

Perceptions from Tasmanian organic farmers about the availability of information on organic farming practices

By

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Declaration

This thesis contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed

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Abstract

Organic farming is experiencing a steady growth and market signals indicate that this expansion will continue. Organic products are becoming common in mass markets and are in high demand for export to foreign markets. In order to capture a larger share of the growing niche market, the Tasmanian organic industry is confronted with the challenge of expanding its industry to encompass more producers. The response from the Tasmanian organic industry has so far been an increase of 70 percent in the total area of certified organic production within the last three years. However, members of the Tasmanian Organic sector acknowledge the existence of impediments to successful expansion. One of the major obstacles they identified was that organic farmers and those looking to convert, are challenged by a dearth of available information.

This research addresses the issue of whether there is a lack of information about organic practices among Tasmanian organic farmers, and whether such a lack of information is a constraint for the expansion of the organic farming sector. The aims of this research were to evaluate the information sources used and the types of information required by Tasmanian organic farmers. Such an evaluation was necessary in order to direct future research initiatives and to better plan the provision of extension services. The majority of the 13 organic farmers that took part in the study had been involved with the organic industry in southern Tasmania for more than five years, which was an important criterion for ensuring the validity of the qualitative analysis using semi-structured interviews.

The organic farmers were a diverse group. Their main sources of information included books, trial and error and peer advice. There was consensus among the farmers about the lack of information about post-conversion production techniques. There was also a tendency among Tasmanian organic farmers for a high degree of self-reliance for the acquisition of information. However, the lack of information does not currently appear to be a major constraint on the expansion of the industry. Nevertheless, production orientated research and effective educational strategies retained importance among farmers for the successful advancement of their industry.

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Glossary

Accreditation

Accreditation refers to the successful outcome of compliance checks or audits of a certification agency. Certification agencies are accredited by the Australian Quarantine Service, AQIS (Horsley and Kondinin, 2000).

Biodynamic

Biodynamic agricultural practices are a form of organic farming based principally on the work of Dr Rudolf Steiner and subsequent developments derived from practical application, experience and research (Raupp, 2001).

Certification

Certification means the procedures by which an approved certifying organization provides written assurance that an operator has been determined to conform with the established standards. Certification is based on the inspection of practices used, sampling of product and verification of records maintained by the owner (Horsley and Kondinin, 2000).

Certified organic

Certified organic or Level A certification means that a farm has fully converted to organics. Such a establishment has been farmed organically, usually for a minimum of three years, under certifier supervision. No artificial chemicals have been used and the farm has been managed in a way which cares for the environment and for the quality of the produce (Horsley and Kondinin, 2000).

Conventional farming

Production system based on a full range of pre- and post- plant tillage practices, usage of synthetic fertilizers and pesticides (DPI, 2004).

Conversion

Conversion refers to the period between the cessation of conventional practices and the application of organic principles. This process typically takes four years; food can not be sold as “organic” in the first 12 months and may be sold as “in conversion” for the following three years (DPIWE, 2003; 2004).

Holistic

A term which implies that resources are managed in whole units rather than as parts in isolation from their surroundings (Sullivan, 2001).

Acronyms

AQIS	Australian Quarantine Service
AVCA	Agricultural and Veterinary Chemicals Association of Australia
DPIWE	Department of Primary Industries, Water and Environment
FAO	Food and Agriculture Organization
IFOAM	International Federation of Organic Agriculture Movement
MAF	Ministry of Agriculture and Forestry New Zealand
NASAA	National Association of Sustainable Agriculture of Australia
OCT	Organic Coalition of Tasmania
OECD	Organisation for Economic Co-operation and Development
OPAC	Organic Producers Advisory Committee
RIRDC	Rural Industries Research and Development Corporation.
TOFAS	Tasmanian Organic Farming Advisory Service
UN	United Nations
USDA	United States Department of Agriculture
WCED	World Commission on Environment and Development
WHO	World Health Organization

Chapter 1 Introduction

Debates over environmental issues have increased public concern and support for alternative and more sustainable production systems in agriculture, of which organic farming is an established and growing sector (Chang *et al.*, 2003; Lampkin, 1990; Saunders *et al.*, 1997). Market expansion and favourable political measures also seem to favour the increase in the practice of organic farming in Europe and worldwide (Chang *et al.*, 2003; Saunders *et al.*, 1997).

Australians have been following the trend towards more sustainable practices in agriculture, and organic farming has been growing in popularity throughout the country. The export market is roughly one-third the size of the domestic market. Most of the 10.5 million hectares in 2,100 certified Australian organic farms are dedicated to beef enterprises and dairy products (DPIWE, 2002; IFOAM, 2003). Some others of the primary products for export are wheat, rice, wool, herbs, wine, vegetable seeds, sheep and beef (Dumaresq *et al.*, 1997). The most important export markets for Australian organic products are Great Britain, Germany, Japan, New Zealand and Singapore (Alenson, 2000; IFOAM, 2003). Australian producers benefit because they can provide the European market with out-of-season fresh fruit and vegetables. In addition, New Zealand, Singapore, and the USA are supplied with organic produce (DPIWE, 2002). On the domestic market, organic produce receives a substantial price premium over conventionally grown produce (RIRDC 2001). For cereals and livestock products, this premium ranges between 50 percent and 75 percent, and for fruit and vegetables, it is usually between 50 percent and 60 percent (FAO, 2001).

Tasmania has a population of approximately half a million people, and about 40 per cent of Tasmanians live in and around Hobart (RIS, 1999). A number of relatively large towns and cities on the island's north coast serve as centres for agricultural and industrial activities typical of the region. Agriculture is an important part of Tasmania's economy with agricultural properties occupying about 29 percent of the State's total land area (RIS, 1999).

Tasmania's small population and lack of heavy industrialisation has resulted in the development of a 'clean-green' image, particularly with regard to food exports. At the

same time, Tasmania has an organic farming sector that is over 30 years old (Griggs, 2000a). The Organic Gardening and Farming Society (OGFS) was formed in 1971 and was one of the first organic organisations in Australia (Griggs, 2000a; 2000b). OGFS funded the establishment of Tasmania's first certification organization, the National Association of Sustainable Agriculture Australia (NASAA) and their group magazine was distributed nationally before other magazines that dealt with organics (Griggs, 2000a; 2000b). Several certification agencies are now responsible for the coordination of the activities of more than one hundred certified organic enterprises in Tasmania (DPIWE, 2002; DPIWE 2003).

Stimulated by the comparative strength of having a clean and green image, members of the local organic industry have been concentrating efforts to improve organisational and performance structures. The conversion of King Island Cooperative Dairy Company Ltd has been considered as a step forward in the development of the Tasmanian organic industry (Griggs, 2000a). The Organic Coalition of Tasmania (OCT) has recently started to develop a strategic plan and identified a few issues hindering the development of the industry. Difficulties in establishing a market for organic produce have been recognized and attributed to the small quantity of available produce (Griggs, 2000a). The number of certified organic operations has increased, but the local organic industry is still facing challenges (Whitten, 2002; 2003).

The use of appropriate information constitutes the basis of success for any industry. Information is required for strategic and competitive success; to undertake appropriate physical configurations and operational adjustments; to use readily available technological tools to meet legislative and consumers demands; to enhance product quality, to guarantee customer satisfaction and to increase operational efficiency and profits. Thus it becomes clear that the competitiveness of individual producers and the viability of the organic industry as a whole will be determined by their capacity to effectively manage the challenges confronting them. At the same time, the relevance of organic agriculture goes beyond immediate potential benefits to the long-term imperatives of ecological sustainability (RIRDC 2001). Organic farming has been championed as an alternative that increases farm incomes and facilitates positive land stewardship at the same time (Chang *et al.*, 2003; Reganold, 1988; USDA, 1980;

Wynen 1992; Wynen, 1998).

Organic farmers are producing value-added crops within a growing niche market, which may command a substantial premium over prices for conventional produce (RIRDC, 2001; Yussefi and Willer, 2002). However, organic farming methods of production also present new challenges for farmers converting to those systems. In particular, the lack of readily available information and extension support for organic farmers is an issue that needs to be addressed.

1.1 *Effects of insufficient information*

Progress in organic agriculture, by its practice of use of local resources, is dependent on knowledge of local conditions. For example, a certain crop rotation in one place might prove excellent in keeping a particular weed within manageable limits, while in a different place (with a different climate) the threat of a potential insect pest requires a different rotation. In particular, soil fertilization requirements vary between agro-ecosystems and even within production systems and parcels. Research on organic agriculture could yield benefits for conventional farming as well as organic agriculture itself.

Wynen (1992) emphasizes that the loss of income for farmers who want to adopt organic agriculture is due to two factors; conversion on the farm and the farmer himself. The success in the conversion of the farm is related to the farmer's knowledge about how to go organic. Lack of information can be due to a number of factors (Wynen, 1992), which include a shortage of:

1. *Practical experience*: even where knowing what to do, it still might take some time for farmers to learn how to do it most efficiently;
2. *Research*: a good solution to particular problems may not exist because of the absence of research into the problems specific to organic farming; and/or
3. *Extension*: the farmer may not be aware of the solution to a particular problem because the outlets for information on organic agriculture are not easily accessible as those on conventional agriculture.

1.2 Aims and objectives

This research addresses the issue of whether there is lack of information about organic practices in Tasmania, and whether such a lack of information is a constraint for the advance of organic farming in Tasmania. The issue is addressed in the present work with the following research aims that are to:

1. determine how Tasmanian producers gain access to different forms of information about organic agriculture;
2. to determine what type of information is the most required by organic farmers in Tasmania; and
3. relate the information requirements to the development of research and the provision of extension.

1.3 Significance

Organic agriculture has been acknowledged as a major potential contributor to increased levels of sustainability, and the ecological, economic and social benefits of the activity have been widely supported (Reganold, 1988; USDA, 1980; Wynen 1992; Wynen, 1998; Wynen, 2003). It is important to explore how to enhance and manage organic farming practices in Tasmania. The study is significant because organic farming may encourage primary producers to adopt sustainable practices more generally. Structural and legislative changes have occurred in places like the European Community in order to support organic agriculture, and they may be used as a model for the Tasmanian case. Farmers adopting organic farming systems may need Federal, State and local government support. Improvements in the regulation of land use, and in industry practices may be required. Agricultural research and extension will be required for the provision of such improvements, and more holistic and participatory models will be required. There will be a need for awareness about how farmers learn and what they need to learn to make their work more productive. The study is an initial approach to those issues and its significance is elaborated in later chapters.

1.4 Methodology

The development of this topic is informed by both my background as a researcher in new alternatives for sustainable agricultural production and my recent focus in human geography.

I decided to apply a qualitative perspective to the research question because I needed to understand the perceptions of local organic farmers, and qualitative methods allowed me a direct access to those farmers in their own environments, in the natural setting of their organic farms. Apart from the conversations derived from the interviewing process, I had the chance to observe the tangible part of organic practices when visiting respondents' farms. Babbie (2002) remarks on the importance of understanding places where interactions occur

A multi-methods approach, including a literature review outlining the theoretical framework and comparative empirical work was employed in order to maximize understanding. The primary data were obtained from participants in this research, most of them leaders in the Tasmanian organic industry. A combination of interviews and face-to-face discussions were conducted with farmers who were viewed as key players in the Tasmanian organic industry. Certification agencies served as secondary sources of data. Information obtained from participants was coded, analysed, and contrasted to the relevant literature.

Publications and studies from the relevant literature were reviewed in order to get in-depth information on general organic trade and Tasmanian organic trade, and available data about the role of information and extension in organic farming were reviewed. The literature review was important, providing a framework for discussion, primarily in connection with the phase involving interviews and secondarily with the data analysis. An extensive literature search for printed and electronic material on a variety of related topics, such as organic farming practices, sustainable development, social capital, networks, management of information and research on organic farming was undertaken.

Publications on organic farming, including books, papers, magazines and bulletins were also consulted. Web searches using IMAGES, Ingenta, ProQuest, Agricola,

Cab Abstracts, ISI Web Knowledge and Yahoo were allied with reports about organic farming from the New Zealand Ministry of Agriculture and Forestry (MAF), together with similar European publications.

1.4.1 Semi-structured interviewing

An important decision for me as the researcher was how to assess the range of variables under investigation and, thereby, to operationally define constructs. In this study, I positioned myself as an observer of social behaviour, and I wanted to get to know about Tasmanian organic farmers' beliefs and attitudes, behaviours and feelings, perceptions and motivations. The first recourse was to simply ask them some questions. Responses to direct questions are the most widely used source of information in the social sciences (Hoyle *et al.*, 2000, p.96). The most obvious reason for employing this method was the flexibility of verbal communication. Language is a powerful and precise medium for posing and answering questions about attitudes, behaviours, experiences or virtually any other topic (Hoyle *et al.*, 2000, p.97). Different alternatives were considered. Some of the advantages and disadvantages when choosing the most adequate way of data collection are summarised in Table 1.

Face-to-face interviews are often used when there is reason to believe that prospective research participants may not be motivated to complete a written questionnaire, or may encounter problems understanding questions, or have difficulties in communicating their responses on topic matter. Semi-structured interviews have some degree of predetermined order but still ensure flexibility in the way issues are addressed by the informant (Hoyle *et al.*, 2000, p.53). The interview included 12 primary questions. Wording decisions must be made on a host of detailed issues to avoid unwarranted assumptions, and provide opportunities to express all alternatives (Hoyle *et al.*, 2000, p.121). Special care was taken to make the questions uncomplicated for the respondents. The questions (see Appendix I) were drafted following a sequence and transition according to the objectives of this study. A draft with the set of questions was open to comments and suggestions by supervisors and people related to the industry. Furthermore, at a later date, it was decided to query respondents about their opinion on their experience and perceptions of organic farming networks. The setting was informal and participants were probed for

additional information in all cases, enabling them to discuss or raise topics they considered relevant. The interviews were tape recorded in order to gain verbatim records.

Table 1: Comparative advantages and disadvantages for different sampling methods

Dimension of comparison	Questionnaires	Face to Face Interview	Telephone Interview	Electronic mail
Response rate	Low	High	Moderate to high	Low
Respondent motivation	Low	High	High	Moderate to high
Sample quality	Low, unless high response rate	High	Moderate to high	Low
Possible length	Short if by mail; long if in small groups	Very long	Long	Very long
Ability to clarify and probe	None if by mail; some if in small groups	High	High	None
Interviewer supervision	-	Low	High	-
Anonymity	High	Low	Low	High
Control of context and question order	None	High	High	None

Source: Adapted from Hoyle *et al.*, (2000), p.96.

The most important advantage of semi-structured interview techniques is in the quality of information. Face-to-face interviews can attain the highest response rate of any survey technique, sometimes over 80 percent (Hoyle *et al.*, 2000, p.124), as well as allowing researchers to establish rapport with, and motivate respondents to answer fully and accurately, improving the quality of data (Babbie, 2002; Lindsay, 1997). The primary disadvantage of personal interviews is their high cost, which often depends on the geographic coverage required by the study. In this case, distance was an important constraint given the limited resources available for the research and the

high geographic dispersion of farmers.

Pre-testing an interview questionnaire involved undertaking a preliminary administration of the questionnaire to determine whether the questions were ambiguous or difficult to answer and whether the questions will provide useful feedback (Babbie, 2002; Lindsay, 1997).

Considering the strengths and weaknesses of open and closed questions documented in Table 2, some closed questions were used for uniformity of feedback and fast analysis. In order to overcome the possibility of omitting responses in these questions, and the ‘if other please specify’ option was included (Babbie, 2002). Open-ended questions were used where responses were difficult to anticipate, and where depth and insight were required.

Table 2: The benefits and drawbacks of closed and open-ended questions

Type of Question	Definition	Benefits	Drawbacks
Closed	Respondents select from a number of choices	Uniformity	Uniformity at the cost of achieving insight and depth
		Fast analysis	Can omit important responses
		Ensure useful information is provided	
Open-ended	Respondents use their own words	Insight	Time consuming analysis
		Depth	Misinterpretation possible
		Richness	Irrelevant answers

Sources: Adapted from Babbie (2002) and Lindsay (1997).

The population of organic farmers in Tasmania is small in number and geographically dispersed. In order to have a reasonable response rate, it was crucial that participants understood the aims, intention, exact requirements and value of their participation. A preamble providing such information – an Information Sheet - was therefore

distributed with the set of questions, as suggested by Babbie (2002) and Lindsay (1997), and as required by the University of Tasmania Ethics Committee.

Upon the completion of the survey, response counts were totalled and a percentage of the group was recorded for the response of each question. These percentages were critically analysed to ascertain the most common responses and the range of responses. In order to characterise the diversity within the respondents, a Dendrogram of farmer characteristics was produced using a hierarchical cluster analysis. The cluster analysis was performed using Minitab (2000) with a binary dataset for each respondent that grouped all 60 possible response options from all questions. The cluster analysis used the Ward's Linkage method and Euclidean Distance to produce a dendrogram scaled by similarity levels.

1.4.2 Participant selection and recruitment

The sampling in this research was purposive, which involved obtaining a variety of detailed data from individuals or social groups who are central to the study. The basic assumption behind purposive sampling was that with good judgment and an appropriate strategy, I could select the cases to be included, and thus develop samples that were satisfactory in relation to my assumptions. A common strategy of purposive sampling is to choose cases that are judged to be typical of the population in which the researcher is interested, assuming that errors of judgment in the selection will tend to counterbalance one another.

Qualitative research involves a focus on depth, and employing a large number of participants is sometimes inappropriate and often impractical due to time and associated resource constraints. "In qualitative research, the number of people we interview, communities we observe, or texts we read is less important than the quality of who or what we involve in our research" (Bradshaw and Stratford, 2000, p.38). One of the assumptions for the participant selection was that the more experienced farmers would be able to give more insights to the research questions. As pointed by Bradshaw and Stratford (2000, p.43), "it is perfectly feasible that conducting in-depth interviews with a small number of the *right* people will provide significant insights into a research issue". In any case, without an external check, there is no way of

knowing that the “typical” cases continue to be typical (Hoyle *et al.*, 2000, p.187). As suggested by Bradshaw and Stratford (2000), adequate “secondary research allows to approach appropriate key informants to unlock this topic” (p.44). Farmers were selected according to their experience in organic farming. The farmers experience is not related to the time they have been certified organic or bio-dynamic, but to the timeframe they have been practising organic farming. Thus, not all organic or bio-dynamic farmers are willing to undergo certification given the cost of the process (G. Whitten, pers. comm., 2003).

