



Functional and Luxury Foods Research Project

Luxury wine opportunities
for South Australia in Asia

Executive Summary

This reference report does not include original content or analysis; rather, it consolidates material drawn from progress reports submitted by VTT Technical Research Centre of Finland throughout the research phase of the Functional and Luxury Foods Project (February to December 2015).

The information presented in this reference report is specifically focused on luxury wine. The content is based on VTT's analysis of value chains, technologies, markets, and available opportunities in the target markets comprising China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia and Singapore. The Australian domestic market was considered a secondary focus.

This report should be used in conjunction with the following documents:

- Literature Review for the Functional and Luxury Food Project (VTT Technical Research Centre of Finland Ltd, October 2015)
- Functional Foods Market Analysis - China, India, Indonesia, Japan, Korea, Malaysia and Singapore (Frost and Sullivan, November 2015)
- Luxury Foods Market Analysis - China, India, Indonesia, Japan, Korea, Malaysia and Singapore (Frost and Sullivan, November 2015)
- Final Report for the Functional and Luxury Foods Project (VTT Technical Research Centre of Finland Ltd, 2015)

These documents will be available on the Department of Primary Industries and Regions SA (PIRSA) website in July 2016.

The VTT researchers suggested six primary pathways for the South Australian food industry:

1. food technology upgrading,
2. functional food products,
3. ingredients for functional foods,
4. active, intelligent and polysensual packaging,
5. luxury food business strategy uptake and export promotion, and
6. luxury wine driven culinary tourism.

The six pathways differ significantly in terms of their target focus in the food value chain. Four of these pathways are of specific interest to luxury wine, namely pathways 1, 4, 5 and 6. Successful implementation of technologically-driven pathways, technology upgrading and packaging will require close collaboration with technology suppliers and cooperation with research and knowledge providers, including consultants, extension providers, and industry experts.

General conclusions from the study are as follows:

- Most food and beverage producers in South Australia are small in size with limited capabilities and willingness to change their ways of working, processes and product portfolios.
- Currently, food and beverages produced in South Australia are fairly standard or traditional.
- There is some existing luxury capability in the wine industry.
- Food packaging is also very standard; it needs to be upgraded to meet the international standard required for luxury products.

- The Asian luxury food and beverage markets analysed in this study are forecast to grow significantly, providing opportunities for South Australia's food industry to take its share. However, market entry and differentiation in these highly competitive markets has several challenges.
- There are a few companies in the current value chain that are innovative, ambitious and future oriented as well as export focused; these should be used as inspiring examples for the others.
- There are various opportunities available in adopting and upgrading the current processing technologies to improve product quality, yield and capacity to upscale for larger volume. Other relevant technologies available in the global marketplace include digital solutions to e-commerce, supply chain management, traceability, safety, anti-counterfeiting and customer engagement.
- Due to the fairly stagnant nature of the current South Australian food and beverage industry, a change in mindset is needed to initiate transition towards value-added production systems. This change in the mindset is not likely to emerge anytime soon without encouragement and incentives from the Government and key industry stakeholders.
- Pilot research and development (R&D) services accessible to small companies are currently missing in South Australia. These services are required for the future development of the food and beverage industry. Lack of R&D services in South Australia is not as much of an issue for big companies because they can obtain these services interstate or abroad. Thus special care needs to be taken that the services developed and provided will benefit small to medium companies with more limited resources.
- As prerequisites for successful penetration in Asian markets, there is a need for innovative products, excellent quality (acknowledged, not only perceived), and differentiation (e.g. through branding). Since South Australia is lagging behind the global competitors, fast growing Asian markets should be primarily targeted. However, since markets vary for any given product and country, a case by case analysis of the market potential is needed.
- A single shortcoming identified in the local ecosystem concerning these pathways is the lack of applied research and piloting capacity necessary to upscale new products and processing technology. Another related need cutting across these pathways is capability for new technology adoption involving training, benchmarking, demonstration, technology transfer and other activities supporting particularly SMEs with limited own resources.
- An issue related to all the six pathways is the need to improve collaboration between businesses. There is a need for the government to work together with industry to facilitate networking between companies, universities and other stakeholders to build more synergy in developing new products and services. Partnerships and alliances are needed to create more comprehensive offerings, drive local demand for new products, and build avenues for export markets.
- Progress on the luxury export pathway and luxury culinary food tourism pathway depends more on effective customer understanding, collaboration in marketing, networking, and supply chain management. Information and communication technologies, such as social media and traceability solutions play an important role in realising this opportunity.

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List of acronyms

CAGR	compound annual growth rate
FCM	food contact material
FCS	food contact substance
FTA	free trade agreement
GDP	gross domestic product
HNWI	high-net-worth individual
HPP	high pressure processing
MAP	modified atmosphere packaging
NFC	near field communication
NT	Northern Territory
PESTLE	political, economical, socio-cultural, technical, legal and environmental (analysis)
PEF	pulsed electric field
PET	polyethylene terephthalate
PDI	power distance index
QR	quick response
RFID	radio frequency identification
SA	South Australia
SWOT	strengths, weaknesses, opportunities and threats
TRL	technology readiness level
VTT	VTT Technical Research Centre of Finland Ltd

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Chapter 1 – Introduction

Capitalising on luxury food market opportunities provides scope for businesses to expand and grow. The South Australian Government, as part of its *Seven Strategic Priorities*, seeks to secure South Australia's position as a producer of premium food and wine, and boost the state's credentials domestically and internationally. With an increasing demand for premium products globally, the South Australian Government commissioned a study to identify opportunities for South Australian food, beverage and wine producers to tap into these high value markets. The study was conducted by a group of international experts from VTT Technical Research Centre of Finland Ltd, with additional input from ESSEC Business School in Paris and Singapore, Frost & Sullivan (Australia) Pty Ltd and the Food Innovation Centre of Mondelez Australia Pty Ltd.

The primary objective of the Functional and Luxury Foods Project was to provide the South Australian Government with a roadmap outlining where food value chains could be transformed to have higher added value for functional and luxury foods and beverages, with emphasis on domestic and Asian markets. The project consisted of three phases:

Phase 1 (Market opportunities) provided an analysis of high value food manufacturing, markets, and potential competition.

Phase 2 (Industry strengths and value chains) involved a survey of the region's main strengths such as industry assets, raw materials, R&D capabilities, value chains (Asian exports as the primary market, and the Australian domestic market as a secondary market), and geographical locations.

Phase 3 (High Value Food Roadmap) developed an implementation plan of future options (short, medium and long-term horizons) for the South Australian food industry. It considered potential business opportunities based on the region's strengths and weaknesses, and included guidelines for implementation, along with conclusions and recommendations.

This document provides a summary of material extracted from VTT's progress reports, final reports and recommendations generated across all phases of the project, with a specific focus on content relevant to luxury wine production.

Chapter 2 – Luxury

Defining luxury: What is it, and how does it work?

The global luxury market was estimated at AU\$1,174 billion in 2014, of which luxury foods comprised AU\$53.9 billion and luxury wines and spirits, AU\$80.1 billion. The luxury market globally is growing rapidly, largely by the growth in high net worth individuals (consumers with investible assets of USD1 million or more) in the Asia Pacific region, and an increase in outbound tourism. This highly profitable and growing regional market is of particular interest to South Australia given its proximity and demand for product categories in which we have an established capability.

The Oxford dictionary defines luxury as *'a state of great comfort or elegance, especially when involving great expense; an inessential, desirable item which is expensive or difficult to obtain; a pleasure obtained only rarely'*.

Luxury products are sometimes defined as possessing six key characteristics: price, quality, aesthetics, rarity, extraordinariness and symbolism. These characteristics are combined to invoke or create emotive cues to entice consumers to purchase them to feel good, and not because they need them. Luxury products successfully target consumer emotional needs to demand higher price-points than premium products which focus more on consumer utilitarian needs.

Common characteristics in luxury goods across all industries include:

- Authentic, absolute, aspirational
- Have a history, cultural and geographical roots
- Founded by a person, most often the person whose name it bears. It also can be provided with a more or less mythical ancestor, whose history/story is then rewritten
- Outstanding quality
- Extraordinary creativity and design
- Proprietary “savoir faire” (the ability to behave in a correct and confident way in different situations)
- Made by hand i.e. craftsmanship
- Rare or very limited in availability
- Purchased by the world’s most discerning clientele
- Extremely expensive
- Outstanding customer service
- Polysensuality at all consumer food points.

Luxury foods

It is important to note that throughout both the research phase of the Functional and Luxury Foods Project, and this consolidated report, ‘luxury foods’ also encompasses wine and other alcoholic beverages.

There is no common definition nor list of agreed luxury foods. Words such as ‘premium,’ ‘rare,’ ‘gourmet’ or ‘fine’ are often used interchangeably with ‘luxury’ but each can have a different meaning. Many people attribute a luxury product with satisfying a psychological need, with the product symbolising more to the owner than its functionality. Economic and social aspects are also considered, for example in one culture a luxury food could represent indulgence and a status indicator, and for another a necessity. An understanding, therefore, of the society and the foods

consumed in those societies that are regarded as a status indicator, are important considerations for defining luxury foods. The VTT researchers provided the following definition:

Luxury foods can be defined as categories of food that are scarce and rare to source, are painstakingly prepared with care, of consistent quality, often endorsed by the high-end clientele and restaurants in different geographies, follows cultural cues, purchasing power parity, tastes, habits and historical evolution of people of a particular country that are linked to wellness, indulgence, ethnicity and high perceived value.

The Functional and Luxury Foods Project suggested attributes specific for wines and spirits incorporate limited availability, antique/vintage and high price. Wines priced above US\$100 and over were correlated with limited production, old vintage, premium and luxury perceptions. In terms of limited availability, it may be that the ingredients are relatively rare or that production is restricted to a specific area limiting its supply (e.g. Champagne, Cognac). Appellation rules or geographical indicators can help to promote luxury and create opportunities to emphasise the narrative behind the product. Specialist production techniques could also be used by the wine industry to attribute luxury to its products.

Developing luxury wines

Developing luxury brands in the South Australian wine industry requires additional attention to developing product emotive cues over and above the existing focus on the product's performance attributes. This involves understanding which natural attributes a company can exploit and what dream or emotional need the company is trying to meet in the marketplace. Many traditional luxury brands provide narratives about the history behind the product which is particularly effective in European companies that can boast craftsmanship for royalty or heritage dating back many centuries.

Although some brands deliberately set out to target the luxury market, most find their strategy is emergent. Some brands have exploited emerging situations, for example Pol Roger, whilst setting out in the 19th century to produce a style of wine that would appeal to the British palate, could never have foreseen that Winston Churchill, one of the most influential politicians of the 20th century, would like their wine and be linked to their wine from then on (Pol Roger, 2016).

Emotive and differentiated branding

The consumer in the luxury industry is more conscious of the brand or the brand DNA (its vision, values, and sense of purpose). The story behind a luxury brand is vital for the aspiration it creates. A luxury brand translates the essence of the product, the heritage, and the history, into one's desire to own it. The legend usually starts from an influential founder, a creative genius. Provenance doesn't always have to be a particular person; it can also be an iconic emblem, a family history or everything that built the mystique of the brand. The combination makes up a story of a brand that, with time, becomes an integral part of the brand story and personality.

Brand positioning identifies ways the brand is identified and differentiated in the consumer's mind with respect to its competitors. Consumers use comparative methods to select a product, based on functional and emotional perceptions that the brand has managed to create in their minds. The purchase decision for luxury products thus is 'superlative' and not 'comparative' and has nothing to do with needs or utility. Luxury shoppers choose the brand that best reflects who they are and how

they want to be perceived by society. Each luxury brand brings a unique character, an identity that cannot be replicated or compared.

Product craftsmanship

Luxury brands are about craftsmanship, often hand-made, uniquely personalised to individual taste and preferences. They reflect the designer and creator's skills and personality. Consumers are advised and educated about the unique skills involved in the creation. This in turn increases authority and desirability.

