shared trust and frequency. High levels of trust are associated with **bonding social capital** in which people share similar interests and interact regularly. For example relationships between pear growers within a given geographical area or who share membership associated with club varieties. Each type of social capital has an important role in facilitating information and knowledge sharing that influences access and use by growers.

Network brokers use bridging social capital to create relationships between different individuals and groups, enabling individuals and groups who may otherwise be socially unconnected to access and share knowledge (Winch and Courtney, 2007; Cross and Parker, 2004). Network brokers contribute significantly to network integration by facilitating resource distribution and (Parise et al., 2006; King et al., 2009).

Interacting with, and sharing resources with other people within a network promotes cooperation, mutual support, improved confidence to make decisions and collaborative problem solving between people (Lin, 2001; Shirmer et al., 2015). Feeling ‘connected’ to other people in a network or multiple networks is also important to the wellbeing and life satisfaction of people (Shirmer et al., 2015). Growers often use a unique mix of information sources, including people for different information searches (Folder and Cavaye, 2015). They are likely to have multiple networks. How well connected, and the quality and strength of those connections will determine the information and opportunities the growers can access (ibid).

Risk and information seeking within a network

The perceived level of importance or risk of any given decision influences how many different sources will be consulted (Case, 2007) and growers continue their search processes until they are comfortable to make a decision (Kathalau, 2004). Hill et al., 2015 found that people within a growers social network were often key sources of information, with interpersonal information found to be crucial to decision making when making high involvement, important technology adoption decisions.

Mapping a social network creates a model of relationships at a particular point of time and while some networks based on long term relationships remain relatively stable over time, there are ongoing social changes that mean a network is continually evolving (Vega-Redondo, 2007). In this report social network analysis (SNA) is focused on advisory relationships for pear growers in the Goulburn Valley, and an ego network of a marketing manager is presented, providing an example of how information flows or is communicated in the Goulburn Valley pear industry.

Methods

A social network perspective (Cross and Parker, 2004) underpins the conceptual framing of this project. Mixed methods were used to collect following data:

- Quantitative relational data – was used in the social network analysis (SNA)
- Qualitative semi-structured interview data- was used for the case studies and to support analysis of SNA data.

Social Network Analysis

Social network analysis (SNA) is a method for describing the structure of relationships within groups, communities and organisations. Formal and informal relationships are represented visually in social network models (sociograms) using lines (edges) to show a relationship between nodes (vertices or graph points) that represent a focus of interest including individuals and/or organisations. The presence of a relational connection provides the potential for resources, both tangible and intangible, to be shared (Wasserman and Faust, 1994; de Nooy et al., 2005).

For the purpose of social network analysis relational data is initially collected by asking participants within a network of interest to name their contacts with respect to a specific relational question. Each name and relationship is then ascribed a numerical value and this data is entered into social network analysis software such as UCINET or Pajek.

Social networks are formed for many reasons therefore when an explicit relational question(s) are used (Wasserman and Faust, 1994; Scott, 2013) it must be relevant for the purpose and aims of the project and findings cannot be generalised beyond the implications for this question.

The following relational questions were used when reviewing the 25 grower interviews:

1. Who provides you with information with respect to growing fresh pears?
2. Who do you provide with information about growing fresh pears?

The social network data was processed using Pajek2.05 and resulted in a network comprised of 65 nodes (Figure 1 below) including the contacts (alters) of 24 growers and 1 'isolate' grower node for whom no contact data was identified in the interview data available.

Case studies

The qualitative data used in this study is mainly drawn from the set of 25 semi-structured interviews with pear growers conducted by Longley and Seymour in 2013 to investigate which pear growers are interested in growing fresh pears and why (Longley and Seymour, 2013). The interview data has been 're-mined' for the purposes of this study by focusing on the relationships growers use to source information and knowledge for making decisions about growing fresh pears. Three mini case studies are presented below that specifically address why and how three growers interested in growing fresh pear, either currently or in the future, are accessing information about new pear varieties. A cross case analysis was undertaken to identify what issues are common across the case study growers.

In 2015 the researchers also undertook additional interviews with three very experienced industry professionals about social, technical and marketing and marketing issues important to growers of fresh pears. All qualitative data was analysed by identifying themes using constructivist interpretation of human behaviour and interactions (Lincoln and Guba, 2013).

Triangulation, analysis and interpretation

Findings from the mixed methods data sets were analysed separately as well as together in order to triangulate and hence validate interpretations with respect to the project research questions, conceptual framework and results.

The research project received Human Ethics clearance from the University of Melbourne in 2015.