Once the potential participants were listed, each of them was contacted by telephone, and the nature and purpose of the research were briefly explained before interviews were agreed to and undertaken. Thirteen farmers took part in this research (designated as F1 to F13 in order to assure anonymity), eight of them from the organic sector (F1 to F8) and five from the bio-dynamic (F9 to F13). The relationships between the so-called organic farming movement and the bio-dynamic one are explained in Chapter 2. They are both subgroups inside the general organic assemblage, with some differences in practices but common objectives within the movement to more sustainable agriculture.

I have the obligation to ensure that my findings have rigour; I have to ensure that this research is credible, dependable and transferable through the use of triangulation, verification and explication (Bradshaw and Stratford, 2000, p.47). “Rigour is a matter that needs to be considered from the outset of our research, underpinning the early stages of research design and needs to be maintained throughout the course of the research” (Bradshaw and Stratford, 2000, p.46). Unlike quantitative methods, which are validated through standardized and prescribed methods, qualitative methods are reliant on the researcher skill, competence and rigour (Patton, 1990, p.184). The researcher then has the obligation to stay as neutral as possible, cross-referencing all the stages of the research.

Rigour concerns the reliability and validity of a study. Ensuring rigor in qualitative research means establishing the trustworthiness reliability of our work (Bradshaw and Stratford, 2000, p.46). Research can be constructed as a kind of hermeneutic circle starting from an interpretive community, which is a key to ensuring rigour in

qualitative research: participant and interpretive communities check our work for credibility and good practice (Bradshaw and Stratford, 2000, p.46).

1.4.3 Thesis outline

The present work includes an introductory chapter and the justification for undertaking the research. Chapter 1 has presented the aims and objectives of this research, and also encompasses the methodology and methods selected for completing the work. Chapter 2 covers the current status of organic farming globally, detailing the historical development and current status of organic farming at the international, national and local levels, as well as discussing the significance of potential contributions of organic farming towards sustainability. Chapter 3 includes definitional and theoretical frameworks for key terminology, especially information, knowledge and data; the relevance of these concepts for agricultural practices and specifically for organic farming are also discussed, and the acquisition of knowledge is explored along with probable reasons for a perceived lack of information are also discussed. Chapter 4 presents the main findings derived from the data collection process. Some of the transcribed data has been included anonymously in order to provide a closer appreciation of farmers' opinions. Finally, Chapter 5 entwines results and theoretical frameworks in a summary and conclusion to the study.

Chapter 2 Organic farming: setting the context

2.1 *Introduction*

This chapter includes the historical evolution of organic farming and overviews of organic farming at local, regional and international levels. An effort to take into account relevant recent data was made, but finding updated information about organic farming in Australia and Tasmania was difficult, and the few works available refer only to Australia and not to sub-national jurisdictions. Organic production is not listed under any statistical category in the Australian Bureau of Statistics. Thus, the main source of information on the nature and extent of organic farming in Tasmania comes from certification bodies. During the annual certification process, growers must declare the area and types of crop/stock being certified as organic. Certification agencies keep records on such produce and this provides the most reliable assessment of the current extent of organic farming in Tasmania.

At State level, the Organic Coalition of Tasmania (OCT) has compiled data about Tasmanian organic producers after two surveys. Hassall and Associates (1990, 1995) studied the market for Australian organic produce in the 1990s. More recently, the market potential for some agricultural products was examined by the WA Department of Agriculture. The most recent figures for farm gate and retail values of organic agriculture in Australia pertain to 2000/2001 (RIRDC 2001).

At the global level, the provision of information on organics is also irregular, but the International Trade Centre from the World Trade Organisation provides estimates of values of the organic markets and of the expected growth rates. Detailed data for the USA are provided by the US Department of Agriculture (USDA). The USDA also provides insights in the situation in a number of other countries. The European Union (EU) has funded (or co-funded) and published a list of projects in organic farming, including an extensive analysis of the market for organic produce in EU countries in 1999.

Updated reports about organic farming overseas and in Australia include one by Yussefi and Willer (2003). This work provides information on agriculture in general;

on the history and development of organic agriculture; the development of organic land use and production; on organic organizations; state regulations, standards and certification; training, advisory service and research; challenges and outlook. A study by Chang *et al.* (2003) delivers an overview of the markets for organic food products in Australia. The Department of Agriculture Fisheries and Forestry (DAFF) is currently undertaking a project to develop a national profile of the organic sector. Victorian Senator Judith Troeth (pers. comm., 10 May 2004) indicated that “the project aims to collect the latest information on organic production, consumption, sales, promotional activities, prices, imports and exports”. According to Senator Troeth, this report “will contain information helping the industry members to identify opportunities in the market, which products are worth producing and those that are in oversupply”.

2.2 Defining organic farming

There are various definitions of organic farming systems, but in broad terms, organic goods are those produced by specific management practices that take care of the environment and the soil. The Australian Organic Producers Advisory Committee (OPAC), an organization which includes the National Organic Licensing Groups Australia, defines organic agriculture as follows:

... Organic means produced in soils of enhanced biological activity, determined by the humus level, crumb structure and feeder root development, such that plants are fed through the soil ecosystem and not primarily through soluble fertilizers added to the soil. Plants grown in such systems take up essential soluble salts that are released slowly from humus colloids, at a rate governed by warmth. In this system, the metabolism of the plant and its ability to assimilate nutrients is not overstressed by excessive uptake of soluble salts in the soil water (such as nitrates). Organic farming systems rely to the maximum extent feasible crop rotations, crop residues, animal manures, legumes, green manures, mechanical cultivation, approved mineral bearing rocks and aspects of biological pest control to maintain soil productivity and tilt, to supply plants nutrients and to control insects, weeds, and other pests (OPAC, 1998: p.4).

Organic agriculture is usually defined in terms of absence of synthetic fertilizers and pesticides in production (Wynen, 1992; Wynen, 1996). Conventional farming is characterized by a high degree of crop specialization, while organic farming is

characterized by a diversity of crops. The organic system of food production does not comprise just one absolute system; rather there are various farming systems in Australia and internationally which are associated with the term (Griggs, 2000a). Several other terms are used more or less interchangeably with organic. These include natural, biological, ecological, holistic, alternative and sustainable (Troedson, 1991, p.5). Some authors are hostile to the word *organic* because of its range of meanings, many of them rather imprecise; others consider organic farming as a form of sustainable agriculture (Troedson, 1991, p.5). Other terms utilized in the new sustainable agricultural movement, low input, low till, integrated, natural, bio-dynamic and permaculture. The last two ones are noteworthy practices.

Permaculture is a condensation of the two words “permanent agriculture”, coined by the Tasmanian Bill Mollison, who developed the idea and its practices. Permaculture stresses the goal of self sufficiency on a plot of land through design that incorporates intermingling and close interaction of crop plants, trees, animals and aquaculture with minimal inputs from the outside (Mollison, 1988).

Bio-dynamics is an approach based on the teaching of Rudolf Steiner, who was an Austrian scientist and philosopher, known as the founder of Anthroposophy and its many practical applications, among which are the bio-dynamic methods of farming and gardening (Koepf, 1980; Pfeiffer, 1984). Bio-dynamic is similar to organic in avoiding synthetic fertilizers and pesticides, but differs in practices. It requires farms to include animals as well as plant crops, with a few exceptions. Bio-dynamic farming requires eight soil and plant amendments called preparations (see Appendix II).

Organic and bio-dynamic growers are committed to improving soil and land through enhanced biological activity. Such agricultural practices require goods to be produced naturally in soils with enriched biological activity, determined by the humus level and root structure; plants are fed through the soil ecosystem and not with the addition of soluble salts as fertilizers.

2.3 Principles of organic farming

Organic farming is based on a particular set of principles and involves a collection of different practices as listed in Figure 1. Three driving principles are: abstain from using to not use chemo-synthetic mineral fertilizers and pesticides; to maximize the use of naturally occurring mechanisms, "the powerful laws of nature" (Troedson, 1991, p.8) to maintain soil fertility, crop and animal health; and to protect crops and animals from pests, including weeds (Azeez, 2000, p.26).

Other key principle in organic farming system is a holistic approach to farming rather than one based in reductionism. In this way, conservation of biodiversity becomes an integral part of organic farming. The soil is treated as a living entity, not simply as a substrate for crops to grow on. An organic system has to maintain all these characteristics in the long term and it should be able to depend as little as possible on exogenous inputs of any kind.

2.3.1 International voluntary standards

In many countries, locally based organic production is regulated by government and non-government certification organizations (Dumaresq *et al.*, 1997). The industry's peak international body is the International Federation of Organic Agriculture Movements, IFOAM, established some 30 years ago with a General Secretariat based at Tholey-Tholey in Germany (IFOAM, 2002; IFOAM, 2003).

Standards for organic farming were developed long after organic farming had been established, but are now used as a template guide for the practice of organic farming. They are legally regulated and their implementation policed by a number of organic certifying bodies. Some standards are obligatory, some other are recommended. In addition, there are special conservation standards to ensure that specific conservation issues are addressed in more detail.

At the international level the FAO/WHO World Health Organization Codex Alimentarius Commission has produced international guidelines for production, processing labelling and marketing of organically produced food to guide producers and to protect consumers against deception and fraud (FAO, 2003). These guidelines

have been agreed upon by all member states of the Codex Alimentarius Commission, including Australia. The private sector's equivalent to the Codex Alimentarius guidelines is the International Basic Standards for Organic Production and Processing, created by IFOAM. Codex Alimentarius and IFOAM guidelines include accepted management principles for firstly, the production of plants, livestock, bees and their products (IFOAM makes provisions also for fibres, aquaculture and non-wood forest products); secondly, the handling, storage, processing, packaging and transportation of products and finally, there is a list of substances permitted in the production and processing of organic foods. These guidelines are regularly reviewed, particularly the criteria for permitted substances and the process by which inspection is carried out and certification held.

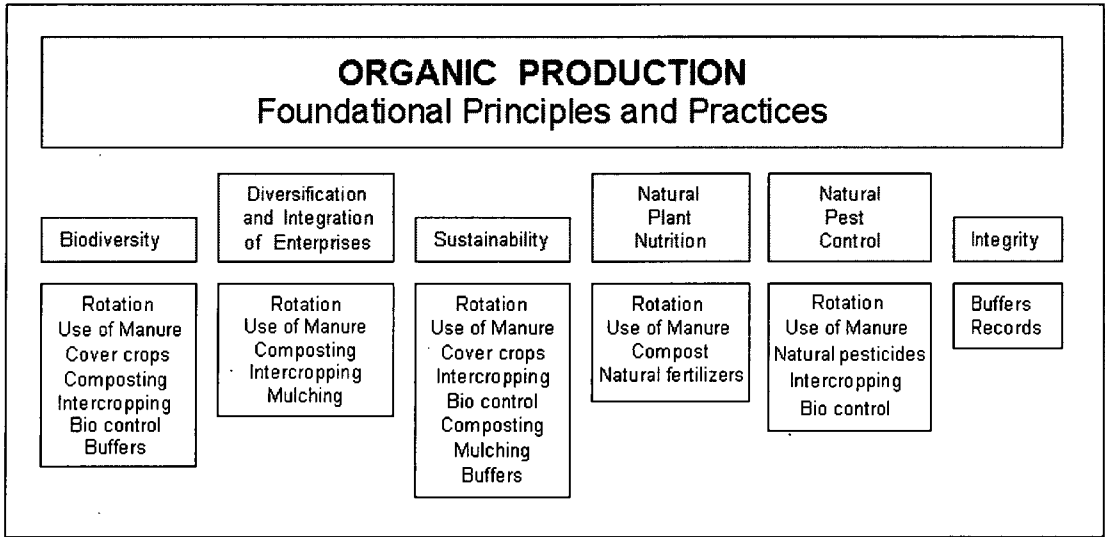


Figure 1: Principles of organic farming. Source: Adapted from ATTRA (2002).

2.3.2 Certification Bodies

The National Association for Sustainable Agriculture Australia (NASAA) has been in existence since 1986 (NASAA, 1999). By 1989, NASAA had developed a national production standards scheme for organic production (NASAA, 1999). These standards serve as a guide for producers, and they protect both producers and consumers from false claims. The aim of the NASSA Production Standards Implementation Scheme (NPSIS) is to facilitate the marketing of produce from sustainable farming. Such a scheme directly benefits three groups: producers, traders and consumers (NASAA, 1999, p.4).

The Australian industry certifies compliant producers, processors and system inspectors against the National Organic Standard. The organic industry and the Australian Quarantine and Inspection Service (AQIS) jointly administer the certification process (Figure 2). The International Codex agreements outline a basic framework for equivalence across various international Standards. The national industry structure was consolidated with the formation of the Organic Federation of Australia in 1998. The industry is currently considering the role of the new peak body, the Organic Federation of Australia, in the development and management of standards for the industry. A recent study comparing the Australian organic industry with other key international arrangements and standards found that the Australian industry was soundly based and well placed to contribute to the management of the industry worldwide (RIRDC, 2001).

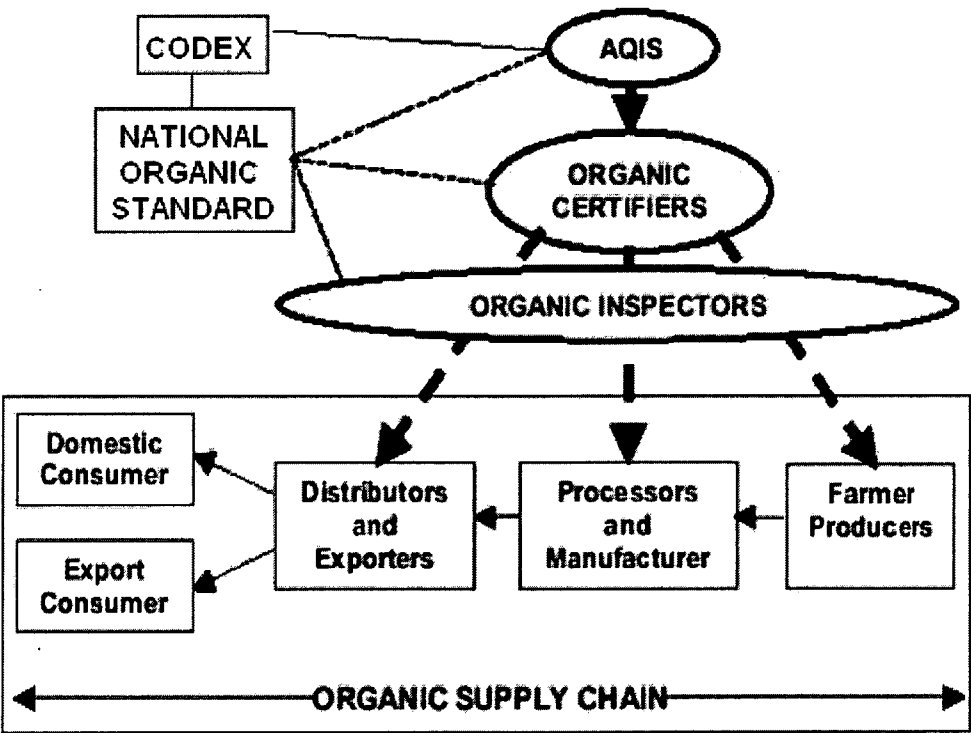


Figure 2: Organic Industry Certification arrangements. Source: RIRDC (2001), p. 6.

Certified operators perform in diverse industries, including grains and pulses, horticulture, viticulture, beef and pork, dairy, and honey. Seafood is a new opportunity driven by the increasing contribution of the aquaculture sector. RIRDC

(2001) estimates the number of certified operators will increase by approximately 40 percent in the next five years. The gross retail value of certified organic production (GVP) is currently undocumented. However estimates prepared by the RIRDC (2001) indicate a range of gross retail values, the high end of which is currently approximately AUD220 million, excluding exports. More recent projections prepared by the Organic Federation of Australia suggest total retail sales (including exports) may reach AUD1 billion by 2006. Other organizations in the organic industry do not certify enterprises but assist with communication, training, domestic and export market development and general information.

2.4 *Organic farming and sustainability*

Sustainability is the ability of a system to endure and the absence of unacceptable effects on people or the environment (MAF, 1996). Sustainable development is "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p.8) and it was meant to be driven by an understanding of the importance of poverty alleviation and the limited carrying capacity of the Earth. Much has been written about sustainability over the past two decades. At the global scale, the Brundtland Report published in 1987 and entitled "Our Common Future" has been accepted widely as a milestone in conceptualising what sustainability means. The Brundtland Report was primarily concerned with securing a global equity, redistributing resources towards poorer nations whilst encouraging their economic growth (WCED, 1987). The Report also suggested that equity, growth and environmental maintenance are simultaneously possible and that each country is capable of achieving its full economic potential whilst at the same time enhancing its resource base. Achieving this equity and sustainable growth would require technological and social advances, and the challenge facing agriculture and farming in the twenty-first century is to feed a growing population using sustainable farming methods (WCED, 1987).

The Food and Agriculture Organization (FAO) World Food Summit in Rome in 2002 and the World Summit for Sustainable Development in Johannesburg in September 2002 served as stages for the launching of organic agriculture as a practice offering a significant contribution to sustainability and food security. The United Nations

promotes sustainable agriculture through efficient storage and distribution methods and responsible land management. Techniques for increasing production and conserving soil and water resources need to be applied. The Rio Declaration on Environment and Development and Agenda 21, urges the development of long-term land conservation and rehabilitation programmes. Chapter 14, entitled “Sustainable Agriculture and Rural Development” details plans towards the acquisition of objectives (UN, 1992). In it, current conventional agricultural practices are considered unsustainable and have been blamed for a number of problems. Four are specially noteworthy. Firstly, environmental harm, including decreasing bio-diversity within agricultural production and in the surrounding environment, soil degradation and degradation and inefficient use of natural resources such as water. Current methods of farming, particularly in developing countries, often result in desertification and deforestation. Secondly, is the reduction on the income levels for farmers with the associated social and cultural degradation. Thirdly are human, animal and environmental health problems caused by pesticides, antibiotics, hormones and unnatural feeding conditions. Lastly are the environmental problems caused by genetically modified organisms (GMOs), pesticides and agrochemicals and pollution caused by industrialized animal husbandry. Compared with a conventional agricultural system, organic farming involves more aspects of a Sustainable Agricultural Systems (Box 1).

Also in relation to food security, organic agriculture has the potential to produce sufficient food of a high quality in a sustainable way (FAO/WHO, 1999; FAO, 2000). In addition, organic agriculture is particularly well suited for those rural communities that are currently most exposed to food shortages (FAO, 2000). Organic agriculture contributes to food security by a combination of many features, most notably: increasing yields in low-input areas; conserving bio-diversity and nature resources on the farm and in the surrounding area (Azeez, 2000; FAO, 2000) producing safe and varied food and being sustainable in the long term.