In luxury foods this craftsmanship is relative. Products need to have some aspects of this but still the actual processing can be quite modern (but not highly automated). With luxury foods locality and use of local special ingredients is common. If the main ingredient(s) need to be sourced from elsewhere/abroad, the provider also needs to fulfil the criteria for luxury. In foods this often means using small, old, well-built and photogenic factory buildings for the production. This is important for promotional purposes. Modern industrial buildings do not fit the traditional luxury attributes of heritage, history and story-telling. By using old buildings it is possible to create a story for a new product. Modern technology can be used in the production, but only to a certain limit (no high level of automation or robotics). The people behind the brands are important; they need to be highly skilled craftspeople.

Product scarcity

In the luxury industry, exclusivity and inaccessibility is the way to go. The luxury good has to be earned; it is a journey, an experience. The greater the inaccessibility of the product or service, the greater the desire for it. Although luxury goods are no longer exclusively available to the upper class and extremely wealthy, they are still relatively scarce compared to fast moving consumer goods (FMCG). This scarcity is decided by the excellent performance of the products, the unique provenance of the brand, but also by marketing strategy, such as pricing, geographic differentiation of product offering, collaboration and limited edition. The place for distribution has to be very selective. It is the place where potential buyers are educated about the privileges that come with owning the brand; and turning them into members of the selective brand 'club' is the key.

Pricing

Pricing strategy for most commodities is generally about launching a product at a low enough price to attract sales and then trading-up. When the segment becomes more competitive brand managers often use price incentives to maintain or increase the demand. Luxury pricing strategy however focuses on developing an imagined price higher than the actual price, thereby creating higher perceived value. Also in contrast to the tradition of pricing as a function of demand, luxury pricing is supply-based. In luxury, the product is created first and then the pricing is set. The more the product is perceived by the client to be a luxury, the higher the price it can attract.

Promotional strategy

In general, advertising uses a mix of rational and emotional messages to entice clients to consider a product. In the luxury world, the dream is what sells. There is no need for a rational reason to justify a purchase. Content is very important. Luxury advertising uses only high-quality advertisement in

highly selective communication channels, all consistent with the brand's image. Graphically, a luxury brand advertisement or campaign almost always uses suggestive imagery without any written message.

Luxury brands often use public figures or celebrities for promoting the brand (for example with luxury watches). The advertisements are not for direct responses but to promote the dreams to many more people than could actually afford to buy it. Promoting the brand with endorsement from public figures and celebrities is becoming more popular, but associated reputational risk needs to be considered.

Celebrity endorsements work well with luxury food products such as wines and spirits (and perhaps coffee). However, with other food products this approach is rarely used (celebrities do not usually advertise their favourite chocolates). With luxury foods the general rules of luxury product advertising apply, but you need to be more careful not to go to extremes. Sophistication is the key. Also it has to be kept in mind that unlike other luxury items, foods can directly impact health; luxury consumers are also becoming more health conscious. Due to the nature of the foods they need to be promoted in a responsible way.

Position

The competition for retail space is fierce as spaces available for luxury brands are limited. Only the super brands in luxury business can manage to negotiate the sought-after places in the world. Position ranking is one of the most important parameters, not only in retail store location, but also in event venues, media coverage and in online inventory when it comes to digital strategy. Luxury foods are typically available at high-end department stores, at airports, and, depending on the product, in single brand shops (like some chocolate speciality retailers). Online selling is becoming more and more popular as well.

Pedigree

Many luxury brands have a rich pedigree and heritage which can form part of a brand's mystique. Consumers are subconsciously influenced by the brand's rich lineage, heritage and years of mastery.

Chapter 3 – Luxury food market overview

Asian luxury market

The luxury market is experiencing rapid growth, with Asia topping the list globally. This growth is driven by an increase in the number of high net worth individuals (HNWIs) and increasing tourism. The compound annual growth rate (CAGR) for luxury sales in Asia between 2009-2014 was 15%, with cities such as Tokyo, Hong Kong, Beijing, Shanghai and Seoul among the world's top 10 luxury markets.

There is limited data on luxury food markets at an aggregate level but estimates vary between US\$50 to US\$140 billion globally. Asia accounts for 30%, based on its share of the overall luxury market, which is growing at 7%, with luxury wine and spirits close behind at 5%.

The growth of luxury in Asia, where there are hierarchical and newly-industrialised societies, has been fuelled by cultural practices. Exhibiting one's economic status by consuming luxury products and displaying visible possessions are social norms across Asia. The demand for luxury products is linked with self-distinguishing behaviours, a need for uniqueness or differentiation and genuine appreciation for product excellence.

Higher consumption of luxury foods in Asia is most likely in countries with adequate purchasing power and where social ranking, associated symbolism and social exclusivity are well ingrained. Although there is currently no data available to support the size of luxury food markets in different countries, in the research phase of the Functional and Luxury Foods Project, VTT identified the most attractive markets in Asia by looking at the parameters of Gini coefficient, Power Distance Index (PDI) and the number of high net worth individuals (HNWIs). The table below ranks the Asian countries by luxury food opportunity.

Note: Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies inequality. PDI measures the extent to which power differs within the society, organization and institutions (like the family) are accepted by the less powerful members (Hofstede, Geert H. 1997).

Table 1: Ranking of Asian countries by luxury food opportunity

Rank	Country	Gini Coefficient	Number of HNWIs (millions)	Power Distance Index
1	China	37	0.76	80
2	Japan	32	2.31	54
3	Hong Kong	53	0.12	68
4	Singapore	46	0.10	74
5	Malaysia	46	0.07	100
6	Thailand	39	0.08	64
7	Indonesia	38	0.04	78
8	Australia	34	0.21	36
9	India	34	0.15	72
10	Korea	31	0.18	60

It can be seen from the table, and using defined luxury criteria, that China is the most attractive country for luxury foods given its high (and growing) social stratification and high number of HNWIs. Hong Kong and Singapore, which have predominantly ethnic Chinese cultures are also in the top five. Across the countries studied, Singapore is likely to remain the most accessible and easiest country for South Australian luxury business activity. Singapore has the lowest risk level identified for the ease of doing business, lowest levels of corruption, the existence of FTAs with Australia, economic freedom, political stability and local food regulations were also assessed. It is important to note that in 2014, the Singaporean Government raised the import duty on alcoholic beverages by 25%. Figure 1 outlines the evaluation of the market opportunities.

Countries	Ease of Doing Business, 2014 ranking	Corruption Perception Index, 2014 ranking	FTAs with Australia, 2014	Economic Freedom Index, 2014 ranking	Political Stability Risk, 2014 Percentile ranking	Food Regulation, 2014 ranking
Indonesia	7	8	X	6	6	7
Malaysia	4	5	✓	5	5	5
Australia	3	2	NA	2	2	2
Singapore	1	1	✓	1	1	3
Japan	5	3	✓	3	3	1
South Korea	2	4	✓	4	4	4
China	6	7	✓	7	7	8
India	8	6	X	8	8	6

Ease of Doing Business: Encompasses factors such as ease of starting business, registering property and contract enforcement. Rank 1 indicates the country with the highest ease of doing business

Corruption Perception Index: Higher score implies more corruption.

FTAs with Australia: Ease of trade, liberalisation of conditions of investment, foundation for further bilateral or multilateral cooperation

Economic Freedom Index: Incorporates government spending, regulatory freedom for businesses, property rights; Higher score corresponds to greater freedom.

Political Stability Risk: Reflects perceptions likelihood that the government will be destabilized or overthrown by unconstitutional means (i.e. violence and terrorism); 0 (lowest) to 10 (highest)

Food Regulation: Rules enforced by a country to ensure food safety and security.

Figure 1: Asia Pacific market opportunity evaluation for functional and luxury foods. GREEN indicates low risk (scale 1-5); YELLOW medium risk (scale 6-7); and RED high risk (scale: 8).

Market Drivers

There are five main factors influencing the growth in consumption of luxury foods in Asia:

Rapidly growing number of HNWI

The largest opportunities for luxury food and beverage products are in countries where there are significant numbers of consumers with investable assets of USD1 million or more, known as High Net Worth Individuals (HNWIs).

North America has the highest number of HNWIs followed by the fastest growing region globally, Asia Pacific. Between 2012 and 2013 the number of HNWIs in Asia Pacific grew by 17.3% to 4.3 million. Given the strong correlation between the consumption of luxury foods and wealthy individuals, the increase in HNWIs in Asia Pacific is likely to boost demand for these products in the region.

Growing interest in fine dining

Increases in wealth in Asia have spurred an interest in and demand for fine dining and hence consumption of luxury foods and wines. Japan has the highest number of Michelin-starred restaurants globally, with China in sixth place.

Reduced taxes on luxury items

Luxury foods such as shark fin and beche-de-mer (sea cucumber) can attract taxes up to 35%. These taxes are made up of import duties, VAT and consumption tax; however free trade agreements (FTAs) such as the one recently signed between Australia and China are reducing or removing these taxes which could lead to increased demand for imported luxury foods and wines.

Growth in luxury travel

With a forecasted annual growth rate of 7.9% for 2014-2020, Asia Pacific is the fastest growing region globally for outbound travel. China, South Korea and Japan are forecast to be the largest outbound markets in 2020, with China the largest market for luxury travel. More than half of China's HNWI's list travel as their most favoured leisure activity and 42% of them spend in excess of US\$1,000/day when travelling. Red wine is the most common gift purchased by Chinese HNWI's whilst travelling.

Luxury foods and wines are commonplace while travelling on luxury aircraft or ships and staying in luxury hotels, however interestingly the demand for luxury food continues once the travellers return home. Food tourism is an important market to these travellers and provides opportunities for the Australian wine industry. Regions already having success in marketing themselves for luxury food tourism include the Basque Country and various French regions.

Growth in gifting culture

“Guanxi” is the Chinese word for establishing and maintaining relationships of which gift giving plays an essential role. Gift giving is an important part of many Asian cultures and food, and chocolates and wine are common gifts. Imported luxury food and wine with attractive labelling and packaging, which offer a perceived value as status symbols are particularly important in this market. Wine gifts in the luxury market are predominantly via direct sales to large companies and government departments, with gifts usually accompanied by other accessories to complement the wine, such as glassware.

Market Challenges

There are two main factors contributing to the restraint of luxury foods growth in Asia:

Chinese Government clampdown on corruption/extravagance

An anti-corruption campaign was launched at the end of 2013 by Communist Party Secretary, Xi Jinping, affecting all levels of the Chinese government. This campaign has affected official and semi-official banquets (worth an estimated US\$49 billion) at which luxury food is consumed. The crackdown has seen a reduction in luxury seafood sales in China, and may also be attributed to the decline in sales of Cognac (19% in 2013).

Counterfeiting and traceability

Protecting brand and product intellectual property in Asia can be difficult and many companies are investing in authentication technology. Counterfeit products can lead to consumer dissatisfaction and distrust, resulting in a decline in consumption.

Routes and channels to market in Asia

Retail stores and high end restaurants are the end distribution channels for luxury foods in Asia, with airport stores and online retailers growing in importance. Distribution to both the retail and restaurant sector can involve several layers, including licensed importers and local wholesalers or distributors. Distribution can often be fragmented, for example in China there is no nationwide network of trucks, highways and cold storage warehouses to efficiently deliver supplies from the manufacturer or importer to the store shelf. Major retailers like Carrefour and Tesco have central distribution centres, but no large regional distribution centres, adding significant cost and complexity to distribution.

The Asian consumer – drivers of purchase/attitudes/preferences and trends

Luxury food consumption is largely determined by culture and dietary tastes. In China, consumption can be linked partly to traditional Chinese medicine. Foods which promote general health and are considered tonic-like are typically exotic, wild or rare and are known as ‘bu’ foods. There is also a large emphasis on status, prestige and symbolism for luxury food and wine consumption in Asian cultures, particularly at banquets where trust is established by performing social customs to honour guests, demonstrate their status and provide ‘face.’