Results

Social network analysis

1. The Goulburn Valley pear industry information network

The information sharing network of Goulburn Valley pear growers based on the sources mentioned by 25 pear growers is shown in the sociogram below (Figure 1, key Table 1). These growers are represented by the black nodes. Their unique and shared sources of information are indicated by the lines with arrows pointing in the direction of the information source. Sources of information are indicated by the coloured nodes (see key below).

A limitation of this data set is that it does not reflect the roles of the individual growers as providers of information, and that some growers appear to be isolated or weakly connected.

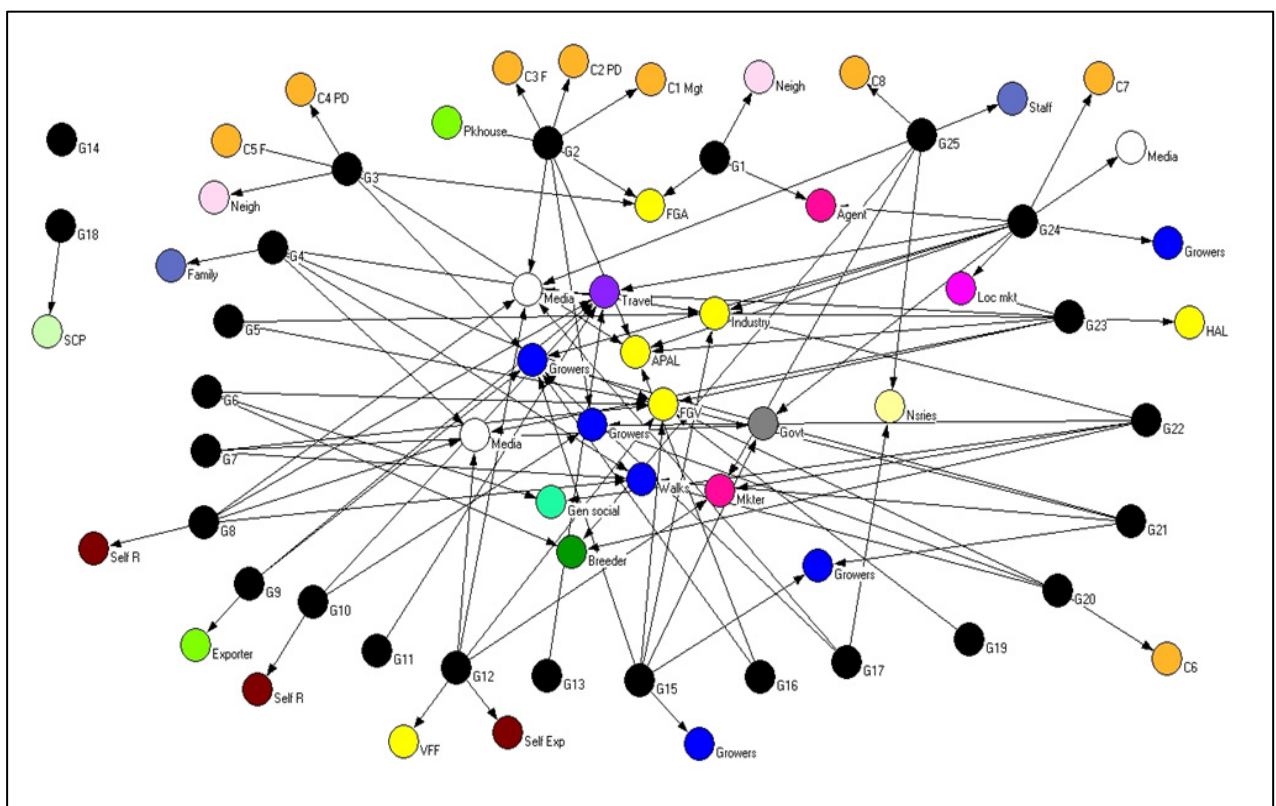


Figure 1: The relationship between GV pear growers and sources of information about growing fresh pears (see key below)

Sixteen information sources used by growers (G) are identified in the network model. These range from growers referring to their own experience and on-orchard trials as well as other growers, marketers and industry bodies. Within the group of 25 growers interviewed the number of sources mentioned ranged from 1 connection (G18) through to 10 connections (G24). Names of individuals were not provided by interviewees therefore their sources are described by their role or function eg. Media, Marketer etc.