In January 1999, the FAO Committee on Agriculture adopted a report stating that “many aspects of organic farming were important elements of a system approach to sustainable food production” (FAO, 1999, p.1). The FAO committee also recognized

"the environmental and potential health benefits of organic agriculture and its contribution of innovative production technologies to other agriculture systems and to the overall goals of sustainability". A number of national governments, notably in Europe, have developed action plans and set targets to be reached for the development of organic agriculture.

Box 1: Characteristics of Sustainable Agricultural Systems (SAS)

A Sustainable Agricultural System:

is based on the prudent use of renewable and/or recyclable resources. A system which depends on exhaustible resources, such as fossil fuels can not be sustained indefinitely. A sustainable system would use renewable energy sources such as biological, geothermal, hydroelectric, solar, or wind.

protects the integrity of natural systems so that natural resources are continually regenerated. Current thinking focuses on reducing the rate of degradation of natural and agricultural ecosystems. A system will not be sustainable as long as the goal is simply to decrease the rate of its degradation.

improves the quality of life of individuals and communities. In order to stem the rural to urban migration, rural communities must offer people a good standard of living including diverse employment opportunities, health care, education, social services and cultural activities. Young people must be afforded opportunities to develop rural enterprises, including farming in ways which care for the land so that it may be passed onto future generations in as good or in better condition.

is profitable. Transition to new ways of knowing, doing and being require incentives for all participants. Systems and practices that do not include profitability as one of the prime motivators will not be successfully implemented.

is guided by a land ethic that considers the long-term good of all members of the land community. Holistic or whole-system analysis views an agro ecosystem as a dynamic community of soil, water, air and biotic species. All parts are important because they contribute to the whole. This ethic strives to protect the health of the land community, that is its capacity for self-renewal.

Source : MAF (1996), p.7.

2.4.1 Criticism of organic farming

Most of the criticisms of organic farming have come from researchers and farmers in areas where major pests problems require chemical control, and/or soil nutrients deficiencies are overcame by fertilizers, and from manufacturers and suppliers of

agricultural chemicals (Troedson, 1991). There were mainly three criticisms. Firstly, the inability to grow certain crops (AVCA, 1989; Troedson, 1991, p. 18): cotton, tomatoes and some legume crops may not be able to grow organically in some areas because insects or weeds cannot be controlled without pesticides. Secondly, the overall production from organic farms is generally lower because of the use of the land for green manure crops (Troedson, 1991, p. 22). Thirdly, organically grown foods may be blemished or damaged by insects and diseases, which may decrease the price obtainable or make consumers to avoid those foods completely. Some organic produce is said to have improved keeping quality, but shelf life will be shorter than conventional produce if it has been damaged and if post-harvest diseases occur (AVCA, 1989).

2.5 Organic farming worldwide

Organic agriculture systems are experiencing rapid worldwide growth (Chang *et al.*, 2003; IFOAM, 2002; Yussefi and Willer, 2003). Organic farming has been described as a safe alternative to traditional commercial food production that relies on the use of pesticides (Lampkin, 1990). The world market of certified organic products is approaching USD25 billion (Yussefi and Willer, 2003, p.22). Organic farming is practised in approximately 100 countries of the world and the total land area under organic management is currently almost 23 million hectares worldwide (Yussefi and Willer, 2003, p.7). Australia and Oceania hold 46 percent of that area; Europe has 23 percent and Latin America 21 percent (Yussefi and Willer, 2003, p.13). Europe continues to lead the development of the organic sector, where countries such as Austria, Switzerland and Sweden have organic land in the range of fourteen percent in total farming and farmland (Yuseffi and Willer, 2003, p. 23). Currently, Germany and France import about 50 percent of their organic food and Great Britain is still in the 70 percent range.

Large volumes produced in the EU and North America dominates production and trade. Substantial subsidies at both the EU and national levels are available to most European farmers for converting land to certified organic production.

Japan has a total food market of USD333 billion, predicted that organic consumption

will grow between eight to ten percent, making Japan to become the largest per capita consumer of organic foods in the world (Chang *et al.*, 2003). The Japanese market for organic produce is a key market for the region Oceania (Alenson, 2000) and the value of this Japanese market for organic food was estimated to be USD500 million in 1994 (Saunders *et al.* 1997, p.14). This has grown considerably with the demand for organic produce estimated to have increased at an annual rate of two percent since the mid 1980s. This growth shows signs of continuing with many commentators arguing that demand continues to be greater than supply.

2.5.1 Factors influencing the expansion of organic farming worldwide

Sales of organic horticultural products expanded rapidly in many of the major organic markets such as United States, the European Community and Japan during the second half of the 1990s; a strong and sound growth in the sale of organic foods has provided these products with a viable and sometimes value added market niche (IFOAM, 2003).

There are a number of factors identified as influencing the growth of organic practices. Firstly, organic farming has been promoted as a more sustainable and environmentally friendly agricultural system and as a possible solution to an international farm crisis characterized by overproduction, declining farm incomes and environmental degradation (FAO, 2000; IFOAM, 2001; Ilbery *et al.*, 1999; Troedson, 1991). Secondly, a major change affecting agriculture in the twentieth century has been the continued improvement in living standards. This advance has meant that a greater amount of income has been available to spend on an increasing variety of food (Robinson, 1988). Lifestyle has become a key factor in the changing social structures of modernity involving the adoption of a style, a manner and a way of consuming good, places and times (Ilbery *et al.*, 1999). A lifestyle image is likely to be related to income and class, with reasonably affluent groups being able to perceive food as not only good to eat but also a good to think (Alabaster and Hawthorne, 1999; Ilbery *et al.*, 1999). Organic goods may represent a style of consumption that serves as an indicator of socio cultural status (Alabaster and Hawthorne, 1999).

Thirdly, there has been growing concern over the safety of modern methods of food production (Ilbery, 1985; Ilbery *et al.*, 1999). Due to major food scares with Bovine Spongiform Encephalopathy (BSE) and Foot and Mouth disease in many countries in Western Europe in the late 1990s and early 2000s, consumers in general have become more critical when purchasing food (IFOAM, 2002). This awareness has been recently accentuated by perceived problems surrounding genetically modified crops (IFOAM, 2002; Ilbery, 1985; Ilbery *et al.*, 1999). The outcome has been greater consumer interest in high quality specialty food products, with authenticity of geographical origin and traceability (Deasy, 2002; IFOAM, 2003). Organic food products are in a strong position to qualify as specialty foods, and in places such as the UK quality and authenticity are monitored and controlled by the United Kingdom Register of Organic Food Standards (Ilbery, *et al.*, 1999).

Finally, changes in dietary habits among many segments of the population of developed countries resulting from increased health awareness and the increasing demand for a wider variety of products, including convenience food have also contributed to this growth (McCoy, 2002; Troedson, 1991). Consumer attitudes towards mass produced food are changing for a range of ethical and moral reasons that are both human-centred and concerned with the rights of non-humans. Some people are, for example, rejecting meat for these reasons (IFOAM, 2003). This rejection usually coincides with other lifestyle attributes such as ethical and religious commitment, often among organic farmers themselves (IFOAM, 2003). European supermarkets have responded to consumer concerns by supplying an increasing range of organic food products and introducing quality assurance schemes (Ilbery, *et al.*, 1999).

2.6 Organic Farming in Australia

The organic agriculture movement in Australia arose from a wide coalition of interests such as urban food consumers, lifestyle of residents in periurban areas and European migrants (Dumaresq *et al.*, 1997). During this period, organic production received little attention from the State Government, with no incentives being created for growers to convert to organic production. Recent trends include an increase in growers' numbers, production and distribution (Figure 3). However, there are still no

subsidies for organic agriculture. In 1995, it was estimated that between one and two percent of all Australian primary producers were either certified organic producers, or were seeking certification by one of the main certification agencies (Hassell and Associates, 1996). In 1995 there were over 1,400 certified producers, out of a total of fewer than 138,000 producers in Australia (Hassell and Associates, 1995).

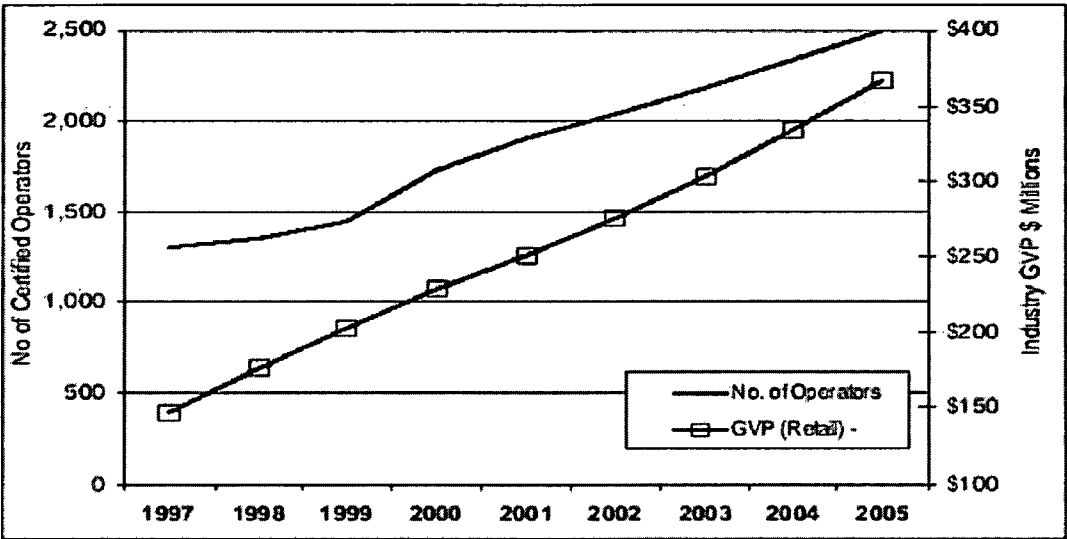


Figure 3: Growth in the Australian Organic Industry. Source: RIRDC (2001), p.3.

Of the few consumer studies undertaken in Australia, results illustrate that while there appears to be some positive correlation between income and the demand for organic food (McCoy and Parlevliet, 2000) no clear delineations can be made with respect to consumption of organic food with any particular category. The organic/bio-dynamic industry is an emerging opportunity for Australian producers, processors and marketers. At the core of the industry are certified farming systems that promote the sustainable use of natural resources, soils in particular. The industry finds itself with enormous market opportunities worldwide to supply a range of certified organic products. But the ability of the industry to service these opportunities is severely constrained by the current small size of the industry. Since the demand for organic products is greater than the available local supply, Australia has to import organic food (Yussefi and Willer, 2003). The total value of imported organic produce is unknown, however, according to McCoy and Parlevliet (2000, p.62), imports are mostly of processed grocery line, such as coffee, pasta sauces, olive oil, soy drink,

preserves and the like, primarily from the United Kingdom and the USA.

Yussefi and Willer (2003) give details about the extent of land under organic management in Australia compared with other countries within Oceania (Table 3).

Table 3: Organic land and farms in Oceania

Country	Date	Organic Farms	% of all farms	Organic Hectares	% of Agricultural Area
Australia	2001	1,380	1.4	10,500,00	2.31
Fiji	2000	10		200	0.04
New Zealand	2001	983		63,438	0.38
Papua New Guinea	1995			4,265	0.41

Source: Yussefi and Willer (2003), p. 91.

The total value of imported organic produce is unknown, but principally comprises organic grain from the Unites States (FAO, 2001). Many national and regional agribusiness stakeholders and organizations have an interest in the organic industry, and in supporting its viable emergence into mainstream Australian food and fibre systems.

2.7 Organic Farming in Tasmania

The Organic Gardening and Farming Society of Tasmania Inc. (OFGS), was formed in 1971 and was one of the first organic organizations in Australia (Griggs, 2000a; 2000b). The group's magazine, edited by David Stephens, was distributed nationally before production of other magazines covering organics had begun. OGFS funded the establishment of Tasmania's first certification organization (Griggs, 2000a). Since this time, certifying groups have become more dominant and the mantle has been taken away from OFGS. Nevertheless, OGFS remains active in Tasmania and has aided the establishment of the Tasmanian Organic Farming Advisory Service (TOFAS). The TOFAS project evolved from the Organic Farm Monitoring Project (1995-1998) initiated by the Tasmanian Organic-Dynamic producers Co-operative (TOP) (Stevenson, 1997). This project, also funded by the Natural Heritage Trust, aimed to

establish productivity benchmarks for the organic industry in Tasmania (Stevenson, 1997; Stevenson and Tabart, 1998). A cornerstone of the project was the use of experienced organic growers as mentors for new entrants into the industry. The Tasmanian State Government involvement in organics began with a report on Organic Horticulture in Tasmania in 1989. More recently, various projects have been undertaken in the state and an organic unit established within the DPIWE. The unit has been focusing on marketing, legislation and administration, and crops under contract for the Japanese market.

2.7.1 Organic Unit in DPIWE

The State Government has commenced initiatives towards providing more support to organic farmers with the creation of the DPIWE Organic Unit in Launceston. The unit was formally set up in 1999 at the request of the former Minister David Llewellyn. The aims of the unit are: to act as intermediary among researchers, industry and local growers, and to provide help to farmers with information on organic practices and conversion.

Llewellyn initiated the push for DPIWE involvement with organic agriculture in recognition for the potential for development of an organic industry in Tasmania, and to fulfil a Labour election promise. When first created, the organic unit was constituted by four professionals, mostly with a conventional background in agriculture; Chris Brunswick-Hullock was appointed as director and his main role was as facilitator. Brunswick-Hullock is the only professional left from the original team.

2.7.2 Tasmanian Organic-dynamic Cooperative, TOP

The Tasmanian Organic-Dynamic Producers Co-operative (TOP) was established in September 1993 (Stevenson, 1997). TOP is involved in the certification of organic and bio-dynamic producers. TOP was created to capitalize on the uniqueness and opportunities presented by being an island state. It was also believed that a regional body would be closer to growers and better able to identify and respond to their needs. Apart from certification, TOP provides assistance through extension (farm monitoring programs, field days), marketing and administration. (Stevenson, 1997).

The TOP Networkers Guidebook is a biannual publication aiming to provide producers with a list of useful contacts. The first edition was released on 2002, and included topics such as mentoring and advice for farmers, conversion advice, farm certification, funding and grants, business planning and farm management. There is also a list of recommended literature including books, periodicals and websites.

2.7.3 Organic Coalition of Tasmania

A need for a more proactive state representation in the organic field was considered and, in order to help foster the development of Tasmania's organic industry, a number of organisations with an involvement in commercial organic production in Tasmania have come together to form a peak body to be known as the Organic Coalition of Tasmania (OCT). In an interview conducted on 29 September 2003, Mr Greg Whitten explained that OCT does not intend to deal with certification issues, which it was felt, are more appropriately dealt with on a national level.

In November 2002 a survey was conducted by OCT and was sent to 86 organic properties in Tasmania, which were either certified as organic, in conversion to organic, or were in the process of obtaining certification (Whitten, 2003). The survey received a response by 39 participants (45 percent), and was considered sufficient to provide a picture of the whole Tasmanian organic industry. The previous survey in May 2001 reached a level of response of 82 percent (Whitten, 2001).

OCT estimated the current total Tasmanian certified production through a pro-rata calculation based on information from certifying organizations. These certifying bodies have a record of a total of 3,922 ha in certified production for 2001/2, while the OCT survey respondents' total area was 2,304 ha. On this basis, they estimated a total Tasmanian organic production for 2001/2 of approximately AUD4 million which represents an 18 percent increase over our previous 2000/1 total of AUD3.38 million. The estimated totals for organic production in Tasmania are presented in Table 4.

As at October 2003, there were 100 producers already certified as organic and or bio-dynamic in Tasmania, with another 60 in various stages of conversion (DPIWE, 2003). The estimated production was AUD5 million on 4,500 hectares of land (DPIWE, 2003). Organic farms can be found right around the State and are involved

in varying enterprises from wine to sheep's cheese. Respondents to the OCT 2001 Survey provided an extensive list of raw products (Box 2).

Table 4: Organic production in Tasmania

Production	1999/2000	2000/01	2001/02	2002/03
Area covered (ha)	2,343	2,730	3,924	4,500
Number of operators/holdings/landowners	62	64	86	100
Stock/product “farm gate” value (AUD million)	\$1,627	\$3,386	\$4,010	\$5 million
Processing and distribution (wholesale) number				6

Source: DPIWE (2002).

Box 2: Products listed by survey respondents

Raw products: apples, apricots, beans, beef cattle, beeswax, blueberries, Brassicas, broccoli, carrots, cauliflowers, celery, cherries, day old chicks, dried herbs, eggs, grains, grapes, potatoes, hay, honey, lemons, milk, mixed vegetables, myrtus berries, olives, onions, pears, plums, pumpkins, radicchio, raspberries, sheep, sheep milk, stone fruit, strawberries, walnuts

Value added products: accommodation, cheese, herbal extracts, herbal teas, fruit juice, meat, muesli, wine, yoghurt.

Source: Whitten, (2001).

There are approximately a dozen large enterprises but the majority of the organic farmers are small-scale operations. Most enterprises tend to deal locally. Some enterprises serving in niche markets have to accommodate the cost of crossing Bass Strait. The new twin ferries have made a nightly service possible for Melbourne markets to receive fresh produce. A number of producers are also taking advantage of this service to connect with onward flights to overseas destinations where local plane capacity has been reduced. The local efforts have recently included merging of local apple orchards with plans to convert it into the world’s largest organic orchard (Clark, 2003, p.7).

2.7.4 Biodynamics Tasmania

Bio-dynamics Tasmania (BDT) has approximately 120 members in different stages of certification, including producers on Bruny Island, King Island and Flinders Island. BDT organises four events through the year, field days which have the aim of explaining the preparations and their applications. They are held at Mountain River farm and conducted by Marjorie Simmond. These activities are opportunities for BDT members to share information and gain new perspectives on planning and managing their farms, orchards and gardens Bio-dynamically. The BDT group publishes a quarterly journal, “Elementals”, and has organized their own library with resources available for members either for loan or purchase.

Appendix II details some of the concepts and practices for the bio-dynamic farmers group such the burial of cow horns (Figure 4).