With an increase in the middle classes, purchasing power and exposure to westernised luxury food there has been a growth in non-local food categories such as chocolate and wine. French wines (in particular those from Bordeaux) are widely accepted by Asian consumers to be synonymous with luxury. Elite wines are purchased to show wealth, therefore much importance is placed on the label and packaging to demonstrate its expense/luxury value. It is anticipated that as the Asia Pacific wine market matures consumers may wish to show sophistication as well as wealth which will see the taste for luxury wines expand beyond French borders.

Consumers globally are becoming more focused on sustainability and ethical production of food, and Asian consumers are no exception. The high price of luxury food and wine has resulted in counterfeiting which in turn has led consumers to also have an increased interest in traceability.

Chapter 4 – Market Analysis by Country

China/Hong Kong

Consumers in the China/Hong Kong market consider quality and craftsmanship in addition to the price and rarity of luxury food and wines. As discussed previously there is a large focus on gift-giving in Chinese culture and demonstrating wealth and social standing. Consumers are particularly concerned with product packaging, with both the quality of the product and its packaging having a direct correlation with the perceived luxury of the product. Traceability and authentication are becoming more important due to concerns over fraudulent luxury foods and wines on the market, with consumers paying more attention to the country of origin and the credibility of distributors.

There are regional differences for consumer preferences with wine and spirits across China. There is a growing market for imported wines in southern China because of the quality and perceived status of wealth and sophistication associated with the consumption of imported wines. Consumers in the north of China, with its cooler climate, have a preference for strong liquor and spirits; however, there is an emerging market for grape wine due to perceived health and nutritional benefits.

Chinese consumers show a strong preference for red wine, becoming the market leader for red wine consumption in 2013 (155 million nine-litre cases), a 136% increase from 2008. Although 80% of wines consumed are produced locally, Chinese industry experts forecast that imported wines will have over 50% market share by 2030. Red wine not only pairs well with Chinese cuisine but is perceived to have health benefits. The colour is also considered to be lucky, associated with wealth, power and good luck, whereas the colour white is associated with death and funerals.

French wines, particularly Bordeaux wine is synonymous with luxury in the Chinese market, however there is growing interest in luxury wine from other countries such as Australia (second largest importer behind France) and Spain (third largest importer). With the current anti-corruption campaign within the Chinese Government, luxury wines from outside France that offer comparable quality at a lower price point are expected to be in higher demand.

India

With a relatively low number of HNWI's (approximately 150,000 in 2014), the market for luxury food and wine in India is still quite small. Imported luxury food and wine is largely a new experience for Indian consumers, but with a growing affluence and strong economic growth this is likely to change. Masterchef India and other cooking competitions on television are gaining popularity in India and have been major drivers for marketing gourmet food and wines to Indian consumers.

Up to 30% of the Indian population is strictly vegetarian, and a further segment avoids non-vegetarian food during religious festivals and special days. Interestingly though, meat consumption is growing rapidly with more liberal attitudes and westernisation of tastes. Affluent and well-travelled Indians, supported by strong economic growth, are partly driving this trend. Foods and wines exclusively served at high-end restaurants or 5-star luxury hotels are perceived as luxury by these consumers.

Regional and ethnical differences do not play a significant role for the demand of luxury foods and wines across India as India has Tier-I and Tier-II cities across the nation (cities with populations over

100,000 and 50,000, respectively, as classified by The Reserve Bank of India). The majority of luxury consumption including dining, high-end retailers or restaurants occurs in Tier-I and Tier-II cities.

India has some challenges to luxury food and wine exports that should be noted. High tariffs, along with local excise and sales taxes, distributor margins and transportation costs can lead to doubling or even tripling of the manufacturer's price for an imported product. For imported foods these tariffs can be between 30-50% and approximately 140-150% for liquor. Both the EU and the United States have filed complaints with the World Trade Organization about Indian tariffs creating an unfair barrier for foreign countries to compete in India's lucrative alcohol market. Although there have been recent improvements to facilities, India has limited - and costly - refrigerated warehousing and transportation infrastructure.

With India's growing middle class, the alcoholic beverage market shows promise. For wine, however, this market is still quite infantile and marketers have the cultural stigma of wine being 'a woman's drink' to overcome. Wine consumption is popular with younger Indians and with 100 million Indian consumers reaching the legal drinking age of 25 in the next 5 years, the market is expected to grow rapidly. Further contributing to this market growth is the number of educated young Indians entering the workforce, gaining greater independence and higher disposable incomes.

By 2017, Indian wine consumption is projected to rise to 2.1 million cases per year which represents a 73% increase from 1.21 million in 2013. The Indian government's campaign to raise the awareness of health issues associated with the consumption of hard liquor is expected to increase market share for wine. The majority of wine consumption in India is in major economic and tourism hubs, as can be seen in the below figure. Mumbai and Delhi have the highest number of HNWI's in India, as well as large populations of foreign nationals from Western cultures who have aided the popularity of wine. Goa's large tourism industry has driven wine consumption in recent years. Bangalore is the IT hub of India and has a large population of educated young Indians who have developed a taste for wine.

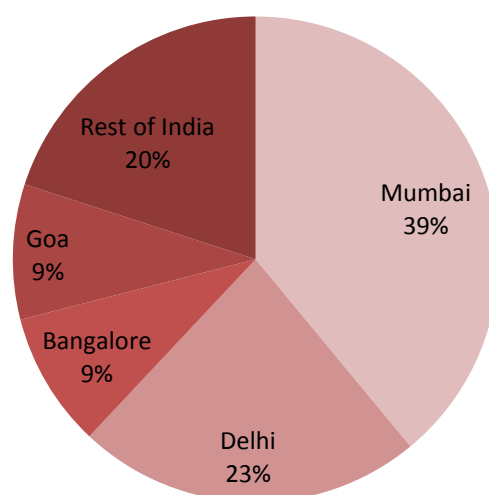


Figure 2: Wine consumption in India by region

Wine consumption in India is largely made up of domestically produced wines, approximately 75%. Despite the challenges for wine imports mentioned previously, the market for imported wines in India has grown from 13.3% in 2003 to 19.14% in 2013 with the major importers being France (60%), Australia, Chile, Italy, South Africa, California and Spain. Red wine (45%) is slightly preferred over white wine (40%), followed by sparkling (13%) and rosé (2%). Luxury wine is a concept restricted currently to the nation's elite; however, with the current phase of economic growth a new generation of consumers is expected to emerge, potentially following the footsteps of their Chinese counterparts, using luxury wine purchases to assert their status in society.

Indonesia

The World Bank lists Indonesia as one of the 'next 15' economies for economic growth. The luxury food and wine market is limited to the relatively small upper middle class and rich population in Jakarta, and to a lesser extent, the island of Bali with its luxury tourism industry. The Indonesian government, in a move to increase local consumption of luxury goods, reduced luxury tax on many products except alcohol. Rising inflation and increased import tariffs on products such as spirits have restricted high priced food and wines to only the very rich.

Indonesians who are becoming increasingly status conscious often have lavish weddings to demonstrate their family's wealth and status. It is at weddings, as well as at high-end restaurants, where luxury food and wines are largely consumed. Consumption is largely restricted to Jakarta and Java because logistics costs make even the most basic of products expensive in other regions of Indonesia. Wine consumers have a preference for red wine (nearly 80%), particularly French and Italian red wine; as it is believed to create an image of being affluent and health conscious.

Japan

The average disposable income per capita in Japan is US\$26,000 a year, much higher than most Asian countries, meaning Japanese consumers are more able to afford luxury food and wines. Japan is home to about half of the very wealthy people in Asia Pacific, with 2.3 million HNWI's and has a relatively large and well-established luxury food market compared to other Asian countries. Controlled by supply and demand rather than by government regulations, the Japanese luxury food market is appealing to exporters. Japan's ageing population and the impact of recent natural disasters (2011 earthquakes and tsunami), however, do provide challenges to the market. The decrease in the working population as Japan's population ages means that a higher percentage of personal income will need to be allocated to paying taxes, debts, and other social obligations, reducing the spend on luxury food. Consumption of luxury foods was reduced following the 2011 earthquake and tsunami with people focusing on social obligations and only consuming foods considered essential.

Consumer purchases of luxury foods are driven by seasonality (*"kisetsukan"*), treating themselves with a small luxury (*"petit zeitaku"*), or gift giving. Japanese people pay particular attention to the presentation, craftsmanship, production and preparation, packaging, taste, quality, brand, species and time period in which the food or wine should be consumed. Both price and endorsement by celebrities are used as a gauge by consumers as to the luxury and premium status of products.

More specifically for wine, Japan is the EU's sixth largest trading partner with a noticeable increase in consumption from 2009. There has been an 18% jump in consumption annually since 2011. Nearly half of the Japanese population consumes wine weekly and approximately 7% consume daily. More

than half of consumers consider the country of origin and the wine's performance in the country of origin as important aspects to consider. The quality to price ratio is also a critical factor for Japanese consumers' decision-making process.

Premium French and Spanish wines have traditionally had significant market share in Japan due to brand awareness and global popularity. In 2013, however, the annual market share of sales for French wines fell by 1.5%. This was largely attributed to the new Japan-Chile Economic Partnership Agreement in 2007, which saw an increase in Chilean wine imports of 17% by volume in 2013. Chilean wine sales have reached 25% of total sales as of 2014, and are popular with the younger generation in the market. Despite the fall in French market share, the French Beaujolais Nouveau and Bordeaux wines have a steady market in Japan through demand from the older generation and international accolades and brand recognition. Italian and Spanish wines also faced declines in market share by about 4.5% and 5.1% respectively in 2013. These declines have been linked with their dependency on restaurants for distribution. However, Spanish premium wines have maintained strong market share due to their established global presence, taste and attractive packaging.

Australian wine imports also suffered a decline of 5.6% between 2012 and 2013, which was attributed to a lack of support from Japanese distribution networks and lack of awareness of Australian premium labels in the market.

Korea (South Korea)

Korea is a developing luxury food market which is driven by the desire for Koreans to distinguish themselves and a growing interest in gourmet foods. Interest in fine foods has coincided with entertainment shows based on food, which are important channels for educating the Korean population about international and fine dining cuisine. Consumers are highly influenced by the visual appeal and presentation of luxury foods. They associate fine dining with social status, and it also forms an important part of their social functioning.

In addition to visual appeal, Koreans regard the health or cosmetic benefits of foods highly. The elements of water, wood, fire, metal and earth are represented in Korean food by the colours yellow, green, red, white and black respectively. Luxury food and wine purchases are highly influenced by western ideas of luxury, but interestingly also a need for value for money. A large portion of the current luxury food market is for foods once seen as forbidden as they could only be consumed by the aristocracy. Consumption of these foods is seen to improve social status.

The wine market in Korea is small, accounting for only 2% of alcoholic beverages sales. Consumption is growing at over 100% year on year. Fine wines are dominated by Bordeaux labels which are typically consumed in Korean restaurants, though in-home consumption is growing. Consumers show a preference for red wine due to its intense flavours, which are complementary with Korean garlic-based cuisine. Korea is a large distilled spirits market with many local speciality liquors. Single malt whiskies are a niche import market with highly brand conscious Korean consumers paying high prices for well-known Scotch and Japanese whiskies.

With a slowing economy, there is an increased focus on value for money with 'deal-savvy' consumers wanting to find the best deal available. Manufacturers have the challenge to demonstrate value for money as well as luxury.

Malaysia and Singapore

Malaysia and Singapore share a strong history and cultural identity. Their tastes and demands for luxury foods and wines are similar, despite their differences in economic development. Singapore has approximately 107,000 HNWI's compared to Malaysia's 67,000. Both countries' economic power is dominated by the Chinese population and their preference for luxury products is similar to Chinese consumers. The consumption of luxury foods is associated with status symbolism and impressing business partners and customers in business dealings. In both countries consumers believe that if a product is considered to be luxurious then it needs to have been imported.

