



Government of South Australia
Primary Industries and Resources SA



Sustainable value chain analysis: a case study of South Australian wine

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Executive Summary

Introduction

- The Australian wine industry is facing one of its greatest challenges in living memory – to compete on a global stage with quality wines that are accessible to the mass market, without jeopardising the livelihoods of wine producers, the communities they serve or the environment upon which they rely. Industry leaders are looking for ways to improve the industry's competitiveness into the future.
- This project explores the potential for using Sustainable Value Chain Analysis (SVCA) as a tool for achieving better alignment between resource allocation, environmental management and consumer value, in the context of Australian wine destined for the UK supermarket sector. The analysis, illustrated in Figures 8 and 9 in the main report, shows the value of using SVCA as a strategic business decision making tool.
- The Oxford Landing – Tesco (OLT) value chain was selected for this case study, given that Oxford Landing Estate is based in South Australia (the largest wine producing state in Australia), and exports to Tesco (the largest supermarket customer for Australian wine) in the UK (the greatest consumer of Australian wine outside of Australia). As such, there are a range of learnings that can be taken from this value chain analysis and applied to the analysis of other South Australian value chains.
- Co-investment by all stakeholders in the project shows the benefit of value chain members investing in, and then sharing, information generated by consumer research. An output of the project is the UK consumer research that, if used wisely, can inform the targeting of consumer preferences with specific attributes in wine products.
- Key findings outlined in the analysis relate to:
 1. Consumer value
 2. Material flow
 3. Emissions
 4. Information flow
 5. Relationships

Methodology

- The project uses Value Chain Analysis (VCA) and Life Cycle Analysis (LCA) to map the Oxford Landing – Tesco (OLT) value chain.
- The VCA provides an assessment of material flows, information flows, and stakeholder relationships. The LCA provides an assessment of CO₂ emissions, from grape to glass.
- The VCA is then viewed alongside the LCA highlighting the way in which consumers value both physical and emission-generating activities.

Key Findings

1. Consumer value

- Sustainability is a concept that remains poorly understood amongst UK supermarket shoppers. More sustainable wine production/packaging may be something that retail buyers are requesting of their suppliers, in an effort to support socially responsible strategic initiatives; but very few UK shoppers currently value sustainability as an attribute of the wine they purchase from supermarkets.

- There is a significant degree of heterogeneity in the level of importance supermarket shoppers attach to different wine attributes - there are clear opportunities for segmentation - however a strong consensus around the most and the least important attributes for wine purchases from a supermarket: price, type of wine (e.g. sweet/dry), colour, grape variety and promotional activity are the most highly rated attributes. Bottle design, closure, sustainability of production/packaging, 'wine miles', front label, weight of the bottle and suitability for vegans/vegetarians are the lowest rated attributes for a regular wine purchase.
- UK consumers who purchase wine from a supermarket regard Australian wines as reliable ('it will never let you down'), good quality and good value. However, Australian wines are rarely on the radar screen when they are looking for something special.
- Oxford Landing is regarded as a 'typical' Australian wine (a 'safe bet') but for many supermarket shoppers the selection of Oxford Landing, like most 'everyday' wines, is triggered by a promotion, which in the case of a known brand is difficult to resist and requires little effort, and thus, attention to the bottle or the label.
- More time is taken when shopping for something special, when price and promotional offers are substantially less influential, but on these occasions UK supermarket shoppers are less likely to consider Australian wines than more expensive alternatives from other countries (notably France and Italy).

2. Material flow

- The VCA highlights the dominance of necessary but non-value adding activities in the OLT value chain, which implies a focus on efficiency and suggests that there is some scope for adding value.
- The OLT material flow is largely efficient, but the process of trans-shipping wine from the Oxford Landing Winery to Yalumba Angaston for bottling is considered wasteful, causing excessive motion and double handling.
- Tesco's approach to merchandising, setting promotion slots, introduces greater uncertainty in forecasting annual sales, potentially creating waste or loss of value upstream.

3. Emissions

- The LCA reveals relatively low carbon emissions occurring downstream (retail and final consumption) but substantial contribution made in the vineyard, particularly from trellising system components and viticulture practices, and at the winery, particularly bottling and packaging. Together these account for more than one-half of the total carbon emissions from the chain.
- Whilst many consumers and commentators believe that transportation is a major contributor to the carbon emissions, the LCA data for the OLT value chain indicates that transportation, from the winery to the Tesco shoppers' household, is actually a relatively minor contributor.
- The recent attention directed towards alternative packaging formats is justified by the emissions data – bottling, packaging and labelling together account for 15% of total emissions. However, the fact that consumers regard the appearance of the bottle and the information on the label as 'value adding' means that investment in more sustainable packaging formats should be made with caution, and with due consideration of consumer preferences.

- Low cost packaging solutions that are effective in reducing emissions may reduce the perceived value of the wine in the eyes of the consumer, resulting in less not more value being added as a result of reducing the carbon footprint.

4. Information flow

- The OLT value chain contains a mixture of strong and weak information flows between and within organisations. A clear correlation exists between the nature of relationships and information flows. Relationships appear slightly weaker with downstream partners (e.g. Tesco) and with the secondary players (e.g. logistics providers).
- Moreover, the understanding of the customer (Tesco) needs and consumer wants (value) is distinctly limited upstream, particularly amongst input suppliers and growers.
- The information flow between Yalumba and consumers is weak: Yalumba rely on their product labeling to communicate with consumers and do not undertake much direct marketing. To date, they have invested little in consumer research, relying primarily on product quality and promotional activity to engage with supermarket shoppers.

5. Relationships

- The OLT value chain is characterised by strong relationships. There are many examples of best practice throughout the chain. Yalumba is widely respected both as a customer and supplier and as a place to work.
- Tesco rate Yalumba highly, Oxford Landing is recognised as a good value wine at the price point and Yalumba's unique selling properties (still family-owned, long history, sustainability credentials) are recognised as supporting Tesco's vision for a rounded category.
- Yalumba need to make more use of their strong relationship with Tesco to engage more effectively in strategic dialogue with respect to sustainability and to the longer term development (and possible re-positioning) of the Oxford Landing range.

Conclusions

- Overall, the Oxford Landing – Tesco value chain is characterised by efficient material flow, reasonable information flows and strong relationships.
- Currently the ability to accurately predict short and long term supply and demand is widely regarded as a lottery, causing significant costs (wasted investment) and missed opportunities for Yalumba and growers. Thus, the greatest opportunity for improvement lies in leveraging already strong relationships, to improve the flow of information (strategic and operational) and enable more effective forecasting of supply and demand.
- Oxford Landing, like so many successful Australian wine brands, suffers from brand loyalty being inextricably linked to promotions. The brand managers of Oxford Landing recognise the need to supplement their winemaking competence with a more detailed understanding of shopper behaviour and consumer preferences.

- In depth market intelligence (including consumer research) would enable Yalumba to break out of the commodity trap and more effectively reach the distinct market segments, targeting their differential preferences with specific attributes when feasible. Other Australian winemakers would do well to follow suit, with this project showing a shared approach in sharing the cost of the research (as well as sharing the resulting information) resulting in making consumer research more affordable for the smaller businesses in the industry.
- The value of emissions data as an input to sustainable value chain management and decision-making is enhanced substantially when viewed alongside the categorisation of activities in the material flow analysis, in which consumer value is used to categorise the physical activities undertaken (Refer to Diagram 9). This should underpin investment/innovation strategies which simultaneously optimise both value in the eyes of the consumer and environmental management (Refer to Diagram 8).
- The results of combining VCA and LCA also informs government policy and programmes to ensure interventions are designed and targeted to achieve compatible competitiveness and environmental outcomes.
- Although taking a case study approach, this project has identified generic lessons and possible improvement projects at a sector level.
- The findings illustrate the potential of this approach for other South Australian food and beverage value chains.

Sustainable value chain analysis: a case study of South Australian wine

1.0 Research Objectives

The dramatic increase in global competition, growing uncertainty over environmental resource availability and the fragility of the global economy have conspired to draw the attention of international governments, businesses, consumers and citizens to the complex challenge of sustainability. Nowhere is this challenge more evident than in Australia: one of the major wine growing regions of the world, furthest removed from its major markets in Europe and North America, consumed by the worst drought in living memory, yet no less exposed to the growing demands from around the world for more sustainable production systems, more efficient distribution systems and continued innovation in winemaking, to delight wine consumers who have become accustomed to Australian wines that represent great value for money.

Many people within the Australian wine industry recognise the need for change – for greater attention to market requirements (customer needs and consumer wants), more effective sharing of information from grape to glass (to facilitate more accurate forecasting of supply and demand), more efficient distribution (from vineyard to winery to store), and more sustainable use of resources, some of which (i.e. water, labour) are in critically short supply. However, many more are blissfully ignorant or in denial. Yet, time is running out for the Australian wine industry to embrace the challenge of sustainable competitive advantage – this project seeks to provide a much needed catalyst for change.

The primary objective of this project is to explore the value of sustainable value chain analysis (SVCA) as a tool for achieving better alignment between the allocation of resources in the Australian wine industry and consumer preferences in the UK, one of the most important export markets for Australian wine, and environmental management throughout the chain. In so doing, we seek answers to the following questions:

- What is it that UK consumers value in the wine they purchase from supermarkets?
- How efficient is the flow of materials in the wine value chain?
- Which operations create the greatest emissions?
- How effectively does information flow up and down the wine value chain?
- How robust are relationships between the different stakeholders in the wine value chain?
- What opportunities exist for improving the competitiveness and sustainability of the Australian wine value chain?
- What lessons can we learn about sustainable value chain analysis that might benefit other sectors?

The focus on sustainability is motivated, in part, by the increasing demand from South Australia's major export markets for carbon labelling, especially from European food and wine retailers, including Tesco. In addition, the imminent carbon reduction initiatives by global, national and state governments, including taxes, emissions trading, standards, voluntary incentives and related regulations, have far reaching economic and market access implications for all stakeholders in food and wine value chains. Many firms are also interested in the scope for using sustainable production as a source of competitive advantage.

By examining the potential for LCA to be used with value chain analysis, the project aims to contribute to investment and innovation strategies, policy debates, regulatory outcomes and the development of carbon labelling standards. The intent is to provide better information for private and public decision-making, improving the sustainability of South Australia's high value food and wine value chains.

This report presents the headline findings and comprises seven sections. Section Two summarises the basic principles of value chain thinking and value chain analysis (VCA). Section

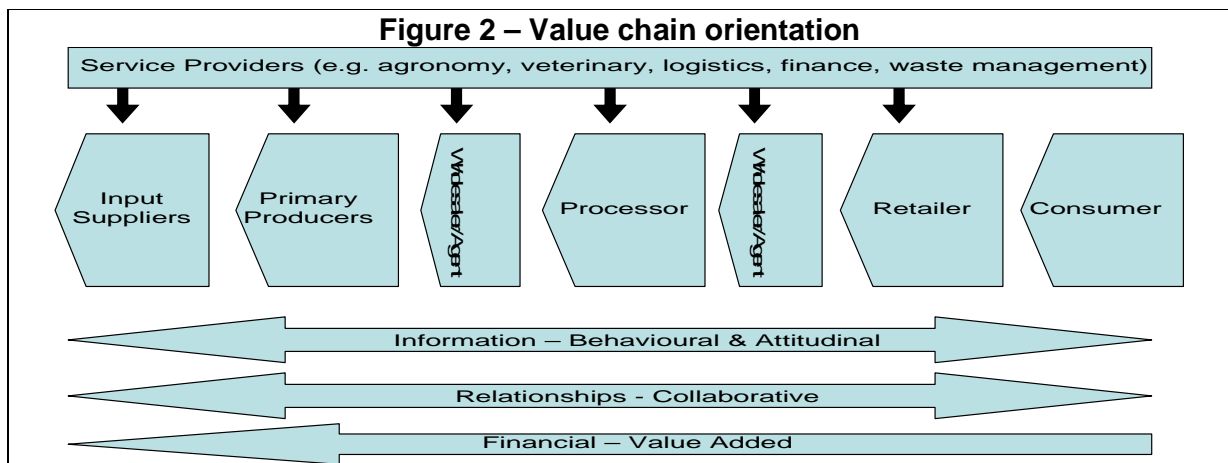
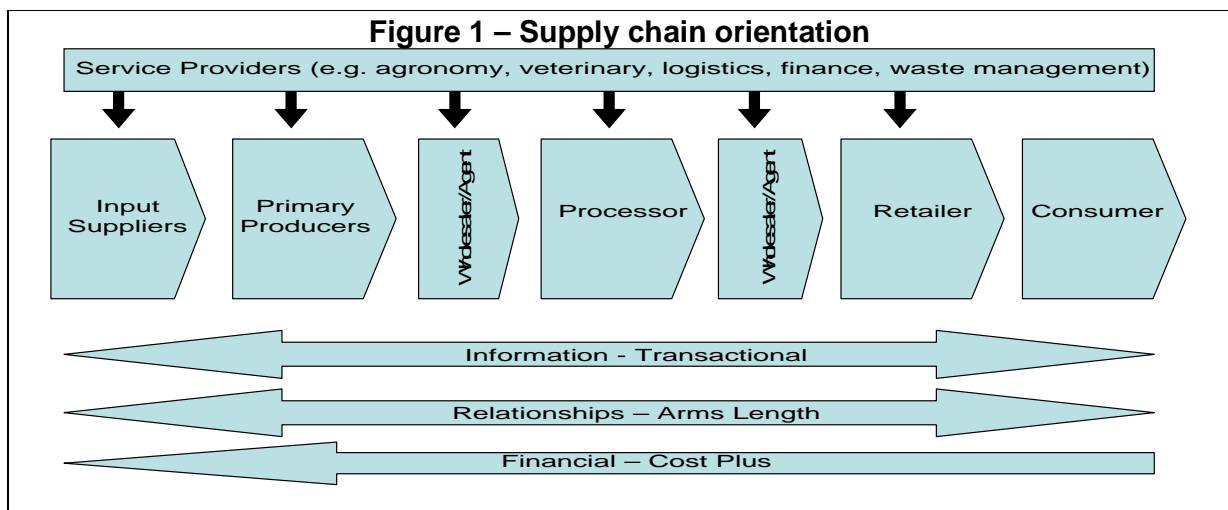
Three summarises the basic principles of life cycle thinking and life cycle analysis (LCA). Section Four explains the rationale for combining the two methodologies to provide a holistic diagnosis of a specific wine value chain – Oxford Landing to Tesco (OLT), the structure of which is described in Section Five, along with the headline findings from the case study. The report concludes with a discussion of the key methodological lessons learned and the practical implications for stakeholders in the Australian wine industry.

2.0 Value Chain Thinking and Value Chain Analysis

The concept of the value chain was first introduced by Michael Porter in his seminal work on competitive advantage (Porter 1985). The chain, as the name implies, represents a linked set of value-added activities and Porter's view was that competitive advantage cannot be discerned by looking at a firm in isolation but stems from the many discrete activities in designing, producing, marketing, delivering, and supporting products and services. Hence, sustaining competitive advantage depends on understanding not only a firm's value, but how the firm fits in the overall value-adding activities (value system) of the chain as a whole.

2.1 Value Chain Thinking

Value chain thinking requires a shift in emphasis, away from supply chains to value chains and the thinking that goes with it, as summarised in Figures 1 and 2.



Focusing on three key flows – information, relationships and financial – changes the way we view the world in which we operate. A switch to value chain thinking has fundamental implications for

the quality of information and the strength of relationships that underpin strategic and operational decision-making, and the financial model that drives the incentivisation of individuals, from the boardroom to the shop floor (Fearne, 2008a). Value chain thinking requires firms to embrace collaborative efforts in integration and cooperation, which in turn demand aligned objectives, open communication, sharing of resources, risks and rewards (Soosay et al 2008)

In essence, the starting point on the journey to sustainable competitive advantage is a change in mindset that places the consumer first and everything else subordinate to their needs and wants. Whether we are trying to build loyalty for individual brands or more sustainable communities and environments, changing peoples' behaviour begins by understanding what motivates them, and the ability to do that requires a paradigm shift in the way we view the value chain – from supply *push* to demand *pull*.