2.7.5 Certifying bodies in Tasmania

There are several certification agencies operating in Tasmania (DPIWE, 2003):

- Bio-dynamic Research Institute, BD Tas
- Biological Farmers of Australia Co-operative Ltd, BFA
- National Association of Sustainable Agriculture (Australia) Ltd, NASAA
- Organic Herb Growers of Australia Inc., OHGA
- Organic Gardening and Farming Society, OGFS
- Organic Vignerons Association of Australia Inc.
- Tasmanian Organic –Dynamic producers Cooperative, TOP
- Tasmanian Organic Herb Growers Association, TOHGA

Other certification agencies in Australia:

- Eco-organics of Australia
- Organic Food Chain Organic Federation of Australia Inc.



Figure 4: The burial of cow horns involved in biodynamic preparation.

2.7.6 Field Fresh Tasmania

The DPIWE Organic Unit formed an alliance with certifying organizations, processors and producers across a range of industries to facilitate increasing organic production in the state (DPIWE, 2002). An organic project, which was funded by the Rural Industry Research and Development Corporation (RIRDC) and was a joint initiative of DPIWE and Field Fresh Tasmania, achieved full organic certification for the farmlet in Sept 2001 (DPIWE/Field Fresh/RIRDC, 2002). Following a three-year conversion, a 10 ha organic demonstration farm at Forthside was certified by NASAA. This project became one of the only two certified organic demonstration farms in Australia.

2.7.7 Organic Information Network

An organic information network (OIN) has been recently established in Tasmania. The network formation was possible via sponsorship from DPIWE, the Organic Coalition of Tasmania (OCT) and the Tasmanian Institute of Agricultural Research (TIAR).

Rebecca Ashley (pers. comm., 26th March 2004) explained that the concept was originally a suggestion of by Dr Graeme Stevenson (from Tasmanian Organic Farm Advisory Service, TOFAS), in discussions with Andrew Bishop from DPIWE. Rebecca Ashley stated that “the network administrators hope to provide additional information services as needed to assist in the development of the organic industry, and to complement existing industry development activities. The network enables free access to the latest organic research and development information for organic industry participants”.

The information network has only one main function at present; it provides free access to organic research for Tasmanians, as the site is a specialist research database run by CABI publishers. Rebecca Ashley estimated that the organic network had approximately 60-70 subscribers, “some of whom would be organic producers, others have just heard about the site and are interested in organic farming”.

2.8 *Agricultural Research and Extension*

Several studies shows that the integration and linkage of research, extension and education institutions and thus, incorporating the active participation of farmers in technology, can improve the overall performance of agricultural technology systems (Schwartz, 1994; Van Crowder and Anderson, 1997). Farmers knowledge of their agro-ecosystem, analytic capacities and willingness to experiment and innovate offer immense opportunities for research and hence, an improved information base (Wynen, 1996; Wynen, 1998).

Traditional practices of extension view agricultural knowledge and information as flowing from research organizations to farmers through extension services (Schwartz, 1994; Van Crowder and Anderson, 1997; Wynen, 1998). Technology generation is mainly the domain of researchers and extension has primarily a messenger function (Schwartz, 1994). When feedback from research occurs, it is provided by extension personnel, relegating farmers to a largely passive role (Schwartz, 1994; Van Crowder and Anderson, 1997). Knowledge is often viewed as hierarchical with better trained researchers at the top, extension below and farmer knowledge at the bottom (Van Crowder and Anderson, 1997). In this context, knowledge exchange takes place has

traditionally taken place within relationships of power and superiority. Research and extension tend to be carried out on the assumption that farmer's knowledge and analytical skills are undeveloped and unscientific.

In the last decade or so there have been important shifts in approaches to agricultural research. An increase of research into organic farming is noticeable in USA and Europe. In research for instance, active farmer participation and on-farm research are believed to be indispensable to overcome the failure of traditional experiment station research to solve the problems of many farmers, especially those outside the most favourable environments (Schwartz, 1994). On farm research is more likely to be used to deal with less general or basic research (Lockeretz, 1995, p.664). On farm research should be used only where the use of a working farm will provide data that will best answer the research question. Lockeretz (1995, p.665) lists five situations where on farm research is likely to be particularly suitable: 1. to obtain particular soil types or physical conditions that are not available on research situations; 2. to study phenomena that must be studied on a larger area than is available on a research situation; 3. to analyse systems that involve interactions among several individual enterprises or that intrinsically of a whole farm nature; 4. to compare a systems performance under farm conditions to experimental conditions; and 5. to evaluate production techniques which are highly sensitive to management skills.

In extension, thinking has moved from expert driven transfer of technology approaches to approaches where the emphasis is on helping farmers to help themselves, that is, to develop their own skills and information/knowledge acquisition system (Rogers, 1995).

The retreat from agricultural extension by state departments of agriculture is expected to have a range of medium and long-term impacts for Australian agriculture. Marsh and Pannell (1998) question the capacity of the private sector to immediately provide similar levels of research and extension services to those previously offered by government, and note that many providers are dependent on government support.

Marsh and Pannell (1998) suggest that Australian research and development corporations now accept private sector researchers, and question the infrastructure

costs. This, combined with the increased emphasis on intellectual property rights, has contributed to a fragmentation of the flow of information from research to a farmer and vice versa (Marsh and Pannell, 1998).

2.9 Evolution of research in Organic Agriculture

Globally, agricultural research has neglected organic farming for decades, and just recently some authors have started to deal with the needs and priorities of research activities in organic farming. The latest advances mainly come from European countries where multiple authors have tried an approach to the need for research in organic farming (Niggli, 2002; Niggli and Lockeretz, 1996;Niggli and Willer, 2000; Padel, 2001; Willer and Zerger, 1999).

Major developments in research have been historically conducted in Europe, from where it has spread to the rest of the world. According to Niggli (2002), the evolution of organic agriculture until now can be characterized in four phases, starting in the beginning of the 1920s (Figure 5).

Organic			State R&D *
		Universities	
Pioneers	Private Institutes		
Biodynamic			
1920	1970	1985	1990 2000

Figure 5: Evolution of research and organic farming (* State Research and Development).
Source: Niggli, (2002), p. 20.

1. Pioneer farmers and scientists: Farm-oriented development in Europe had the benefit of privately financed research in biodynamic farming from early on. The biological laboratory at the Goetheanum, Dornach, Switzerland performed research oriented on biodynamic farming during 1920 to 1939. The Institute for Biodynamic Research, Darmstadt, Germany was founded in 1950, the Järna-Institute in Sweden in 1958. Pfeiffer's biochemical research laboratory in Spring Valley, U.S.A. started at the end of the 40s. Universities have sponsored occasional Masters and

PhD theses related to the activities of these institutes, since the 1960s (Niggli, 2002).

2. Pioneer private research institutes. With the beginning of the 1970's main research input to organic agriculture has been derived from private institutes such as the Research Institute of Organic Agriculture (FIBL) in Switzerland, "Elm Farm Research Centre" and "Henry Doubleday Research Association" (HDRA) in the U.K. Others that followed were, for example, the "Louis Bolk Institut" in the Netherlands (mid-1970's) and the "Ludwig Boltzmann Institute" in Austria (Niggli, 2002).
3. Organic farming chairs at universities. The early 80's were characterized by the increasing number of professorships in European universities and colleges, some of them having their own experimental farms and laboratories (Niggli, 2002).
4. Organic farming projects and institutes at state research institutions. The organic farming "boom" started in the early 1990's and was substantially driven forward by European policies, which combined the aim of regulating EC's surplus production in conventional farming with environmental aspects (Niggli, 2002; Niggli and Willer, 2000). As a function of this influence, current research in organic agriculture is mainly driven forward in several European countries on a state-run departmental basis (Niggli, 2002).

Although many factors have led to the recent development of the organic industry perhaps two key research reports gave it the recognition it needed (Horsley & Kondinin Group, 2000). The first of these was the 1980 Report on Organic Farming by the United States Department of Agriculture, and the second was Reganold's study on the "Long term effects of organic and conventional farming on soil erosion" (1988). This report was widely publicised in scientific journals and in the media. The results demonstrated the positive contribution of organic farming to the prevention of land degradation. Today, organic agriculture has become finally accepted within agriculture and food research in Europe, where public funded research has shifted

towards organic farming, whereas the research resources for conventional farming have been cut down considerably.

2.9.1 Research in Oceania and Australia

Most of the research work in Oceania is led by New Zealand, while a couple of authors have conducted reviews about the need for research in Australia (Derrick, 1998; Wynen, 1998; Wynen, 2003) and discussed the future research requirements for organic farming. Focuses in research which has not been specifically called organic (although containing information which may be relevant to organic farming), can be found in published conventional research. The majority of agricultural research in Australia is conducted by government agencies such as RIRDC, Commonwealth Scientific Industrial Research Organization (CSIRO) at a national level, and by the State Government Departments of Agriculture at the State level (RIRDC, 2001). Funding is provided by research corporations and by government. The RIRDC dispenses approximately AUD270,000 per year over five programmes (RIRDC, 2001), and is considered the major contributor to research in organic farming (Wynen, 2003). Hassall and Associates (1990; 1995; 1996) estimated that the proportion of Australian farmers who were certified as organic is less than one percent of the total. However, if those seeking organic certification are included this figure increases to somewhere between 1.4 percent (Hassall and Associates, 1995). Given the small size of the organic industry it is unlikely that much organic specific research will be funded.

In a local scope, previous works include examination of the status and evolution of organic farming in Tasmania (Griggs, 2000b). Part of her work also ventured in the evaluation of opportunities and constraints of the local organic industry. Griggs (2000b) states that the number of research projects involving organic farming have increased since 1980 and despite the fact that organic extension and education are relatively new areas, they accounted for 18 percent up to year 2000 (Griggs, 2000b, p.7).

Chris Brunswick-Hullock, Organic Unit Promotion Officer (pers. comm., 24th of March 2004), expressed that as far he is aware, there has been just one organic trial

completed in recent times in the State. It was a four-year trial on vegetables. This was done at Forthside in the Northwest. Last June 2003, an apple trial was planted at the Grove Research Station in the Huon Valley.

2.10 Summary

Following a general trend of a steady expansion worldwide, Tasmanian organic farming industry has experimented a significant growth in the last decade. The strengths of the local industry are based in a strong degree of innovativeness and individuality of their members. The local industry is still confronted with the challenge of a successful expansion maintaining their unique characteristics. Organic agriculture is not practiced or studied by many people, which might result on a scarce on technical details and knowledge. Although it has been shown that organic agriculture is an economically feasible alternative in terms of levels of returns to inputs and pollution (Cacek and Langner, 1986; USDA 1980; Wynen, 1996; Wynen, 1998), lack of formal research means that there are many questions remaining about why and how the system works. “Lack of more information on organic agriculture in general, and on specific technical details in particular, is generally mentioned as the first obstacle to shifting to organic agriculture (Wynen, 1998, p. 9). It has already been stated that organic farmers seem to face most of the same problems that conventional farmers do. Organic farming takes a more integrative and therefore a more time consuming approach to resolving them (Niggli and Willer, 2000). Considerably less private sector research support, such as from pesticide and seed companies, is allocated to organic farming. Therefore, research has the potential to be crucial factor driving organic farming quickly and substantially forward.

Chapter 3 Data, information and knowledge in agriculture

3.1 *Introduction*

The terms information and knowledge are often used as though they are interchangeable, when in practice their management requires a different process. How are these technological changes affecting organic farming? Administering information and knowledge resources effectively is required for managing natural resources in a sound manner. It is necessary firstly, to provide a definitional framework for the concept of information and secondly, to establish the relation between concepts such as data, information, knowledge and insight in order to get a better understanding of the role of such concepts in organic farming.

As in the previous chapter, finding related works about the role of information on organic agriculture was difficult, as the literature about the availability of information in agriculture in Australia focuses on conventional farming systems rather than in organic farming.

3.2 *Definitional framework*

Information has long been understood as a concept appropriate to humanities and social sciences. The social science literature of the 1950s and 1960s used ideas about information measurement developed by Shannon and Weaver in the late 1940s (Losee, 1997) and Katz and Lazarsfeld in the 1950s (Schmidt, 2001). For these researchers, information was a set of data organized in a way that it would retain most of its physical integrity after leaving its “source” and arriving at its destination. The same empirical assumptions informed subsequent communication research including Roger’s theory about diffusion of innovations (Rogers, 1995). In the so-called “technological era”, the concepts of information and knowledge have been analysed from an Information Technology (IT) perspective, and concepts such as information management and knowledge management have emerged.

The division of philosophy that investigates the origin and nature of knowledge is

known as epistemology and its objective is to establish the foundations upon which human knowledge rests (Stenmark, 2002, p.1). Western philosophers have for long tried to find out what knowledge is. From Plato and Aristotle to Kant and Hegel, the question addressed has been how knowledge relates to technology and information (Stenmark, 2002, p.1). Ontologically, knowledge may be seen to exist on different levels, i.e. individuals, groups, organizations and inter-organizations (Nonaka and Takeuchi, 1995).

Nonaka (1994) made a distinction between tacit and explicit knowledge. Boisot (1995) advocated a typology consisting of proprietary, public, personal and commonsense knowledge. Choo (1998), building on Boisot, pointed to differences among tacit, explicit and cultural forms of knowledge. However all these views share a common assumption that some knowledge is difficult to articulate through language and only exists in form of experiences of which we are not always aware (Stenmark, 2002, p.5). From the various contested definitions of these three terms (Table 5), data could be defined as bits of facts that constitute the raw material of knowing about our practices. Information corresponds to data of some recognizable form, which shows us one or more patterns that may justify modifications or changes in our practices.

Explicit or codified knowledge is knowledge that can be articulated and in formal language including grammatical statements, mathematical expressions, specifications and manual (Nonaka and Takeuchi, 1995). All types of explicit knowledge can be disseminated more easily across and within communities. People from the same tradition and culture have more tacit knowledge in common than have people from different traditions.

Clearly, data, information and knowledge are not the same, but despite efforts to define them, many researchers use the terms very differently, as is evident from Table 5. In particular, the terms knowledge and information are often used interchangeably. Kogut and Xzander (in Stenmark, 2002, p.3) define information as “knowledge that can be transmitted without loss of integrity, thus implying that information is a form of knowledge”. Losee (1997) argues that the term information is used by different individuals in different activities and defined according to specific problems and disciplines. He encourages a more general and discipline independent definition of

information as the values within the outcome of any process (Losee, 1990; in Losee, 1997).

Table 5: Contested definitions for data, information and knowledge

Authors	Data	Information	Knowledge
Wiig, 1993	-	Facts organized to describe a situation or condition	Truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and “know how”
Nonaka and Takeuchi, 1995	-	A flow of meaningful messages	Commitments and beliefs created from these messages
Spek and Spijkervet, 1997	Not yet interpreted symbols	Data with meaning	The ability to assign meaning
Davenport, 1997	Simple observations	Data with relevance and purpose	Valuable information from the human mind
Davenport and Prusak, 1998	A set of discrete facts	A message meant to change the receiver’s perception	Experiences. Values, insights, and contextual information
Ritchie,1991	Text that does not answer questions to a particular problem	Text that answers the questions who, when, what or where	Text that answers the questions why and how
Choo, 1998	Facts and messages	Data vested with meaning	Justified, true beliefs

3.2.1 Relationship between information and knowledge

Losee (1997) argues that information is always instructive about something, being a component of the output or results of the process called information, and that all processes produce information (Figure 6).

Although information and knowledge are related, information per se contains no knowledge. Information requires knowledge to be created and understood (Stenmark, 2002, p.4). Alavi and Ledner (2001) posit that information is converted to knowledge once it is processed in the mind of individuals and knowledge becomes information once it is articulated. These statements would provide us with a linear relationship between the three concepts and proposed by Bellinger *et al.* (1997).

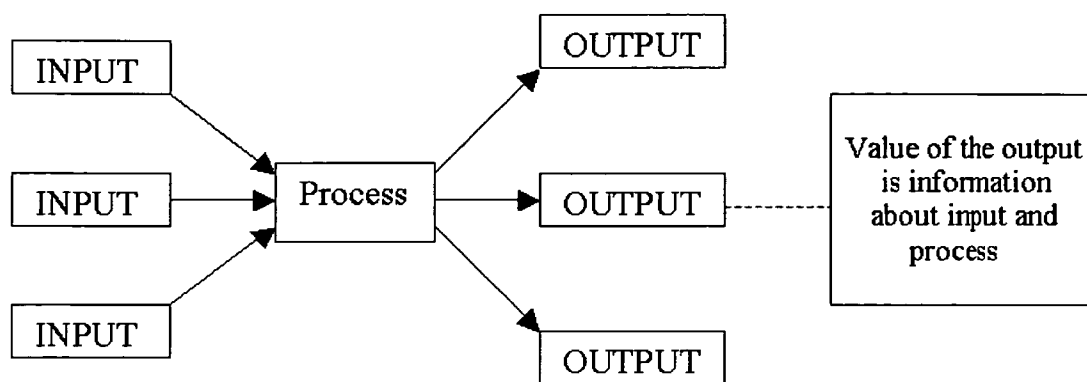


Figure 6: The value of the outputs. Source: Losee, (1997).

A key difference between information and knowledge is that information is more easily identified, organized and distributed. Knowledge, on the other hand, cannot really be managed because it resides in one’s mind. As knowledge turns into information (documents, best practices databases, etc) a transformations occurs. Information can be made tangible and represented as objects outside the human mind (Stenmark, 2002). The relevance of the concepts of data, information and knowledge for the different stages of a decision-making process are presented in Figure 7.

From the previous scheme, it can be deduced that information and knowledge are essential for all the stages of any strategic planning. Learning about farming practices has been described as a complex process (Hassenein and Kloppenburg, 1995; Liepins and Campbell, 1998; Liepins *et al.*, 1997). Figure 8 depicts a schematised learning process for organic farmers. Firstly, producers bring a range of skills from their background, interests and resources, which contribute to their interest in organic farming practices. Secondly, key awareness triggers could initiate people’s interests in organics (such as premium prices for organic products or health and environmental concerns), or they could stimulate increasing involvement in learning for producers that were already producing organic products. Thirdly, producers’ acquisition of technical competencies, (such as specific farming practices which are needed to meet the standards for organic certification) formalize the learning process. Finally, there is the practice of information networking where an exchange of experiences and knowledge through industry associations and informal networks supports farmers’ development of alternative agricultural practices.