There are notable differences between the nations that allow for differences in luxury consumption. Due to high living standards, a favourable business environment and higher average incomes, Singapore is largely considered the 'Switzerland of the east.' It attracts HNWI's to relocate which results in a larger market for luxury products. Many world-renowned chefs have also set up restaurants in Singapore, furthering luxury food and wine consumption. Singapore has a significant advantage over Malaysia for the import and distribution of luxury foods, due to more advanced supply chain infrastructure. This remains a significant challenge for the luxury foods market in Malaysia. Singapore with its restricted land mass is also not able to grow its own produce, unlike Malaysia.

There are broadly two types of consumers in these markets, 'Prada' and 'Pride.'

Prada: This consumer places its highest value on the status symbolism that comes from the consumption of luxury foods. Brand names and perceived exclusivity are the ultimate purchasing criteria among this group. Assisted by social media, this group readily shares their experiences of consuming luxury foods which subsequently increases their appeal. To take advantage of this trend, some chefs have adjusted the plating of their food to ensure it presents well in the square frame of Instagram.

Pride: These consumers pride themselves on having a more refined and sophisticated palate and do not judge a product simply on perceived quality. The preparation and production methods, as well as the narrative behind the product are considered important criteria as to whether a product is luxurious.

Consumption of wine in both markets is increasing but consumers still assume that France is the only origin for high-end luxury wines. More recently high-end Chinese restaurants have broadened their wine selection for pairing with their cuisine. Whisky is the most popular liquor in both markets, with whisky from Scotland and Japan, and over 18 years' maturity, considered luxury. There are trends in the alcoholic beverage markets of mixology and cocktails as well as priority access to nightclubs upon purchasing a bottle of expensive liquor at 100-200% retail mark-up. Weddings are also important occasions for alcohol consumption (except in Muslim weddings), with the quality of the alcohol often a measure of the wedding's prestige.

Chapter 5 – Identifying opportunities within SA’s existing value chain and ecosystems

This part of the consolidated research report assesses the actors, value chains, and opportunities for the South Australian food industry that VTT analysed during the research phase of the Functional and Luxury Foods Project.

The South Australian food and wine industry is a significant contributor to the state, contributing approximately \$10.2 billion in revenue and employing almost one in five, or 18% of the state’s employed workforce (Food and Wine ScoreCard, 2013–14, PIRSA, 2014b). The key industry organisation, Food South Australia (Food SA) and South Australian government development agencies have produced a number of reports assessing the state and development of the South Australian food industry; the main messages from the reports are that the industry is growing fast, and it is widely acknowledged as an important value creator in the South Australian economy (Estrada-Flores, 2015; Estrada-Flores and Bethell, 2014).

The main research undertaken for this part of the study consisted of interviews with South Australian wine industry actors (and 65 in total for the overall South Australian food and beverage industry actors). The research methods combined value chain analysis, innovation research approaches and market analysis tools. This was supplemented by a Literature Review to identify potential regional opportunities in luxury and functional foods.

Local suppliers in the value chain were also assessed, along with the challenges and issues related to the current state of the food and beverage industry and its development, and interesting and arising opportunity areas relevant to South Australia. The report also contains information about the key actors in the important Asian export markets in relation to the identified functional and luxury product opportunities.

Industry players

Table 2 shows the 65 companies interviewed for the value chain analysis of the overall study, 12 of which belong to the wine and spirits industry and 6 from the packaging industry (although none with a luxury and premium focus). The ‘other focus’ column refers to additional sources that were identified as interesting stakeholders within the food industry – their representation in the interview material is indicative and not comprehensive.

Table 2: Companies identified and interviewed

Industry area and focus	Luxury and premium focus	Health promoting focus	Other focus	Interviewed
DAIRY INCLUDING CHEESE	4 companies	3 companies	1 association	6 companies
GRAINS INCLUDING BEER	9 companies	6 companies	-	8 companies
HORTICULTURE	12 companies	8 companies	1 cosmetics company	12 companies
MEAT (RED, WHITE & SMALLGOODS)	10 companies	3 companies	-	5 companies
SEAFOOD	16 companies	-	-	5 companies
WINE INCLUDING SPIRITS	12 companies	-	1 association	7 companies
OTHER FOOD MANUFACTURING AND SUPPORTING ACTORS	14 companies (e.g. cakes, pastries, chocolate, sauces)	6 companies	1 luxury importer, 2 business service companies	16 companies
PACKAGING	N/A	N/A	9 packaging industry companies	6 companies

Value chain and actors

Figure 3 presents the overall SA food and beverage value chain studied and its components. It includes the stages and actors in the value chain, examples of goods and services produced and support services across the value chain.

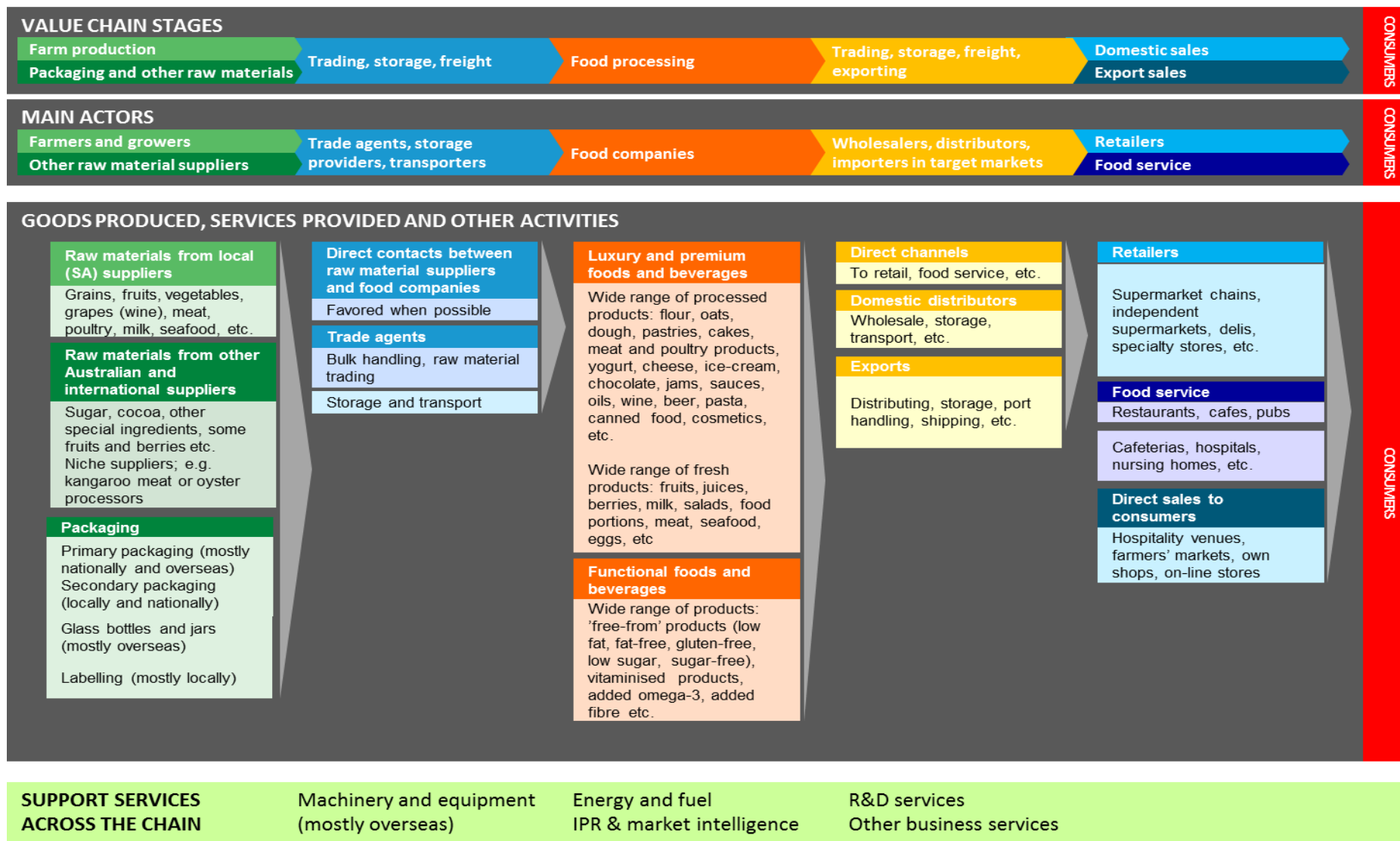


Figure 3: South Australian food and beverage value

Table 3 presents a summary of luxury actors currently present in the wine and spirits ecosystem of South Australia. The portrayal is not exhaustive and naturally the South Australian actor base is wide and constantly evolving.

Table 3: Luxury actors of the wine and spirits value chain in South Australia

Products	Trade agents, importers, wholesalers, distributors	Retailers	Food and beverage services
Red wine	Riverland Food & Wine (RDA), Bird in Hand, Coriole Vineyards, D'Arenberg, Gemtree Wines, Penfolds, The Lane, Pernod Ricard-Orlando Wines, Seppeltsfield Wines Pty Ltd, Bekkers Wines, Rockford's, SA Wine Industry Association	East End Cellars, Dan Murphy's, Vintage Cellars, Fine Wine Merchant, Treasury Wine Estates	Hilton Adelaide, Stamford Adelaide, Mercure Hotels
Distilled Spirits	Southern Coast Distillers, Horndale Distillery and Wine Cellars	East End Cellars, Dan Murphy's, Vintage Cellars, Fine Wine Merchant, Treasury Wine Estates,	Roy Murphy's, Hilton Adelaide, Stamford Adelaide, Mercure Hotels

It was clear from the interviews that in this kind of value chain the most critical stage is between the companies and the destination markets. Within the local end markets in South Australia, and with company-owned or otherwise easily accessed transport services, it is optimal to sell directly to retailers such as supermarkets and to services such as restaurants. However, when moving further to national or to international markets, the role of distributors and distribution networks becomes more critical. Especially in specialised luxury markets, local knowledge about products and the markets, and well-established networks of foreign distributors, are needed. Many respondents already exporting emphasised the long-term (more than 10 years) work they have done in order to establish overseas distributor connections and market access points. Although production of luxury and functional foods is limited among South Australia's local food and beverage companies, interviewed companies recognised such products as interesting, but challenging, forms of adding value.

Figure 4 represents the value chain of the wine industry.