2.2 The Value Proposition

It is widely agreed that final consumers have exclusive rights to the definition of what constitutes value in a product or service and that firms can only create successful value propositions by understanding what it is that consumers value in the products and services they create and subsequently adapt to suit specific target segments (Anderson et al 2006, Butz & Goodsten 1996, Parasuraman 1997, Rintamäki et al 2007, Vargo & Lusch 2004, Woodruff 1997). Thus, when discussing value propositions, value chains and the sustainability thereof, it is important to distinguish between the terms 'Customer Value' and 'Consumer Value' (Clawson & Vinson 1978, Kahle 1977, Peter & Olson 1990, Sheth et al 1991, Vinson et al 1977, Wilkie 1990). The former relates to organisational buyer behaviour and focuses on the buyer's evaluation of a product (or service) in the context of organisational performance measures (e.g. margin, rate of sale, waste) and business objectives (e.g. profit, return in investment, market share growth), while the latter focuses on final consumers and their evaluation of the consumption of a product or service, in the context of individual or collective (e.g. household or community) utility, which extends from the basic fulfilment of physiological needs (e.g. hunger and thirst) to higher levels of psychological fulfilment (e.g. wellbeing, self-actualisation).

Therefore, the primary difference between a supply chain and a value chain is a fundamental shift in focus from the supply base and producers to the customer base and consumers. Both ends of the chain are highly heterogeneous and require careful segmentation, for the purpose of effective resource allocation. However, in most instances, supply chains focus upstream on integrating supplier and producer processes; improving efficiency, reducing waste and meeting customer value; while value chains focus unequivocally downstream, on understanding what it is that consumers value and then delivering it as effectively, efficiently and quickly as possible. This distinction often gets lost in translation as businesses become too focused on value as defined by their own organisation and fail to recognise the importance of delivering value as defined by the final consumers of their products or services.

The important point here is that whilst customer value is critical in order to gain market access – failure to understand and meet the needs of the retail buyer will eventually result in an adversarial relationship, minimal information sharing and a competitive strategy wholly reliant on efficiency – it is the final consumer who ultimately determines where the value lies in a product or service. Failure to understand and meet the wants of final consumers will result in both suppliers and buyers losing ground vis-à-vis competitors who have likewise satisfied customer needs but present a stronger and more carefully targeted consumer value proposition.

This point is particularly relevant in the context of the growing interest in sustainability - of production and consumption behaviour - and the increasing demands being made of commercial businesses to behave more responsibly with respect to the environmental sustainability of their procurement, production and distribution practices. If sustainable production and distribution practices are something that consumers value, then suppliers should allocate resources to reduce their carbon footprint, in the expectation of a commercial return in the form of a price premium. However, if consumers remain oblivious to the challenges of sustainability, the response to which

is currently being led by government agencies and corporate strategy, the appropriate allocation of resources would likely be very different, with compliance rather than excellence being the primary motive for changes in the way products and/or services are produced and delivered for those firms and chains which do not identify financial and management advantages to undertaking investments which benefit them commercially as well as achieving wider environmental objectives.

2.3 Value Chain Analysis

There are opportunities for improvement in all organisations and all value chains. The problem is that all too often organisations (or at least the people that manage them) are reluctant to accept the principle of continuous improvement, or believe it applies only to other organisations with whom they interact, and not themselves! Value Chain Analysis (VCA) is a diagnostic tool, defined by Taylor (2005) as “... the multi-dimensional assessment of the performance of value chains including the analysis of product flows, information flows and the management and control of the value chain” that provides a mechanism for drawing the attention of different stakeholders to the opportunities for improvement at different stages in the value chain and can be an effective catalyst for change.

VCA involves an assessment of the relationships between the different stakeholders which, coupled with the effective flow of information, enables the economic (and environmental) optimisation of material flows – allocating time, people and technology appropriately and with minimal impacts on the environment. Consequently, the methodology focuses on three key issues:

- The dynamics of information in the value chain from final consumption through to primary production and input suppliers and back again – how inclusive, transparent and responsive are the information flows in the chain? To what extent are stakeholders’ decisions (what to produce, when to produce, how to produce) influenced by what consumers value?
- The creation and flow of value, in the eyes of the final consumer, at each stage in the value chain – how many of the production and processing activities truly add value? How much investment is being made in these critical activities? How many are necessary but do not add value (these should be completed with minimal resource allocation)? How many are unnecessary (wasteful activities must be eliminated and resources re-allocated to drive value creation and efficiency)?
- The nature of relationships – how much trust exists between different stakeholders? What is the nature of communication within and between organisations? What evidence is there of organisational commitment? How are risks shared and the assumption of risks rewarded in the chain?

Understanding the nature and source of consumer value (as opposed to cost or margin) facilitates behaviour change at all stages in the value chain, the operation of which will always be sub-optimal when there is a lack of transparency (poor information flow) and poor communication between trading partners due to a lack of trust and commitment (poor relationships).

There is no globally accepted method for conducting a value chain analysis, the application of which to the food and beverage industry has been extremely limited to date. Thus, for the purpose of this study, the methodology developed by Bonney et al (2008) which has been applied in two cases studies in the Australian vegetable industry, formed the basis of the methodology used for this project. The eight stage process is summarised in Figure 3. Further details are available from the Horticulture Australia website (www.hal.org.au).

Figure 3 - VCA Methodology

Stage 1 - Securing Commitment

VCA requires a substantial amount of organisational commitment. Thus, participating businesses must be 'open' to value chain thinking and willing to engage fully in the diagnostic process. At the outset a project team is established, with an independent chairperson, to ensure that the project progresses according to the research plan and to facilitate the removal of barriers encountered along the way. This group should comprise senior management from chain partners, who are required to authorise staff to co-operate and be honest and open with the researchers.

Stage 2 - Confidentiality and Privacy

Before the data gathering begins, confidentiality agreements should be put in place with the value chain partners. These safeguard the commercial and personal sensitivity of the information provided, thus encouraging all parties to be candid during discussions and in sharing information.

Stage 3 – Selecting the value stream

This involves the selection of a specific value stream as the focus for improvement, where a value stream is typically defined as a specific product family serving a specific consumer or market segment.

Stage 4 - Establishing what it is that consumers value

Unless this information already exists, it will require primary consumer research to be undertaken at the beginning of the project. This usually involves both qualitative (focus group) and quantitative (questionnaire) research. The focus groups shed light on consumer attitudes and perceptions towards the product category, how purchase decisions are made and the range of attributes that are influential therein. An objective measure of the relative importance of specific attributes (which is used as a proxy for consumer value) is then determined through the survey, which may be conducted face-to-face, by mail, telephone or internet, depending on the context, budget and time available.

Stage 5 – Mapping the current state

This involves the collection of information (qualitative and quantitative) to enable the graphical representation (process mapping) of the material flows, information flows and relationships within and between the businesses that constitute the value stream for the designated product family, from input supply to final consumer purchase. Key informants are identified within the stakeholder organisations and interviewed, face to face or over the phone, using a common discussion guide. Additional information (e.g. charts, tables, reports) are used where available and appropriate, to substantiate claims made with respect to the three flows.

Stage 6 – Identifying improvement projects

The generation of a current state map facilitates the identification of bottlenecks and weaknesses in the current value stream, within organisations (i.e. between functional departments) and between trading partners. The final stage in the analysis involves the identification of improvement projects. The emphasis is on inter-organisational improvement opportunities, as these are notoriously difficult to achieve and, as a result, can deliver benefits that are difficult for other value chains to replicate, providing a potential source of sustainable competitive advantage.

Stage 7 – 'Groundtruthing'

The diversity and sensitivity of information used in the mapping stage increases the scope for mis-interpretation. Thus, a penultimate stage involves sharing the diagnosis with each of the stakeholders in turn, to verify that the current state map is an accurate reflection of reality. This 'groundtruthing' process, which takes the form of an oral presentation of the key findings to senior management from each of the stakeholder organisations, enables the researchers to identify areas for further research and/or analysis and provides a mechanism for stakeholders to 'sign-off' on the confidentiality of the material presented, prior to dissemination of the findings.

Stage 8 – Written communication

There are typically two levels of written communication of a VCA. Firstly, each stakeholder received a 'warts and all' report containing commercially sensitive information that is confidential to their business. Second, the key findings likely to be of generic interest to the relevant industry are published in the form of a case study.

One major dis-advantage of VCA is its resource-intensity. In particular, it is especially intensive in terms of the time required for data collection, from both the researchers, who are required to conduct individual interviews with key informants, and the information providers, who are required to spend time describing (often for the first time) what they do and why, within their own organisations and, where appropriate, in partnership with customers and/or suppliers. This makes VCA a relatively high cost diagnostic – rich in insight, across several dimensions, but expensive in terms of both research budget and stakeholder engagement. This is undoubtedly a barrier to its wider use across industries with a fragmented structure, such as food and wine, in which time and resource availability is particularly limited, especially upstream, and in which the majority of organisations have yet to embrace the principles of value chain thinking. Thus, as part of this project, an alternative method of data collection was piloted, using an on-line survey to supplement the face-to-face interviews with key informants. Further details of this potential amendment to the VCA methodology and the implications thereof are discussed later.

3.0 Life Cycle Thinking and Life Cycle Analysis

The life cycle paradigm can contribute another dimension to the analysis of value chain. This can be achieved through the application of its concepts and techniques to address environmental, economic, technological and social aspects of brands, products or services.

The life cycle paradigm is work-in-progress: its principal tools, ‘environmental’ life cycle analysis, life cycle cost analysis and social life cycle impact assessment are still being developed (Gauthier 2005; Grießhammer *et al* 2006; Rebitzer and Hunkeler 2003; James 2003; Jørgensen *et al* 2008). However, the growing interest in environmental sustainability and the measurement thereof has given rise to a substantial LCA community¹ seeking to develop global standards and facilitating the adoption of life cycle principles in the management of organisations and, by definition, value chains as a whole.

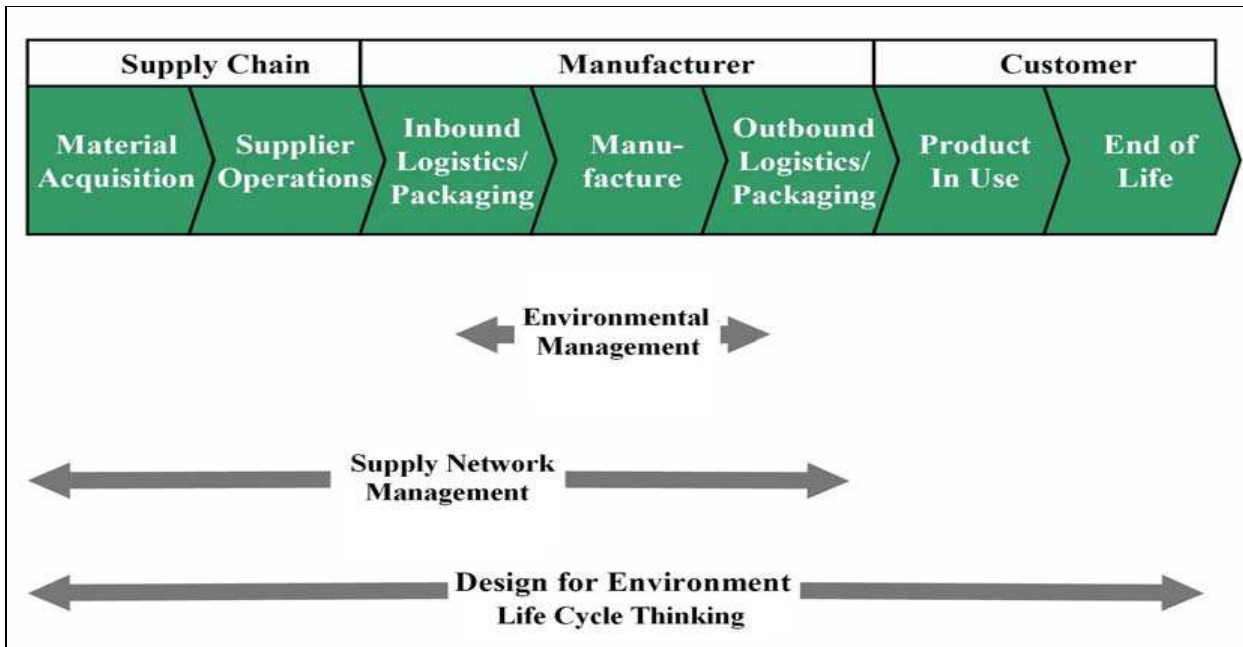
3.1 Life Cycle Thinking

Life cycle thinking is a qualitative framework used to understand and assess systems. It has historically been applied to natural systems through fields like ecology, where the relationships between species and their habitats are studied. More recently, the framework of life cycle thinking has been applied to the field of industrial ecology as a means of understanding the interaction of industrial systems with the natural environment (Cohen-Rosenthal 2004; Ehrenfeld 1997; Ehrenfeld 2000; Nielsen 2006; O’Rourke 1996). Life cycle thinking does not produce easy answers, but it does provide a framework to recognise and understand complex systems and their interrelationships.

The goal of life cycle thinking is to reduce resource use and emissions to the environment from a brand, product or service whilst simultaneously improving its socioeconomic performance throughout the life cycle. This way of thinking leads to extended and shared responsibilities from cradle-to-grave, going beyond the traditional focus on production sites and manufacturing processes so that the environmental, social, and economic impact of a brand, product or service over its entire life cycle, including the consumption and end of use phase, is taken into account (Figure 4).

¹ Most notable among which are The *Life Cycle Initiative* (a programme of UNEP and SETAC, 2008); the Carbon Trust (2008a); The *Greenhouse Gas Protocol Initiative* of the World Business Council for Sustainable Development and the World Resources Institute (WBCSD/WRI 2007); and the International Organisation for Standardisation (ISO 2008).

Figure 4 – Life cycle thinking and the value chain



Source: adapted from UNEP/ SETAC (2008)

Life cycle thinking and, by extension, brand sustainability are made operational by Life Cycle Management (LCM), which aims to minimise and manage the environmental and socio-economic burdens associated with a brand or a product portfolio throughout its entire life cycle *and* supply network through:

- Continuous improvements of product systems; and,
- Support for business assimilation of integrated brand policies.

This concept, which addresses the need to establish a stronger link to managerial decisions, was put forward by Hunkeler *et al* (2003). LCM is therefore for organisations with a strategic orientation who, because of political, economic, social, technological, environmental-or legal circumstances, desire to:

- Produce or trade brands that are as sustainable as feasible;
- Improve their reputation, visibility, and general relations with stakeholders;
- Increase their stakeholder and consumer value; and
- Increase awareness of and preparedness for changing regulatory and social contexts.

Yalumba is one such organisation that through its 'commitment to sustainable winemaking', has sought to extend its sphere of influence beyond its organisational boundaries and expand its scope of collaboration and communication to all stakeholders in the value chain.

3.2 Life Cycle Analysis

Life Cycle Analysis (LCA), often called 'cradle to grave' analysis, is the most comprehensive of the analytical tools available for quantifying the environmental impacts related to the production, processing, packaging, distribution, use and disposal of a product (Camilleri 2008a, Potts 2006). The focus of LCA is on the intensity of resource utilisation (e.g. energy, water) and the environmental impact of outputs (e.g. by-products, waste and emissions) at each stage of the value chain, the aim being to identify opportunities for improving resource use, reducing

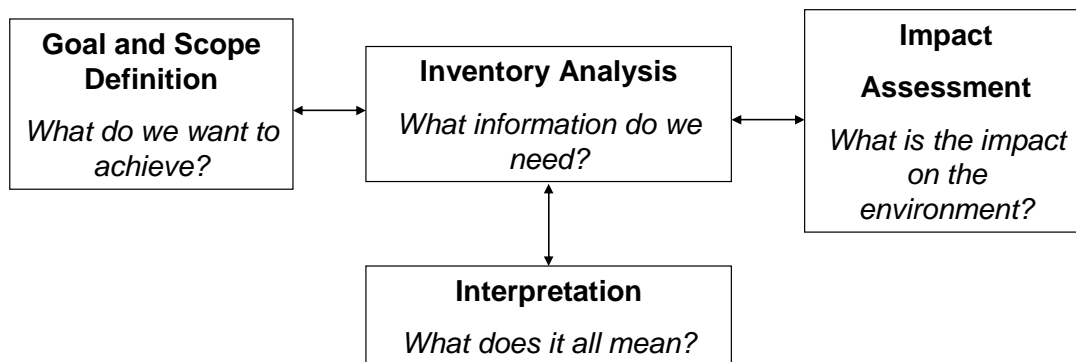
environmental impacts and targeting parts of the life cycle where the greatest improvements can be made.