Table 1: Key to information sources, and abbreviations used in Figure 1 above (in brackets)

Self – experience/own trials (Self/exp)	●	Packhouse (P/house)	●
Family and staff (Family, Staff)	●	Marketing agents (Agent, Mkter)	●
Neighbours – direct locality (Neigh)	●	Direct from local market (Loc mkt)	●
Grower groups/orchard walks (Grower, walks)	●	Plant breeders (Breeders)	●
Travel (Travel)	●	Plant nurseries (Nsries)	●
Consultant (C1-8)	●	Cannery (SPC)	●
Industry bodies including, APAL VFF,HAL,FGA, FGV ¹	●	Government (DEDJTR) (Govt)	●
General social interactions (informal) (Gen social)	●	Written and digital media (Media)	○

In Figure 1, the connections of the growers (black nodes) show that each has a unique combination of information sources. Across all 25 growers the most connected has 10 connections and the least connected has no connections (although this is likely to be due to a data collection anomaly). Table 1 summarises the connections used by each grower from most to least connections.

The most connected growers are more likely to include consultants in their range of information sources and are connected to industry groups, marketers, other growers and a range of media sources. This suggests they are active information seekers who scan a wide range of sources and value professional advice.

Eleven growers are moderately connected with between 3-5 information sources including industry, other growers and media sources but only one uses a consultant. In this group three growers identify nurseries and breeders as sources of information. Overall this group is likely to prefer information sources that are local and familiar.

Growers with two or less information sources identified industry, the cannery (SPCA) and their own travel. These growers are likely to be self-reliant or not active information seekers.

¹ See page 2 for acronyms.

Table 2: Summary of pear growers connections from most connected (10 contacts) to least connected

Grower Node	Number of connections	Network connections
24	10	Consultant (1), agents, APAL, general fruit growing community, industry network, DPI, travel, local markets, local media workshops
2	8	Consultants (3), FGV, walks, reading, APAL, packhouse
23	7	Reading, APAL, internet, industry network, FGV, local markets, HAL
3	6	Consultants (2), FGV, APAL, neighbours, general fruit growers
12	6	Reading, internet, FGV, own experiments, marketers, VFG
15	6	General fruit growers, industry network, FGV, DPI, orchard manager, meetings
25	6	Consultant (1), reading, general social, marketers, nurseries, staff
4	5	Family, Internet, FGV, industry walks and networks
8	5	Reading, internet, walks, travel, own experiments
22	5	Grower groups, industry network, general social, breeders, marketers
20	4	Grower groups, FGV, travel, consultant
21	4	General fruit growers, FGV, travel, meetings
1	3	Mkt, Agents, Fruit growers
6	3	FGV, walks general socialising
7	3	FGV, walks, breeders
9	3	Fruit growers, travel, exporters
10	3	Grower groups, travel, own research
17	3	Reading, general fruit growers, nurseries
5	2	Industry networks and walks
16	2	APAL, general fruit growers
11	1	Travel
13	1	Travel
18	1	Cannery
19	1	FGV
14	0	

2. Growers use of information sources

Growers' use of information sources is summarised in Figure 2 below. The nodes positioned around the outer circle represent the growers whose interviewed data was used for analysis (except Grower 14). Information sources are represented by nodes within the inner circle with nodal size indicating the relative popularity of the source (larger nodes with more inwards pointing arrows are more popular than smaller nodes. The size of the grower nodes represents the number of connections they have to information sources for example G24 has 10 information sources, which is the most of any grower in this study, and is therefore the largest grower node.