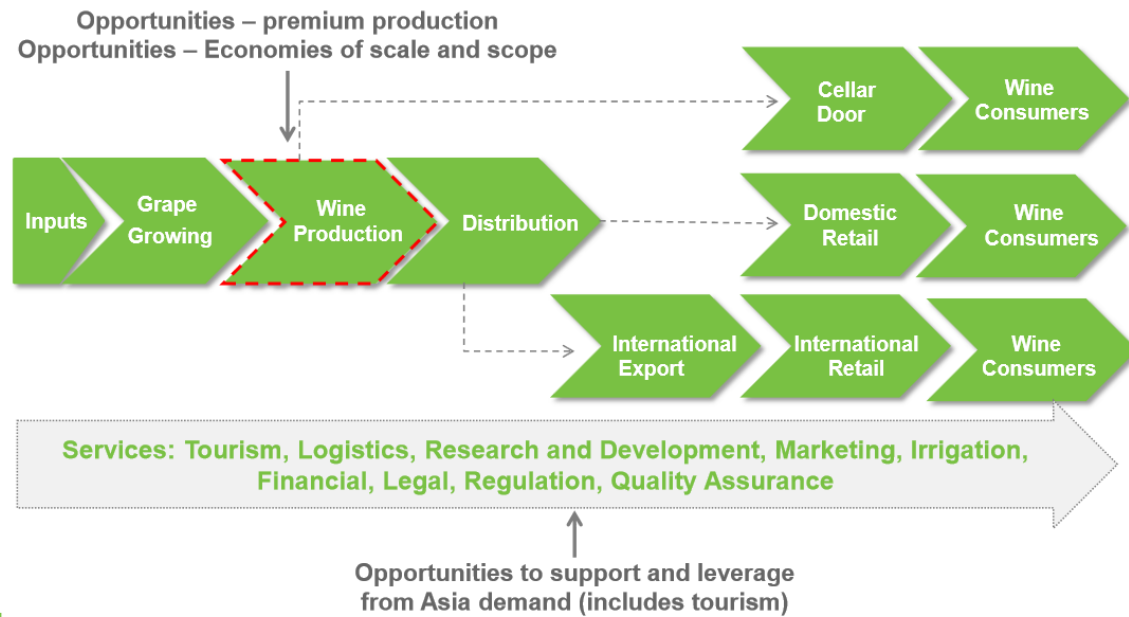


Figure 4: Wine industry value chain (source: PIRSA, 2014a)

The innovative business ecosystem of South Australia

Innovating through luxury products can bring new business opportunities to the South Australian wine industry, but greater value can emerge from activities combining value chain and innovation ecosystem thinking (Hekkert et al. 2007; Nambisan and Baron, 2013). Having a resilient, innovative economy in South Australia is part of the core regional goals as outlined by the Department of Primary Industries and Regions SA (PIRSA) (2013b). The ecosystem approach emphasises the use of local knowledge and skills. The definitions used of innovation ecosystems and hubs often reflect the models of regional innovation systems such as the Triple Helix (Etzkowitz and Leydesdorff, 2000) or learning regions, but the logic behind constructing innovation systems varies from the localised, path-dependent inter-firm learning processes to regionalised national innovation systems, where scientific research and development have taken a much more prominent position. However, all ideal models and types emphasize strong regional networking. Another and more demanding criterion is the connection to global value networks and the ability to create value in the global economy (Prahalad and Krishnan, 2008).

In figure 5, the mapped actors are presented as a part of the value creation system. The presentation of the key elements and actors follows the business and innovation ecosystem approach, which is useful in anticipating the future developments of different industrial sectors. The innovation ecosystem may start with how South Australian actors internally structure their processes to deliver products and services, with the value network that consists of partners, and ultimately, stakeholders such as governments, affiliated industry players such as Food SA, and related industry segments such as tourism, packaging, transport or agriculture. In addition, in the ecosystem approach the supporting services are seen as very important.



Figure 5: Actor mapping in an innovation ecosystem

The innovation ecosystem can be evaluated by analysing the current status of public policy driven activities, public-private partnerships and company and forum-driven activities in comparison to global best practice environments. The overall starting point in South Australia is quite good, with a lot of ecosystem assets and strengths that need to be fully recognised and used – wine is one of the already identified industries that has a lot of potential.

State of the industry (company performance) and SWOT

PESTLE

The macro level factors affecting the SA industry are presented in the PESTLE analysis in Table 4, with some of the identified issues also applying more broadly to Australia.

Table 4: PESTLE summary of local factors affecting the industry

PESTLE Analysis						
	Political	Economic	Socio-cultural	Technical	Legal	Environmental
Luxury	<p>Stable government with an increasing interest in advanced manufacturing, agriculture and food and wine lays a good basis for the development of luxury industries.</p> <p>Exporting premium wine and food is one of the economic priorities of the government.</p>	<p>Similarly, to most Western economies, the SA economy is service driven. Economic growth is somewhat dependent on mining and agriculture sectors. The financial system is generally stable and quite strong, but the economic growth has lagged a little behind the rest Australia. Markets are open, with no notable restrictions.</p> <p>Notable taxes affecting the industry are GST and WET (Wine Equalisation Tax).</p> <p>Industries are sensitive to the movement in exchange rate.</p> <p>There are challenges related to high-cost environment.</p> <p>The local South Australian market and the Australian national market are competitive and quite saturated: this affects growth rate and creation of new sales. Some industries such as grain and wine are also in overproduction.</p> <p>Growth in the number of premium and high quality food outlets e.g. Thomas Dux, and a growing number of high net worth individuals with the ability to buy special food.</p> <p>Free Trade Agreements with Japan, Korea and China improve market access for SA companies.</p>	<p>The population of South Australia continues to grow. Rapidly growing ethnic populations, especially Chinese and Indians are driving demand for specific ethnic foods in Australia e.g. saffron in the luxury field.</p> <p>Affluent older population seeks to indulge in high end products in small amounts.</p> <p>Population is well-educated, and the food culture is vibrant with initiatives fostering local food (e.g. Eat Local SA). Much enhanced interest in gourmet cuisine in Australia as a result of popular TV shows.</p> <p>Significant increase in expenditure on eating out, which is growing at double the rate of general retail expenditure.</p>	<p>High focus on top-quality products that do not require much technological investments. The companies have usually automated their processes where suitable and feasible, and do not have many technology-related issues in the operation.</p> <p>Demand for luxury products with a premium story and high end retail options drive the luxury food industry development.</p>	<p>No major regulatory guidelines related to luxury food industries.</p> <p>Quite flexible business laws. Some expansions of regulation have increased compliance and food costs (e.g. related to trade waste).</p> <p>Consumers are more and more concerned about labelling information and food production attributes such as traceability (Country-of-Origin), No Growth Hormones Used, Free Range and Animals Treated Humanely and Environmentally-friendly.</p> <p>The food industry also emphasises a need for more clear certifications, standards and labelling, for example in terms of clean and sustainable food and organic products.</p> <p>IPR knowledge and support is needed to overcome trade barriers related to technical regulations, standards and conformity assessment procedures and labelling rules overseas.</p>	<p>Water scarcity affects food and beverage industries.</p> <p>The industry is widely dependent on natural resources and energy.</p> <p>Environmental and climate issues are important and Australians are investing in replacing fossil energy by renewable fuels such as solar, wind and marine.</p> <p>Via regulation (e.g. water restrictions), all industries have had pressures to adapt and mitigate in the hope of alleviating or managing climate change</p> <p>'Clean and green' standards are well represented.</p>

SWOT

SWOT is an analytical framework that is used to identify and structure an industry's greatest challenges and its most promising opportunities. The strengths and weaknesses are internal factors that stem from within the industry, and the opportunities and threats represent factors arising from the external environment. The strengths, opportunities, weaknesses and threats identified from the interview data are summarised in Table 5, with the most notable issues and challenges arising from the material presented. Strengths, opportunities, weaknesses and threats were previously assessed in the South Australian Food Strategy 2010–2015; the SWOT in the current report presents an updated analysis emphasising the recent industry insights from the interviews, with a focus on luxury food and beverage businesses.

Table 5: SWOT analysis

SWOT ANALYSIS	
Current state of the South Australian Functional and Luxury Food Industry	
INTERNAL	<p>STRENGTHS</p> <ul style="list-style-type: none"> • Many unique businesses, niche market players and 'gap fillers' with novelty value • Long traditions and quite strong business culture with a variety of different companies and high-quality products • Experienced businesses and some pioneering operations and initiatives: learning from more experienced businesses, interest in mentoring possibilities (ecosystem thinking and benefits) • Good relationships and level of trust among businesses and sustainable relationships with suppliers, customers, regulators etc. • Some "pockets" of collaboration • Diversity in regional climates, attributes and cultures • Innovative culture and tradition • Healthy independent retail sector • Primary industry funding schemes such as AFM (Advanced Food Manufacturing) grants and DSD's (Department of State Development) grants supporting innovation, SA innovation vouchers, micro finance fund grants • Demonstrated collaborative mechanisms and cooperation builders such as SA Food, SAWIA and other industry organisations <p>WEAKNESS</p> <ul style="list-style-type: none"> • Conservative and traditional attitudes and quite slow development, with a few exceptions • Cautious product development • Small amount of genuine luxury and functional products – value chains generally quite short • Size of the local customer base is generally too small for high value luxury and functional products: resulting in a limited interest in product development and innovation in the luxury and functional fields • Limited interest and capabilities to export • Difficulties in finding right partners for export • Limited funds for new machinery, facilities and R&D • Limited collaboration in exports • Distance to Australian markets • Threats to water supply/security • Rising input costs associated with business operations • Scale and complexity of distribution systems • An ongoing need for infrastructure in some regional areas
EXTERNAL	<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> • Collaboration possibilities in exports • Recognition and full utilisation of the specialities and resources of the region • Improving the readiness to enter Asian markets • Increasing the amount of R&D, product development and technology – when feasible • Spreading and utilising the existing knowledge within the value network; increasing the market intelligence • Increasing health consciousness • Increasing the understanding of diverse range of customers and potential customers (needs, habits, culture, etc.) • Providing help in partnership building, and in establishing international connections (e.g. international boards, visits) • Simplifying and standardising regulation and certifications • Increasing demand for safe and nutritional food production systems • Increasing diversity of food markets • Ensuring a competitive trade and service provider network • Growing food service industry • Enhancing the food, wine and tourism experience <p>THREATS</p> <ul style="list-style-type: none"> • Not enough funding and recognition for SMEs • Limited knowledge and preparedness to enter the Asian markets • Too much bureaucracy and tax burden • Vulnerability to natural and environmental threats (water, drought, energy etc.); impacts of climate change and variability • Highly competitive environment with a wide range of risks, regulation, and difficult requirements (Asian markets) • Complex and inconsistent certification system that needs standardisation • Exposure to commodity and currency volatility • Future labour shortages and low rates of skilled labour retention • High costs of business operations • Access to capital for future expansion • Challenges of the Australian packaging industry; worries of the interviewed companies related to local availability for differentiated and luxury packaging • Highly competitive environment with a wide range of risks, regulation, and requirements (Asian markets)

Strengths

The luxury brands of food and wines in South Australia are predominantly family owned, and customers tend to place more trust in products from family companies than those from multinational organisations (The Economist, 2014). An appreciated heritage and small familial structures are attributes of luxury and strength within the South Australian food and wine industry, as described by those businesses interviewed.

Weaknesses

Limited innovation

Product development and transition within the food and beverage industry is in many places slow and cautious. Only a small number of genuine luxury products can be found, and where they exist, the value chains are generally quite short. Regarding luxury foods, there may even be reluctance to move from premium towards luxury foods; this is mainly due a fear of losing loyal domestic market share. Another important weakness is that the size of the local customer base is too small for high value luxury; this has resulted in a limited interest in product development and innovation in luxury areas. This weakness can be avoided by directly targeting export markets; however, the interests and capabilities related to exports are limited, and there are some difficulties in finding the right partners for export. There are also challenges relating to continuous supply of raw materials to maintain a stable production level when using seasonal raw materials.

A further weakness is an unwillingness to prioritise investments in new machinery, automation, facilities and research and development. Both the stakeholder interviews and studies identify high costs (e.g. energy, water, waste and labour) as a competitive disadvantage for establishing, operating and growing food companies in South Australia.

Of the food processors and manufacturers interviewed, more than 50% stated that the current primary driver for growth is a focus on increased efficiency and reduction in costs of production. This is one key driver for a limited interest in R&D, and as a consequence, the R&D community has focused its efforts (in attracting industry support) elsewhere. Businesses are mainly concentrated in doing what they have already done for a long time – innovation through completely new luxury products is currently quite rare. Equally, this has meant that the food processors and manufacturers have, in the main, not employed staff with the technical competency to, for example, identify R&D needs or emerging technologies that could be applied within their company. This forms part of a vicious cycle. Another important weakness is the lack of widely accepted definitions of luxury food products. Terms such as 'luxury' or 'premium' are used mostly as market differentiators, and not as a systemic part of product development.