The method involves a systematic evaluation of resource consumption and environmental releases to air, water and soil associated with products, processes and services (Jensen and Remmen 2005). In principle, a product's life cycle starts when raw materials are extracted from the earth, followed by manufacturing, transport and use, and ends with waste management, including re-cycling and final disposal. At every stage of the life cycle there are emissions and consumption of resources. Therefore, environmental impacts from the entire life cycle of products and services need to be addressed. Second generation impacts, such as energy required to fire the kilns used to manufacture glass from the raw material must also be considered in the analysis. Consequently, an effective life cycle analysis requires life cycle thinking about resource use and emissions from within an organisation and throughout the entire value chain.

The general framework of a life cycle analysis is summarised in Figure 5 and consists of the following steps:

- goal and scope definition;
- detailed life cycle inventory, including inputs (energy, water and resource usage) and outputs (by-products, waste, emissions);
- assessment of potential environmental impacts of the life cycle inventory;
- interpretation of results.

Figure 5 – General framework for life cycle analysis



3.2.1 Goal and scope definition

In this initial step, the goal is expressed in terms of the exact question to be addressed, the target audience and the intended use. Importantly, it is also necessary to decide whether the study will result in a comparative assertion disclosed to the public, as this would require the most rigorous procedures to be used.

The scope of the study is defined in relation to:

- temporal, geographical and technological coverage;
- the coverage of economic processes (activities);
- the coverage of environmental interventions and impacts;
- important environmental interventions and impacts that are unlikely to be quantified;
- the level of detail;
- if the study is a comparison, the parts of the life cycle that can be omitted because they are virtually identical.

The function, functional unit, alternative systems and reference flows are also defined. The function is the service provided by the product system. The functional unit is the quantification that will be used as the basis for comparison of alternative systems for fulfilling equivalent requirements. A reference flow represents one possible system for obtaining the functional unit.

3.2.2 Life cycle inventory (LCI) analysis

The first task in LCI analysis is to set the system boundaries: between the product system and the environment system; between different product systems (allocation); and between processes that may or may not be relevant to the product system. Data is then collected for all the inputs and outputs of each unit process in the product system for all reference flows. Alternative forms of process data are available, namely:

- LCA databases relate a particular economic output to economic inputs and to environmental inputs and outputs, and are usually quantified in relation to a reference flow, such as a unit mass of material;
- Company data are usually measured in terms of inputs and outputs per unit time, for example, the number of tonnes of CO₂ emissions per year.

Case-specific primary data is usually collected for a small number of foreground processes. Secondary data sources are used for the remaining background processes.

The final phase in the LCI analysis is to calculate the inventory table for each alternative product system so that each unit process within each system is scaled to deliver the quantity of product required for the reference flow.

3.2.3 Life cycle impact assessment (LCIA)

In LCIA, the results from the inventory analysis are assigned to relevant environmental impacts by completing the following tasks: category definition, classification, characterisation, normalisation, grouping and weighting. During category definition, impact categories of relevance to the LCA study are selected from an established list (Table1).

Table 1 – Life cycle impact categories

Group	Impact category
Baseline impact categories (included in most LCAs)	<ul style="list-style-type: none"> • Depletion of abiotic resources • Impacts of land use (land competition) • Climate change • Stratospheric ozone depletion • Human toxicity • Ecotoxicity (freshwater aquatic, marine aquatic, terrestrial) • Photo-oxidant formation • Acidification • Eutrophication
Study-specific impact categories (included if appropriate data is available)	<ul style="list-style-type: none"> • Impacts of land use (loss of life support function, loss of biodiversity) • Ecotoxicity (freshwater sediment, marine sediment) • Impacts of ionizing radiation • Odour (malodorous air) • Noise • Waste heat • Casualties (from potential accidents)
Other impact categories	<ul style="list-style-type: none"> • Depletion of biotic resources • Desiccation (problems related to water shortages) • Odour (malodorous water)

Adapted from: Guinée (2002)

The next step is classification, in which the environmental interventions identified in the inventory analysis are assigned to the selected impact categories. This is followed by characterisation of the environmental interventions within each impact category, which entails quantification to arrive at a category indicator that can be aggregated into a single score known as the category indicator result, for example, the global warming potential expressed in CO₂ equivalents.

The final three steps in LCIA are optional. Normalisation, although optional, is a strongly recommended step in which each category indicator result is divided by a normalisation factor in order to assess the relative importance of the results of each product system being studied. Grouping involves aggregating the impact categories into one or more sets. Weighting entails the assignment of numeric factors to the normalised indicator results for each impact category according to their relative importance. The indicator results are multiplied by these factors and (possibly) aggregated.

3.2.4 Interpretation

The final interpretation phase involves: an evaluation of the results for completeness and consistency in relation to the goal and scope of the study; an analysis of the results for their soundness; and lastly drawing conclusions and making recommendations, preferably as a separate step from the analyses above to ensure transparency.

Not surprisingly, because of the cost of data collection and the inevitable uncertainties associated with the method, some authors doubt the viability of LCA as a tool for decision support (Schaltegger 1997). Indeed, the rigour associated with a *full* life cycle analysis can be so onerous that, quite possibly, a complete quantitative LCA has never been accomplished, nor according to Graedel (1998), is it likely to be! However, LCA can introduce managers and stakeholders alike to new perspectives, such as increased awareness of transportation, product use and other non-point sources of pollution, as well as the potential of environmental impact in distant places, in the present or in the future.

More recently, as government agencies around the world (particularly Western Europe) and corporations (particularly supermarkets) seek to progress the sustainability agenda, in the face of disinterest and ignorance amongst consumers, efforts have been made to facilitate the adoption of LCA amongst manufacturers and service providers (particularly logistics), through the introduction of *streamlined* life cycle analysis as a means to circumvent the necessity for reliable, complete, representative accurate and costly data (de Bakker 2002).

Typically, a *streamlined* LCA would have one or several of the following characteristics:

- Application of threshold levels to stop analysis at specific points;
- Focuses on only a specific set of environmental issues – for example, carbon labelling (BSI 2008);
- Restriction of analysis to a shortened list of inventory categories;
- Omission of the impact assessment stage;
- Omission one or more stages in the life cycle;
- Use of qualitative information;
- Use of surrogate data from previous studies.

There are currently several standards for streamlined LCAs and the scientific community continues to debate the advantages and disadvantages of alternative approaches. For the purpose of this study the information on greenhouse gas emissions to the Oxford Landing value chain has been provided by Yalumba, whose internationally recognised environmental management system uses a streamlined LCA that underpins the company's commitment to sustainable winemaking (Camilleri 2008a), provides the core framework for the 'International Wine Carbon Calculator Protocol' (Provisor 2008)², contributes to the 'Climate Change Wine Sector

² Developed by a partnership of wine industry bodies from Australia, New Zealand, South Africa and the U.S.

Agreement³ and to international dialogue on carbon labeling;⁴ and forms the basis for dialogue with the Agricultural Sector Working Group of the Australian National Life Cycle Inventory Database Initiative.

While recognising that focusing solely on a product's carbon footprint ignores other important environmental impacts, Yalumba uses its LCA to calculate greenhouse gases, to identify potential reduction points along the supply and to explore options to purchase carbon offsets or to use bio-sequestration (Camilleri 2008b). While providing limited information, using the life cycle paradigm to carbon footprint is useful as a contributor to strategic dialogue, within Yalumba and with its trading partners, upstream and downstream.

4.0 The integration of Value Chain and Life Cycle Analysis

VCA and LCA are diagnostic tools, the value of which lies in their ability to stimulate behavioural change amongst multiple stakeholders in the value chain: LCA, by definition, requires an assessment to be made of the environmental sustainability of a product from input supply to final consumption and end of life. VCA requires value chain members to expose themselves to scrutiny with respect to the economic efficiency of material flows, the effectiveness of information flows and the resilience of stakeholder relationships.

In both cases, the assumption is that participating organisations are receptive to the principles of co-innovation – the collaborative allocation and management of resources to improve the competitiveness of the value chain as a whole (Bonney et al, 2008) – and continuous improvement. However, the reality is that

- a) collaboration is the exception rather than the rule in the majority of food and wine value chains, and
- b) more often than not VCA is embraced, reluctantly, by companies under extreme competitive pressure looking for one-off cost reductions, and LCA is embraced by companies under pressure to demonstrate their carbon footprint or adopt a carbon label, without a clear understanding of the opportunities thereof for improving the value chain's collective resource allocation and management.

Moreover, both VCA and LCA require participating organisations to embrace holistic, aligned thinking, in pursuit of sustainable solutions to increasingly complex environmental, economic and ethical problems, yet functional and organisational silos perpetuate the application of these techniques in isolation.

In this study, the aim is not to explore the methodological benefits of combining the two approaches – Yalumba have already invested considerable resources over many years in monitoring and improving their carbon footprint, through their 'commitment to sustainable winemaking' program, so we are not starting with a 'blank sheet'. Rather, we aim to demonstrate that measuring environmental impacts (carbon emissions) in a value chain, in isolation, is of limited value and potentially damaging to the competitiveness of a value chain, if consideration is not given to a) the value that final consumers attach to the activities that contribute to emissions and b) the impact on consumer perceptions of value of changes to production processes and product attributes that may result from considering an LCA.

All change is costly, if only in the opportunity cost of (re)allocating scarce resources to one activity rather than another. Both VCA and LCA are designed to facilitate more effective resource allocation by identifying priority areas (environmental 'hotspots') and bottlenecks in two of the key enablers for co-innovation and continuous improvement – effective information flow and resilient relationships. The hypothesis that we seek to test is that together they provide a more powerful diagnostic of sustainability, within and between organisations in the value chain, that **could** result

³ The 'Climate Change Wine Sector Agreement' partners are the South Australian Minister for Sustainability and Climate Change and the South Australian Wine Industry Association Inc and the Wine Grape Council SA Inc.

⁴ The Carbon Trust and the Product and Supply Chain GHG Accounting and Reporting Standard.

in different, and potentially damaging, corrective action (resource allocation) than if one or the other diagnostic tool was applied in isolation.

5.0 A case study of the Oxford Landing – Tesco (OLT) value chain

In this section we present the results of the VCA and LCA, beginning with a description of the key stakeholders. The details of the research methodology, as applied to this case study, are then presented, followed by the headline findings.

5.1 Key stakeholders

The OLT value chain consists of five key stakeholders:

- Grape growers in the Riverland, South Australia. This region produces half of South Australia's grapes and a quarter of Australia's wine, the bulk of which is exported. There are over 1300 registered wine growers in the area, and the restrictions on irrigation caused by the recent drought have highlighted the area's susceptibility to the impact of climate change;
- Yalumba, Australia's oldest family-owned winery and one of the country's largest exporters of wine. It operates two wineries, both in the Barossa Valley, at Angaston and Moppa, where the Oxford Landing brand is made. Yalumba's achievements in environmental sustainability have been widely recognised. It was the first wine company to receive the Climate Protection Award from the US Environmental Protection Agency, and the first company of any sort to be officially recognised by the Australian Government's Greenhouse Office as a leader in greenhouse gas management;
- Amcor, one of the world's largest packaging solution providers and a major supplier of glass and corrugated packaging and bottle closures to the Australian and New Zealand wine industry. Its Gawler plant, between Adelaide and the Barossa Valley, produces over 400 million wine bottles a year. It too is dedicated to managing its environmental impact. In 1999, Amcor became one of the first members of Australia's National Packaging Covenant in Australia. It uses 40% recycled glass in its bottle production, and has been working closely with Yalumba on the design and production of lighter weight bottles;
- Tarac Technologies, an innovative company that has invested heavily in technologies for value-adding to the residuals from the wine making processes. Tarac Technologies reprocesses most of the residuals from the Australian wine industry, including over 120,000 tonnes of grape marc every year (74% of Australia's total production), as well as filter cake and liquid waste. Its innovative closed loop technology means it is also helping to reduce the Australian wine industry's environmental impact. Tarac prevent the release of ethanol into the atmosphere from composting grape marc, as well as the need to send residues to landfill by turning these bi-products into inputs for the food and wine industry, such as grape alcohol used in the production of fortified wine. Tarac's four plants are strategically located in the key winemaking regions of Australia, namely, two at Nuriootpa in the Barossa Valley, and one each in the Riverland and at Griffith in New South Wales;
- Tesco UK, the world's fourth largest supermarket and responsible for 25% of all UK wine sales, making it the single largest overseas buyer of Australian wine and the largest customer for Oxford Landing. Tesco is also committed to reducing its own environmental impact, as well as that of its suppliers and the products it sells. It has pledged to reduce the carbon footprint of its existing stores and distribution centres, globally, by 50% by 2020. As a signatory to the UK's Courthauld Commitment, Tesco has undertaken by the end of 2010 to reduce packaging of its own label products - and uniquely the branded products it offers too - by 25% (by weight). It is also taking a lead in trialing the use of

carbon labels to help inform consumers about the environmental sustainability of their food and beverage purchase decisions;

- UK supermarket shoppers, of which 31 million are wine drinkers, consuming 120m cases per year, of which 25% are Australian, creating a market worth around \$900m to the Australian wine industry in 2008. Average annual growth (6%) has been strong over the last decade but in recent years has come under increasing pressure from increased competition, from new entrants (notably Chile), who have been targeting the discount market, and established wine producing countries (notably France), who have been targeting the quality end of the market.

The Oxford Landing value chain was selected as a demonstration case study for several reasons:

- The stakeholders involved are significant players in the context of the Australian wine industry and the product family (Oxford Landing) is broadly representative of the many branded Australian wines that have been in the vanguard of Australia's success in overseas wine markets generally and the UK market in particular. Thus, many of the findings of this case study are likely to be of broader relevance to the Australian wine industry as a whole and particularly those reliant on supermarket channels.
- VCA requires a substantial level of organisational commitment. Thus, participating businesses must be 'open' to value chain thinking and willing to engage fully in the diagnostic process. Yalumba, Amcor and Tarac Technologies are all partners to in the 14th Adelaide Thinker in Residence program, the focus of which is sustainable value chain management⁵. Thus, their commitment to the project was immediate, enabling us to progress much quicker than had we been required to recruit a value chain from scratch
- All the stakeholders in the OLT value chain have demonstrated commitment to improving the environmental sustainability of their respective organisations, so were able to see the relevance of a demonstration case study designed to shed light on the value of sustainable management practices in the wine industry and the synergies with commercial goals and consumer preferences

5.2 Research method and data sources

The information for this case study was collected over a period of six months, from June to November, 2008. The VCA involved a considerable amount of primary research, using the methodology presented earlier (Figure 3). Specifically, the research undertaken for the VCA comprised:

- 38 semi-structured interviews conducted with 57 people in 12 organisations, supplemented by an on-line survey of senior managers within the key stakeholders (Tesco, Yalumba, Amcor, Tarac and a sample of contracted grape growers)
- 6 consumer focus groups (2 with of young adults – male and female, 2 with young mothers and 2 with of female empty nesters – older adults with children no longer living at home) all of whom were primary Tesco shoppers who regularly purchase Oxford Landing
- A survey of 1,100 people who purchase wine from supermarkets

The LCA is based on the extensive environmental analysis conducted by Yalumba over the past three years, as part of their 'commitment to sustainable winemaking' (Camilleri, 2008a).

5.3 Headline Findings

The results of the combined VCA and LCA are presented in four sections. First, we present a summary of the consumer research, designed to establish what attributes add value to wine, in

⁵ For further information about the Adelaide Thinkers in Residence program and the 14th residency, "Food & Wine Value Chains: Prosperity Through Collaboration", see www.thinkers.sa.gov.au.

the eyes of consumers. This is followed by a summary of the material flow, overlaid with emissions data derived from the LCA. The material flow map is then supplemented with the analysis of information flows and finally, the diagnosis of the value chain is completed with the analysis of stakeholder relationships.