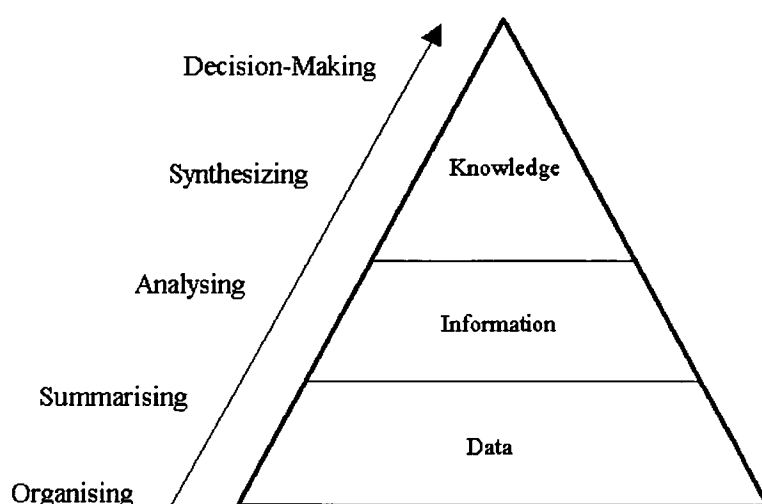


Figure 7: Relations between data information and knowledge

While these dimensions of the learning process are important in developing producer's knowledge and practices of organics, such a learning process does not occur isolated or in a vacuum; there is a range of overlapping contexts instead, which shape how producers experience the process. Following the Hasseinen and Kloppenburg scheme (1995), information seems to be evaluated by farmers according to predetermined criteria (background). Farmers may seek satisfactory rather than optimal decisions and these will be related to attitudes, perceptions and values as well as to past experiences (Ilbery, 1985).

Two major groups of available information sources to the farmer can be identified (Ilbery, 1985; Morgan and Munton, 1971): external to the producer - including the mass media, advisory services and research centres- and internal to the community, largely based on interpersonal contact between farmers. In terms of acquiring essential knowledge and skills, Schwartz (1994) proposes that farmers learn through a combination of mechanisms such as reading, experts, farmers, the media, experience and observation, groups, field days, seminars, conferences and organized training or education. Farmers seem to prefer non organized non-institutional learning (such as one on one with experts and peers, experience, observation and the media) to organized training and education. In general, data, information and knowledge can be acquired in several ways, with advantages and disadvantages (Table 1).

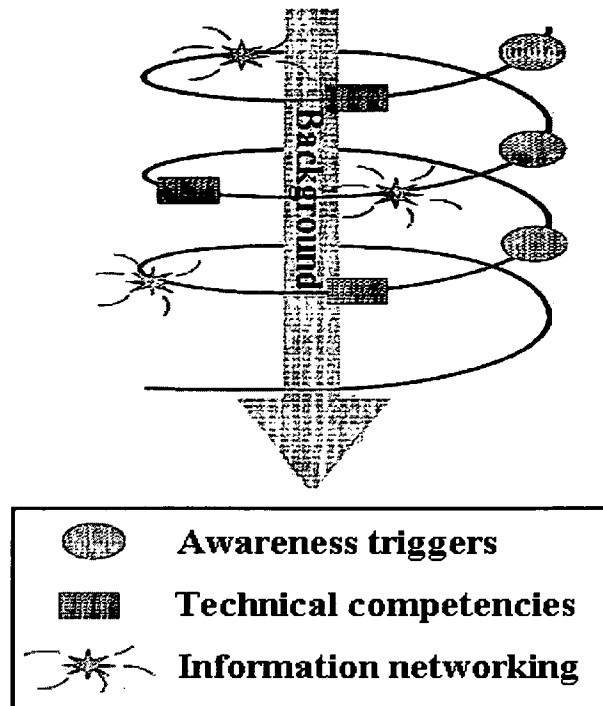


Figure 8: A process of learning about organics. Source: Liepins *et al.* (1997), p.8.

Learning processes can include interactions between a person and a book or computer, between individuals and various levels and kinds of interactions, between the other elements of learning process be this animate or inanimate (Kilpatrick, 1999, p.3). Establishing a timeframe in terms of when the learning experience occurs is probably quite difficult but the learning experiences can be set either before doing (farmer's actions might be based in existing models, theoretical frameworks or proven experience); while doing (farmers could learn while executing tasks and continually recording processes; and after doing (after any task is executed, the farmer needs to take time to reflect on the lessons learned, perhaps using independent observers and/or facilitators).

3.2.2 Experiential knowledge

Some analysts of sustainable agriculture have recognised farmers as producers of knowledge as well as of agricultural commodities (Hassanein and Kloppenburg, 1995). Geber, in Hassanein and Kloppenburg (1995), suggested farmers produce experiential knowledge through an intuitive understanding of relationships among multiple variables, the confidence in their observations and the success in practical

solutions. He also suggested that such knowledge may have more immediate utility than scientific knowledge. Hassanein and Kloppenburg (1995) emphasized that local knowledge is fundamentally tied to direct experience that develops with careful attention to particular characteristics of a specific place or activity. Such information is often catalogued as local, but is not necessarily idiosyncratic and it is transmissible to others.

Table 6: Sources of information

Sources		Advantages	Disadvantages
Internal	Through experiencing or practice, observation or self acquisition of skills.	Learning through practice	Might lack scientific background and broader applicability.
External	Written sources such as books, magazines, journals	Give a quick access on essentials	Hardcopies can never, by themselves, give practical hands on learning.
	Seminars, workshops or courses	Usually oriented around a practical framework,	May lack the theoretical background or lack a cohesive framework for integrating theory and practice.
	Academic courses	Usually balance theory and practice	Suffer from the teaching methods used. Full time courses mean that students lose touch with business reality. Case studies tend to focus on somebody else’s situation.
	Mentors and experts or through consultancy	Focused learning around specific problems and issues, and transfer of other’s experience.	Unless built into the relationship, the fundamental conceptual underpinning may be omitted.

Source: Adapted from Morgan and Multon (1971).

3.2.3 Diffusion of information and agricultural innovations

One important aspect of agricultural decision making concerns the diffusion or spread of innovations, their adoption and any resultant effects on patterns of land use (Ilbery, 1985). Surry and Farquhar (1997, p.26), define diffusion as “the process by which an innovation is adopted and gains acceptance by members of certain community”.

Rogers (1995, p.5) describes diffusion of innovations as "the process by which an innovation is communicated through certain channels over time among the members of a social system. An innovation is defined as an "idea, practice or object perceived as new by a unit of adoption" (Rogers, 1995, p.11).

Theories about innovation diffusion have been incorporated into the field of instructional technology by a number of professional in multiple disciplines, from agriculture to marketing. Every person adopts innovations at different rates. According to Lefebvre and Lefebvre (1996), when a technological innovation is introduced into an organizational system, some individuals within the organization are more open to adaptation than others.

Learning and adopting innovations are closely connected activities within the practices of communities. The distinction between awareness of and use of information is important because communities not only have to realise the need for information but also learn where to get that information from and how to use it in the most convenient way. Apart from the awareness for the need for information, any activity involving a learning process requires technical competencies (available information) and information exchange (information networking).

A traditional approach of innovation diffusion describes three main models based in the early work of Hagerstrand and modified by Rogers (1995). The first model is the "adoption perspective". In a traditional approach to diffusion, the adoption perspective assumes that all have an equal opportunity to adopt diffusion and concentrates on individual characteristics to explain differences on time of adoption. The second model, "market and infrastructure", was developed by Brown (1981), and states that the opportunity to adopt is egregiously and in many cases purposely unequal; accordingly the focus is on the supply aspect of diffusion. Brown also developed the third model or "development perspective", and it is an extension of the market and infrastructure perspective. Brown (1981) advocates for a complementation of various perspectives.

After revisiting relevant literature about organic farming and also after interacting with Tasmanian organic farmers, there were some traits of their personalities, which I

thought would fit into the adoption model and would help to explain why had them adopted organic farming. Therefore, I considered relevant to include details of the model of adoption of innovation to gain an insights to the reasons behind adoption of organic farming and uptake of information related to this activity.

3.2.4 Adoption perspective

Rogers (1995) classified adopters into five categories: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. Table 7 shows the distribution for each of Rogers' adopter category and identifies its characteristics.

The innovators and early adopters tend to be better educated, have higher social standing (Padel, 2001), belong to larger organizations, have upward social mobility, more mass media and interpersonal communication channels, take greater risks, and seek information more readily than the early majority, late majority, and laggard adopters (Rogers, 1995). He also states that adopters from the same category share similar socio economic status, personality values, and communication behaviour.

Five characteristics of innovations are identified and they help explain the differences in adoption rates (Rogers, 1995). Firstly, the relative advantage that potential adopters need to see an advantage for adopting the innovation. Secondly, the compatibility of innovations with potential adopters' current practices and values. Thirdly, the complexity or easiness of innovations will lead to more rapid adoption. Fourthly, the experimenting and testing, as potential adopters want the availability of "testing" before adopting. Finally, observability: potential adopters want to see observable results of testing.

3.2.5 Relevance of innovation diffusion

The relevance of innovation theories for the adoption of conservation farming practices is the subject of a debate in the community of rural sociology. Diffusion – adoption has come under attack many times for its various biases and generalisations (Fliegel, 1993, Ruttan, 1996). Gillespie (2001) argues the usefulness of the diffusion adoption model in understanding the overall dynamics of organics' growth. The main point of several authors is that the adoption of conservation practices is different from the adoption of new technologies. Roling (1996), in his study about the emerging

sustainable agriculture in the Netherlands states that a shift towards a more sustainable agriculture is not a question of adoption of an innovation, because it requires a slow learning process and a change in mentality (p.42). Pampel and van Es (1997) showed that farmers tend to be innovative with respect to commercial or environmental practices, not both. According to Valente (1995), diffusion of innovations is the spread of new ideas, opinions, or products throughout a society, thus diffusion is a communication process in which adopters persuade those who have not yet adopted to adopt". In this broad sense of innovation, the adoption of agro-environmental measures or more sustainable farming practices seems appropriate.

Table 7: Adoption perspective

Adopter Category	Characteristics
Innovators - first 2.5% of individuals in a social system to adopt an innovation	Eager to try new ideas. Have more years of formal education. Have higher social status. Have substantial financial resources. Able to cope with high degree of uncertainty. Contacts outside peer group. May or may not be respected by peers
Early Adopters - next 13.5% of individuals in a social system to adopt an innovation	Respected by peers. More integrated part of the local system. Opinion leaders - potential adopters look to them for advice and information. Change agents. Role models for other members of social system
Early Majority - next 34% of individuals in a social system to adopt an innovation	Deliberate before adopting new idea. Adopt new ideas just before the average member of a system. Interact frequently with peers. Rarely hold positions of opinion leadership. Provide interconnectedness in the system's interpersonal networks
Late Majority - next 34% of individuals in a social system to adopt an innovation	Approach innovations with caution and scepticism Adopt new ideas just after the average member of a system. Adoption may be due to economic necessity or peer pressure. Unwillingness to risk scarce resources. Uncertainty about innovation must be removed before adoption
Laggards - last 16% of individuals in a social system to adopt an innovation	Hold to traditional values. Resistance to innovations. Last to adopt an innovation Near isolation in local social networks. Suspicious of innovations and change

Source: Rogers (1995), p.56

Surry and Farquhar (1997) state that the study of diffusion theory is valuable for extensionists for three reasons: Firstly, most extensionists do not understand why their products are or are not adopted. Secondly, instructional technology is inherently an innovation-based discipline. Thirdly, the study of diffusion theory could lead to the development of a more systematic and prescriptive model of adoption and diffusion.

3.2.6 Importance of Internet for information diffusion

The Internet is one of the main infrastructures through which the "information age" has become reality. In general, the Internet is still used primarily for information display and retrieval, although it appears to have considerable potential in multi-stakeholder situations to extend information sharing, learning and networking.

3.3 Summary

Information and knowledge are contested terms, and they are essential for all the stages of any strategic planning. Learning about organic farming practices has been described by few authors (Hassenein and Kloppenburg, 1995; Liepins and Campbell, 1998; Liepins *et al.*, 1997) and it becomes important to understand the motivations of farmers to adopt innovations and therefore to participate of any learning process. The acquisition of information in any human endeavour is based on searches of different sources such as books, journals, and newspapers and, more recently, electronic files.

Chapter 4 Results

4.1 Introduction

This chapter details the results of the interviewing process. Extracts from the transcripts have been included to provide the reader with a direct interpretation to the farmers’ responses. All responses are summarised in Appendix III.

4.2 Interviews results

The cluster analysis revealed that farmers fell into three general groups based on their responses (Figure 9). The relevance of the groups are reported for each question (below).

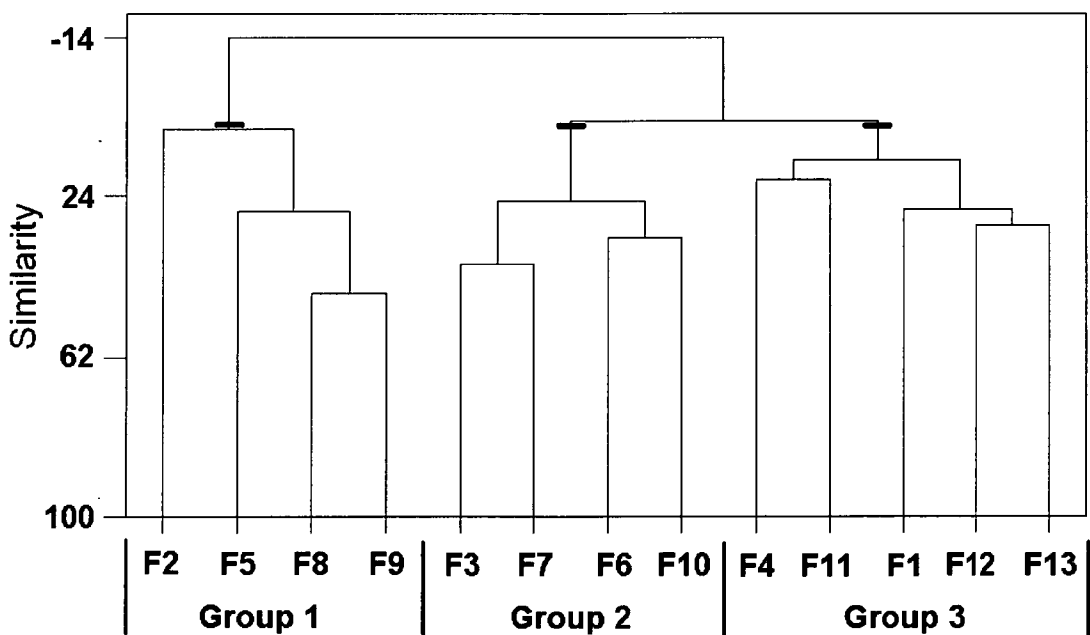


Figure 9: Dendrogram produced by cluster analysis showing cluster groups of farmers. The thick horizontal lines represents the position of the trim.

4.2.1 Experience

In terms of experience, 61.4% of the respondents have between five to ten years of experience in the general organic sector (mostly Group 2), and the great majority of them started with their production in states other than Tasmania (a couple of them

started in Canada and USA). A total of 30% of respondents have been engaged in organic farming for more than 25 years and only one of the participants had less than five years experience. Cluster Group 3 was the most diverse.

F13: “25 years ago, when I lived in the suburbs of Sydney, I became interested in and started reading about BD [bio-dynamics]. When we moved to Tasmania about 3 years ago we bought a few acres with enough room to grow a few things so I thought I would try using some BD techniques”

4.2.2 Background

In terms of background, 15.4% of respondents acknowledged having a background as conventional farmer (only from Group 1), while 84.6 % of respondents had no conventional background.

4.2.3 Production types

In terms of the types of production, respondents listed various products including apples (varieties Gala, Golden Delicious and Sturmer), mixed vegetables, mixed herbs, spices, seeds, sheep, cheese, beef cattle, eggs, grains, berries, cherries and grapes. The most common products across all farmers were apples (30.5%) and vegetables (30.7%). Group 2 included the only two respondents involved with animal husbandry.

4.2.4 Reasons to commence organic practices

The respondents listed a variety of reasons for engaging in organic farming, though the main responses were health concerns (54%), environmental concerns (46%) and lifestyle (30%). Only 30% of respondents listed only one reason for commencing organic practices. The failure of traditional agricultural methods was listed by 15% of respondents, while none of the respondents listed economic reasons. Cluster group 3 was dominated by respondents listing both health and environmental concerns.

F12: “My interest in Bio-dynamics and organics started long before we decided to buy land and start farming. My wife and I have always been keen gardeners, growing vegetables, flowers and fruit trees and always along our awareness of organics. As time progressed we became even more convinced of the need for no chemical inputs, developing the soil, micro-organisms and good balance in the soil structure to produce nutritional food. We progressed from going to the

Organic Farming and Gardening Society field days and weekends to becoming aware of and involved with the Bio-Dynamic farming approach”.

F2: “My awareness about organic farmers was raised by conversations with older farmers who followed more sustainable practice away from heavy use of chemicals, in a more natural way”.

4.2.5 Sources of information

The main sources of information listed were books (84.6%), trial and error (77%) and peer advice (46%). There were no distinctions between cluster groups. For written sources of information, participants listed sources such as books, magazines, journals and websites. “Acres Australia”, a monthly national publication dedicated to sustainable agriculture, was acknowledged by some as a good source of information. Other written sources mentioned include the “Australian Organic Journal”, the bio-dynamic publication “Elementals”, “Good Earth” (published by the Organic Farming and Gardening Society of Melbourne), and, the book “Herbal Harvest”. “I got to a point where I had to write my own book (Herbal Harvest) because I was not able to get the information I wanted” (Greg Whitten, pers. comm., Sept 2004). Advice from certification agencies accounted for 15% of responses. Many farmers listed both books and trial and error (77%).

F2: “I’ve learned through word of mouth”.

F12: “We attended biodynamic workshops, lectures and field days and read much on this approach and started this some 5 years before we bought our farm. -For problems and questions we have we can consult with our local Tasmanian group, organic farmers we know and the larger mainland biodynamic organisations, such as Bio-dynamic Agri-Culture Australia (BACA) based in NSW or the Biodynamic Farmers and Gardeners Association of Australia (BDFGAA) based in Victoria”.

F13: “Information has been sought mainly from books on bio-dynamic agriculture - and with some help from being a member of Bio-dynamic Tasmania”.

F3: “Acres Australia was “the” magazine to help us to get started”.

F4: “Using books and searches on the internet”.

F5: “When we started we did not find a lot of information”.

F13: “We have to do everything pretty much ourselves”.

F7: “We learnt reading and experimenting by ourselves in a small scale”.

F10: “Earth Garden was a good magazine and Steiner’s books”.