The current state of local packaging providers and materials

Standard packaging is readily available and the Australian packaging companies are relatively healthy, but local supply for non-standard, customised packages and bottles that suit the needs of luxury beverages is limited. Many companies stated that using local packaging manufacturers is not feasible, and also that the quality and design suitable for product differentiation is not good enough compared to overseas competitors. For example, for luxury wines all the bottles must be sourced from Europe, and the capacity to produce coated paperboard that is generally used for premium and luxury packaging has diminished locally. In particular, needs related to special and custom packaging cannot be fully met by local or even national actors, although the food companies like to source all they can locally. Many interviewees viewed packaging as a critical part in their operation and emphasised the differences between premium and standard packaging. In addition, a major part of the current product development involves variation through packaging and bottling. In summary, the industry is moving faster and is more entrepreneurial than the packaging sector. Insufficient

attention is being paid, for example, to packaging design, which is important if companies want to move up the value chain towards more luxury products.

Threats

Support and recognition of SMEs

Threats arise, for example, from the limited amount of support for and recognition of SMEs, from high costs, from limited knowledge of and preparedness to enter the Asian markets, and from a challenging regulatory environment. The highly competitive environment as relates to Asia (although good in principle in driving improved performance) can be challenging for smaller firms. This is further complicated by the complexity and inconsistency of the regulatory regimes and behavioural customs in some of the target markets. Similarly, some Australian regulatory actions appear as threats and cause debate; for example, regimes such as Wine Equalisation Tax (WET) have changed industry dynamics, but abolishing WET could result in reduced profitability.

The availability of quality workforce

Team management and business management were also strongly identified as skills shortages. Access to a high quality workforce is a challenge, especially for bigger companies and companies located in more distant areas of South Australia. In summary, human resources are one of the greatest problems of the food and beverage industry in South Australia at every level, from technical staff and seasonal workers to specialists. Some companies mentioned that there are huge gaps in finding suitable employees who understand and are genuinely interested in the business. These, and other human resource related issues, have also resulted in the situation where companies are reluctant to hire more staff. Generational changes can also cause problems if ageing family business owners cannot find successors for their work.

Opportunities

Research and development

One unexploited opportunity relates to increasing the amount of R&D, product development and technology when feasible.

Market understanding

The company interviews indicated that there is a need for improving the readiness to enter Asian markets. Opportunities here lie in spreading and using the existing knowledge within the value network – some of the most innovative companies emphasised that the most important benefits and learnings they have received have been from more experienced industry actors and business mentors. In practice, this means increasing market intelligence, improving the understanding of a diverse range of current and potential customers (demographics, needs, habits, culture, etc.). In addition, a stronger focus on target marketing based on one or a few key segments could prove to be beneficial. The most successful companies have already understood the requirements of individualising markets: adaptability and local knowledge and presence in each market (Porter, 2014).

The importance of differentiation

More radical and disruptive technology and innovation cases are very rare. Generally, the luxury category was defined to be too restrictive in terms of sales. Approximately 90% of the interviewed companies seemed to be satisfied with their current situation and position, which is to offer high quality, premium-end products to a variety of customers. Only 5–10% of the interviewed companies claimed to be highly selective with their customers and target markets. These cases, however, represent a genuinely innovative and intelligent way of doing business; within these companies, for example, the value of stories related to the products and a stand-out design is underlined.

Packaging

Innovation in packaging targets extending product shelf-life, enhancing consumer convenience, and ensuring product safety and sustainability. Tamper-evident and tamper-resistant packaging innovations can provide a means to combat counterfeit products and unauthorised refills and protect a luxury brand image in Asian markets. Sustainable packaging – meaning the development and use of packaging which results in improved sustainability – is another packaging trend to be noted.

The current state of the local packaging providers could be improved with new approaches to packaging. A number of technologies are potentially available to address food industry needs, including flexible modified atmospheric packaging (MAP), vacuum skin packaging, smart packaging and labelling, and sustainable packaging.

Digitisation

Digitisation (also referred to as digitalisation) is likely to drive industry (Scott-Thomas, 2011). It will affect the whole value chain, including raw materials, product development, processing, packaging, logistics, distribution, marketing and sales. Digitisation helps to manage an enterprise more efficiently (PwC, 2011), it creates market opportunities for companies by connecting them with digitally empowered customers and by improving the understanding of consumers' needs in emerging markets, and enables value chain transformation.

More technology and innovation-related opportunities and information (e.g. 3D printing and biotechnologies) will be identified and assessed later in this report via strategic roadmaps.

Branding

The luxury market was noted as transforming from its traditional conspicuous consumption model to a new experiential luxury model (Wiedmann et al., 2007). For example, Bulgari and Baccarat are pursuing new business opportunities in the hospitality sector by opening hotels in locations such as Milan, London, New York and Bali, thus tapping into the growing experiential luxury market (Som and Pape, 2015). Value creation through experiences and meanings related to food and beverages is often mastered by experienced entrepreneurs, for example the most successful luxury winemakers develop carefully and cleverly crafted narratives for their products. The importance of experience and the 'meaning components' of products and services is also widely recognised and examined within design thinking studies (Verganti, 2009).

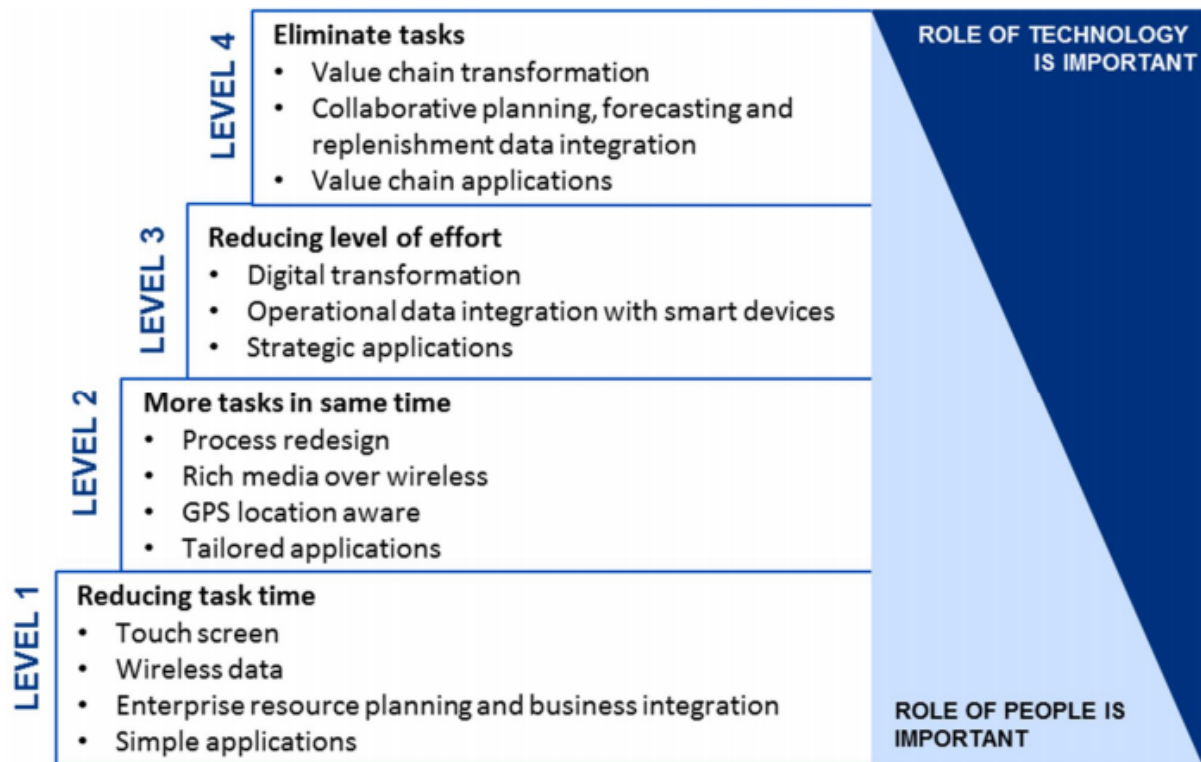


Figure 6: Productivity improvements enabled by digitisation (Adapted from PwC, 2011).

These meaning components include elements such as economics (price, brand), environment (durability, sustainability), societal aspects (communality, ethical values), usability (quality, complexity) and personal aspects (experience, usefulness, life management), which convey new reasons for customers to use and buy things.

Entrepreneurs, researchers, technologists and artists are all interested in understanding and interpreting possible future environments and habits. In practice, producers may integrate social and psychological knowledge into their expertise, or firms can integrate anthropologists or artists into their teams. It is also argued that the most valued experience building requires understanding of societal, cultural and technological changes and their implications (Oksanen and Hautamäki, 2015). The required knowledge about the dynamics of social and cultural models is often tacit; it cannot be easily found in books or reports or anticipated by building forward-looking scenarios. Such dynamics consist of numerous unpredictable interactions between different actors (companies, users, designers, media, schools, researchers, artists and so on). In this context, innovators need to understand the notion that they are also in a network that constantly reflects different meanings from other industries, societal groups and individuals.

Food and wine tourism

Food and wine tourism is closely linked to branding. Food and wine tourism is a growing market, comprised of travellers seeking authentic experiences of the places they visit through the products they consume. The 'Eat Local SA' initiative for consumers and premium wine and food tours serve as a good basis for further development of SA food tourism and promotion of SA as a luxury food

region, which could expand the inbound tourism opportunity. The romanticism associated with having visited vineyards, cheese production facilities, and mushroom growing areas is an important part in the experience for travellers. For example, the Central Market in Adelaide is a food tourism asset visited by hundreds of thousands of tourists every year; the capabilities of different regions of SA could be similarly strengthened. Adelaide Farmers Market at the Wayville Showgrounds has been voted the best farmer's market in Australia by Australian Traveller and the Barossa Farmers Market is also highly rated. South Australia has the potential to expand its positioning as a luxury food and wine tourism location, but requires a range of initiatives, including unified definitions for products, stronger understanding and use of cultural heritage, cooperation of industry stakeholders (producers, hotels, travel agents etc.), and ensuring the sustainability and maintenance of high quality services and products. A potential option could be to enhance the existing National Wine Centre (and other centres) into an expanded luxury food centre, with a goal of developing South Australia as a luxury food and wine region. In addition, targeted marketing efforts, including activities in social media (e.g. food blogs and food and wine travel blogs), could bring visibility, facilitate brand enhancement, and promote SA luxury food and wine as desired experiences.

E-commerce

Online sales and home shopping are quickly becoming the distribution mode of choice in Asia due to consumers' ability to make informed decisions and compare prices. Some South Australian food companies already have online stores, but especially in luxury foods, there are opportunities for South Australian producers to increase online sales, for example through opening e-commerce sites on Tmall, China's largest merchant e-commerce site and one used by many overseas vendors. The success of ventures such as Net-A-Porter has shown that consumers are willing to buy luxury products online, and at undiscounted prices (Dauriz et al., 2014). Alongside online sales, social media shows strong potential in luxury business and online advertising. For example, Instagram offers brands new advertising options, such as ways to expand brands' ability to convey a richer and more detailed story (Sorin, 2015).

Internet retailers have proven the case for selling luxury online, working creatively to overcome the limitations traditionally associated with retailing designer fashion – sizing, fit and 'feel' to name a few (Luxury Society, 2012). Online food and wine commerce is different from other luxury products, and presents some new challenges such as tasting, for example the fine wine industry still lacks unified and global e-commerce platforms. However, regardless of the challenges, online retailing is changing food and beverage trading, and industry actors need to be prepared for the change.

