Mapping the extension capability of the Goulburn Valley fresh pear network

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Abstract. Declining demand for canning and fresh pears, along with rising costs and diminishing returns, mean that Goulburn Valley pear growers are facing major production, market and investment decisions. Access to information and support about market opportunities, consumer preferences and quality protocols is critical for growers making reinvestment decisions; however increasing privatisation of advisory services makes it more difficult to source information. This study used social network analysis to understand how a sample of 25 pear growers use information networks to support their production and investment decision making. The findings show that growers' closest information-sharing relationships are with family members, staff and close neighbours. Fruit Growers Victoria and marketing agents are important sources of marketing information while some growers travel overseas to seek information. Industry and government organisations could strengthen the network by providing greater opportunities for growers and other stakeholders throughout the value chain to connect and share information.

Keywords: social network, information access, farmers, advisory services, information networks

Introduction

The Goulburn Valley grows the majority of Victoria's 105,000 tonnes of pear production, valued at approximately $93 million (APAL 2016). Yet with declining demand for canning and fresh pears, along with rising costs and diminishing returns, Goulburn Valley pear growers are currently facing major production, market and investment decisions. Examples of these decisions include whether to adopt emerging technologies to minimise costs, how to manage new pests (e.g. Queensland Fruit Fly), whether to invest in new pear varieties, and how to position themselves to capture new export opportunities.

A recent national research project 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.

This indicates that growing fruit is a competitive and challenging profession where access to current market, production and technical information, problem-solving resources, and practical and emotional support to make and implement sound decisions is increasingly critical. This process occurs both formally and informally through growers' everyday interactions with the growers, advisers, service providers and marketing professionals in their network. Access to such a supportive information network has been found to bear directly on growers' subsequent production and marketing decisions (King & Nettle 2014).

In this study, social network mapping was used to explore the advisory networks of the pear industry within the Goulburn Valley. Social network mapping and analysis allows the myriad of relationships that can either facilitate or impede knowledge creation and transfer to be visualised and understood (Cross & Parker 2004). It answers questions about how information flows within an industry, and who people turn to for advice. Using social network analysis enables the strengths and weaknesses of the information and knowledge network to be explored, including identification of the most commonly accessed information sources and the brokers and champions that facilitate access to these (Cross & Parker 2004).

Theoretical and conceptual framework

Social networks and social capital

A network is a group or system of interconnected people or things. A social network maps social interactions and personal relationships based on a specific relational question or topic (Cross & Parker 2004). In a social network people are connected by at least one relationship (Marin & Wellman 2011).

Networks provide people with social capital, a term used to describe the collective value of their social networks (Better Together 2013; Schirmer et al. 2015). Social capital is used to explain

how people and groups access and share resources, including information and knowledge through their social networks (Putnam 1995; Lin 2001; Burt 2004; High et al. 2005).

The central premise of social capital 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, p1).

Within a network there are three different types of social capital (High et al, 2005; Fisher, 2013):

1. Bonding social capital is associated with high levels of trust and usually found when people share similar interests and interact regularly.
2. Bridging social capital provides access to resources beyond an immediate network. For example production, management and marketing information provided to growers through advisers.
3. Linking social capital is accessed through relationships between different networks such as between pear growers and industry or government organisations.

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 (Cross & Parker 2004). Network brokers contribute significantly to network integration by facilitating resource distribution (King and Nettle 2014).

Information seeking within a network

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; Folder and Cavaye 2015; Schirmer 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 in agriculture (Schirmer et al. 2015). Growers often use a unique mix of information sources, including people, for different information searches and are likely to use multiple networks. How well connected growers are and the quality and strength of those connections, will determine the information and opportunities they can access (Folder & Cavaye, 2015).

The perceived level of importance or risk of any given decision influences how many different sources will be consulted (Case 2007) and growers will continue their search processes until they are comfortable to make a decision (Kathalau 2004). Hill et al. (2015) found that other growers within a 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.

The effectiveness of information-sharing can depend on the social network through which resources are shared (Putnam 1995; Lin 2001). 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 industry developments. 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, service providers, marketers and consultants (field days and newsletters) with strategic advice from government, industry and researchers to support a collaborative industry initiative.

Social network analysis also enables brokers and champions of information sharing to be identified. These are individuals and organisations whose social positions within the network (number of connections and perceived trustworthiness) 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 & Nettle 2014).

Methods

Qualitative Data

The qualitative data used in this study was mainly drawn from the set of 25 semi-structured interviews with pear growers conducted by Longley and Seymour in 2014 to investigate which pear growers were interested in growing fresh pears and why (Longley & Seymour 2014). The interview data was 're-mined' for the purposes of this study by focusing on the relationships

growers reported using to source information and knowledge for making decisions about growing fresh pears.