5.3.1 Consumer value

The detailed findings from the consumer research, including focus group verbatims and tabulated survey data are available from a separate report (Fearne, 2008), downloadable from the Adelaide Thinkers In Residence website (www.thinkers.sa.gov.au). What follows is a summary of the key findings.

5.3.1.1 Focus Groups

A strong degree of consensus was found across focus group consumers with regard to the positive images associated with Australian wine – reliable, good quality, good value, fresh, crisp, fruity - with the over-riding view that Australian wine will ‘never let you down’. On the negative side, the investment made by the Australian wine industry in delivering good quality wine at competitive prices appears to have resulted in a degree of commodisation, as the majority of the discussants confessed that Australian wine rarely featured when they were looking for something special

Oxford Landing was described as a ‘typical’ Australian wine - a safe bet – but viewed by some as more expensive than others of a similar quality. The bottle and labelling were widely regarded as uninspiring. For many, the purchase of Oxford Landing, like most ‘everyday’ wines, was triggered by a promotion, which in the case of a known brand was difficult to resist and required little effort (and thus attention to the bottle or the label). Effectively, the positioning of Australian wine has reduced the perceived value of some, if not most, of the attributes peripheral to the wine itself.

Promotions were regarded as the main purchase filter for most of the discussants, when considering which wines to purchase as part of a supermarket shopping mission, followed by colour and wine type and/or grape variety. More often than not, known brands would be purchased with minimal consideration when on promotion. More time would be taken when shopping for something special, when the promotional offers would be less influential, but as already highlighted, on these occasions, shoppers would often bypass the Australian wines on route to more expensive wines associated with other countries (notably France and Italy).

Few of the discussants saw any link between the concept of sustainability (which for most was primarily associated with re-cycling and corporate social responsibility, as opposed to the responsibility of individual consumers) and wine – its production or consumption! None of them were remotely aware of the sustainability credentials of the Oxford Landing brand and when the information on the back label was drawn to their attention there was a mixture of mild interest and considerable scepticism – as one discussant put it “...if they were that bothered they wouldn’t be selling it over here really would they”! Similarly, few people were impressed by the eco-friendly packaging formats they were shown (pouches and cartons), concluding they were unappealing, and only suitable for outdoor drinking. A few said they would be more likely to trust a brand they knew if it was offered in a different format.

5.3.1.2 Survey

The primary focus of the survey was the quantification of the value that shoppers attach to different product attributes when considering which wine(s) to purchase as part of their supermarket shopping mission. The results (see Tables 2-4) highlight the degree of consensus around the most and the least important attributes for regular wine purchases: price, type of wine (e.g. sweet/dry), colour, grape variety and promotional activity accounted for almost three quarters of the choices made for ‘the most important wine attribute’ for a regular wine purchase; bottle, closure, sustainability of production/packaging, ‘wine miles’, front label, weight of the bottle and

suitability for vegans/vegetarians scored particularly low in terms of importance and together accounted for just 8% of choices made for 'the most important wine attribute' for a regular wine purchase

Table 2 - Importance of wine attributes (mean scores*)⁶

	Full Sample	Oxford Landing Buyers	Oxford Landing Buyers - Tesco
Price per bottle	5.6	5.6	5.6
Type of wine (e.g. dry/sweet)	5.5	5.6	5.6
Colour	5.5	5.5	5.5
Grape variety	4.8	5.3	5.4
Which wines are on promotion	4.7	5.1	5.1
Information on the back label	4.4	4.6	4.5
Recommendations from friends/relatives	4.3	4.4	4.3
Country of origin	4.3	4.7	4.8
Brand name	4.1	4.7	4.8
Specific region within a country	4.0	4.4	4.4
Year of vintage	3.6	4.1	4.2
Recommendation in newspapers/magazines	3.5	3.8	3.8
Alcohol content	3.5	3.7	3.8
Appearance of the bottle	3.4	3.7	3.6
Type of closure	3.4	3.4	3.3
Environmentally sustainable production process	3.3	3.5	3.4
Environmentally sustainable packaging	3.3	3.4	3.4
Design of the front label	3.2	3.6	3.6
Distance the wine has traveled	2.8	3.1	3.0
Weight of the bottle	2.8	3.0	3.0
Suitability for vegetarians/vegans	2.4	2.6	2.5
Number of respondents	1100	377	181

* 1= Not at all important, 3= Not very important, 5 = Quite important, 7 = Extremely important

They also highlight the degree of heterogeneity of preferences when shoppers are segmented and consideration is given to different shopping missions:

- Price and promotional activity were chosen as the most important attribute associated with wine purchased for a special occasion by just 11% and 5% of respondents respectively, compared with 25% and 12% respectively for a regular wine purchase. Brand name was chosen as the most important wine attribute for special occasions by 12% of respondents, compared with just 3% for a regular purchase
- Females attach greater importance to colour, type of wine and promotions, and less importance to price per bottle and country of origin than males
- Younger shoppers are more likely to be influenced by recommendations from friends, the appearance of the bottle and front label design than older shoppers
- Single parents attach the greatest importance to environmentally sustainable production/packaging, alcohol content and recommendations in newspapers/magazines
- Level of education has no bearing on the importance attached to environmental sustainability, but graduates are significantly more interested in country of origin and year of vintage than shoppers with no education beyond secondary school
- Frequent wine buyers attach significantly more importance to brand names and promotional offers for special occasion purchases than occasional wine buyers, who are more interested in price per bottle and type of wine
- Wine shoppers in M&S or Waitrose are significantly more interested in grape variety and provenance (country or region) than shoppers in Asda, Morrisons and Aldi, whilst Co-op shoppers attach the greatest importance to promotional offers

⁶ Highlighted attributes are those for which the difference in mean scores (table 1) and % of respondents (tables 2 and 3) for the different respondent groups are statistically significant, at the 5% level.

Table 2 - Most important attribute (Regular Purchase)

	Full Sample	Oxford Landing Buyers	Oxford Landing Buyers - Tesco
	% Respondents	% Respondents	% Respondents
Price per bottle	25	22	27
Type of wine (e.g. dry/sweet)	12	9	8
Colour	15	11	12
Grape variety	11	15	14
Which wines are on promotion	12	15	13
Information on the back label	1	1	1
Recommendations from friends/relatives	3	4	4
Country of origin	4	5	6
Brand name	3	6	3
Specific region within a country	2	2	2
Year of vintage	1	2	1
Recommendation in newspapers/magazines	1	1	1
Alcohol content	2	2	2
Appearance of the bottle	1	1	1
Type of closure	2	1	2
Environmentally sustainable production process	1	2	1
Environmentally sustainable packaging	1	1	1
Design of the front label	1	1	2
Distance the wine has traveled	1	1	0
Weight of the bottle	0	0	1
Suitability for vegetarians/vegans	1	1	2
Number of respondents	1029	377	176

Table 3 - Most important attribute (Special Occasion)

	Full Sample	Oxford Landing Buyers	Oxford Landing Buyers - Tesco
	% Respondents	% Respondents	% Respondents
Price per bottle	11	8	8
Type of wine (e.g. dry/sweet)	13	9	8
Colour	7	7	9
Grape variety	13	15	18
Which wines are on promotion	5	4	4
Information on the back label	2	3	2
Recommendations from friends/relatives	7	5	4
Country of origin	5	6	6
Brand name	12	16	17
Specific region within a country	3	3	4
Year of vintage	7	9	7
Recommendation in newspapers/magazines	3	5	4
Alcohol content	2	2	3
Appearance of the bottle	3	3	1
Type of closure	2	2	1
Environmentally sustainable production process	1	1	1
Environmentally sustainable packaging	1	1	1
Design of the front label	1	1	1
Distance the wine has traveled	1	1	1
Weight of the bottle	1	1	0
Suitability for vegetarians/vegans	1	2	1
Number of respondents	989	377	170

The results of the consumer research indicate very strongly that sustainability is a concept that remains poorly understood amongst shoppers. Furthermore, sustainable wine production/ packaging is something that supermarket buyers may be requesting of their suppliers in support of socially responsible strategic initiatives, but very few UK shoppers currently value it as an attribute of the wine they purchase from supermarkets. This may change if UK government and supermarket initiatives designed to encourage more sustainable consumption behaviour begin to impact decision-making at the point of purchase. However, with wine a discretionary item in the majority of supermarket trolleys, and considering the high level of importance attached to promotional offers for branded wines, it is difficult to see this happening soon. In the meantime, Australian winemakers should consider strategies for more effective targeting of distinct shopper segments with differential preferences for specific attributes, in an effort to break the paradox of brand loyalty inextricably linked to promotions and drag themselves out of the commodity trap they have inadvertently engineered over a decade of promotion-driven sales growth and a distinct lack of investment in building genuine brand loyalty.

5.3.2 Material Flow

The objective of material flow is to deliver efficiently the required type, volume and quality of product to maximise consumer value. The efficiency of the OLT value chain was determined against the following aspects:

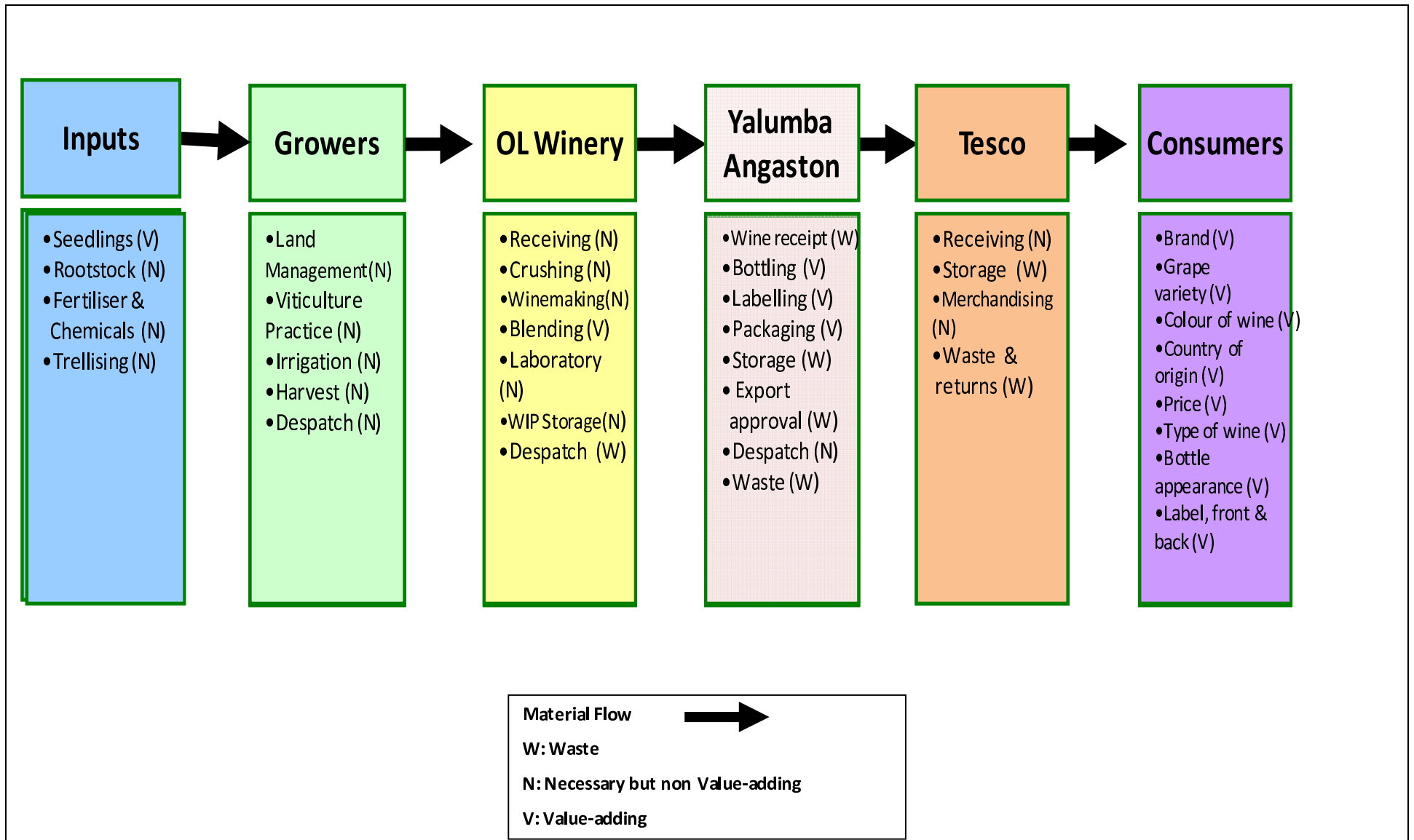
- Timeliness in allowing continuous, efficient flow through processing, while avoiding unnecessary inventory and product movements, and ultimately avoiding stockouts in stores;
- Minimising waste caused by unnecessary processing or by production of unusable raw material or by-products;
- Maximising scope for adding value.

Accordingly, each activity in the OLT value chain was classified as one of the following:

- **Value adding** - those activities that, in the eyes of the final consumer, make a product or service more valuable. For example, in the context of Oxford Landing, colour, type of wine and information on the back label were rated by consumers, on average, as 'quite important', so these could be classified as value-adding activities that warrant further investment. Meeting, if not exceeding consumer expectations is the goal here.
- **Necessary, but non value-adding** - those activities that, in the eyes of the final consumer, do not make a product or service more valuable but are necessary unless the existing supply process is radically changed. For example, in the context of Oxford Landing, the weight of the bottle and the design of the front label were rated by consumers, on average, as 'not very important', so could be classified as non-value adding attributes which do not warrant the allocation of more resources than absolutely necessary. Cost minimisation is the goal here.
- **Wasteful** - those activities that, in the eyes of the final consumer, do not make a product or service more valuable, and are unnecessary. These activities should be targeted for elimination in the short term. For example, in the majority of value chains inventory would not be regarded by consumers as value-adding, yet inventory is invariably held, often at considerable cost, at all levels of the chain, due to a lack of communication, low levels of inter-organisational trust and poor information flows – waste elimination is priority number one in value chains subjected to price competition

The resultant current state map of material flow is presented in Figure 6.

Figure 6 Material flow in the Oxford Landing – Tesco value chain



The analysis highlights the dominance of necessary but non-value adding activities, which implies a focus on efficiency and suggests that there is limited scope for adding value. In the following sections we look in detail at the production processes and where there may be scope for increasing efficiency and/or adding value, given the classification of product attributes by UK consumers.

5.3.2.1 Input suppliers and growers

Grape production is a significant aspect of material flow in the chain. Growers receive viticulture advice directly from Yalumba and therefore know what materials to purchase from input suppliers. The varieties of seedlings purchased by the growers are value-adding, because they determine the type of wine, grape variety, wine colour and country of origin. Agricultural inputs, such as rootstock, trellising materials, fertilizer and chemicals are considered necessary in the production of grapes, but not value-adding in the final consumption by the consumer.

Grape growers contribute to the value chain's efficiency of production through the volume of timely-harvested grapes. This requires a skill in growers to extract the maximum value from their vines, where the baume content may be latent in the vine/vineyard. Viticulture is deemed not to add value because it is a necessary function of 'market entry'. Without the provision of grapes of appropriate quality, the winemakers would not be able to blend wine to meet Oxford Landing's required quality. So consumers would not purchase it at its basic price.

Similarly, land management encompasses the commercially and environmentally sustainable control of vineyards to ensure continuity of supply, production of grapes on time and to meet the required quality. Growers should ensure they are maximising the opportunities for using best practices, economies of scale and efficiency in the procurement and use of inputs (including water) and machinery, irrigation, harvest and despatch of grapes. These are considered essential aspects of viticulture, but not necessarily identified as enhancing consumer value downstream in the chain once the grapes are processed into finished wine.

5.3.2.2 Growers and Oxford Landing Winery

The construction of an Oxford Landing Winery plant has improved the efficiency of material flow (grape) in the chain. The effective flow of grapes essentially concerns timely picking and despatch from growers in the Riverland to the Winery to ascertain their quality and value. This is determined by expert winemakers and staff at Yalumba, who schedule the activities one week in advance. They carefully take into consideration the changes in weather and temperature conditions which may adversely affect the rate of grape ripening and baume content.