Entrepreneurial attitude

Finally, entrepreneurial attitude is identified as the key enabler to benefit from opportunities. The company interviews present a somewhat positive, but still emergent, entrepreneurial attitude among the SA industry. Developing and encouraging an entrepreneurial mindset and promoting inspiring and local success stories in global channels (blogs, articles in business and lifestyle magazines, video clips etc.) could further improve the visibility of the SA brand and companies. Entrepreneurial attitude arises from the will to improve the current situation: many of the interviewed companies demonstrated satisfaction with their current profit and situation, sometimes resulting in a reluctance to grow and take new risks. To enhance the entrepreneurial mindset, the companies' willingness to explore new horizons needs to be strengthened. The more innovative

companies emphasised the importance of risky pursuits and experiments for success. Overall, a few skills that are related to strengthening the entrepreneurial spirit can be identified (Llopis, 2013): broadening the observations beyond obvious details before you (for example, towards food exports to new countries with products not currently produced in South Australia) and simultaneously cultivating the most promising opportunities by giving them the right amount of focus and attention (choosing focus areas and prioritising them in terms of funding and other resources, and in turn not wasting energy on opportunities with limited potential).

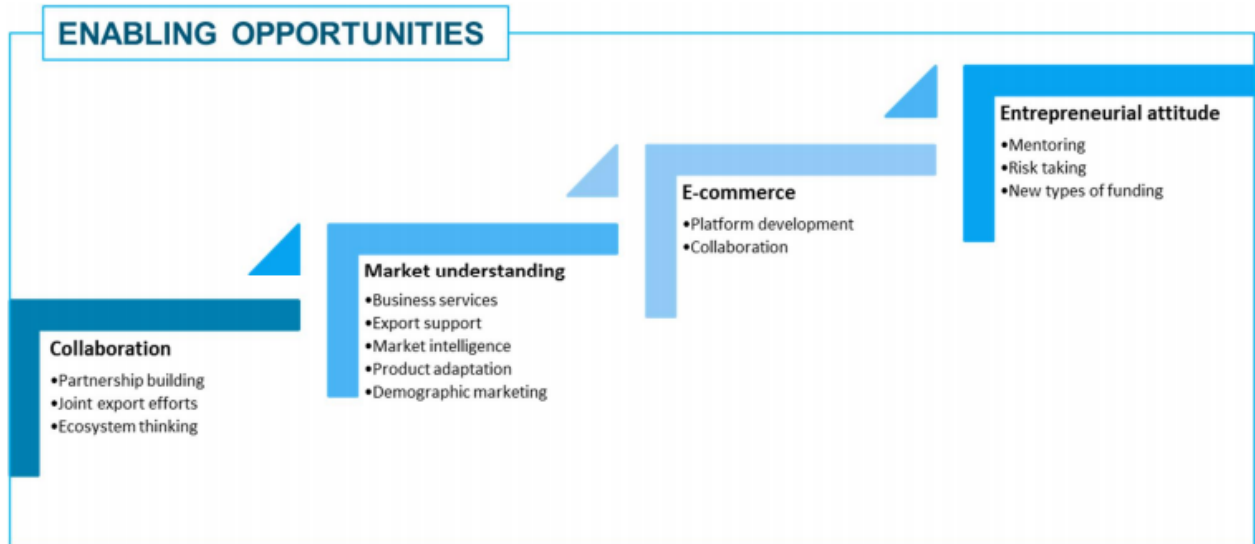


Figure 7: The enabling opportunities for adding value to the luxury and functional food value chains.

Target market actors and issues

The most important export targets for the South Australian food industry within Asia include six countries (with Hong Kong classed separately from China), based on the largest existing luxury food markets and countries with relatively large number of HNWIs:

- China
- Hong Kong
- Singapore
- Japan
- Malaysia
- South Korea

The initial market situation in each of these countries was assessed in PESTLE table 6.

Table 6: PESTLE analysis of the six most important export targets for the SA wine industry for red wine production.

Country	PESTLE Analysis for Red Wines					
	Political	Economic	Socio-cultural	Technical	Legal	Environmental
China Red Wine	Stable government with an	Increasing affluence and disposable	Red is associated	Insufficient (volume and		

Country	PESTLE Analysis for Red Wines					
	Political	Economic	Socio-cultural	Technical	Legal	Environmental
	<p>increasing focus on anti-corruption drives. Growing interest in outward FDI to foster economic ties with the West FTA (free trade agreement) with Australia and New Zealand. Government agents have been warned against extravagance especially on luxury goods.</p>	<p>income of the Chinese population.</p> <p>GDP in 2013 grew at 7.7 per cent.</p> <p>0.76 million HNWI's in 2014.</p>	<p>with prosperity in China and wine is seen as a symbol of sophistication.</p>	<p>quality) local wine production will drive an increasing demand for imported products. Growing call for anti-counterfeiting measures</p>		
Hong Kong	<p>Hong Kong has removed duties on wine imports and aided by falling Euro value, more European luxury wines are available in the country.</p>	<p>Hong Kong is the world's third ranked financial centre and has advanced wine and gastronomy market in the East Asia region. The financial status along with a relaxed duty for wines has ensured heavy presence of wine brands from around the world, including luxury brands.</p>	<p>Socialising culture is big in Hong Kong, which is one of the major financial centres of the world, and this gives opportunity for expats and high income groups to socialize in high-end restaurants and bars, thus creating more demand for luxury beverage such as fine wines.</p>	<p>Very little wine production in Hong Kong owing to unsuitable weather for grape production. Large scale wine imports due to favourable import regulations.</p>		<p>0% duty for wines</p>
Singapore	<p>In 2014, the Singaporean government raised the import duty on alcoholic beverages by 25%.</p>	<p>Consumers in Singapore appeared to trade up to more luxurious alcoholic drinks as their disposable incomes increased.</p>	<p>Red wine has a positive perception in terms of the health benefits gained from rich polyphenol content. With the increasing number of fine dining</p>		<p>The Liquor Control (Supply and Consumption) Bill has been passed in Parliament. Under the new laws, the public will not be allowed to buy alcohol to take away</p>	

Country	PESTLE Analysis for Red Wines					
	Political	Economic	Socio-cultural	Technical	Legal	Environmental
			restaurants, the influx of wine brands and new types of wines are expected to be witnessed further in order to cater for the demand of consumers.		or consume alcohol at public places from 10.30pm to 7am daily. The new laws are expected to take effect by 1 April 2014.	
Japan	Stable government with an increasing focus on ageing population and austerity measures. Growing interest in outward FDI (foreign direct investment) to buoy struggling local economy. FTA (free trade agreement) with Australia and New Zealand.	Shrinking of the workforce due to ageing population placing heavy burden on the economy. Austerity measures driving consumers to focus increasingly on quality over quantity.	Affluent older population seeks to indulge in high-end products in small amounts. Growing entry of women into the workforce driving red wine consumption	Lack of local industry. High focus on quality imports particularly in fine wines with strong copyright and IP protection.		
Malaysia	As a country of Muslim majority, the country's political parties at times use the banning of alcohol in certain areas as means of satisfying certain religious fundamentalists. However, popular tourist and urban areas are largely unaffected.	Malaysia has a relatively small consumer base for wine. Australia is the dominant supplier with 48% market share. In 2013, the import market was valued at US \$75 million, amounting to 6 million litres.	There was a shift in preference towards wine, especially among young working adults who are becoming increasingly sophisticated with wine drinking. The perception of wine as a healthier choice than cognac and whisky further propelled demand in	Malaysia lacks the climate, soil and grape variety to cultivate its own red wines.	Tariff for non-sparkling wine (HS 2204): (A) Import duty of RM 7 (USD 2.20) per litre; (B) Excise duty of RM 12 (USD 3.76) per litre plus 15%; (C) 5% sales tax on CIF + duty. Labels on imported wines must give a specific description of the product, the alcoholic	

Country	PESTLE Analysis for Red Wines					
	Political	Economic	Socio-cultural	Technical	Legal	Environmental
			<p>Malaysia. Although the majority of Malaysia's population is comprised of Muslims whose faith prohibits alcohol consumption, wine in Malaysia remained profitable for wine companies. Cabernet and Shiraz are the two most popular red wines.</p>		<p>content, as well as the primary ingredients used in production.</p>	
South Korea	<p>Korea has been ranked fifth in the world for 'ease of doing business' according to the World Bank Group, encompassing factors such as 'trading across borders'. Korea has entered into a number of bilateral free trade agreements (FTAs) with countries such as Chile, the U.S., the E.U., Australia, and now soon New Zealand. This has had significant implications on wine trade, with the elimination</p>	<p>With growing wealth and increasing disposable incomes, more consumers are purchasing wines for private consumption. The E.U., U.S., and other FTAs, have resulted in lowered imported prices on wines from the major wine exporting regions.</p>	<p>Wine is traditionally a status symbol amongst Koreans, commonly associated with sophistication and luxury. As wine becomes more affordable and wealth increases, consumers are enjoying the greater accessibility to wine as a social drink.</p>	<p>Korea lacks the climate, soil and grape variety to cultivate its own red wines.</p>	<p>The legal purchasing age for alcohol in Korea is 20.</p>	<p>Grape qualities are highly volatile and sensitive to climatic conditions, resulting in 'vintages' that vary year to year and thus are valued differentially according to quality.</p>

Country	PESTLE Analysis for Red Wines					
	Political	Economic	Socio-cultural	Technical	Legal	Environmental
	of import tariffs, resulting in more competitive prices					

Conclusions and next steps

In summary, for South Australia to fully tap the opportunity potential of luxury products and service offerings, several challenges need to be tackled. The main problems and challenges are related to:

- the availability of a quality workforce,
- the weakening state of the local packaging providers and materials,
- the limits of differentiation, and
- the size of the local market.

In addition, companies would benefit from more market intelligence and stronger international networks that are critical in exporting; similarly, more support and knowledge sharing is needed in order to use the latest know-how related to technology and innovation. Opportunities and pathways for their realisation are summarised later in this report.

Table 7: Main actors for wine in the six most important export targets for SA.

Country	Value Chain Actors of Luxury for wine			
	Trade agents, importers, Wholesalers, Distributors	Producers	Retailers	Food and beverage service
China	CVBG Grands Crus, Cavit Italy, Sarment Wines, EEDC Wines & spirits, ASC Fine Wines Beijing, Aussino Beijing, DT ASIA - BALLANDE GROUP, Jointek Fine Wines, Jebesen & Co. (China) Ltd, Torres China, Summergate Wines, Roque Fine Wines		Sotheby's Auction House, Christie's Auction House, Treasury Wine Estates Ltd, Sarment Wines, Jiuxian, Watson's Wine, Yangjiu, Force Eight Cellars, Jointek Fine Wines, Magnum Fine Wines, Yantai Changyu Group Company Limited, China Great Wall Wine Co. Ltd, Tonghua Grape Wine Co. Ltd	Grand Hyatt, Beijing, Hilton Grand Shanghai, Shangri-La Hotel Beijing, Wanda Sofitel Beijing
Hong Kong	Conti Int'l (Hong Kong) Trading Co Ltd, Woodside Wines and Spirits Ltd, Hong Kong Liquor Store, Macro Wines and Spirits Asia Golden Gate, Hong Kong	Châteaux Siran, Margaux, Lanessan, Mouton	Majestic Wines, Watson's Wines, Hong Kong Liquor Store, Wickens & Co Ltd	8½ Otto e Mezzo, L'Atelier de Joël Robuchon, Lung King Heen, Bo