F7: “Luckily, I had kept my books from all those years ago”.

4.2.6 Obtaining information

All participants noted some degree of difficulty in obtaining information. Some respondents also knew of persons willing to start organic farming that did not have enough technical information and did not know how to get it.

F11: “In the case of Bio-dynamic Tasmania, the most difficult part of the process is the getting started or transition, in terms of making preparation, understanding the Antipodeans calendar”.

4.2.7 Stage for required information

Around 69% of participants agreed that they mostly require information for the post conversion stage, when specific needs arise as the productive process develops. Group 2 respondents mostly required information at other stages.

4.2.8 Topic for required information

Required information was varied but the main types of information required included for weed control (38.5%), animal health (15,8%) and pest control (15%). Cluster groups 1 and 3 were variable, while all group 2 respondents specifically wanted information for weed control.

F13: “The major challenge for me is the control of fungal diseases in the grapes. Using books and searches on the internet, I have investigated various Biodynamic and traditional organic methods and am trying various things with reasonably good success so far... time will tell but the thing is that I really don't want to use chemical fungicides (especially not systemic fungicides) so I will exhaust all other options that I can”.

4.2.9 Information Format

All participants believed the available information was of a suitable formats, and they all reiterated the point that the lack of specific information was the greater problem.

All the interviewed farmers had personal Internet access, but they indicated that the main difficulty was in finding the right sites from which to download information applicable to their particular needs. Some respondents mentioned search time was a major restriction.

4.2.10 Organic farming unit usefulness

The largest proportion of respondents made no comment (46%), while responses to the usefulness of the unit were varied. None of the Group 1 respondents made a comment, while all Group 3 respondents commented. Some of the farmers value the efforts made by the Organic Unit in DPIWE, and believe the appointment of a technician would be beneficial. One respondent acknowledged never approaching the Organic Unit .

F3: “The information is out there, we need someone to bring it all together to one place”.

F4: “Everyone is quite nice at the Organic Unit, thank you very much”.

F12: “ No, I have never approached them”.

When probed about other advisory services and their effectiveness, some recognized the former Tasmanian Organic Farming Advisory Service (TOFAS) as a good alternative. Certification bodies were also believed to be helpful in organising field days and providing all the information required for the preconversion stage.

4.2.11 Mentoring

When probed about their disposition to become a mentor, most respondents stated that a lack of spare time was prevented them from considering mentoring others. A couple of the bio-dynamic respondents would consider becoming mentor if they could find some spare time. Group 3 showed the most varied responses.

4.2.12 Need for Education at State level

The majority of the respondents believed that education at the state level was not necessary (53%). Some believed that there is a need for organic or bio-dynamic farming oriented educational programs to foster awareness among consumers. TAFE

courses were considered the best educational alternative (38%) compared to university or DPIWE courses. There was no distinction between cluster groups.

F12: “University and TAFE courses in organic farming will start to break down barriers and improve understanding. Joint projects with Uni and DPIWE and all farmer groups would extend awareness of organics and break down the barriers of fear”.

4.2.13 Improvement of information delivery

When participants were asked to suggest improvements for the delivery of information, mentoring (46%), experimental farms (26%) and field days (21%) were the most common replies. None of group 2 respondents suggested mentoring. When probed about their non-attendance at organic farming events, their reasons included lack of spare time, lack of economic resources and misinformation. Some respondents alluded to a reluctance of other organic farmers to accept advice or to “mix” with other farmers.

4.2.14 Networks

Some typical definitions of networks described by respondents were as follows:

F1: “Interconnected group of things and people”.

F3: “Communicate within a group, you have to network if you want to have a job”.

F3: “A group of people with common interests and problems”.

F10: “A group of people that can communicate with one another and share information and resources .A group of people working together”.

F11: “A system of computers connected”.

F13: “A connection between two or more people so they can share experiences and information”.

When questioned about which organic networks they were aware of, they mention the Tasmanian Organic Coalition (TOC), certifying agencies, TOFAS, internet and the Information Network of DPIWE.

When probed about the importance of networks for organic farming, there was a general consensus that networks help to create, capture, organise and access information that improves decision making and the exchange of best practices.

Chapter 5 Discussion

This final chapter expands on the results of the research, presented in chapter 4, and links those results into a narrative including answers to the research question and objectives.

5.1 *Respondent characteristics*

The overall interpretation of the farmer characteristics, achieved through the cluster analysis, showed that Tasmanian Organic farmers are a diverse agricultural group. Group 1 could be generally characterised by a wealth of farming experience, some conventional background and do not consider health or environmental concerns as the reason for becoming involved in organic farming. They were hesitant to comment about DPIWE. Group 2 could be characterised by moderate farming experience, some animal husbandry, and required information at varying stages of production with specific weed control information requirement. They also show a reluctance for mentoring. Group 3 can be characterised by a diverse range of experience, strong concerns for health and the environment as a reason to farm organically, and placed greater value on mentoring. Three of five farmers in this group are bio-dynamic, whilst another uses both bio-dynamic and organic practices.

These cluster groups represent a crude characterisation that nonetheless sheds some light on the diversity of organic farmers. This may have particular significance for future initiatives that attempt to provide extension services for this diverse agricultural group.

5.2 *Research question*

The main question was about a lack of information about organic practices in Tasmania, and is any lack of information a constraint for the advance of organic farming in Tasmania?

Respondents agreed that there was sufficient information related to technical and administrative issues in the transition and conversion stages. The great bulk of the

information for these stages is provided by certification agencies, and organic and similar farmer associations provide support. As confirmed by the results in chapter 4, the greatest information requirement is that required for the post conversion stage. The diversity of organic operations in Tasmania generates diverse information requirements, and respondents described the types of required information as being “site and product specific”. These findings are consistent with other studies about sources of information (Chapter 3), particularly with two studies conducted in New Zealand (see Section 5.4). The latter studies also indicate that there are no generalized solutions as to how one might extend knowledge and new techniques in organic production (Liepins *et al.* 1997; Martech, 2003). In fact, the opposite applies, as organic production is extremely sensitive to local knowledge and problem solving.

Primary producers within the Tasmanian organic industry have often developed their own production systems. The majority “convert” existing operations to satisfy organic requirements. Support for the conversion process is provided by the certification agencies; post-conversion operation relies largely on books, trial and error and peer advice.

The use of local knowledge becomes an important aspect of Tasmania organic farmers. The importance of local knowledge has been recognised by Hassanein and Kloppenburg (1995), who concluded that creation and dissemination of local knowledge constitutes the principal activity of the social movement in the sustainable agriculture movement. There was an attempt to increase the dissemination of the knowledge generated by Tasmanian organic farmers by mentoring experiences, such as TOFAS and Field Fresh Tasmania. These experiences proved to be useful and successful means to disseminate information. The collation and dissemination of information of information generated by farmers is important to avoid duplication in research.

The results do not support the hypothesis that the lack of information on technical aspects of organic agriculture is hindering the development of the Tasmanian organic farming. Although recognised as a limitation within the local organic farming community, Tasmanian organic farmers show high levels of self-sufficiency and problem solving capacity. However, more financial and technical support would help

the local industry to concentrate on other more significant issues.

The following matters were not considered as part of the research strategy but are derived topics worthy of brief exploration as they show some degree of interrelation with the management of information within the organic industry.

5.3 Paradigm difference and need for research

Some authors have considered the success in learning in organic agriculture is a question of a systematic change in paradigm to a totally new way of farming rather than just adopting new cultivation methods (Seppanen, 2002; Wynen, 1996). Transformations to more sustainable practices have not only ecological and technical dimensions but also social and organizational dimensions. The character of organic farming systems places many demands and potential risks on farmers wishing to convert or those already converted. This approach, already defined as holistic in chapter 2, requires specific attention to soils, fertility, pests, diseases, weeds, post harvest storage and handling, and the economic consequences of changes. Although organic and bio-dynamic systems are quite similar in principles, there are differences in practices. Furthermore, different approaches are required within the general organic movement; bio-dynamic farmers seem to require more extensive practices compared to their peers within the so-called organic group (Table 8).

Table 8: Differences between organic and biodynamic

Organics	Biodynamics
Closer to conventional in terms of Input and Outputs	Inputs and outputs based on energies and cosmos
Solutions to enhance fertility closer to conventional	Use of specially made preparations ('dynamic measures') to enhance the natural system capacity to develop lasting soil fertility
Based on ecological aspects	Strongly based on spiritual aspects
Based on symbiotic relationships	Takes into account the cosmic influences on soil, plants and animals

Another objective of this research was to relate the information requirements to the development of research and the provision of extension. Although the present work

does not thoroughly address by whom or how the research should be conducted in organic farming, it is probably relevant to mention that any research conducted in organic agriculture is also applicable in conventional agriculture, but not all research on conventional agriculture can be used in organic agriculture. Derrick (1997) divided research in agriculture in three categories. The first of these was conventional specific research, which yields information which is only of value to conventional farmers. For example, the use of herbicides is not permitted under organic standards; nevertheless the general knowledge could be useful to be transferred to consumers or in promoting organic products. The second category is organic specific research, only of value to organic farmers. Few results from such trials would be solely of use to organic farmers as there would be no reason to prevent conventional farmers using organic methods if they chose. However, it is likely that conventional farmers might consider such knowledge irrelevant to their farming systems. Thirdly, there is system neutral: research, which produces results that are useful to both organic and conventional farmers. For example, research into the ecology of pests provides an understanding of life cycles and may provide insights into improved means of control for both organic and conventional farmers.

There is a need in Tasmania to carry out multi-disciplinary research aiming to determine effective techniques, useful not only for organic and bio-dynamic farmers, but also to conventional farmers.

5.4 *Networks and community building in farming*

Although the analysis of the importance of networks within organic agriculture was not considered as part of the research question or objectives, it became clear that most of the developments within the Tasmanian organic industry have been affected by the existence of different sorts of collaborative associations or informal networks. Some of the examples include OCT, TOFAS, Field Fresh, DPIWE organic unit and certification agencies. As a researcher I am interested to know how to enhance the transmission of information and to establish the importance of networks for the diffusion of information and as a form of social capital. Social networks are important as a form of generation of social capital, as supported by relevant literature, and I considered important to expand about the interrelations of concepts such as social

capital and networks and the relevance they have in capacity building within agricultural communities.

In recent decades there has been growing recognition of the value of intangible resources within organizations not only at the level of individual skills and knowledge but also shared competence related to team working, communities of practice and networking. Some knowledge is viewed as being a potential key driver of organizational success. How this knowledge is transferred and applied through facilitating networks and norms is emerging as a key consideration for analysis.

Several studies, mostly in sociology, recognize the importance of socio informational networks in farmer's decision-making (Buttel *et al.*, 1990; Kilpatrick and Bell, 2000; Skerratt and Dent, 1994). Most of these studies concentrate on technology transfer (or innovation adoption). In particular, Buttel *et al.* (1990) states that farmer decisions were affected by neighbouring farmer opinions and advice as well as institutionalised sources such as extension providers and mass media. Part of this process is the search for information, where farmers would connect with colleagues and extension institutions in order to get relevant information to support their decisions (Ferreira, 1997; Skerratt and Dent, 1994). This information search can be interpreted as a rational part of the decision making process in which expectations and uncertainties, probably related to a particular farm or productive system, are evaluated. In the particular case of Tasmanian organic farmers, the existence of networks has not only supported the conversion process but also the continuation of the whole organic production process. These informal information networks not only act as a source of varied information but also as an element of support to the learning process. "Networks are a very efficient tool for stimulating research and disseminating results in the scientific community as well as among extensions, in spite of the fact that many of the requirements are quite site specific" (Wynen, 1998, p.9).

Successful networks within the organisation (intra-networking) or external to organisations (extra-networking, i.e. to have access to knowledge from outside the organisations) require the right connections and channels of networking (Healy, 2001, p.8). The potential effectiveness of networks will be related to the assets held by the networkers, being these participatory or relational. Healy (2001, p.11) defines

participatory assets as the frequency of contact and connections to other groups at different levels; relational assets are the degree of personal knowledge of various actors, including suppliers, producers, and university researchers among others.

Concepts such as networking, learning, social capital and change seem to be interlinked (Kilpatrick, 2002). The creation of social networks constitutes a way of incrementing social capital. "Social capital cannot be build unless opportunities for this occurs, or are provided; the provision of opportunities for interactions of the necessary quality to occur implicates an attention to collective processes for communities of common purposes that is often ignored" (Falk and Kilpatrick, 1999, p.21). The term "social capital" has been defined and scrutinised by several authors in the last decades (Bourdieu, 1986; Coleman, 1988; Fukuyama, 2001; Putnam *et al.*, 1993; Putnam, 2000). Bourdieu (1986) defines social capital as "made up of social obligations ('connections'), which is convertible, in certain conditions, into economic capital" (p.243) and again as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition" (p.248). Social capital is, in other words, the value of social contacts formed through a social network. Social networks are "the medium through which social capital is created, maintained and used" (Johnson, 2003, p.3). Social capital refers to the collective value of all "social networks" [who people know] and the tendencies that arise from these networks to do things for each other ["norms of reciprocity"] (Johnson, 2003, p.5). The central premise of social capital is that social networks have value in conveying social capital.

Jacobs (1961), was the first to provide evidence of the importance of social capital to a healthy functioning society. She believed that neighbourhood networks are essential to fostering healthy cities. For Putnam *et al.* (1993, p.167), social capital refers to "the features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating co-ordinated actions". Similarly, Stone (2001, p.4) sees social capital as networks of social relations, which are characterized by norms of trust and reciprocity.

In the recent publication by the Organisation for Economic Co-operation and Development (OECD) entitled “The Well-Being of Nations” social capital is defined as a collection of “networks together with shared norms, values and understandings that facilitate cooperation within or among groups” (2001, p.41). Prevalence of trust (among strangers as well as familiars) is viewed as being closely associated with norms and networks and may be viewed as being part of the concept for practical or operational purposes.

The OECD report (2001, p.18) defines human capital as “the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well being”. This understanding of human capital emphasizes the importance of a wide range of human capacities including non-cognitive skills and attributes as well as knowledge acquired through informal learning experiences. It also acknowledges the wider potential of human capital. Social capital is relational, while human capital is individual.

In summary, social capital has been defined in numerous ways, and the core meaning appears to revolve around two concepts: firstly, the social networks facilitating cooperation or collective action; secondly, associated norms of reciprocity (mutual help) and trust. Trust can have many dimensions including a belief in good intentions from other as well as their competency and reliability. Trust is likely to be partly dependent on perceived or observed trustworthy behaviour of others as well as generator of social networks (Putnam, 1993).

5.4.1 Constraints on participation in networks

Despite the existence of support networks within the Tasmanian organic industry, not all the members are willing to participate in such experiences. This was mentioned by respondents when they were probed about their perceptions of their peer willingness to participate in networks for information exchange. According to Garland (1991, p.283), major barriers to be considered in diffusion and adoption of an innovation are "people issues, including cultural traditions, risk aversion, lack of knowledge, and user acceptance". Barriers to participation in learning or change opportunities may be factors related to an individual, their family situation, and the characteristic of their

farm, business, rural community or industry (Fulton *et al.*, 2003, p.19). They may also be related to the content, accessibility or delivery of the learning or change opportunities presented to the farmer (Fulton *et al.*, 2003, p.19). Most of the available works are related to Australian conventional farmers (Kilpatrick 1996; Kilpatrick and Bells, 1999; Kilpatrick and Johns, 1999; Kilpatrick, 2002). The great bulk of research about facilitation of learning is based on conventional agriculture.

Fulton *et al.*, (2003) tried an approach to the constraints to participation in learning opportunities. These constraints can be due to different reasons, including firstly, farmer characteristics (Fulton *et al.*, 2003; Kilpatrick, 1999; Kilpatrick and Johns, 1999); secondly, unsatisfactory experiences in education and training (Kilpatrick and Johns, 1999); thirdly, learning content (Kilpatrick, 2002; Kirkpatrick and Bells, 1999; Kilpatrick and Johns, 1999); fourthly, volume and diversity of information (Marsh and Pannell, 1998); fifthly, use of information technology (Bryant, 1999), and, finally, method of delivery (Marsh and Pannell, 1998). While Bryant's (1999) study of computer usage patterns amongst Australian farmers did not directly examine the role of information technology in farmer's learning, subjects provided evidence of having learned more about their own business by using computers. Barriers specific to women's participation in learning and management in the agricultural sector were examined in New Zealand by Liepins *et al.* (1997).

Respondents to a survey amongst European researchers in organic agriculture mentioned that constraints for the advancement of research in organic agriculture were institutional rather than technical (Wynen, 1996). In other words, technical problems were seen as being surmountable. Gabriel (1995) came to a similar conclusion during a workshop with researchers in sustainable agriculture in the USA. Probably the most relevant institutional considerations related to lack of interest in participating in learning activities by organic farmers are belief systems (Gabriel, 1995 p.348) and social obstacles (Gabriel, 1995; Wynen, 1992). Possibly, the single biggest constraint to the development of organic agriculture is that most people in all kinds of areas, including scientists, researchers, extension officers and politicians strongly believe that organic agriculture is not a feasible option. For this reason, very few farmers can obtain information about this management system, even when they

inquire about it. Survey respondents in developed countries often mention the social isolation which organic farmers endure as a result of their choice of management system. Farmers in Australia feel that they were considered "odd" or "eccentric" and that they needed a "thick skin" to be able to withstand the social pressure (Wynen, 1992).

An interesting finding in the case of this research relates to the characteristics of Tasmanian organic farmers. The local industry has been faced with the issue of industry fragmentation and exclusion from corporate involvement. This has been attributed to several factors, including small farm size, the relative absence of large-scale growers, division within the industry, and the relatively narrow range of produce grown (G. Whitten, pers. comm. 2003; C. Brunswick-Hullock, pers. comm. 2003). Tasmanian organic farmers have shown to be individualistic, yet cooperative, autonomous and innovative with some of them showing leadership qualities. The survey showed that they are a diverse agricultural group with differing needs and opinions. The diversity of Organicse perceptions would not be sufficient to understand the reluctance of some organic farmers to a more active participation in learning networks.

5.5 *Contrast with other results*

The situation of Tasmanian organic farmers is similar to that of their organic producer in the Oceanic region. Previous studies addressing lack of information have been conducted in New Zealand. In March 2003, the New Zealand Ministry of Agriculture and Forestry contracted a Consulting Group to develop a 20-year plan for the organic sector (Martech, 2003, p.3). This report proposes strategies to address issues currently affecting the New Zealand organic sector. One of the issues addressed by this report is inadequate knowledge of sustainable organic systems (Martech, 2003, p.6). When approached, most farmers cited a lack of information about organic methods and potential returns.