Similarly, a steady flow is essential for efficient processing of the vintage. Six freight companies are deployed during vintage in the transportation of grapes to the winery. The co-ordination of trucks can be challenging due to peak demand and multiple trucks have to be synchronised for timely arrival and minimal queuing at the crusher. There are risks associated with transport delays or early deliveries and where multiple vineyards are involved. The activities described above are once again critical to the efficient and flow of materials but are not deemed value-adding to the final consumer.

5.3.2.3 Oxford Landing Winery and Yalumba Angaston

The production stage is entirely based at the Oxford Landing winery. As such, other than the influence of input supply, it would seem self contained. The crushing and subsequent processing of grapes are regarded as necessary but non value-adding, although some processes affect final product quality (for example the time of contact with skins), but these judgments are considered part

of wine-making. Additional activities in the winery, such as laboratory analysis and works-in-progress are considered necessary but non value-adding.

The analysis shows that the blending process is the only activity considered as value-adding because blending helps balance flavors, acid and tannin levels. The goal is to produce the perfect balance between all of the flavors present in wine at the peak of the ageing period. This process establishes the type of wine, colour, variety and quality which consumers clearly value.

The bottling and packaging of wine are carried out at the Yalumba Angaston plant. At this stage, the wine is differentiated into its final packaging. These processes have the largest number of different input suppliers; glass and cardboard packaging, closures, labels and consumables amongst other issues. It is here that value is consequently embedded in many of the activities. The data from consumer research has indicated that the appearance of the bottle, the brand name and information on the back label are 'quite important', so may be regarded as adding value.

The logistics management must also interface with the Australian Wine and Brandy Corporation (AWBC) to obtain, manage and report on export approval for wine batches. This activity is considered wasteful because it involves sending a sample to bi-weekly tasting boards in Adelaide; with financial costs and delays to export. It is felt that wineries and retailers should be responsible for quality assurance. Similarly, the inventories of differentiated finished goods stored at Yalumba Angaston are considered wasteful and costly.

5.3.2.4 Yalumba and Tesco

Yalumba transports finished wine from Angaston to the port in Adelaide via road, and subsequently to the port in United Kingdom via sea. Upon receipt, the wine is further transported to Tesco's warehouse for storage before delivery to its Regional Distribution Centre and onward to its retail stores. This system of activities is considered wasteful due to multiple handling, transportation and storage.

Tesco's approach to merchandising by setting promotion slots introduces uncertainty in forecasting annual sales, potentially creating waste or loss of value. Tesco has sought to attract new consumers to wine and educate existing customers to grow both volume and value of sales. However, the recent economic climate has caused a rapid shift to competition on price.

5.3.2.5 Tesco and Consumers

The convenience of any supermarket as a 'one-stop-shop' is valued by consumers, but in terms of any individual product, the material flow from Tesco to consumers is only necessary. The material flow is efficient, with little evidence of excessive inventory held by Tesco or any waste.

Overall, the OLT value chain appears to be efficient, yet all stakeholders who responded to the on-line survey recognised the scope for further reductions in the levels of waste in their businesses (figure 6). This is encouraging, not because waste is acknowledged as being present but because all stakeholders in the value chain recognise the scope for improvement.

When asked about the main barriers to achieving greater efficiency, there was strong agreement over the existence of unexpected variability in and changes to demand and supply (figure 7), some of which might be unavoidable but some of which might be reduced with a more effective information flows up and down the value chain.

Figure 6 - Opportunities for Improved Waste Management within the Business

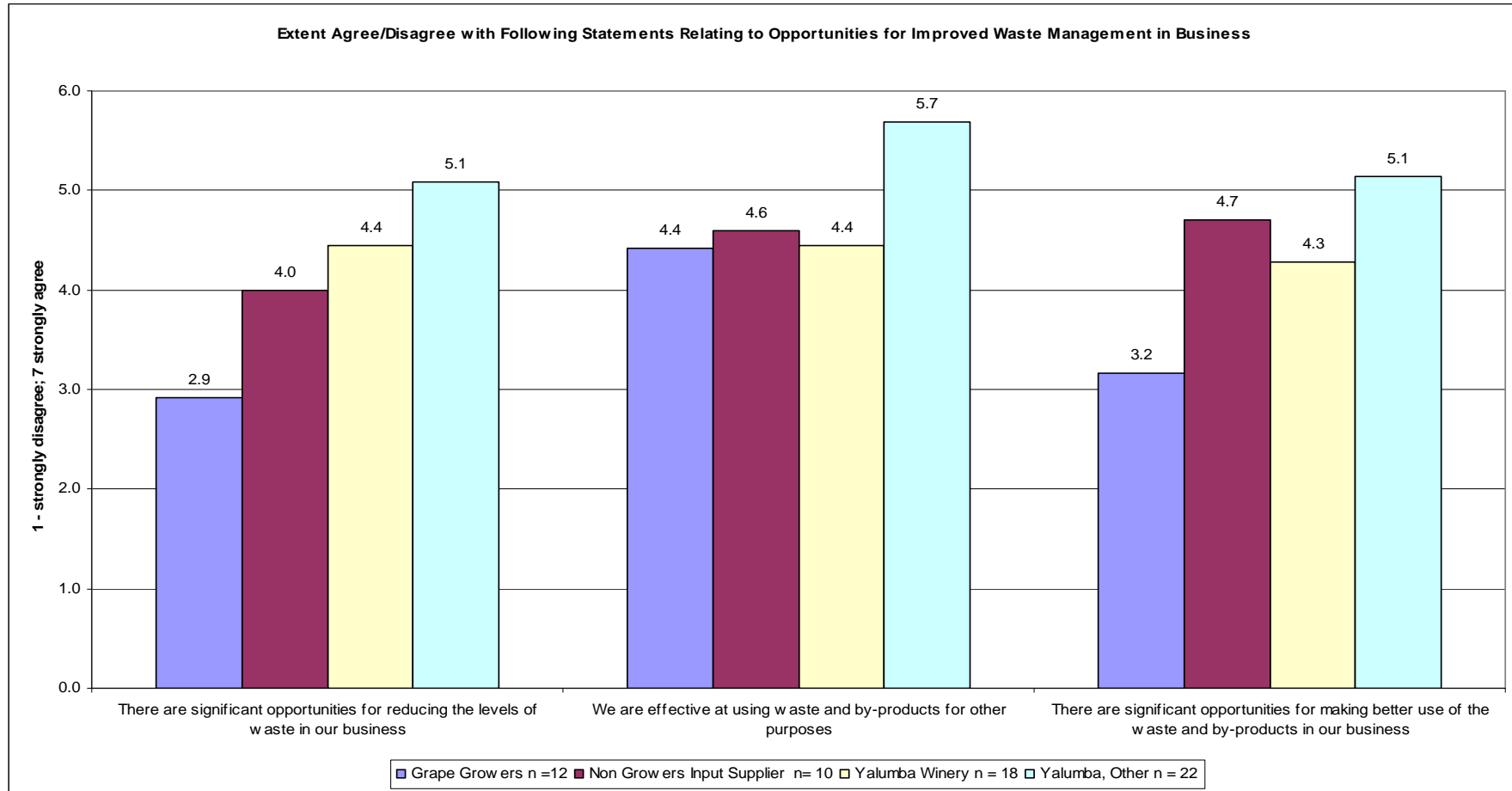
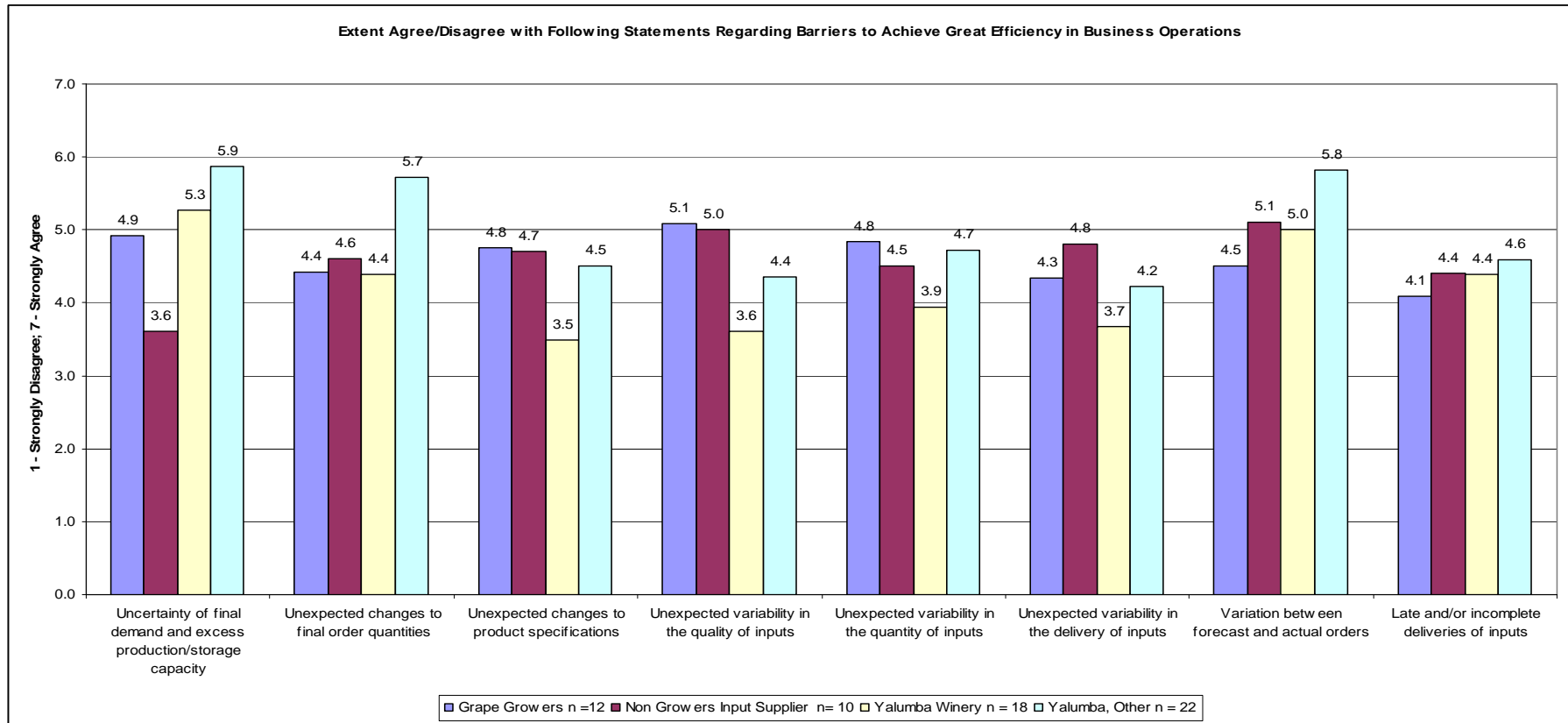


Figure 7 - Perceived Barriers to Achieving Efficiency



5.3.3 Carbon emissions

The carbon emissions associated with each of the stages in the OLT value chain were extracted from the streamlined LCA developed by Yalumba (Camillieri, 2008) and are summarised in Figure 7. For ease of interpretation, key activities at each stage in the value chain have been classified according to their contribution to the total emissions from the value chain. Activities that contribute less than 1% of total carbon emissions are categorised as having no or minimal impact (X). Activities that contribute 1-5% of emissions are categorised as low impact (L), 6-10% as medium (M) and over 11% as high (H).

It is important to note that the distribution of emissions is likely to differ considerably from one wine product to another, given the diversity of management practices in the vineyard (dependent upon grape variety, climate and soil type) and the winery (dependent on the nature and level of crushing and blending). Thus, it would not be appropriate to draw conclusions about the emissions associated with all wines from South Australia from the data presented in Figure 9. As explained above, LCAs are highly contextual and extremely sensitive to the methods used, assumptions made and boundaries defined.

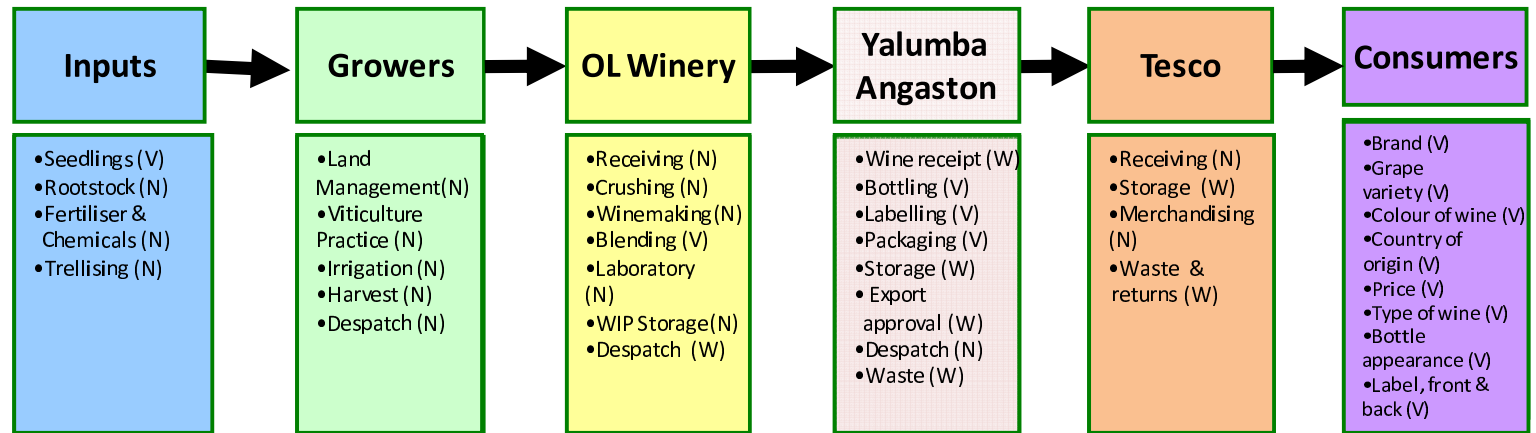
What is immediately evident is the relatively low emissions occurring downstream (retail and final consumption) and the substantial contribution made in the vineyard (particularly from trellising and viticulture practices) and at the winery (particularly and packaging), which together account for over half of the total carbon emissions from the chain.

It is also interesting to note that, whilst many consumers and commentators believe that transportation is a major contributor to the carbon emissions embodied in the products they buy and consume, the emissions data for the OLT value chain demonstrates that transportation, from the winery to the Tesco shoppers' household, is actually a relatively minor contributor (10%) to the total emissions in the chain.

Whilst the emissions data is of interest in itself, highlighting as it does the relative contributions of different activities and dispelling the myth of 'wine miles', its value as an input to management decision-making is substantially enhanced when viewed alongside the categorisation of activities in the material flow map, in which consumer value is used to categorise the physical activities undertaken.

For example, trellising systems are the single largest contributor of emissions in the value chain, and might therefore warrant prioritisation in an effort to reduce the chain's carbon footprint. However, this activity is undertaken during the establishment of a vineyard and is therefore a difficult and costly activity to change at a later date, and the fact that consumers attach no value to it (the sustainability of the production process was of little importance to the majority consumers surveyed) means that there is no incentive for growers or the chain to tackle this source of emissions – unless, of course, technology is forthcoming (which this analysis might stimulate) which provides low energy trellising at a lower cost. Failure to recognise the lack of value attached to this activity by consumers could, in theory, result in capital investment and/or R&D expenditure being directed towards more sustainable trellising systems, in the expectation that consumers would be willing to pay more for the final product, as a result of the reduced carbon footprint and increased sustainability of the production process. Instead, this analysis suggests that government R&D funding may be required and justified to investigate how best to reduce the related emissions since there is no commercial driver for firms and chains to do so.