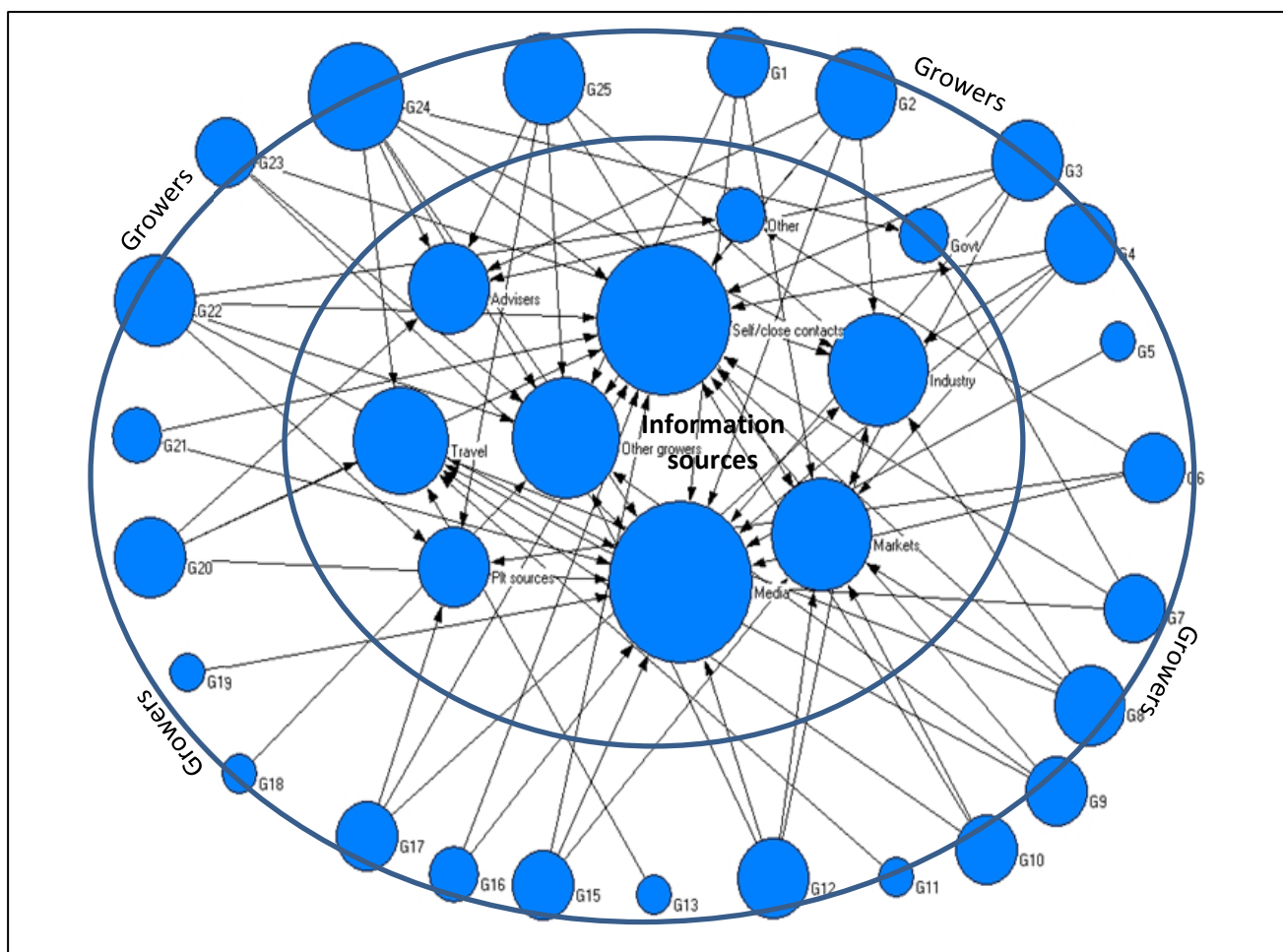


Figure 2: Growers use of various information sources.

The information sources from all growers were summarised into ten categories. These include

1. Media sources including orchard related magazines, journals and books; internet and local news.
2. Self and close contacts including growers own experience and trials/experiments, family, staff and direct neighbours.
3. Other growers including grower groups orchard walks, meetings, workshops and the general grower community.
4. Market sources including marketing agents, packhouses, exporters, local and national markets and (previously) the cannery.
5. Industry including Victoria Fruitgrowers Federation (VFF) , Apple and Pear Australia Ltd (APAL), Horticulture Australia Limited (HAL), Industry Development Officers (IDO's), Fruitgrowers Australia (FGA).
6. Travel undertaken at growers own initiative or organised groups
7. Advisers/consultants including specialists in management practice, pest management, fertiliser, and agronomy).
8. Plant sources including breeders and nurseries.
9. Government including local, and regional (Department of Economic Development, Jobs, Transport and Resources).
10. 'Other' including general socialising.

Table 3: Connectedness ranking of all information sources (by cluster)

Rank (Highest to lowest)	Node ID (re Figure 2)	Number of connections	Description
1	30	16	Media
2	28	14	Self/close contacts
3	29	9	Other growers
4	27	8	Industry
5	26	8	Markets
6	34	7	Travel
7	31	5	Advisers
8	33	4	Plant sources
9	32	2	Government
10	35	2	Other

Table 3 presents the ranking of the ten information sources used by pear growers from most used to least used sources according to the grower data set. Media, both paper based and digital, is the most common information source used by growers followed by their own experience, knowledge and that of those they most regularly interact with. Other growers, industry, market and travel are moderately accessed information sources and are likely to be less frequently used or when needed for decision making. Limited use is made of other information sources including advisers except by the most connected growers. The use of information from nurseries and plant breeders is likely to coincide with decision making about planting or replanting blocks and therefore accessed on an occasional basis. Government sources are not drawn on by most growers. It is notable that researchers are not specified as information sources although plant breeders are likely to work in research roles.

Grower Case Studies

In the following interview summaries the context, reasoning ('the why') and information being sought and why are examined for three Goulburn Valley pear growers (names have been changed to protect the growers and businesses privacy).

Case study 1- Mauricio

Mauricio and his family have a medium to large orchard that has been in the family for several generations. They grow apples and pears, and since 1992 they have been gradually replacing any outdated or poorly performing varieties. Mauricio said 'you grow whatever you can sell'. He currently has 23 different varieties growing.