The researchers also undertook additional interviews with three experienced stakeholders in the pear value chain to test the analysis. Human Ethics clearance from the University of Melbourne was obtained for these interviews, which were conducted in 2015. All qualitative data was analysed by identifying themes using constructivist interpretation of human behaviour and interactions (Lincoln & Guba 2013).
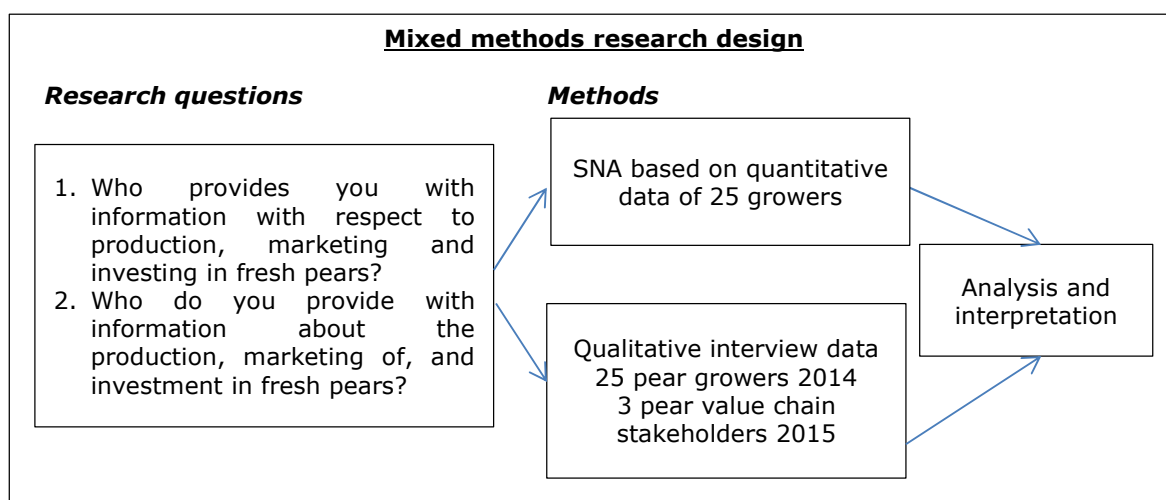
Social network analysis

Social network analysis 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 & Faust 1994; de Nooy, Mrvar & Batageli 2005). Social networks are formed for many reasons, therefore when an explicit relational question is used (Wasserman & 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.

For this social network analysis, a combination of qualitative and relational quantitative data was used to collect data (Figure 1). Qualitative semi-structured interview data was collected to understand why and how growers seek information and quantitative relational data was used to create the social network analysis. The 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.

Relational data was initially collected from the 25 participants within the network of interest by asking them to name their contacts with respect to two specific relational questions:

1. Who provides you with information with respect to production, marketing and investing in fresh pears?
2. Who do you provide with information about the production, marketing of, and investment in fresh pears?

Figure 1. Mixed methods research design

Mixed methods research design

Research questions

1. Who provides you with information with respect to production, marketing and investing in fresh pears?
2. Who do you provide with information about the production, marketing of, and investment in fresh pears?

Methods

SNA based on quantitative data of 25 growers

Qualitative interview data
25 pear growers 2014
3 pear value chain stakeholders 2015

Analysis and interpretation

Results

Social network analysis of The Goulburn Valley pear industry information network

For the social network analysis, each growers' name and relationship was ascribed a numerical value and this data was entered into the social network analysis software Pajek 2.05 (de Nooy, Mrvar & Batageli 2005). This resulted in a network comprised of 65 nodes including the contacts of 24 growers and one 'isolate' grower node for whom no contacts were identified from the interview data available (Figure 2). This grower (G14) is shown as a single unconnected node.

The resultant information sharing network of Goulburn Valley pear growers is shown in Figure 2 and Table 1. The circles positioned around the outer ring represent the growers (G1 – G25) whose interview data was used for analysis. Information sources are represented by nodes within the inner ring 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 the most information sources, and is therefore the largest grower node. The connecting arrows point towards the information source(s) growers are using to access information.

Sixteen information sources used by growers (G) are identified in the network model. These range from growers referring to their own experience and own on-orchard trials to other growers, marketers and industry bodies. Not including 'isolate' Grower 14, the sample group of growers identified information networks that ranged from one 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 e.g. media, marketer.