Figure 9 – Emissions in the Oxford Landing – Tesco value chain



23.2 %

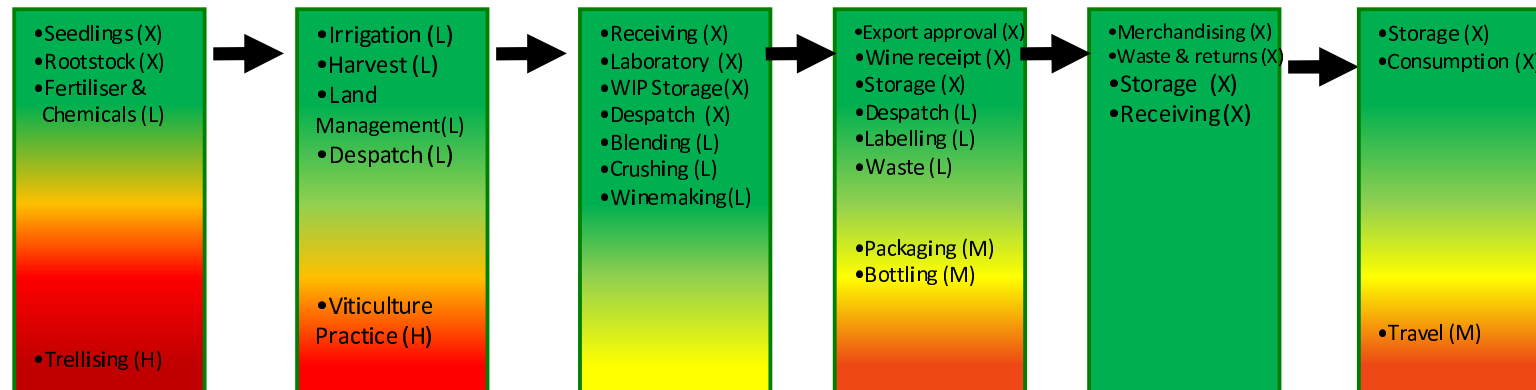
28.2 %

5.3 %

30.2 %

1.2 %

10.0 %



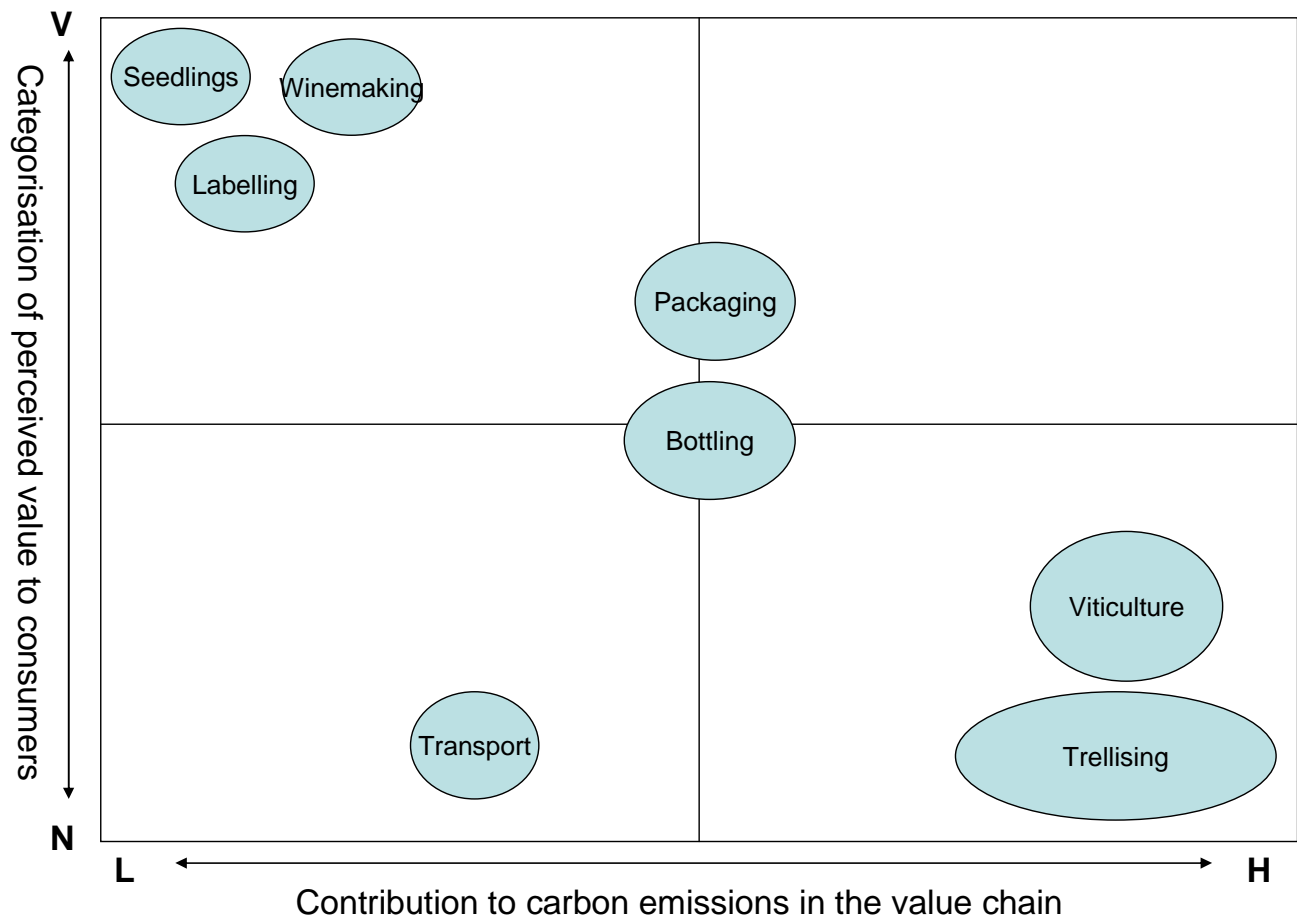
Material Flow →
 W: Waste
 N: Necessary but non Value-adding
 V: Value-adding

Greenhouse Gas Emissions %
 X: No/Minimal impact L: Low impact
 M: Medium Impact H: High impact

In contrast, the recent attention directed towards alternative (more sustainable) packaging formats is justified by the emissions data – bottling, packaging and labelling together account for 15% of total emissions – and has resulted in the introduction of new packaging variants at considerable (investment) cost to suppliers. However, given the value consumers attach to the appearance of the bottle and the information on the label, a different approach to reducing emissions from these activities would be appropriate. A low cost solution that is effective in reducing emissions may reduce the perceived value of the product, thus, resulting in less not more value being added as a result of reducing the carbon footprint. Indeed, the feedback from the consumer focus groups suggests that recent new product/packaging format introductions have been met with mixed reactions from consumers, some of whom may be less likely to purchase wine re-packed in a way that offers benefits that are not aligned with their preferences.

Looking more broadly at the integration of the material flow analysis from the VCA and the emissions data from the LCA, Figure 8 presents the different activities in a 4x4 matrix which measures the value perceived by consumers (from necessary but not value adding to value adding) on one axis and the contribution to total carbon emissions (from low to high) on the other. By positioning the different activities it is possible to determine the appropriate management approach to the prioritisation of any intervention and the nature thereof.

Figure 8 – The Value-emissions trade-off matrix



Activities appearing in the top right quadrants should attract investment with a view to potentially adding value (or at least preserving it) as these activities are valued by consumers – changing them exclusively with the aim of reducing emissions and/or cost could result in the value perceived by consumers declining; whereas change induced by the pursuit of a reduction in the carbon footprint could present an opportunity to add value for a specific target group.

In contrast, activities in the bottom right quadrant should only attract investment if there is a net cost reduction associated with any reduction in carbon emissions, as consumers do not perceive these activities as adding value. As stated above with respect to trellising systems, in the absence of potential cost savings, these issues are candidates for government involvement if it wishes to see emissions reduced.

Activities in the top left quadrant are ‘star’ attributes – low in emissions and high in value-added. In the context of sustainability, these are the attributes that should be supported, enhanced and promoted as they hit both customer needs (reduced emissions) and consumer wants (taste, colour, good labelling information).

Finally, activities in the bottom left quadrant require limited attention – they add little or no value but contribute little or nothing to emissions.

This kind of information and the categorisation of it in the manner presented here is potentially of considerable value to business managers confronted with decisions relating to carbon footprinting, carbon labelling and the sustainability of their businesses, but lacking the resources tackle all issues at once and the knowledge or experience to determine which activities to prioritise and how to change them. It may also prove valuable to policy makers and government agencies responsible for allocating funds and developing programs to support industry adjustment to the rapidly changing dynamics of global competition – facilitating greater influence over the outcomes/benefits sought from public investment in new technologies for the reduced carbon emissions and higher levels of, environmental, ethical and economic sustainability.

5.3.4 Information Flow

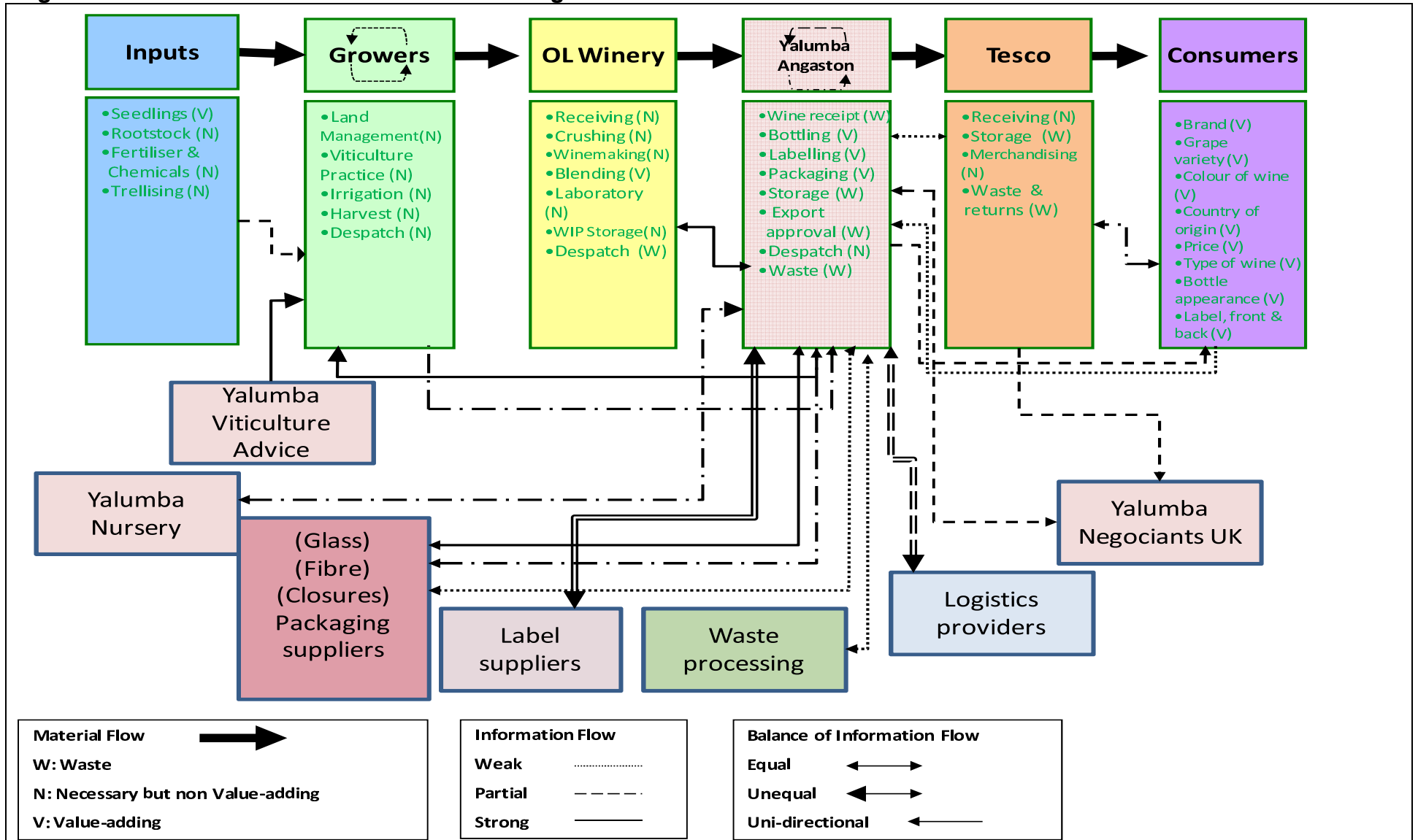
The information flow in the OLT value chain was assessed with respect to different functional activities (e.g. quality control, sales, and distribution) and at different levels (e.g. operational or strategic), with the aim of improving efficiency and effectiveness

The current state map of information flow is presented in Figure 9.

5.3.4.1 Growers

There are currently 3 types of growers engaged with Yalumba: a core group of long-term growers, who have been providing grapes for several generations; second-tier growers, who have an average of 3-5 year contracts; and annual growers, who are sourced when needed. In addition, the Oxford Landing estate also produces its own grapes. There are some growers who collaborate but generally, the various groups of growers have more scope for interaction and information sharing.

Figure 9 – Information flow in the Oxford Landing – Tesco value chain



Yalumba provides a lot of information and advice to their growers through grower liaison officers, winemakers, viticulturists and vineyard managers on maximising their opportunities and efficiencies. For example, growers are well informed about the choice of grape varieties, procurement of input supplies, benchmarking activities, trellising, irrigation techniques, use of water and machinery. There are also efforts made to educate growers through workshops, seminars and social activities organised. There is scope for more feedback from Yalumba to growers about which wines the grapes are used to produce and more consultation on price structure and contracts.

There is generally little information exchanged between growers and input suppliers, since the relationships are mainly transactional and growers receive advice from Yalumba.

The production of seedlings and rootstocks by Yalumba's nursery (a unique asset) is undertaken on a transactional basis, with limited use of internal demand forecasts. Indeed, the nursery serves as a strategic intelligence source to Yalumba and the information tends to flow more from the nursery to Yalumba than the reverse.

5.3.4.2 Yalumba

Within the organisation as a whole the information flow is generally strong, with only isolated examples of 'blind spots' between departments. The distinctive 'family culture' is widely cited as a major contributor to high job satisfaction and staff retention, which creates a harmonious working environment and permits individuals to regularly challenge the status quo.

Yalumba adopts an informal management style, reflecting the personality of senior management and extent of synergies. They have developed as a team, overcoming operational as well as strategic challenges together. However, the reported informality of information flows may leave certain individuals under-informed, especially across departmental boundaries. As the business grows this is likely to become more important, requiring investment in more formal information management systems.

The UK marketing agents (Negociants UK) suffer from limited access to consumer data, which occasionally hampers their discussions with Tesco – this is a weakness that Yalumba are aware of and intend to rectify.

5.3.4.3 Packaging supplier

Ancor provides 3 types of packaging to the Oxford Landing wine – closures, corrugated packaging and glass – from three different locations. Information flows are generally strong, which has benefited both firms, most evidently in the joint development of lightweight bottles. There is scope to exploit the strong relationships and information further, to allow for more bi-directional communication in relation to the potential impact of design changes.

5.3.4.4 Waste Processing

Tarac provides an outlet for the most significant waste product in winemaking. Their relationship with Yalumba is essentially transactional meaning that Tarac rarely receives information directly on what days/volumes Yalumba are crushing. Although the truck drivers from the haulage and transport companies provide some indication of the grape marc quantities, Tarac would benefit from information on scheduling, quality and volume by Yalumba directly.

5.3.4.5 Label Suppliers

Collotype produces all labels for the Oxford Landing wine. There is a strong two-way information flow between both organisations. This is demonstrated by the feedback in terms of cost reduction initiatives. Although forecasting can be a problem and exacerbate staffing and planning difficulties, Collotype employs casual labour to maintain flexibility. Yalumba was commended on their forecasting ability for labels.

5.3.4.6 Logistics Providers

Two transport companies interviewed revealed that because of their purely transactional relationships with Yalumba, the information flow tended to be basic and partial. Both companies are underpinned with short-term renewable contracts. They do not receive information pertaining to forecasts of production or volumes of grape crushing (and hence haulage), but nonetheless are given adequate lead times to schedule and plan deliveries.

5.3.4.7 Tesco

Tesco is the largest purchaser of Oxford Landing wine and has a good relationship with Yalumba. There is occasional communication with the general manager of Oxford Landing wine and visits from Tesco staff to the winery, but overall the flow of information is limited and primarily through Negotiants in the UK office.

5.3.4.8 Consumers

Consumers speak highly of the reliability and quality of the Oxford Landing brand. However, analysis of supermarket sales data reveals a strong degree of 'promiscuity' amongst wine shoppers, resulting in limited brand loyalty for off-promotion sales. The information flow between Yalumba and consumers is unequal: Yalumba rely on their product labeling to communicate with consumers and do not undertake much direct marketing. To date, they have invested little in consumer research, relying primarily on product quality and promotional activity to engage with supermarket shoppers.