Mauricio sells his (Williams) pears to a packing shed. He said 'they (the packing shed) will take anything, if you can't find anyone else to take it. But they will only give you \$50/bin, which doesn't even cover the cost of picking'. To manage this Mauricio puts some of his fruit into cool storage, so he can choose when to sell it.

Mauricio would not plant any more pears, except that he has heard about a new variety ('Pica') from New Zealand. His son went to New Zealand and was impressed with the pear 'it looks and tastes good. The Asian market likes red pears'. Despite saying that our Australian dollar and wages are too high and so there is little export opportunity, which he doesn't see changing, Mauricio is interested in this new variety. It is a club variety and Mauricio is in a group of about 20 orchardists who can access it. He will put in a small block to trial it. He said of the group 'It's about the sharing of ideas, all growing a new variety and testing it'.

Case study 2- Hossain

Hossain and his family have been in the orchard industry since 1995 and have 90 acres of pears and 10 acres of apples, a packing shed and a small cool store. They supply fruit to the local fresh markets in Sydney, Melbourne and Brisbane, to supermarkets through agents, and for the last two years to Indonesia and China, again through an agent.

Hossain said that it is difficult to move large volumes of pears in the fresh markets and it would be useful to get assistance in new techniques like packaging or making cider. But the key to his business is to have marketable varieties, 'if you have marketable varieties you are a successful business'. He said that everyone is growing apples and that the pear industry will get smaller in future.

With the new pear varieties Hossain said 'we are not sure how consumers will like those new varieties, I am waiting for feedback on these new pears, it will be a big risk, there is a lot of outlay when planting new blocks. I don't want to take that risk, I want to be on the safe side'.

Hossain gets his information from agents and he visits the markets himself. He likes to try new agents based on who they supply after getting the fruit from him. Each agent has their own supply partners. He talks to the local growers to see which agents to work with. If he hears negative feedback he will not deal with that agent. Hossain sources local and industry information from a wide range of sources.

Case study 3- Rachael

Rachael and her family have 200 hectares of land, 95% of which is planted to pome and stone fruit. They grow a split of fresh market and canning pears, with long term relationships in the fresh (wholesale) market 'from way back'. They also sell a lot of their fruit through the major supermarkets.

Rachael is very interested in the 'good' new pear varieties. As Rachael said 'I'm looking to get the edge. Being involved in the commodity lines isn't going to be good enough anymore, because you're just going to be competing with everybody. All that is a volume thing. You need to just turn over more and more and more of them, because the margins are diminishing. So while you need the turnover in your business for continuity, you also need some nice, niche, unique thing. I want some better (pear) varieties, some club varieties, a couple of varieties that are just a bit different, as well as my mainstream lines'.

'I usually get my information through the industry network. I look at which breeding programmes are going on at the time, and keep abreast of what all those guys are doing. We've got an alliance with a marketer who has a division that looks at intellectual property in fruit, so there's that avenue as well. So they are looking at all the breeders around the world all the time, and seeing what's coming through. We keep our eyes and ears open as to what is going on in the industry, not only in Australia, but around the world'.

'We also have alliances with the XX Fresh Business Group, a New Zealand/Australia organisation. It's been a great thing for my business, fantastic thing, because of the information sharing and the collaboration, the strength in numbers. You've got lots of sheds pooling the product, these guys marketing it, so you're able to - they offer up a much longer consistent supply of arranged products. So that's been good. Through, and within, that group we've been able to secure a club variety apple. It was bred over in northern Italy. It ticks all the boxes for the Goulburn Valley region' (i.e. suitable temperature for production, stores well, nice colour, sweet, firm).

Key points from case studies

- The growers are seeking solutions to specific context and market driven issues in their businesses.
- They are pro-actively seeking information and developing networks to get high quality or unique information or opportunities.
- These relationships and networks are enabling the growers to reduce risk and in some cases gain some emotional and problem solving support.
- These networks cost the growers time, money and energy to develop and maintain. In most cases they have been developed over many years.
- Without these networks the growers would not have access to some new planting material and opportunities which they consider will be very important to their medium term business viability.

Case study: Pear marketer's information sharing network

The information sharing network of a pear marketing manager employed by a large apple and pear pack house in the Goulburn Valley is shown in Figure 3 below. This pack house is supplied by approximately 20 local pear growers, and offers marketing services for smaller organisations and growers.