Figure 2. The relationship between Gouburn Valley pear growers and a range of sources of information
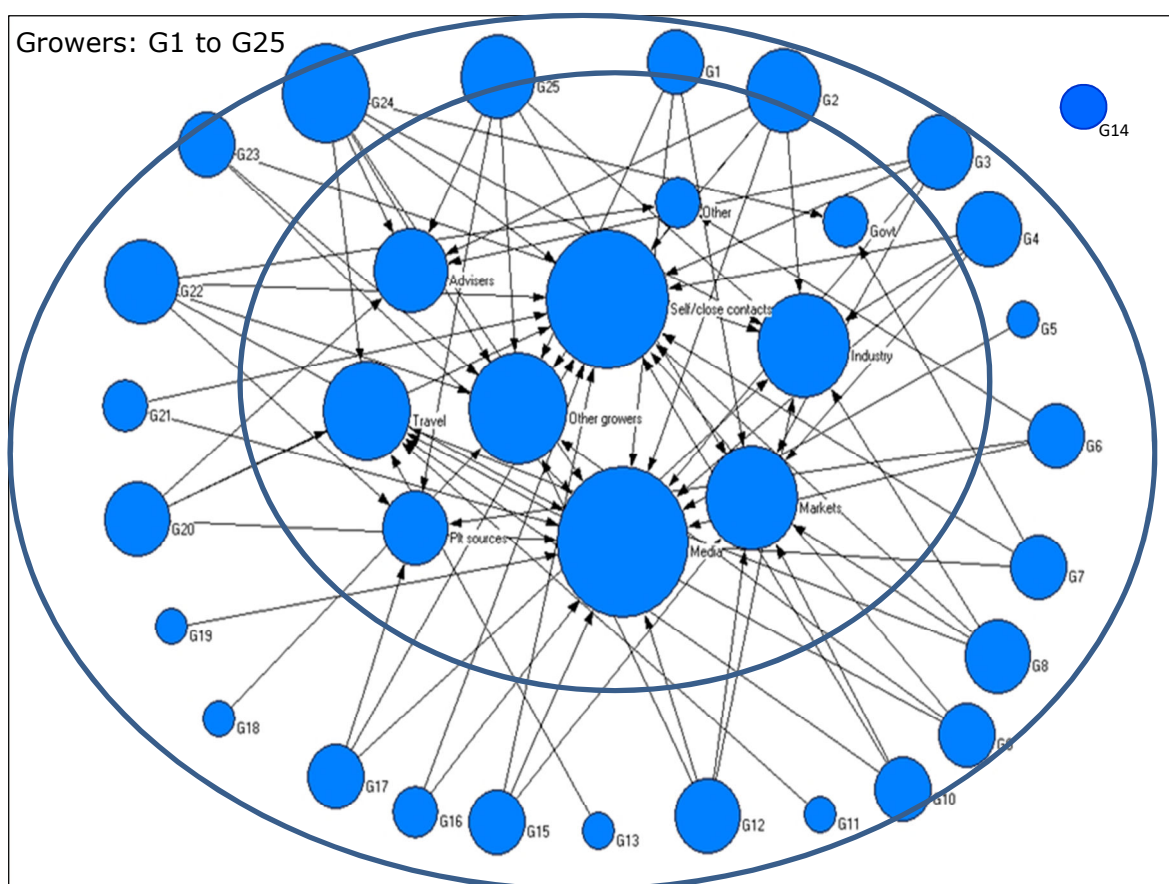

Table 1 presents the ranking of the ten information sources used by pear growers from most-used to least-used sources according to the grower data set. Media, both paper-based and digital, was the most common information source used by growers followed by their own experience and knowledge and that of those they most regularly interact with. Other growers, industry, market and travel were moderately accessed information sources and were 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 were not drawn on by most growers. It is notable that researchers were not specified as information sources although plant breeders (which were specified) are likely to work in research roles.

Table 1. Type of information sources, ranked in order of frequency of reported use

Frequency of reported use	Type and description of information	Abbreviations used in Figure 1
1	Media sources including orchard related magazines, journals and books; internet and local news.	Media
2	Self and close contacts including growers' own experience and trials/experiments, family, staff and direct neighbours.	Self/close contacts
3	Market sources including marketing agents, packing houses, exporters, local and national markets and processers (i.e. the cannery).	Markets
4	Industry including Victoria Fruitgrowers Federation (VFF) , Apple and Pear Australia Ltd (APAL), Horticulture Innovation Australia Limited (HIAL), Industry Development Officers (IDOs), Fruitgrowers Australia (FGA).	Industry
5	Other growers including grower groups, orchard walks, meetings, workshops and the general grower community.	Other growers
6	Travel undertaken at growers' own initiative or organised groups.	Travel
7	Advisers/consultants including specialists in management practice, pest management, fertiliser, and agronomy.	Advisors
8	Plant sources including breeders and nurseries.	Plt sources
9	Government including local and regional (Department of Economic Development, Jobs, Transport and Resources, DEDJTR).	Govt
10	'Other' including general socialising.	Other

In Figure 2, growers' connections (shown as arrows) identify that each has a unique combination of information sources. Table 2 (below) summarises the connections used by each grower from most to least connections.