The information flow between Tesco and the consumers is partial. Across the store, the information flow is strong, since Tesco collects detailed information from consumers through their shopper loyalty card (Clubcard). However, Tesco rely on suppliers to purchase and interpret this information, which Yalumba has been reluctant to do in the past.

Overall, the flow of information is reasonable but scope for improvement clearly exists, as evidenced by the responses to the stakeholder survey (figures 10 and 11), which reveal a lack of understanding, particularly upstream, of numerous aspects of the OLT value chain and its market environment, and limited use of consumer insight in business decision-making.

Figure 10 – Level of understanding of the OLT value chain

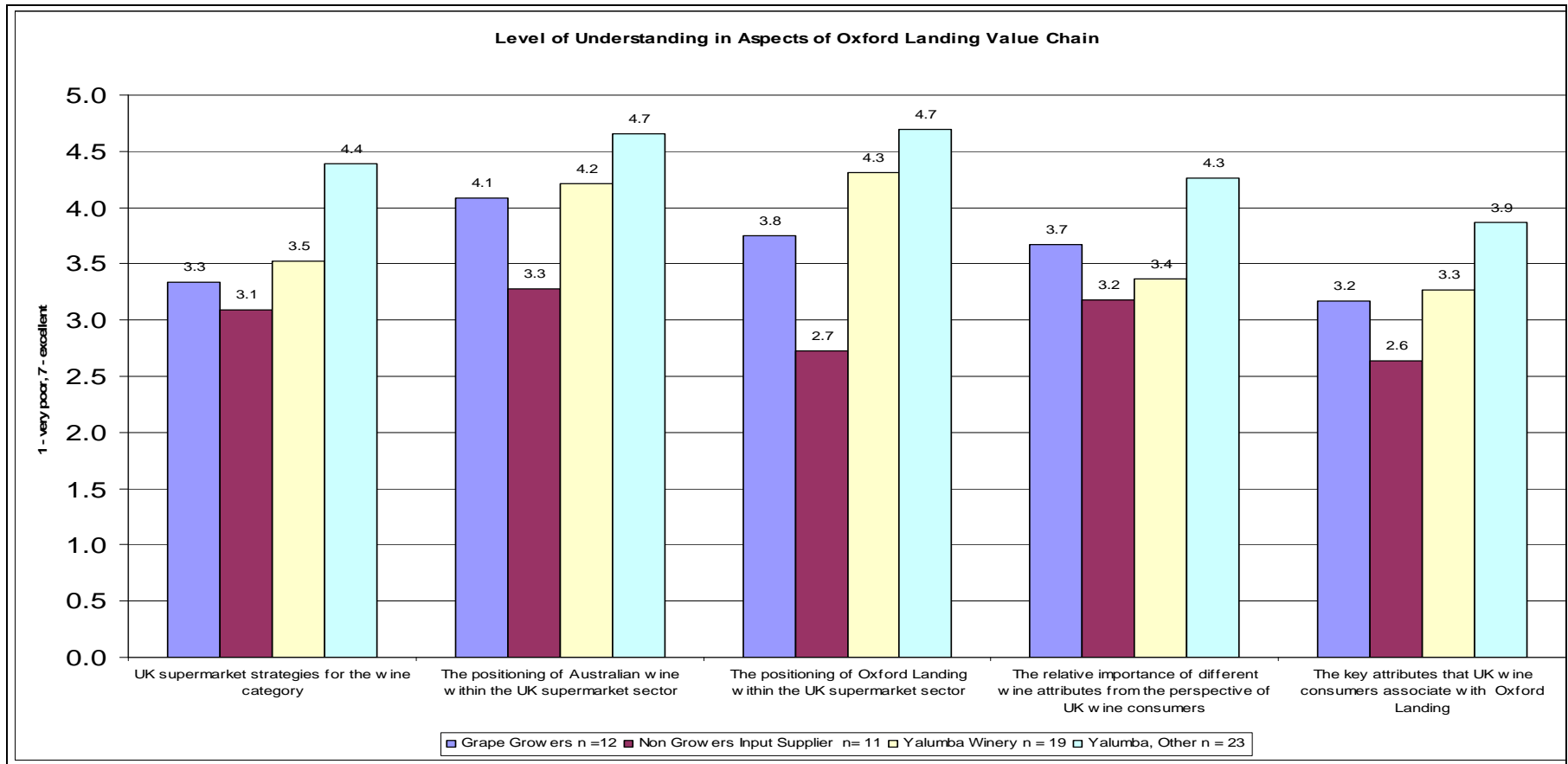
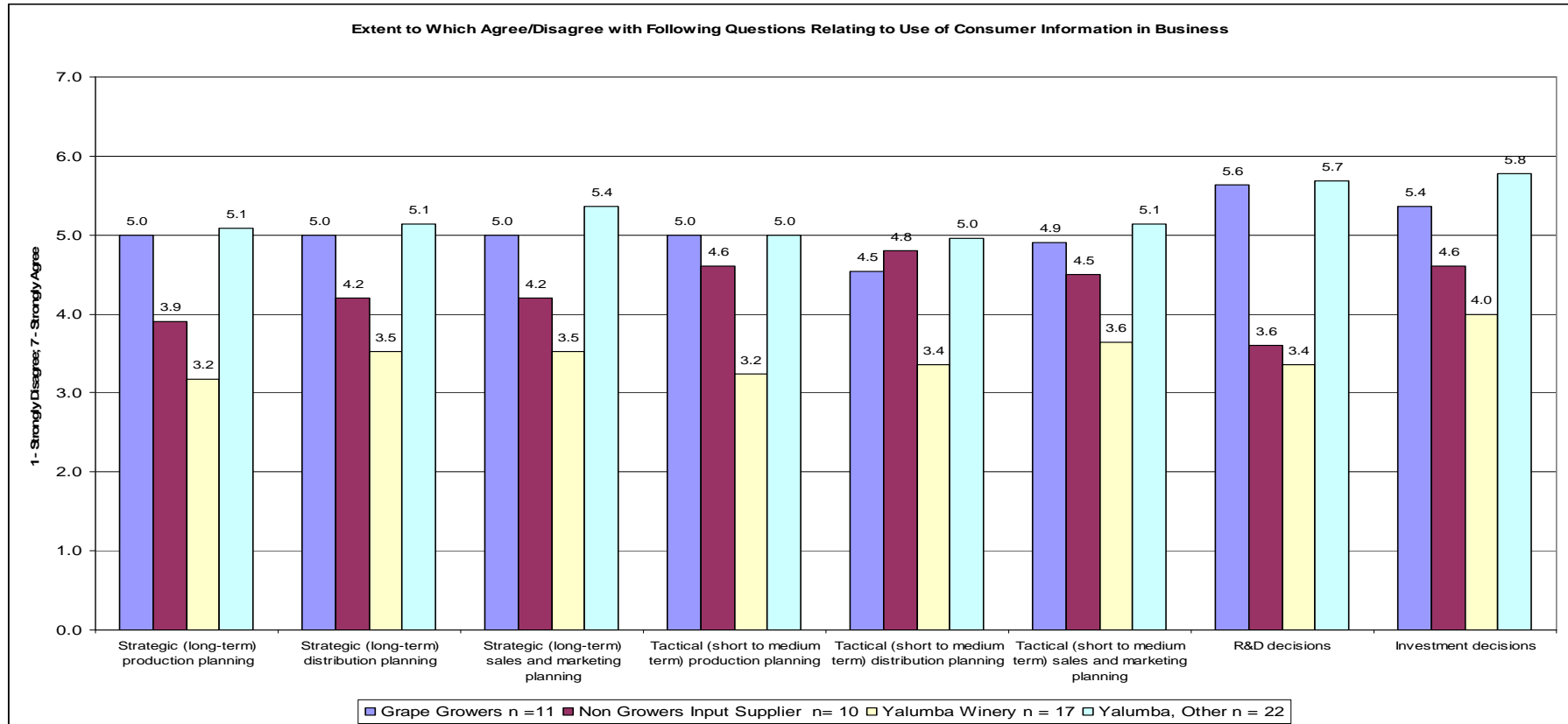


Figure 11 – Use of consumer information in business decision-making



5.3.5 Relationships

Relationships are the foundation of sustainable value chains. Basic relationships are often sufficient for exchanges that are largely transactional and where there are limited opportunities for greater efficiency, value adding or co-innovation. However, strong relationships often drive improvement and poor relationships invariably cause stagnation in material and information flows.

In seeking to evaluate the strength of relationships, within and between organisations in the OLT value chain, we focussed on three key areas:

- Strategic alignment
- Trust, cooperation, commitment and a long-term orientation
- Power, dependence, opportunism and conflict resolution

The current state map of relationships in the OLT value chain flow is presented in Figure 12.

Overall, the Oxford Landing value chain is characterised by strong relationships. There are many examples of best practice throughout the chain. Yalumba is widely respected both as a customer and supplier; and as a place to work.

5.3.5.1 Yalumba

Strong relationships are evident within Yalumba as an organisation. This is because of the 'family culture' established over the years and the informal style of management. Senior managers are deemed approachable, involved and enthusiastic. There are many long term employees at all levels, with most senior managers having had experience at operational level. There is a robust 'people culture' evident in Yalumba and explicitly stressed on several occasions throughout the interviews. Although information flows may vary across the departments, the relationships appear formidable.

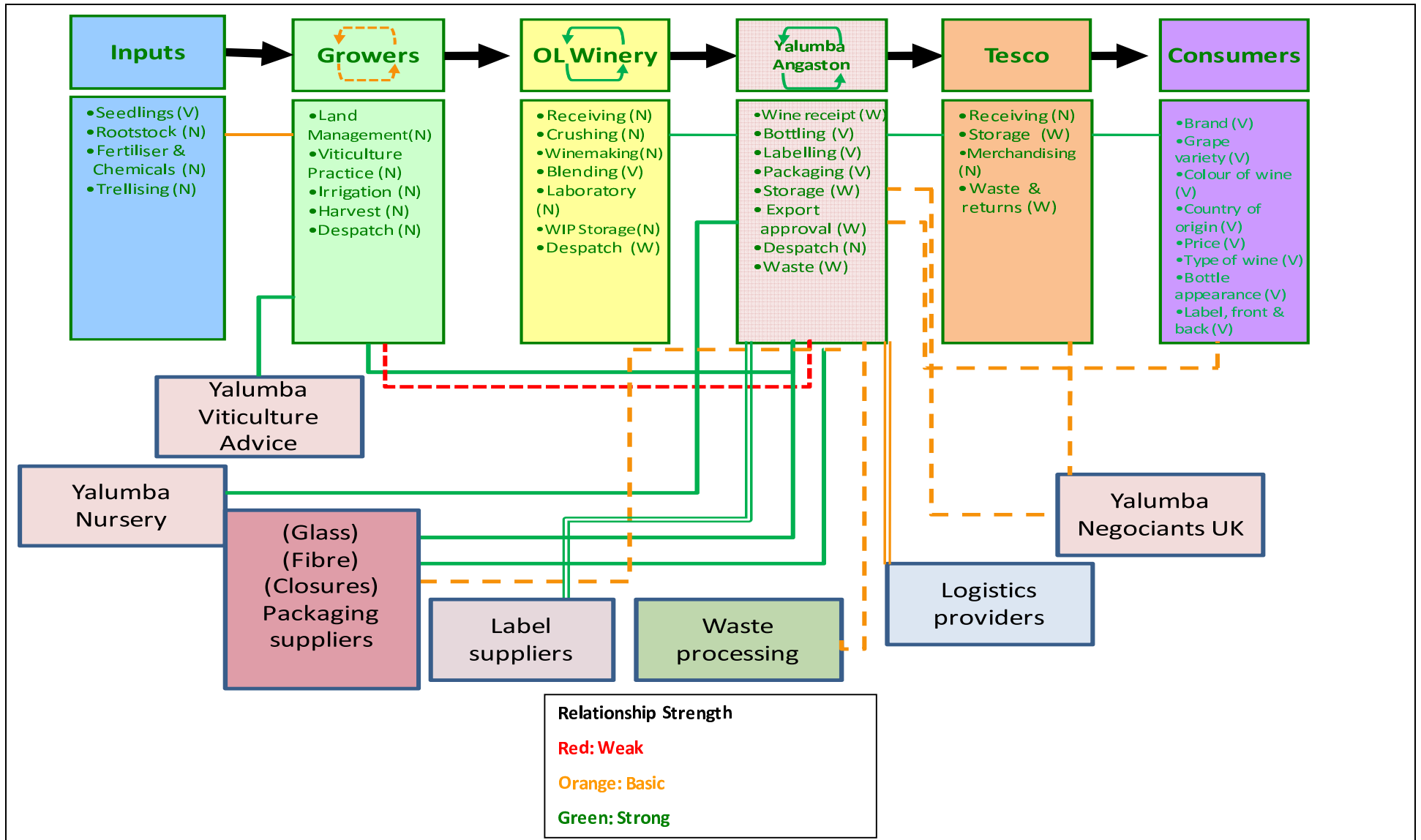
5.3.5.2 Growers

The relationships between Yalumba and the growers vary depending on whether the grower is a long-term supplier or annual contractor. Many core growers have supplied Yalumba for many years, reflecting mutual benefits from the relationship. While the nature and length of contracts varies between growers, thereafter growers appear to be dealt on equal terms, in terms of the provision of viticulture advice, harvest scheduling and the flow of grapes into the Oxford Landing winery.

There are some identified strains in the relationships with growers, especially in the annual price negotiation and contracting process, and this underpins much of the other problems. There seems to be an asymmetrical relationship especially on the 2nd tier and annual growers, where the growers are perceived to be dependent on Yalumba.

Growers communicate regularly on diversification strategies, purchase of water, pricing strategies, choice of grape varieties to grow, biodiversity and use of machinery. There are opportunities created for growers to get together and form collaborative relationships (e.g. annual barbecues, educational tours overseas and regular workshops and seminars).

Figure 12 – Relationships in the Oxford Landing - Tesco value chain



5.3.5.3 Packaging Suppliers

The relationships between Yalumba and the three divisions of Amcor are generally strong but there is scope to exploit the strong relationships to allow for more innovative designs and improvements to packaging to meet Tesco's needs. Yalumba was cited as being committed to transparent, honest and open communication; and also strives for win-win situations with Amcor. There were examples of Yalumba staff being commended for being highly approachable, 'natural innovators' and collaborative with a long term vision and growth strategy.

5.3.5.4 Label Suppliers

Similarly, the relationships are strong - the label suppliers 'love dealing with Yalumba'. It was highlighted that the personnel from Yalumba are flexible and willing to adjust their systems to suit their operations.

5.3.5.5 Waste Processing

As the dealings are generally contractual in nature, the relationship with Tarac is deemed to be basic. As already noted, this results in limited information flow, which can cause problems for Tarac, of which Yalumba are not aware.

5.3.5.6 Logistics Providers

Most contracts with logistics providers tend to be short-term. Correspondingly, the relationships are considered basic in nature. The people interviewed consider Yalumba as one of their major customers with close communication, relaxed environment and friendly people. It was also highlighted that Yalumba has made extra efforts to support the community, local businesses and in employing local people from the region.

5.3.5.7 Tesco

Tesco rate Yalumba as a high performing supplier, which includes the role of Negotiants UK (Yalumba's UK marketing agent) in acting as an effective conduit between Tesco and Yalumba for ordering and logistics.

5.3.5.8 Consumers

Oxford Landing has a high rate of recognition and is generally a well liked product. However, consumers are reportedly 'promiscuous' generally showing little brand loyalty for off-promotion sales.

Yalumba communicate with consumers largely through the product (bottles, labels) and do not undertake much direct marketing. Historically, Yalumba have undertaken very little consumer research into shopper behaviour or consumer preferences. Thus, scope exists for improvement in alignment resource allocation and management with consumer value

The overall impression of strong relationships in the OLT value chain is supported by the reasonably high level of strategic alignment, particularly upstream, reported by respondents to the stakeholder survey (figures 13 - 14).