This manager seeks (refer to the outward pointing arrows) information in relation to his role and responsibilities for marketing fresh pears (local and export) from APAL, DEDJTR, import agents, external packhouses, the Pear Exporters Steering Committee, international logistics operators, knowledge based on his own travel, AQIS and trade missions. He shares information (refer to the inward pointing arrows) with pear growers who supply the packhouse with fruit packaging companies, freight forwarders, staff, domestic logistics operators, external packhouses and the Pear Export Steering committee.

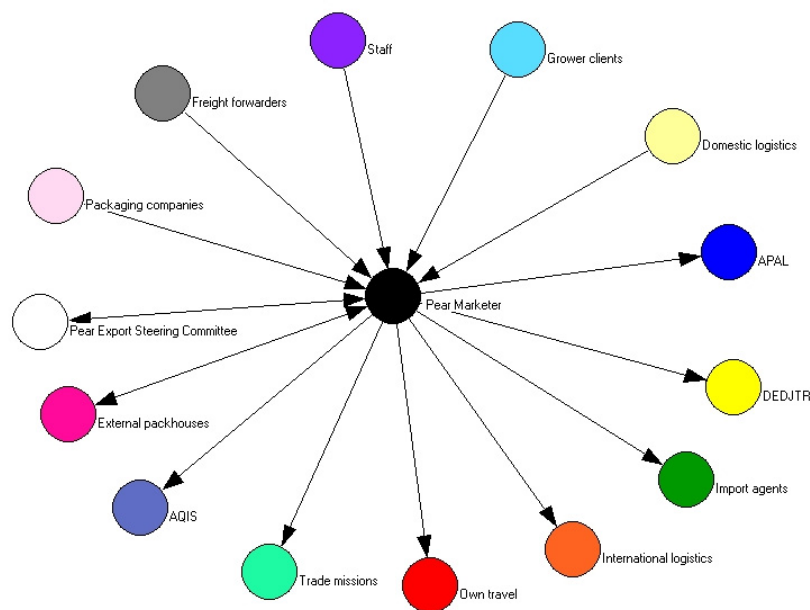


Figure 3: Pear marketer's information sharing network

This marketing manager has been developing opportunities for fresh pear exports for the past three years but warns that: *'We (Australian fruit growers) are high cost producers so we are only really fitting to either shoulder periods, or niche opportunities. So, it's a matter of finding those opportunities and developing them'*.

The process of marketing fruit and identifying and developing opportunities in domestic and export markets involves the following steps:

Making contact

The manager makes market contacts and gets information through a range of mechanisms:

- Queries from individuals (phone or email) may be passed onto him from organisations (e.g. APAL, DEDJTR) *'someone calls them looking for pears and they will pass it on'*
- Industry conferences (e.g. APAL Conference, Gold Coast) *'there was a lady from the citrus industry speaking at the conference, she said we should be looking at working with the New Zealanders'*

who are exporting fruit from April until July. They've already got a readymade market and we could just tack onto the end of it'

- Agents/ exporters making direct contact (phone, email, visit). *'I have been exporting through a citrus person this year. They've got a relationship with somebody that asked for pears'*
- Inward and outward bound trade missions (e.g. organised by APAL or DEDJTR) *'we have showcased some of the new varieties on trade missions and there has been a lot of interest in them'*
- Own travel to markets- *'We go to see some of the markets, it gives you a better understanding of how to service those customers better and what the opportunities are. Traditionally our export was about large premium pears to Asia. Well, since we have been travelling, we have been able to develop some opportunities for smaller fruit'*

Doing business

The manager gets an enquiry or contacts potential customers and negotiates the deal:

'Generally the negotiation process starts when we (the packing house) send some photos and quote a price. The buyer will then say I want something better and then you'll go okay, that's got to be five dollars more, but they don't want to pay five dollars more. So, it comes down to –experience really, understanding your market and what you've been able to serve that market with in the past, which is the difficult thing when you're starting from scratch'. The manager said he prefers to work with exporters he already has history and a relationship with.

When filling an order the manager liaises with growers and sometimes with other packhouses: *'At the moment I am trying to fill a container for Singapore and we need Corella. We are not packing any Corella at the moment so I have put it out to another grower to ask whether he will help me'*

The manager highlighted the complexity of managing fruit specifications for different markets and customers, and needing to stay in touch to know what is going on, for example: *'You've got your top end retailers that only want a premium product, and then you've got your 'Vic Market' that sells number twos. So, you've got Aldi that has traditionally taken a lower grade and been a more competitive retail outlet, versus maybe Coles or something that have been a bit harder on quality. Traditionally, Indonesia is a fairly high quality market, but from time to time they will take a composite grade.*

Sending the fruit to market

This manager also has relationships and a network with key service providers and suppliers, including:

- Packaging companies to sources packaging that meets specific market or customer requirements. *'sometimes packaging can get fiddly. We had one earlier in the year that took me quite a lot of work to find the right packaging that was going to best suit that customer'*
- Logistics/freight forwarders to send fruit to market and get feedback about protocol changes
- Australian Quarantine Inspection Service (AQIS) for information about fruit quality protocols required in each export market

Key points

- The marketing manager needs his social network to be able to do business. The better his network as far as obtaining current information, identifying opportunities and sourcing product, the more successful he, and his business will be.
- While it is the packhouse business that has the customers the manager brings, to an extent much of the network are his. This means while a new marketing will have access to the contacts, he or she will then have to develop their own relationships with the actors in the networks.