New Zealand organic producers stated that the highest initial costs of converting to organic farming were not so much the costs of certification and control, but the huge losses during the first harvests, resulting from insufficient knowledge and lack of

capability to protect the crops from pests and plagues. Moreover, during conversion to organic agriculture, yields might drop significantly (and may remain lower even after the transition period), and there are higher risks of severe pest and disease attacks. Constraints were mainly technical, including nutrient and soil management, animal health, woody weeds, limited skills, knowledge and access to information (Martech, 2003, pp.9-10). For the New Zealand case, organic farming was said to be carried out on a trial-and-error basis until the appropriate techniques were developed through continuous adjustments. This corroborates the findings of the present research, where almost all the interviewed farmers mention trial-and-error as a method of acquiring knowledge. Among the New Zealand study findings, the ones relating to the Tasmanian cases are:

- producers need technical information about sustainable systems by means of extension management packages;
- there are significant research and development problems to be addressed in the soils, plant and animal health area;
- few farm consultants can provide technical advice on organic agriculture;
- few schools teach ecological practices in agriculture and horticulture, although an increasing number of tertiary institutions are including ecological and organic options and information is increasingly available.

In terms of sources of information, Liepins *et al.* (1997) noted that organic growers in New Zealand used a variety of sources of information to learn about organic production. Primarily, growers used books, newsletters and informal networks to learn about organic techniques and skills. When industry bodies organized field days and seminars they were well attended, but they were not a frequent occurrence. In contrast to this, formal discussion groups and consultants were not widely used by growers to access knowledge about organic production. The Christchurch Polytechnic (which runs organic husbandry courses) was not considered to be a significant knowledge source by most commercial organic growers (Liepins *et al.*, 1997).

In a different study, Campbell *et al.* (1997) identified that the impetus for developing skills in organic production for kiwifruit in the Bay of Plenty differed from the pattern identified by Liepins *et al.* (1997); the most obvious difference was in the prominent role of the Bay of Plenty Polytechnic and industry discussion groups in extending knowledge about organic production in recent years. During the formation of the organic kiwifruit pool and in the first years of high recruitment (1990-1994), growers who entered organic production recollected that they learnt their skills from: personal experimentation, polytechnic courses, a pack-house discussion group and the Kiwigreen program. The only common feature to both cases is that State agencies have played a minimal role in promoting knowledge of organic production and the current situation is entirely due to a combination of personal networking and investigation and industry activities (Campbell *et al.*, 1997; Liepins *et al.*, 1997).

5.6 Limitations

Resource restrictions limited the sample size of participants for this research. A larger participant sample would have enabled a better statistical analysis. However, experienced organic farmers were selected specifically to improve the level of confidence in observed trends from the small participant sample. It was believed that this improved the data quality sufficiently to draw meaningful conclusions from the results.

Initially, some of the methods considered in this research included a written survey, but constraints such as the great geographic dispersion of farmers and the time limitations for the study made semi-structured interviews more suitable. Another consideration was the low level of responses to previous surveys conducted by the Organic Coalition of Tasmania among organic farmers (Whitten, 2001). A qualitative research approach is recognised in the literature as the most efficient and productive way of obtaining in-depth data on a given subject.

5.7 Conclusion

Organic farming has been described as generally more labour intensive and requiring a higher level of management than conventional agriculture (FAO, 2001). Organic

farmers face different technical challenges to conventional farmers, because they often cannot use the same tools as their mainstream counterparts. Furthermore, organic producers do not have the management infrastructure available to conventional producers. Therefore, gaining knowledge can be difficult, time consuming and expensive. Success in conversion and post conversion operation of organic agriculture is related not only to economic and political conditions but also to the availability of information about technical aspects of organic farming.

There is a general perception among Tasmanian organic producers of a lack of production specific information for the post conversion stage. If the information available has a scientific nature, some producers often disregard it because they tend to prefer information based on their own trial and error. The conclusions drawn from the present study, are that several actions can be taken that may improve the provision of information to Tasmanian organic producers. These include:

1. the compilation of farmer-knowledge,
2. creating strategies to encourage networking,
3. research to determine effective production techniques, and,
4. further documenting of the extension experiences and personal characteristics of Tasmanian organic farmers.

In sum, most of the participants in this research were in consensus about the importance of sharing information. The capacity to share values and interests allows a community to develop strong bonds and a high level of trust among individuals. Trust is an important factor to information sharing, and organic farmers show a preference for advice based on experiential knowledge rather than technical “recipes”. It would be quite useful to conduct an inventory of participatory and relational assets within the Tasmanian organic industry, as little data has been collected on the participation of farmers in learning activities. There are perception among Tasmanian organic farmers, this supported by responses of participants, that there are a few members of their community with very developed leadership skills and self-sufficiency in problem solving. These data could be useful for designing and implementing extension

programs. Funding limitations prevented the continuation of self-generated networking experiences in Tasmania, such as TOFAS and Field Fresh. The history of innovation within the Tasmanian organic industry provides grounds for optimism that the industry will adopt the necessary measures to address these issues.

References

- Alabaster, T. and Hawthorne, M. 1999. Information for the Environmental Citizen. *Sustainable Development Journal*, Vol. 7, pp. 25-34.
- Alavi, M. and Leidner, D. E. 2001. Knowledge Management: Conceptual Foundations and Research Issues. *MIS Quarterly*, Vol. 25 (1), pp. 107-136.
- Alenson, C. 2000. Organic Farming Growing in Australia. In *Organic Farming In Australia*, Kondinin Group Report for RIRDC. RIRDC publication No 00/97. Kingston, ACT, Australia.
- ATTRA, 2002. Canadian Centre for Appropriate Technology Transfer for Rural Areas. *Organic Farming*. From [http:// www.attra.org](http://www.attra.org). Visited 02-11-2003.
- AVCA, 1989. *Submission to Senate Select Committee on Agricultural and Veterinary Chemicals in Australia*. AVCA Publications, Sydney, Australia.
- Azeez, G. 2000. *The Biodiversity Benefits of Organic Farming*. Report for The Soil Association. Bristol, UK.
- Babbie, E. 2002. *The Basics of Social Research*. Second Edition. Wadsworth, California, USA.
- Bellinger, G., Castro, D. and Mills, A. 1997. *Data, Information, Knowledge and Wisdom*. From [http:// www.outsights.com/systems/dikw.htm](http://www.outsights.com/systems/dikw.htm). Visited 10-03-2004.
- Boisot, M.H. 1995. *Information Space: A Framework for Learning in Organizations, Institutions and Culture*. Routledge Press, London, UK.
- Bourdieu, P. 1986. "The Forms of Capital", in *Handbook of Theory and Research for the Sociology of Education*. J. Richardson (ed), pp. 241-258. Greenwood Press, New York, USA.
- Bradshaw, M. and Stratford, E. 2000. "Qualitative Research Design and Rigour". In *Qualitative Research Methods in Human Geography*. I. Hay (ed). Chapter 3, pp. 37-49. Oxford University Press, Melbourne, Australia.
- Brown, L. 1981. *Innovation Diffusion: A New Perspective*. Methuen, London, UK.

- Bryant, L. 1999. *Computers on the Farm: Farmers' Usage Patterns and Impact on Farm Management*. Report for RIRDC Canberra, Australia.
- Buttel, F.H., Larson O.F., Gillespie G.W. Jr. 1990. The New Sociology of Agriculture. II: The Environment of Agriculture. p. 129-170. In *The Sociology of Agriculture*. Greenwood Press, New York, USA.
- Cacek, T. and Langner, L. 1986. The Economic Implications of Organic Farming *American Journal of Alternative Agriculture*, Vol. 1 (1), pp. 25-29.
- Campbell, H., Fairweather, J. and Steven, D. 1997. *Recent Developments in Organic Food Production in New Zealand: Part 2, Kiwifruit in the Bay of Plenty*. Studies in Rural Sustainability Research Report No. 2. Department of Anthropology, University of Otago, New Zealand.
- Chang, C., Griffith, G. and Zepeda, L. 2003. *An Overview of the Organic Food Products Market in Australia*. University of New England, Armidale, Australia.
- Choo, C.W. 1998. *The Knowing Organization*. Oxford University Press, New York, USA.
- Clark, T. 2003. "Largest Organic Orchard Planned". *The Saturday Mercury*, 11 October 2003, p. 7.
- Coleman, J. 1988. Social Capital in the Creation of Human Capital. *American Journal of Sociology*, Vol. 94 (Supplement), pp. 95-120.
- Davenport, T.H. 1997. *Information Ecology*. Oxford University Press, New York, USA.
- Deasy, D.J. 2002. "Food safety and assurance: the role of information technology". *International Journal of Dairy Technology*, Vol. 55 (1), pp. 1-4.
- Derrick, J.W. 1997. Research in Organic Farming. In: *Organic Agriculture in Australia. Proceedings of the National Symposium on Organic Agriculture: Research and Development*. D. Dumaesq, R. Greene, and L. van Kerkhoff (eds). RIRDC, pp. 153-172.

- DPI, 2004. *Terminology in organic farming*. Department of Primary Industries NSW.
From <http://www.agric.nsw.gov.au/reader/4859#Terminology>. Visited 13-06-2004.
- DPIWE /Field Fresh Tasmania/RIRDC, 2002. *Forthside Field Day*. Annual Report.
From <http://www.dpiwe.tas.gov.inter.nsf/attachments/CBRT>. Visited 24-8-2003.
- DPIWE, 2002. *Annual Report 2002. Output Group 2: Food, Agriculture and Fisheries*, pp. 48-58. From www.dpiwe.tas.gov.au/inter.nsf/attachments/CBRT. Visited 24-8-2003.
- DPIWE, 2003. *Certifying Bodies in Tasmania*. From www.dpiwe.tas.gov.au .Visited 24-8-2003.
- DPIWE, 2004. *What is Bio-dynamics?*. From <http://www.dpiwe.tas.gov.au/inter.nsf/WebPages/SSKA-5J97YX?open> -Visited 12/07/2004.
- Dumaresq, D., Greene, R. and Van Kerkoff, L. 1997. *Organic Agriculture in Australia. Proceedings of the National Symposium in Organic Agriculture: Research and Development*. Edited by the Rural Industries Research & Development Corporation. RIRDC Publication No 97/14. Kingston, ACT, Australia.
- Falk, I. and Kilpatrick, S. 1999. What is Social Capital? A Study of Interaction in a Rural Community. *Sociologia Ruralis*, Vol.40 (1) pp. 87-110.
- FAO/WHO, 1999. *Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods*. Codex Alimentarius Commission, CAC/GL 32-1999. Rome, FAO/WHO.
- FAO, 2000. *Organic Agriculture*. From <http://www.fao.org/unfao/bodies/COAG/COAG15/X0075E.htm>. Visited 11-08-2003.
- FAO, 2001. *World Markets for Organic Fruit and Vegetables*. Joint publication with TC/CTA. From http://www.agricta.org/pubs/world_markets/summary.pdf. Visited 1/07/2003.

- FAO, 2003. *Organic Agriculture at FAO: Frequently Asked Questions*. From www.fao.org/organicag/faq-e.htm. Visited 11-08-2003.
- Ferreira, G. 1997. *An Evolutionary Approach to Farming Decision Making on Extensive Rangelands*. Institute of Ecology and Resource Management, Edinburgh, UK.
- Fliegel, F. 1993. *Diffusion Research in Rural Sociology: the Records and Prospects for the Future*. Greenwood Press, Westport, Connecticut, USA.
- Fulton, A., Fulton, D., Tabart, T., Ball, P., Champion, S., Weatherley, J. and Heinjus, D. 2003. *Agricultural Extension Learning and Change*. A report for RIRDC, Canberra, Australia.
- Fukuyama, F. 2001. Social Capital, Civil Society and Development, *Third World Quarterly*, Vol. 22 (1), pp. 7-20.
- Gabriel, C.J. 1995. Research in Support of Sustainable Agriculture. *BioScience*, Vol. 45 (5), pp. 346-351.
- Garland, K.P. 1991. Diffusion and Adoption of Instructional Technology. In, *Instructional Technology: Past, Present and Future*. G.K. Anglin (ed), Second Edition. pp. 282-287. Libraries Unlimited. Englewood, Colorado, USA.
- Gillespie, B. 2001. *Trends in Organic Agriculture and Implications for Extension*. Conference by The Canadian Society of Extension. Future Directions in Rural Extension Ontario, July 9-10. From http://www.extension.usask.ca/cse/2001_archive/abstracts_papers/BryonGillespie.pdf. Visited 11-08-2003.
- Griggs, A. 2000a. *Changing Faces of Organic Agriculture: Concepts and Consequences*. Unpublished Honours Thesis. University of Tasmania, Hobart, Australia.
- Griggs, A. 2000b. *Research and Development of Organic Agriculture in Australia : A Review*. Department of Primary Industries, Water and Environment. New Town, Tasmania, Australia.
- Hassall and Associates, 1990. *The Market for Australian Produced Organic Food*. Report for Rural Industries Research and Development Corporation, Canberra, Australia.

- Hassall and Associates, 1995. *The Market of Organic Produce in Australia, Sydney*. Report for the Rural Research and Development Corporation, Canberra, Australia.
- Hassall and Associates, 1996. *The Domestic Market for Australian Organic Production- An Update*. Report for the Rural Research and Development Corporation, Canberra, Australia.
- Hassanein, N. and Kloppenburg, J. 1995. Where the Grass Grows Green Again: Knowledge Exchange in the Sustainable Agriculture Movement. *Rural Sociology*, Vol. 60(4), pp. 721-740.
- Healy, T. 2001. Networks and Social Norms can be Good for Business: the Role of Social Capital in Organisations. Paper Presented at the Conference *Social Capital: Interdisciplinary Perspectives*. University of Exeter. From <http://www.ex.ac.uk/shipss/politics/research/socialcapital/papers/healy.pdf> Visited 11-08-2003.
- Horsley, P. and Kondinin Group, 2000. *Organic farming in Australia*. Rural Research and Development Corporation Publication N0 00/97 RIRDC Project No KDI-20A, Kingston, ACT, Australia.
- Hoyle, R., Harris M., and Judd, C. 2000. *Research Methods in Social Relations*. Seventh edition, Wadsworth, USA.
- IFOAM, 2003. *Guarantee System IFOAM Norms 2002*. From http://www.agricta.org/pubs/world_markets/summary.pdf. Visited 11-08-2003.
- IFOAM, 2002. *Position paper World Summit on Sustainable Development and Organic Agriculture 26th August – 4th September 2002 in Johannesburg*. From <http://www.agricta.org/pubs/worldsumm.pdf>. Visited 11-08-2003.
- Ilbery, B. 1985. *Agricultural Geography*. Oxford University Press, New York, USA.
- Ilbery, B., Holloway, L. and Arber, R. 1999. The Geography of Organic Farming in England and Wales in the 1990s. *Tijdschrift voor Ecionomische en Sociale Geografie*. Vol. 90 (3), pp. 285-295.

- Jacobs, J. 1961. *The Death and Life of Great American Cities*. Random House, New York, USA.
- Johnson, C. 2003. *A Model of Social Capital Formation*. Working paper Series 03-01 Social Research and Demonstration Corporation, Nova Scotia, Canada.
- Katz, E., and Lazarsfeld, P. 1955. *Personal Influence: the Part Played by People in the Flow of Mass Communication*. The Free Press, New York, USA.
- Kilpatrick, S. 1996. *Change, Training and Profitability*. National Farmers Federation, Canberra, Australia.
- Kilpatrick, S. 2002. Learning and Building Social Capital in a Community of Family Farm Business. *International Journal of Lifelong Education*. Vol.21 (5), pp. 446–464.
- Kilpatrick, S. and Bell, R. 1999. Support Networks and Trust: How Social Capital Facilitates Outcomes for Small Business. I. Falk (ed.) *Dead Centre Regional Australia in Crisis*, National Centre for Vocational Education Research, Adelaide, Australia.
- Kilpatrick, S. and Johns, S. 1999. *Managing farming: How farmers learn*. RIRDC, Canberra, Australia.
- Koepf, H.H. 1980. *Compost – What It Is, How It Is Made, What It does*. Biodynamic Farming and Gardening Association, Inc., Fourth Edition, Kimberton, Pennsylvania, USA.
- Lampkin, N. 1990. *Organic farming*, Farming Press, Ipswich, UK.
- Lefebvre, E. and Lefebvre, L. 1996. *Information and Telecommunication Technologies: The Impact of Their Adoption on Small and Medium-Sized Enterprises*. From <http://www.idrc.ca/books/focus/807/807.html>. Visited 04-07-2003.
- Liepins, R., Walker, H., Lyons, K. and Collie, L. 1997. *“Going Organic”: Producers Accounts of their Learning, Information Access and Practice of Organic Production*. Interim report of findings prepared for organic producers and participating industry organizations. University of Otago, Dunedin, NZ.

- Liepins, R. and Campbell, H. 1998. *Social Dimensions Affecting the Development of Organic Agriculture. Knowledge, Gender and Stakeholder Relations in the Initiation and Implementation of Organic Farming, Canterbury, 1996-1997* MAF Policy Technical paper 98/7. Wellington, NZ.
- Lindsay, J.M. 1997. *Techniques in Human Geography*. Routledge, London, UK.
- Lockeretz, W. 1995. Organic Farming in Massachusetts: An Alternative Approach to Agriculture in an Urbanized State. *Journal of Soil Water Conservation*, Vol. 50, pp. 663-667.
- Losee, R.M. 1997. A Discipline Independent Definition of Information. *Journal of the American Society for Information Science*, Vol. 48 (3), pp. 254-269.
- Ministry of Agriculture and Forestry (MAF), 1996. *The Role of Organic Farming*. MAF position paper. Wellington, NZ.
- Marsh, S. and Pannell, D. 1988. The Changing Relationship Between Private and Public Sector: Agricultural Extension in Australia. *Rural Society*, Vol. 8 (2), pp. 133-151.
- McCoy S. and Parlevliet, G. 2000. *Export market Potential for Clean and Organic Agricultural Products*. Report 00/76, RIRDC, Canberra, Australia.
- McCoy, S. 2002. *Organic Agriculture: an Introduction*. Farm note No 21/2002, Department of Agriculture, Western Australia, from <http://www.agric.wa.gov.au> Visited 11-08-2003.
- Martech. 2003. *Organic Sector Strategy. A Real Opportunity for New Zealand: A Strategy to Unlock the Value in Organic Systems*. Martech Consulting Group Publication, Auckland, NZ.
- Minitab Inc. 2000. Minitab Statistical Software. Ver. 13.2.
- Mollison, B. 1988. *Permaculture: A Designer's Manual*. Talgari Publications, Tyalgum, Australia.
- Morgan, W.B. and Multon, R.J. 1971. *Agricultural Geography*. Methuen, London, UK.