Figure 13 – Perceived level of strategic alignment with customers in the OLT value chain

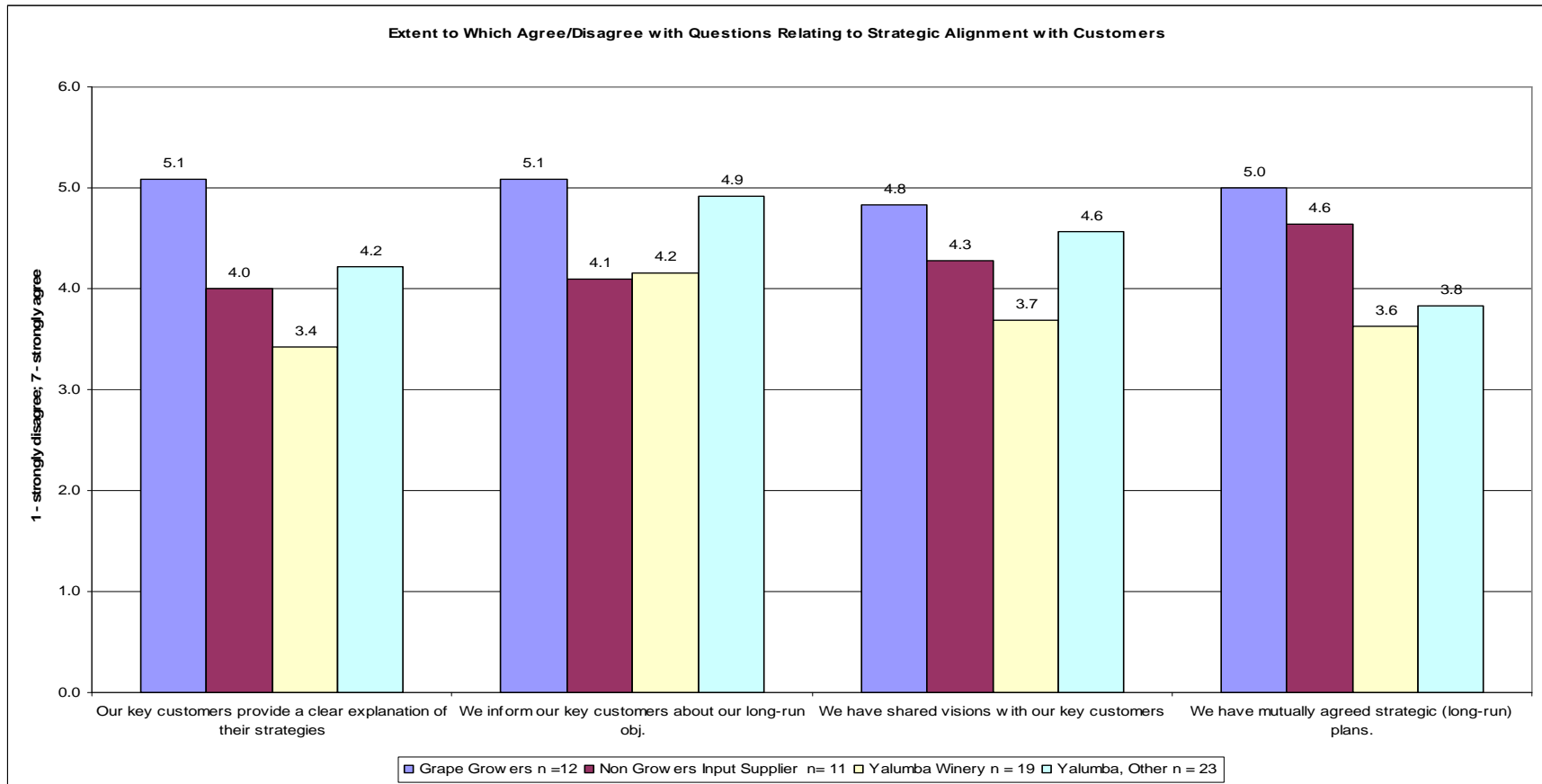
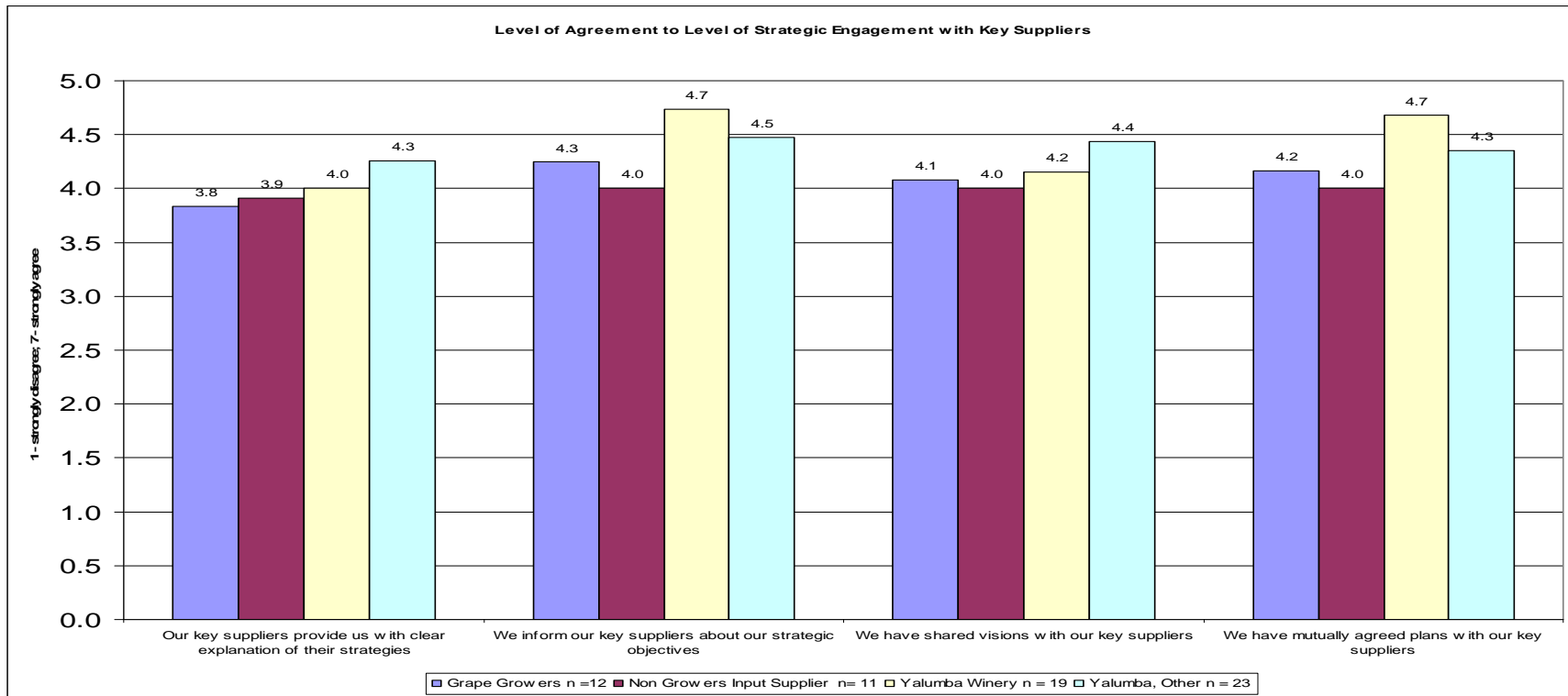


Figure 14 – Perceived level of strategic alignment with key suppliers in the OLT value chain



6.0 Conclusions

The objective of this project was to explore the value of sustainable value chain analysis (SVCA) as a tool for achieving better alignment between the allocation of resources in the Australian wine industry and consumer preferences in the UK and environmental management throughout the chain, using the OLT value chain as a case study.

6.1 SVCA methodology

Our experience with the stakeholders in the OLT value chain indicates that SVCA is an effective tool to confront “conventional wisdom” within organisations. Embedded assumptions and procedures can be challenged effectively by directly comparing product attributes and intrinsic features which add value in the eyes of the consumer, with daily operations and resource allocations in the whole chain.

This identifies over-estimates of the value attached to some attributes and consequent unjustified attention, and the under-exploitation of other opportunities to add value; and distinctiveness of different value chains (i.e. different products but involving all or many of the same chain partners), where consumers value different attributes, yet chains’ material and information flows are the same. Within the wine industry, this is exemplified by volume and prestige wines.

The SVCA methodology provides a clearer understanding of the linkages between product attributes, individual activities and sources of competitive advantage, which allows organisations in the chain to identify specific actions and management mediation to deliver continuous performance improvement.

The OLT case study revealed that firms in the value chain can:

- Continuously improve reliability and process control
- Enhance co-innovation by focussing on key processes, systems and the role of people within these systems to understand potential sources of variation (or non-value adding activities);
- Continually endeavour for shorter lead times and leaner methods;
- Strategically develop an innovative value chain through focussing on the willingness to work with suppliers and customers for cooperative improvement.

While chains, industries and contexts are all distinctive, greater experience with the methodology is allowing for greater focus in the data gathering, improving its efficiency. Nonetheless, an intensive, interview-based methodology remains unaffordable as a consultancy tool, so the project piloted a combination of interviews and an online survey of stakeholders in the chain. Encouragingly, the survey replicated most of the headline findings from the interviews, and accordingly, future projects should use the survey to identify main issues; then follow-up interviews to drill down further.

6.2 Consumer insight

Innovation underpins much success in modern agrifood value chains. The SVCA diagnostic identifies the readiness, history and opportunities for co-innovation. In particular, it explores the extent to which innovation is driven either by consumer-insight or by only partially informed

producers and processors, which is more vulnerable to failure. Indeed, in the absence of consumer-insight, innovation is more likely to be supply-driven.

Oxford Landing, like so many successful Australian wine brands, suffers from brand loyalty being inextricably linked to promotions. The brand managers of Oxford Landing recognise the need to supplement their winemaking competence with a more detailed understanding of shopper behaviour and consumer preferences. In depth market intelligence would enable Yalumba to break out of the commodity trap and more effectively reach the distinct market segments, targeting their differential preferences with specific attributes when feasible. Other Australian winemakers would do well to follow suit.

6.3 Forecasting

Forecasting trends in wine consumption was reported as notoriously difficult, given the apparently unpredictable nature of consumer preferences. Furthermore, innovating and investing around emerging trends takes a high degree of collaboration within any value chain. Accordingly, it offers enormous potential for achieving sustainable competitive advantage. While Australian volume wine has been a strong performer in the UK, there is a growing threat that its market may be eroded by wines from emerging supply countries which offer similar quality but at lower price (in the short term, South America and South Africa; in the longer term, China and Eastern European countries aided by climate change). Knowledge-based innovation may well be an increasingly essential part of Australia's ability to compete.

Overall, the OLT value chain is characterised by efficient material flow, reasonable information flows and strong relationships. However, the ability to accurately predict short and long term supply and demand is widely regarded as a lottery, causing significant costs (wasted investment) and missed opportunities for Yalumba. Thus, the greatest opportunity for improvement lies in leveraging already strong relationships, to improve the flow of information (strategic and operational) and enable more effective forecasting of supply and demand.

6.4 Sustainability

The SVCA examined the extent of a shared, comprehensive assessment of the commercial opportunities offer by sustainability. Misalignment mitigates the competitive advantage offered by sustainable activities. The SVCA can identify whether partners are interpreting and pursuing commercial opportunities beyond cost reduction, including creating value in the eyes of the consumer (if there is value to realise); reducing the chain's long term exposure to risk; protecting asset values and influencing stakeholders, including government.

The value of emissions data as an input to sustainable value chain management and decision-making is enhanced substantially when viewed alongside the categorisation of activities in the material flow analysis, in which consumer value is used to categorise the physical activities undertaken. Regardless of the methodology selected for LCA, the resultant information can be incorporated into high level value chain maps. These highlight the most promising opportunities, such as:

- Activities which are wasteful (ie, wholly unnecessary) and have the greatest environmental impact – such activities should be prioritised for elimination; and
- Activities which offer the greatest scope for adding value to consumers through improved environmental performance.

This allows the chain to make decisions on resource allocation based on what consumers value (and what they do not value), then to prioritise this allocation based on their impact on the commercial and environmental sustainability of the chain and its products.

The results of combining VCA and LCA also informs government policy and programmes to ensure interventions are designed and targeted to achieve compatible competitiveness and environmental outcomes.

When analysing the cost/benefit of addressing wasteful or even necessary non-value adding activities, this additional data will allow a more reasoned risk analysis to be weighed as a factor, assuming that truly sustainable competitive advantage requires agrifood businesses to serve those markets which are most valuable in a manner which is ecologically sustainable.

6.5 Improvement projects

The investment in SVCA has to result in positive commercial outcomes. In this project, the details of improvement projects are subject to commercial confidentiality, but they covered:

- Forecasting
- Process efficiency
- Achieving commercial advantages from sustainability
- Improving the culture of innovation
- Gaining competitive advantage from consumer insight
- Managing diverse product lines
- Risk management in the supply base

Overall, participants' concluded that the SVCA identified practical and commercially-relevant areas for further investigation.

6.6 Wider applications of the SVCA

Whilst the case study necessarily focused on a specific value chain, it revealed several lessons for the potential application of SVCA at an industry (as opposed to enterprise/chain) level. The project piloted the use of an online survey as a means of reducing the cost of data collection by reducing the extent of interviewing. This proved broadly successful and so opens up the feasibility a semi-automated tool which could inform the needs of the majority of value chains in any one industry. It could distinguish between "Runners, Repeaters and Strangers" (Hines et. al, 2004)⁷: "Runners" represent those chains similar enough to be completely analogous and able to be predictably optimised and automated (typically commodity streams); "Repeaters" are smaller, less predictable groups of value streams, who may target both high and low value niches, and where SVCA should be applied to improve performance and/or produce ideal case studies; and "Strangers", are those value streams within an industry which are so different, so far ahead or behind that there is little commercial benefit in undertaking analysis.

An industry-wide SVCA could facilitate firms to use an on-going assessment approach to assist their progression from a reactive operational mindset with little or no clear strategic alignment, to

⁷ [Hines, P., Holweg, M., Rich, N. \(2004\), "Learning to evolve: a review of contemporary lean thinking", International Journal of Operations & Production Management, Vol. 24 No.10, pp.994-1011.](#)

an effective, integrated approach where their value chain strategy is regularly reviewed and updated to accommodate changing business/market environments and consumer values.

6.7 Implications for Government

Commercially beneficial initiatives offer the most attractive solutions to the challenge of sustainability. However, if they are insufficient or ineffectively pursued, there may be a need for government to introduce alternative, and typically less efficient, interventions. Accordingly, the SVCA has the potential to better inform discussions between government and agrifood industries by providing a basis for assessing the alignment between sustainability and competitive advantage. For example, the project illustrated the potential for SVCA to inform government's sustainability policy and how to achieve its objectives through the most economically efficient and practically effective programs and policies.

Essentially, if consumer values are aligned with government's objectives, the latter might be achieved most efficiently through establishing and promulgating consumer insight. This would encourage the development of commercial strategies predicated on exploiting these values. Conversely, where purchasing behaviour does not support government's aims, alternative strategies and interventions will be required. The same logic can be applied to social policy outcomes, such as dietary-related health, or economic outcomes, such as the extent of demand for locally-produced food and drink.

SVCA can also inform government's business support service strategy. For example, if it identifies poor relationships in an industry as a blockage to the growth of the sector, then greater attention needs to be given to appropriate training and advice. Equally, industry bodies might want to reflect on findings in devising their own research agenda.

SVCA can also contribute to regional economic policy. For regions with high cost structures in a global sector, it is essential to understand geographically where value is or could be added. For a high cost production region, efficiency alone may not be sufficient to achieve sustainable competitive advantage, and accordingly government's objectives should focus on encouraging greater value-adding activities prior to export.

Our experience with the OLT value chain case study highlighted the importance of having a project board consisting of the main participants, to provide oversight of the project and the development and implementation of improvement projects. This provides clarity over the objectives of the project and a mechanism for tackling any obstacles which arise during the data collection. However, crucially, it has a subsequent role in:

- Disseminating results to all chain partners;
- Ensuring improvement projects are identified and implemented in full, and
- Sharing the benefits of these projects appropriately along the value chain.

In this way, the project acts as a catalyst for strategic dialogue, and positive outcomes are more probable.

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