- These networks cost time, energy and money to develop. Any way of streamlining the process of making good quality business contacts will enhance business success.

Discussion

The role of social networks and social capital

Consciously or intuitively many growers know the value of actively developing their networks and building social capital. For example the marketing manager referred to above in this study was seeking to expand his export networks in order to develop new market opportunities. Networks lead to potential relationships, information sharing and new knowledge. Horticulture industry networks require reciprocity, regular exchanges, trust, co-operation, agreement with common rules, some common objectives and investment of time and effort to be developed and maintained (Folder and Cavaye, 2015; Miocevic, 2016).

Developing relationships with an exporter-importer in order to access overseas markets has additional challenges as the partners come from different cultures and business environments making it difficult to enforce contracts across borders, assess the capabilities of a foreign partner and access information (Miocevic, 2016). In their study of the Tasmanian cherry industry Folder and Cavaye (2015) found that networks and social capital could be fostered at the individual level, and at the industry level.

Building networks and social capital at the individual level

The SNA of pear growers in the Goulburn Valley demonstrated that some growers were very strongly connected (i.e. Grower 24) while others have few industry connections (i.e. Grower 9). While this situation will be strongly influenced by the growers personality, history, selection of markets and business goals, Folder and Cavaye (2015) found that upon realising the value of networks, some growers actively partnered with others in the value chain who had established networks, enabling them access to their networks.

Building networks and social capital at the industry level

Organisations such as DEDJTR, FGA and APAL that support industry are in a strong position to support the development of networks and social capital as they are independent and are seen as providers of unique and potentially useful advice and research and development information. This could be achieved through creating events that to facilitate networking and contact between value chain participants, and to provide industry access to specific people (i.e. researchers, policy or biosecurity officers, overseas experts) not readily accessible to growers. They can also support 'walking the chain' which involves a value chain case study from growers to consumers (Folder and Cavaye 2015).

While some members of the Goulburn Valley pear industry are already building networks to access overseas markets, this can be an expensive and time consuming process for individual companies.

Building networks with complementary industries to consider regional marketing (i.e. dairy and fruit products), or to develop cross-industry (i.e. not directly competing) information sharing, solutions (i.e. labour sharing, product development, value-adding) or complimentary marketing (including sales and logistics) may enable resources to be combined and a critical mass to be developed to provide opportunities for Goulburn Valley fruit growers.

There is some Government support for this type of initiative, for example the Victorian Government will support 'the implementation of local collaborative approaches that will contribute to the growth of existing and new food and beverage manufacturing businesses and create jobs (Food and Fibre Sector

Strategy 2016 p 15). Small to medium businesses do not have the resources to access this type of support, where a group of businesses in a network might.

As a provider of information to industry DEDJTR must also be conscious of the need to maintain their connection, and role with the industry network. This can be difficult with changes in staff and organisational priorities. However, in order to access, and effectively provide complex or sensitive information, trust, reciprocity, co-operation and an on-going investment of time and effort is essential.

Strengths and weaknesses of the GV pear network

One purpose of using social network analysis in this project was to identify strengths and weaknesses in the information sharing networks available to and involving growers of fresh pears in the Goulburn Valley. The effectiveness of information sharing can depend on the social capital of the (human) relationships through which resources are shared (Putnam, 1995; Lin, 2001).

The information sharing network of the Goulburn Valley sample of pear growers shows that the social connections that growers mostly draw on for information about growing fresh pears are close social relationships such as staff, family and direct neighbours. These types of relationships are generally associated with bonding social capital based on close ties between homogeneous individuals and groups between whom there is shared social history and trust.

Important sources of information also include Fruit Growers Victoria and marketing agents who represent bridging social capital based on their capacity to connect growers with information from heterogeneous sources. In addition, bridging social capital is represented in the network by consultants and private advisers. However relatively few growers (20%) use them and those that do also use many other sources of information. Consultants are likely to be used for a specific purpose e.g. fertiliser or pest and disease advice. Bridging social capital enables growers to be connected horizontally to groups in other parts of the value chain network such as packhouses and service providers.