The highly connected group

The most connected growers were more likely to include consultants in their range of information sources and were 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.

The moderately connected group

Eleven growers were found to be moderately connected with three to five information sources including industry, other growers and media sources, but only one used a consultant. In this group three growers identified nurseries and breeders as sources of information. Overall this group is likely to prefer information sources that are local and familiar.

The sparsely connected group

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

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 fuit growing community, industry network, Department of Primary Industries (DPI), travel, local markets, local media workshops
2	8	Consultants (3), Fruit Growers Victoria (FGV), walks, reading, APAL, packing house
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, FGV
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

Discussion

Strengths and weaknesses of the Goulburn Valley pear grower 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 analysis of 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, informal, social relationships such as with 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 within which there is shared social history and trust.

The notable gaps in the information network of the fresh pear grower sample are particularly those associated with bridging and linking social capital. 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. Linking social capital enables growers to access strategic, rather than operational or tactical information e.g. market development, regulations and new growing methods.

FGV and marketing agents represent bridging social capital based on their capacity to connect growers with information from a number of different sources. In addition, bridging social capital is represented in the network by consultants and private advisers. However relatively few growers (20%) were found to use them and those that did also used many other sources of

information as well – hence it is unlikely that they rely on this particular source. These growers were likely to ask consultants for specific advice e.g. fertiliser or pests and disease. Gaps in bridging social capital include the service sector such as financial advisers (bankers, accountants) and commercial advisers (input and service providers).

DEDJTR, APAL and the connections growers make through self-motivated travel represent linking social capital. Gaps in linking social capital include researchers (only breeders were mentioned). Growers in the sample group were found to have fewer connections with these sources than with other sources.

The results of this social network analysis highlight the popularity of media that growers can access frequently and 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 through 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. Further development of government information sources represents a potential opportunity to strengthen information support for growers particularly if aligned with media and industry.

Building networks and social capital at the industry level

The social network analysis of pear growers in the Goulburn Valley demonstrated that some growers were very strongly connected while others have few industry connections. While this situation will be strongly influenced by the grower's personality, history, selection of markets and business goals, it is also possible that the number of connections can be increased through some form of intervention, for the benefit of the less-connected grower. Folder & 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 wider networks.

State and industry organisations such as DEDJTR, FGV and APAL are well positioned to support the development of networks and social capital that significantly improve opportunities for growers and other value chain stakeholders (Folder and Cavaye 2015) as well as provide essential extension and research and development information. This could be achieved through creating events to facilitate networking and contact between value chain participants and by providing access to specific people (e.g. researchers, policy or biosecurity officers, overseas experts) not readily accessible to growers through their everyday social networks.

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 businesses. Networks with common aims may provide opportunities for co-operation on this front.

Building networks with complementary industries to consider regional marketing (e.g. dairy and fruit products), or to develop cross-industry (i.e. not directly competing) information-sharing, resource-sharing (e.g. labour-sharing, product development, value-adding) or complementary 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' (Victorian Government 2016, p 15). Small to medium businesses do not have the resources to access this type of support on an individual basis, whereas a group of businesses in a network might.

Limitations of the study

One limitation of the study is that a pre-existing data set was used for the social network analysis in this study. This approach had advantages in that it meant that project resources were optimised and pear growers were not over-sampled by asking them similar questions within two years by the same organisation. However it also meant that the researchers could not ask specific questions, which would have had the potential to identify a number of relational connections and networks (e.g. a marketing network and a production-related network).

A second limitation was the small sample size (n=25). While the number used was sufficient to map a reasonable-sized network, a larger sample size would yield additional information.

A third limitation is that the data used in this study was two years old at the time of analysis. Mapping a social network creates a model of relationships at a particular point of time and while generally networks based on long term relationships remain relatively stable over time, there

are ongoing social, market and industry changes that mean a network is continually evolving over time (Vega-Redondo 2007). It would be interesting to remap this network in future in view of the significant changes that have affected, and continue to affect the Goulburn Valley pear industry.

Conclusions

This study mapped the extension network (information and advice) used by pear growers in the Goulburn Valley to support their decision making about the future of their pear orchards. The systematic analysis of the network proved to be a valuable tool for understanding the nature of the network and identifying strengths and weaknesses. This information in turn can help policymakers (DEDJTR), industry stakeholders and growers target limited resources more effectively, in order to increase growth and profitability in the pear value chain.

Acknowledgements

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