- NASAA, 1999. *The European Market for Organic Products Discussion*. Paper No. 2.
From www.elspl.com.au/pubs/MKTG.HTM. Visited 11-08-2003.
- Niggli, U. and Lockeretz, W. 1996. Development of Research in Organic Agriculture.
In *Fundamentals of Organic Agriculture*, Oestergaard, T. (ed) , Tholey-
Tholey, pp. 9-23.
- Niggli, U. and Willer, H. 2000. Stimulating the Potential for Innovation in Organic
Farming by Research. Paper presented at European Conference - Organic
Food and Farming, 10-11 May 2001, Copenhagen, Denmark. In *Organic Food
and farming - Towards Partnership and Action in Europe*, Danish Ministry of
Agriculture and Fisheries, Copenhagen, Denmark, pp. 194-199.
- Niggli, U. 2002. *The Contribution of Research to the Development of Organic
Farming in Europe*. Proceedings of the UK Organic Research Conference, 26-
28 March 2002, Aberystwyth, UK. pp. 19-24.
- Nonaka, I. and Takeuchi, H. 1995. *The Knowledge Creating Company*, Oxford
University Press, New York, USA.
- Nonaka, I., 1994. A Dynamic Theory of Organizational Knowledge Creation,
Organization Science, Vol.5 (1), pp. 14-37.
- Organic Producers Advisory Committee (OPAC), 1998. *National Standards for
Organic and Bio-dynamic Produce*. Second Edition, Australian Quarantine
Service, ACT, Australia.
- OECD, 2001. *The Well-Being of Nations: the Role of Human and Social Capital*.
Centre for Education Research and Innovation, Paris, France.
- Pampel, F. and van Es, J.C. 1997. Environmental Quality and Issues of Adoption
Research. *Rural Sociology*, Vol. 42 (1), pp. 57-71.
- Padel, S. 2001. Conversion to Organic Farming: a Typical Example of the Diffusion
of an Innovation? *Sociologia Ruralis*, Vol. 41(1), pp. 41-61.
- Patton, M. 1990. *Qualitative Evaluation and Research Methods*. Third Edition, Sage,
Thousand Oaks, California, USA.

- Pavleviet, G. and McCoy, S. 2000. *Seminars to Create Awareness about Organic Opportunities*. A report for Agriculture Western Australia and RIRDC. Canberra, Australia.
- Pfeiffer, E. 1984. *Using the Bio-Dynamic Compost Preparations & Sprays in Garden, Orchard, & Farm*. Bio-Dynamic Farming and Gardening Association, Inc., Kimberton, Pennsylvania, USA.
- Putnam, R.D., Leonardi, R. and Nanetti, R.Y. 1993. *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton, USA.
- Putnam, R.D. 2000. *Bowling Alone: The Collapse and Revival of American Community*, Simon and Schuster, New York, USA.
- Raupp, J. 2001. Bio-dynamic Approaches in Research and Development Research Methodologies in Organic Farming. Paper presented at European Conference - Organic Food and Farming, 10-11 May, Copenhagen, Denmark. In *Organic Food and farming - Towards Partnership and Action in Europe*, Danish Ministry of Agriculture and Fisheries, Copenhagen, Denmark, pp. 194-199.
- Reganold, J. 1988. Comparison of Soil Properties as Influenced by Organic and Conventional Farming Systems. *American Journal of Alternative Agriculture*, Vol. 3 (1), pp. 144-155.
- RIRDC, 2001. *Five Year R&D Plan for Organic Produce 2001-2006*. RIRDC Publications, Canberra, Australia.
- RIS, 1999. *Tasmanian Profile*. Rural Information Service. From <http://www.ruralinformationtasmania.southcom.com.au/>. Visited 04-10-2003.
- Ritchie, D.L. 1991. *Information*. Sage, Newbury Park, California, USA.
- Rogers, E.M. 1995. *Diffusion of Innovations*. Fourth Edition. The Free Press, New York, USA.
- Roling, N. 1996. Towards an Interactive Agricultural Science. *European Journal of Agricultural Education and Extension*, Vol. 2 (4), pp. 35-48.
- Robinson, G.M. 1988. *Agricultural Change: Geographical Studies of British Agriculture*. North British Publishing, Edinburgh, UK.

- Ruttan, V.W. 1996. What Happened to Technology Adoption-Diffusion Research? *Sociologia Ruralis*, Vol. 36 (1), pp. 51-73.
- Saunders, C., Manhire J., Campbell H, and Fairweather J. 1997. *Organic farming in New Zealand: An Evaluation of the Current and Future Prospects Including and Assessment of Research Needs*. Report for Ministry of Agriculture and Forestry. Canterbury, NZ.
- Schmidt, D, 2001. *Information in Extension: A Poverty of Theory*. Paper presented for the Australasia-Pacific Extension Network at the International Conference 3-5 October 2002. Toowoomba, Queensland. From <http://www.regional.org.au/au/apen/2001/p/SchmidtD1.htm>. Visited 19-11-2003.
- Schwartz, L. 1994. *The Role of Private Sector in Agricultural Extension: Economic Analysis and Case Studies*, Overseas Development Institute, London, UK.
- Seppanen, L. 2002. Societal Integration in Organic Farming: Exploring the Learning Challenges. *Journal of Agricultural Education and Extension* Vol. 8 (2), pp. 87-100.
- Shannon, C.E. and Weaver, W. 1949. *The Mathematical Theory of Communication*. University of Illinois Press, Urbana, USA.
- Skerratt, S. and Dent, J.B., 1994. Farmer Adoption and Non Adoption of Agri-Environmental Initiatives: the Case of Breadalbane, ESA, Scotland. In: *Farmers' Decision Making - A Descriptive Approach*, B.H. Jacobsen, D.E. Pedersen, J. Christensen and S. Rasmussen (eds.), pp. 135-155. Institute European Association of Agricultural Economists, Copenhagen, Denmark.
- Spek, R. and Spijkervet, A., 1997. Knowledge Management: Dealing Intelligently with knowledge. In *Knowledge Management and its Integrative Elements*. J. Liebowitz and L.C. Wilcox, (eds.) CRC Press, Washington, USA, pp. 31-59.
- Stenmark, D. 2002. *Information v/s Knowledge: The Role of Intranet on Knowledge Management*. Proceedings of the 35th Hawaii International Conference on Systems Sciences.

- Stevenson, G. 1997. Tasmanian Organic-Dynamic Producers Co-operative TOP. In *Proceedings of the National Symposium in Organic Agriculture: Research and Development*, Rural Industries Research & development Corporation (ed.). RIRDC Publication No 97/14, Kingston, ACT, Australia.
- Stevenson, G. and Tabart, T. 1998. *Tasmanian Organic Brief Prospectus*, report for the Organic Coalition of Tasmania, OCT, Kingston, Tasmania, Australia.
- Stone, W. 2001. *Measuring Social Capital: Towards a Theoretically Informed Measurement Framework for Researching Social Capital in Family and Community Life*, Research Paper No. 24, Australian Institute of Family Studies, Melbourne, Australia.
- Sullivan, P. 2001. *Holistic Management: A Whole-Farm Decision Making Framework*. ATTRA (Appropriate Technology Transfer for Rural Areas), Fayetteville, Arkansas. From <http://www.attra.org/attra-pub/PDF/holistic.pdf>. Visited 11-08-2003.
- Surry, D.W and Farquhar, J. D, 1997. Diffusion Theory and Instructional Technology. *Journal of Instructional Science and Technology*. Vol. 2 (1), pp. 24-36.
- Troedson, J. 1991. *Organic Farming: A Growing Role in Australian Agriculture?*. Background Information Brief no 20, Queensland Parliamentary Library, Publication and Resources Section, Brisbane, Queensland. From; <http://www.parliament.qld.gov.au/library/research/index/html>. Visited 14/11/2003.
- UN, 1992. *Local Agenda 21*. United Nations Conference on Environment and Development. From <http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21toc.htm>. Visited 23/09/03.
- USDA, 1980. *Report and recommendations on organic farming*. US Department of Agriculture, Washington D.C., USA.
- Valente, T.W. 1995. *Network Models of the Diffusion of Innovations*. Cresskill, New Jersey, USA.

- Van Crowder, L. and Anderson, J. 1997. Linking Research, Extension and Education: Why is the Problem so Persistent and Pervasive? *European Journal of Agricultural Education and Extension*, Vol. 3 (4), pp. 241-250.
- WCED, 1987. *Our Common Future*. Oxford University Press, Oxford, UK.
- Whitten, G. 2004. *Herbal Harvest. Commercial Organic Production of Quality Dried Herbs*, Third edition, Blooming Books, Richmond, Australia.
- Whitten, G. 2001. *The Tasmanian Organic Industry: A Brief Prospectus*. Report for Organic Coalition of Tasmania (OCT), Kingston, Tasmania, Australia.
- Whitten, G. 2002. *Report on Tasmanian Organic Industry Survey Nov 2002*. Report for Organic Coalition of Tasmania (OCT), Kingston, Tasmania, Australia.
- Whitten, G. 2003. *Tasmanian Organic Industry Strategic Plan 2003 –2004*. Report for Organic Coalition of Tasmania (OCT), Kingston, Tasmania, Australia.
- Wigg, K.M. 1993. *Knowledge Management Foundations: Thinking about Thinking – How people and Organisations Create, Represent and Use Knowledge*. Schema Press, Arlington, Texas, USA.
- Willer, H. and Zerger, U. 1999. Demand of Research and Development in Organic Farming in Europe. FAO - Workshop Paper for *Research Methodologies in Organic Farming*, Forschungsinstitut Biologischen, Landbau.
- Wynen, E. 1992. *Conversion to Organic Agriculture in Australia: Problems and Possibilities in the Cereal-Livestock Industry*. National Association of Sustainable Agriculture Ltd., Sydney, Australia.
- Wynen, E. 1996. *Research Implications for Organic Agriculture: the Case of Organic Farming*. Centre for Resource and Environmental Studies, Australian National University, Canberra, Australia.
- Wynen, E. 1998. *Evaluating the Potential Contribution of Organic Agriculture to Sustainable Goals*. Food and Agriculture Organization of the United Nations.
- Wynen, E. 2003. *Organic Agriculture in Australia: Levies and Expenditures*. A report for the Rural Industries Research and Development Corporation. RIRDC publication, Kingston, ACT, Australia.

Yuseffi, M. and Willer, H. 2003. *The World of Organic Agriculture Statistics and Future Prospects*, Fifth edition, IFOAM, Tholey – Tholey, Denmark.

Appendix I

INTERVIEW QUESTIONS AND THEIR JUSTIFICATION.

1. How long have you been involved in the organic sector? This question is introductory and gives the chronological framework for the farmer's experience.
2. What is the focus of your organic production? Defines the specific field or productive area where farmers concentrate their efforts.
3. Do you have a background as a conventional farmer? Please expand. This question helps to understand if the farmers have been involved in the conventional farming sector.
4. How did you become aware of organic production as an alternative to conventional farming? This question allows the researcher to gain an understanding of what was the main source of information about organics motivating the change of production type from the farmer. Necessary to understand how the farmers got involved in the organic sector
5. What factors led you to become involved in organic farming? This question complements the previous one, trying to get the specific reasons - either social, economic or environmental - leading farmers to change.
6. What are the main sources of information that you have used to set your organic farming operation? This question targets actual sources of information used by farmers when starting with their production.
7. Have you found it difficult to get information about any particular aspect of organic farming? If so, could you please explain This question relates to organic farming as a whole in an attempt to understand in what stage of production is the bulk of information most required.
8. Is the specific information or the format in which the information is provided a constraint for you? The researcher has acknowledged that not all farmers have

the same access to technology and questions whether the format of delivery of information constitutes a constraint for the farmers.

9. To the best of your knowledge, have other organic farmers had difficulties getting information to help them to get established? If yes, please expand. The researcher recognises that organic farmers do not work in isolation and attempts to determine if they take part in any form of information exchange with peers or institutions.
10. Do you find the information provided by the State Government organic unit to be useful? The researcher aims to determine if farmers are aware of the existence of a State Organic Unit, if they approach them and the nature of their perception of the usefulness of resources provided by this unit.
11. Can you suggest any ways in which information for organic farmers could be made more readily available? This question comes from the presumption that farmers could have ideas about how to be provided with more information in ways they find more accessible and readily available.
12. Can you see any need for the State to provide short courses about organic farming? If yes, could you mention some of the topics you would like to be included in such courses? This questions seeks an elaboration of farmers' perception about the extent of knowledge regarding organic farming among the general public.

Appendix II

BIODYNAMIC FARMING AND GARDENING

Bio-dynamic farming refers to a specific type of organic farming based on the principles of Austrian philosopher Rudolf Steiner. Special composts, specific preparations and plant activators are used in accordance with those principles (DPIWE, 2004).

One of the key issues Steiner introduced in his agricultural lectures is the concept of the farm as individuality (Koepf, 1980; Pfeiffer 1984). The entire farm should be organized like a n organism and developed as a unique individual under its natural, economic and social site conditions. Everything, which is essential for life in the farm, should be produced within the farm. In term of today, Steiner would perhaps speak of the farm agro-ecosystem. Like a farm, an ecosystem can be regarded as an organism on a higher level in which various components depend on, work for and with each other. In some textbooks, the description of bio-dynamic agriculture starts with the concept of the farm organism or farm individuality showing the particular significance of this view (Koepf, 1980; Pfeiffer 1984). Today, the term organic often encompasses bio-dynamic farming practices, although it is in fact an enhanced method of organic farming which also accepts the influence of the cosmos on the farming process

The preparations: Bio-dynamic preparations form an integral part of farm management and are essential to the sustainability of the biodynamic system of agriculture. They are used as follows:

1. Preparation 500 (horn manure). This preparation is made by placing fresh cow manure within the horn of a cow and burying it in the soil during the autumn and the winter months. It is to be applied to the total production area, preferably twice, but at least once a year (Koepf, 1980; Pfeiffer, 1984)
2. Preparation 501 (horn silica). This preparation is made from finely ground quartz crystals placed into a cow's horn and buried in the soil during the

spring and summer months. It should be applied at least once in each crop, and at least once a year on pasture (Koepf, 1980; Pfeiffer, 1984).

3. Compost preparations 502-507, are prepared from various herbs. These preparations are supposed to exert a catalytic effect on soil mineral processes. They are to be used to direct fermentation processes in liquid manures and composts (Koepf, 1980; Pfeiffer, 1984).

- 502 Yarrow – Potassium Sulphur and trace elements
- 503 Chamomile Sulphur calcium and nitrogen
- 504 Stinging nettle- Iron
- 505 Oak bark Calcium
- 506 Dandelion Silicic acid
- 507 Valerian Phosphorous

It is preferable that all preparations are eventually made on the farm itself, their highest quality can only be ensured by their production on converted land. For this reason they are available to members of bio-dynamics Tasmania through the association until members are able to produce their own of a quality approved by the association.

Appendix III

QUESTIONS AND RESPONSES GROUPED BY CLUSTER GROUPS

Question	Response		Group 1				Group 2				Group 3				
			F2	F5	F8	F9	F3	F7	F6	F10	F4	F11	F1	F12	F13
Experience		%													
	5 to 10 years	46.2	1				1	1	1	1	1				
	More than 20 years	30.8		1	1	1							1		
	Less than 5 years	15.4												1	1
	10 to 20 years	7.7									1				
Conventional background															
	No	84.6			1	1	1	1	1	1	1	1	1	1	1
	Yes	15.4	1	1											
Production type															
	Vegetables	30.8				1					1	1			1
	Apples	30.8	1		1						1			1	
	Herbs	15.4										1	1		
	Vines	15.4		1					1						
	Berries	15.4					1							1	
	Sheep/cheese	7.7					1								
	Beef/meat	7.7						1							
Reason for organic farming															
	Health	53.8						1	1		1	1	1	1	1
	Environmental concerns	46.2					1		1			1	1	1	1
	Lifestyle	30.8	1					1			1	1			
	Peer influence	23.1			1	1		1							
	Sustainability	15.4	1								1				
	Failures of trad agriculture	15.4	1	1											
	Economic	0													
Sources of info.															
	Books	84.6	1	1	1	1	1		1	1	1		1	1	1
	Trial and error	76.9	1		1		1	1	1	1		1	1	1	1
	Advice from other farmers	46.2			1			1	1		1	1	1		
	Magazines	23.1	1							1				1	
	Journal, leaflets, newspapers	15.4	1							1					
	Advice from certif agency	15.4									1			1	
	Websites	7.7					1								
	Seminars, conferences	7.7										1			
	Discussion groups	0													
	Advice from organic unit	0													
Obtaining info.															
	No	100	1	1	1	1	1	1	1	1	1	1	1	1	1
	Yes	0													
Stage for required info.															
	Post conversion	69.2	1	1	1	1			1		1		1	1	1
	Conversion	30.8					1	1		1		1			
	Pre conversion	7.7						1							
Topics of required info.															
	Weed control	38.5					1	1	1	1			1		
	Husbandry health/disease control	15.4	1								1				
	Fungal disease in grapes	15.4		1											1
	Diseases control in apples	15.4	1		1										
	None at the moment	15.4				1								1	
	How to get started	7.7									1				
	Peppermint rust	7.7											1		
Suitability of info. format															
	Yes	100	1	1	1	1	1	1	1	1	1	1	1	1	1
	No	0													
Organic farming unit usefulness															
	No comments	46.2	1	1	1	1	1		1						
	Not applicable to my production	23.1						1					1	1	
	Very useful	15.4											1		1
	Relatively helpful	15.4							1		1				
	I have never approached them	7.7										1			
Mentoring															
	No available time	61.5	1	1	1		1	1	1		1		1		
	Yes	23.1				1								1	1
	Would consider if had time	15.4								1		1			
Need for education at State level															
	No need	53.8		1		1	1	1			1	1		1	
	Tafe courses	38.5			1				1	1			1		1
	University courses	15.4	1						1						
	Joint project with DPIWE/Uni	7.7	1												
Improvement of info. Delivery															
	Mentoring	38.5	1	1							1		1	1	
	Experimentation farms	30.8					1	1		1					1
	Field days	23.1						1				1	1		