DEDJTR, APAL and connections growers make through self-motivated travel represent linking social capital. Linking social capital enables growers to access strategic, rather than operational or tactical information e.g. market development, regulations and new growing methods. Growers in the sample group have least connections with these sources.

The notable gaps in the information network of the fresh pear grower sample are particularly those associated with bridging and linking social capital. Gaps in bridging social capital include the service sector such as financial (bankers, accountants), commercial (input and service providers). Gaps in linking social capital include researchers (only breeders were mentioned).

The social network analysis identifies the broad range of information sources that growers are currently using. Understanding the implications of each form of social capital - bonding, bridging, and linking, may help to inform strategies for providing growers with information they need about new fresh pear development. This could then inform the provision of an effective mix of grower to grower information sharing (ongoing orchard walks and information interaction), regularly supported by industry (FGV), service providers, marketers and consultants (field days and newsletters) with strategic advice from government, industry (APAL) and researchers to support a collaborative industry initiative.

The social network analysis also enables brokers and champions of information sharing to be identified. These are individuals and organisations whose social positions (number of connections and perceived

trustworthiness) within the network facilitate the spread and reach of information. Using these agents when conducting trials, disseminating research findings or introducing innovations to industry is likely to prove more effective, and efficient than many traditional extension approaches as they are structurally well positioned to both share knowledge and exert influence (King and Nettle 2014).

The findings of SNA highlight the ongoing importance of media that growers can access frequently at times of individual convenience. The inclusion of travel as a means of learning and finding new opportunities highlights the initiative and self-reliance of many growers. Flexible self-learning opportunities provided in a range of media contexts are likely to be valued and used by growers. These can be complemented by less frequent but regular information delivery by industry and marketers. Developing government information sources is a potential opportunity to strengthen an overall information strategy if aligned with media and industry.

Recommendations

- Use growers, service providers or organisations found to be network hubs or information brokers to disseminate research information. They will effectively disseminate information and influence.
- DEDJTR to facilitate the development of networks between members of the pear industry and complementary industries, value chain members or providers of unique advice or resources (i.e. researchers, funding bodies) towards creating opportunities for additional information and opportunities to reach the Goulburn Valley.
- DEDJTR to maintain its role in the industry network.
- Maintain or increase resources to provide the Goulburn Valley pear industry with access to overseas contacts (i.e. references, trade missions) to support their network development.
- Provide policy support (i.e. grants, resources) for members of the pear industry to travel to access information and build networks.
- Develop a network of like-minded or complimentary business in the Goulburn Valley to explore business or market development opportunities (i.e. develop critical mass to access Food and Fibre Industry Funding).

Conclusions

This study set out to map extension capability (information and advice) used by pear growers in the Goulburn Valley to support their decision making about the future of their pear orchards. Better understanding of the network can help policy makers (DEDJTR), industry stakeholders and growers target limited resources more effectively to support growers and the pear value chain growth and profitability.

Social network analysis was based on an existing data set of 25 pear growers (Seymour and Longley, 2013). Findings suggest that current network strengths include information sharing within close social relationships for example between growers and their direct connections (family, staff and proximate neighbours). Fruit Growers Victoria and marketing agents are an important source of marketing information. Consultants and private advisers are important for some growers (20% in the study sample) and these growers also use a range of other information sources. Several growers take the initiative to learn through their own travel. DEDJTR and APAL provide important strategic guidance for the network (linking social capital). Overall growers' most commonly used information source is media including the internet, news and journals.

Network weaknesses include very limited information sharing connections between growers and both the financial (bankers, accountants) and commercial (input and service providers) sector. There are also limited connections between growers and researchers (although plant breeders were mentioned).

Opportunities to strengthen the fresh pear network of the Goulburn Valley include active support by government and industry organisations (including DEDJTR, FGA and APAL) for networking opportunities between growers and with other value chain participants and opportunities for growers to meet and learn from people with specific expertise (i.e. researchers, policy or biosecurity officers, overseas experts). In addition ongoing support is needed for growers' own on-orchard experiments – as individuals and groups, formal and informal grower discussion groups and walks, for growers to meet with local and export marketers, development of study travel opportunities and for building connections between growers and specialist advisers, researchers and financial advisers through forums, field days and discussion groups.

Limitations of the study

One limitation is that a pre-existing data set was used for the SNA in this study. This approach meant that project resources were optimised and pear growers were not sampled, and asked similar questions twice, in a short time, by the same organisation. However it also meant that the researchers could not ask specific relation questions, potentially leading to multiple maps (i.e. a marketing network, a production related network).

A further limitation was that 25 valid growers were sampled. While this enabled the sources of available information to be mapped and conclusions to be made about the network, a larger sample size would yield additional information and enable conclusions to be tested.

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