Country	Value Chain Actors of Luxury for wine			
	Trade agents, importers, Wholesalers, Distributors	Producers	Retailers	Food and beverage service
	Liquor Store, Wickens & Co Ltd, Macro Wines and Spirits Asia	Rothschild, Lafite Rothschild		Innovation, Garden Café Terrace
Singapore	Golden Hung Ho, Grand Vin, Water & Wine, Wine BOS, Certain Cellars, The Straits Wine Company, Diageo Asia Pacific, Crystal Wines, J&D Burleigh, Chuan Seng Huat, Hai Choo Wines & Spirits HC Wines		Culina Dempsey, Legendary Spirits	Almost every medium to high end restaurant in Singapore
Japan	Arcane Japan, ENOTECA CO., LTD) Enoteca Co., Ltd, Koto Corporation, Mikuni Wine, 21 Community Co. Ltd, Kinoshita International Company (KICO), JALUX Group		Sotheby's Auction House, Christie's Auction House, Yamamya Wines, Tanakaya Liquor, Seijo Ishii, Wine Market Party Liquor, Enoteca, Aeon supermarkets, H2O retailing, Ito-Yokado, UNY, Life supermarkets, Maruetsu retail, Max Value retail.	Chateau Restaurant Taillevent Robuchon, Kyoto Takaragaike Prince Hotel, Intercontinental Tokyo, Prince Park Hotel, Tokyo, Hilton Tokyo, Grand Hyatt Tokyo, Hotel Okura Tokyo, Four Seasons Tokyo
Malaysia	Caldbeck Macgregor, Wine Cellar, Vintage Cellars, Milawa, ASIAEUR O Wines, Luen Heng F&B, Diageo Asia Pacific, The Straits Wine Company, Nam Lee Cheong, Albert's Wine & Spirits, Foo Hing, Harilan Wine and Spirits, Wine Warehouse		Wine Warehouse, Village Grocers, Jaya Grocers, Sam's Grocers, Isetan, Cold Storage, Jason's, Ben's Independent Grocers	Almost every medium to high end restaurant in Malaysia
South Korea	As of 2012, Wine importers in Korea have also been Lotte Liquor, Vintage Korea, Shinsegae L&B, Nara Cellar, Les Vins de Maeil, Sureung Corp, Allvintage Wine, Dana Cellars, Shindong Wine, Sumir Food & Wine, Maxxium Korea, Finno Holding, Sung Hyun Wine, Bacchus Wine Korea, Cave de Vin, Buenosaires wine & steak, KAJA Wine & Spirits Trading, Yeonil Wines & Spirits Sales, Daeyoo Wines, Fine Liquor Korea. Many importers are members of Korea Wine & Spirits Importers Association (KWSIA) and/or Korea Imported Liqor Wholesalers' Association	Chateau Reaut, Chateau Greysac, Domaine Fabre, Chateau Cos d'Estournel, Chateau Montrose, Chateau Langoa Barton, Chateau Moulin La Graviere, Chateau Haut Brion, Domaine La Barroche, Chateau Mouton, Rothschild, Clos Henri, Domaines Barons de Rothschild, Jim Barry, Chateau	Dure, KAJA Wine & Spirits Trading, L'Esprit de Bundang, Winenara, Ableliquor, Asiana Duty Free, Cep D'Or, Chateau M, Chiko Vino Shop, D & J Company, Dongwha Duty Free, Vino 494 Hanwha Gal, Ieria, High Street Market, Hyundai Department Store, JDC Duty Free, Korean Air Cyber Sky Shop, Lbwine, Magnum The Bottle Shop, Monodream, Mundovino, Pieroth Korea, Nara Cellar,	Pierre a Seoul Gagnaire, Grand Imperial Hotel, Grand Hilton, Novotel, Lotte Hotel, Ritzcarlton, Millennium Hilton, Sheraton Walkerhill, Hyatt Regency, Park Hyatt, Chosun Hotel, W Seoul Hotel

Country	Value Chain Actors of Luxury for wine			
	Trade agents, importers, Wholesalers, Distributors	Producers	Retailers	Food and beverage service
	(KILWA). http://www.kilwa.or.kr/membership/membership01.asp www.kwsia.or.kr	Durfort-Vivens, Yaluba Chateau de Croignon, Penfolds, Hardy's	Pinot Noir, Podo Plaza, Purple Wine Cellar, Seoul Wine, The Jell, The Malt Shop, Tiwi Trade, W23 Wine Shop & Bar, Wine N, Wine Outlet, Wine Topia, WineDC, Winegage, Wineland, Winline, E-mart, Lotte Department Store, HomePlus, Shinsegae Department Store, Costco, Lotte Premium, Shinsegae Premium, Lotte Avenuel, Galleria Department Store East	

Chapter 6 – Technology Overview

Introduction

VTT's interviews with many South Australian food and beverage producers highlighted an interest in benefiting more from the latest food technology developments and innovations. A technology assessment can provide interested practitioners with the information needed to understand and employ new technology and innovations related to their production operations. Interviewed companies expressed an interest in increasing the amount of research and development (R&D) and product development undertaken in-house and the use of technology to achieve this, as well as the use of outside R&D knowledge, but only when feasible. It was noted that both limited funds and limited local know-how within the industry restrict the spread of new technologies and innovations.

The goal of conducting this technology assessment was to determine the relevance and implications of available technology for the food and beverage sector. The information reported was gathered through a desktop study and through expert interviews with VTT's food technology experts. The technologies were selected for their potential application across both the food and beverage industries and may not be directly applicable to luxury wine production. However, an effort has been made to include elements that have some current or potential future relevance.

The technology assessment method used was focused on the near future, that is, it looked at interesting new and emerging technologies and innovations that might shape South Australia's food industry and its development now and in the near future. Technologies were selected based on their current relevance and on their future-oriented value. Thus the technologies discussed typically have medium and high technology readiness levels (TRLs).

Technology readiness measures the extent to which a technology is suited for deployment in a real operational environment, and it provides a common understanding of technology status, that is, how readily can a food or beverage business buy this technology and use it. In this study we use the commonly used Technology Readiness Levels (TRL) categorised by the European Union, with number 9 being the most mature technology (Horizon 2020 Work Programme, 2015):

TRL 1	basic principles observed
TRL 2	technology concept formulated
TRL 3	experimental proof of concept
TRL 4	technology validated in laboratory
TRL 5	technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 6	technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
TRL 7	system prototype demonstration in operational environment
TRL 8	system complete and qualified
TRL 9	actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies)
Beyond 9	full scale industrial use

Technology assessment findings

The summary of technology readiness is provided below and expanded upon following the table:

Table 8: TRLs of assessed technologies.

	Technologies and innovations	Technology Readiness Level
Digitisation	E-commerce solutions such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange, inventory management systems, and automated data collection systems	High: 8-9 and beyond
Processing technologies	High Pressure Processing (HPP)	High: 9 and beyond
	Pulsed Electric Field (PEF)	High: 9 and beyond
	Microwave treatment and UV pasteurisation	High: 9 and beyond
	Cold plasma	Medium-high: 6–7
Biotechnology	Fermentation	Applications at many levels: 3–9 and beyond
	Microbial production of flavours and pigments	Applications at many levels: 3–9 and beyond
	Enzymatic processing	Applications at many levels: 3–9 and beyond

3D Printing	3D printing in general, e.g. plastics and metals	High: 8–9
	3D food printing / bioprinting	Medium: 4–6
Extraction technologies	Extraction technologies for functional ingredient production	High: 9 and beyond
Food packaging technologies	Active: absorbents, scavengers, antioxidative and antimicrobial packaging	High: 9 and beyond
	Intelligent: Silicon photonics sensors, carbon nanotechnology	Low-medium: 3–6
	Intelligent: indicators, RFID labels/tags and sensor-enabled RFID tags (non-integrated, non-flexible), barcodes, QC codes, digital watermarks, printed electronics temperature sensors (flexible)	High: 9 and beyond
	Active and intelligent food packaging technologies: Sensor-enabled RFID tags (Flexible, integrated)	Medium: 4–6

Digitisation

Digital technologies are creating major opportunities for the food industry. It is argued that by the year 2020, an entire generation, Generation C (for ‘connected’), will have grown up in a primarily digital world. The effects of an increasingly digitised world are now reaching into every corner of our lives because three forces are powerfully reinforcing one another:

- **Consumer pull:** Consumers are adapted to the digital environment. They expect to be always connected, are willing to share personal data, and are more likely to trust referrals from their closest friends than well-known brands.
- **Technology push:** Digital technology continues to expand its influence. The infrastructure backbone of the digital world is bringing affordable broadband to billions of consumers. In parallel, low-cost connected devices are being deployed in every industry, and cloud computing, and the vast information-processing machinery it requires, is developing quickly.
- **Economic benefits:** The economic benefits of digitisation are real. A wave of capital has poured into the new digitisation technologies and companies, and the public markets reward early movers with unprecedented valuations.

Online sales and home shopping are quickly becoming the distribution mode of choice globally due to consumers’ ability to make informed decisions and compare prices. Online retailing is changing food and beverage trading, and the industry actors need to be prepared for the change. In Australia, e-commerce sales in general rose 14.4 % in 2015 to pass \$10 billion (eMarketer, 2015).

Table 9: E-commerce sales in Australia.

Total retail and retail e-commerce sales in Australia 2013-2018, billions

	2013	2014	2015	2016	2017	2018
Total retail sales	\$222.09	\$231.41	\$238.59	\$245.75	\$253.12	\$260.46
Retail e-commerce sales	\$8.01	\$9.40	\$10.76	\$12.05	\$13.32	\$14.52
% Change in e-commerce	11.6%	17.3%	14.4%	12.0%	10.6%	9.0%

Even if less than 1% of food and beverage sales currently occur online (Business Insider UK, Cooper Smith, Jan 2015), digitisation is also a global food trend. It takes place especially through the changing rules of communication and human behaviour. Open innovation, crowdsourcing and co-creation are in the core of digitisation of the food industry. As shopping habits are changing, niche online grocery services such as luxury or functional foods can disrupt the traditions of grocery retail.

A number of food and drink brands have demonstrated original ideas using social media and digital technology (Weston, 2014; Muckersie, 2014). FreshMinds (Muckersie, 2014) benchmarked five leading food and beverage companies that are pushing the boundaries in their industry, using digital technologies to drive innovation – including Starbucks, Coca-Cola, AB InBev, Nestle and Cadbury. Globally, for example Starbucks has launched a Tweet-A-Coffee service as well as mobile payments, Cadbury has used 3D printing to create edible prototypes and employed 3D printing as part of their new product development process, and KitKat has crowdsourced new flavours. Coca-Cola has developed its existing business model to foster new growth – particularly with regard to devising marketing campaigns and developing new products. For example, via crowdsourcing Coca-Cola obtained over 3,000 different interpretations of its new brand positioning from consumers in the form of videos, drawing and photos. These fed into the brand campaign, with one even being released as part of Coke’s marketing campaign in Asia. Coca-Cola has also been at the forefront of innovation in product development, with its FreeStyle machine allowing customers to mix flavours to create a unique drink. This is a good example of mass-personalisation and co-creation with customers. AB InBev has recognised that by partnering with people from outside their organisation, they can source new and innovative ideas. The AB InBev website includes an Open Innovation Portal, which lists both specific briefs and general areas of interest and encourages individuals to submit solutions. Restaurants have got in on the act too, with novel ideas such as providing edible QR codes to check for mislabelled food, or giving customers tablets to create their own cocktails – with the chance to earn commission if others subsequently buy the drink.

New packaging solutions are required, and providers need to cooperate as closely as possible – the key concept here is urban retail logistics (Fruit Logistica press release, 30 June 2015). Generally, digitisation impacts on all areas of the value chain. For online food and beverage companies to deliver the freshness consumers want, they have to be able to deliver orders fast while maintaining the quality of easily damaged foods like produce. But there are also advantages to online grocery shopping, especially in specialised luxury and functional products. For example, in the US, only 15% of consumers have purchased general food items online, but 25% said they have bought specialty food and beverages online, which are hard to find elsewhere (Smith, 2015). Similarly, new start-ups

that focus on concierge shopping and subscription prepared meals develop online grocery models and offer services that really are differentiated from traditional supermarket shopping. Some authors (Smith, 2015) believe that these services could change the way people shop for food.

Since digitisation does not refer to a single technology but to a myriad of different solutions, technology readiness levels within the digitisation development vary. The Technology Readiness Level (TRL) of most of the basic e-trade and e-commerce solutions such as online stores, mobile payment and customer engagement platforms is already high (7-9), and more solutions are constantly being developed, for example crowdsourcing and the Internet of Things (the seamless dataflow between networks and devices) (IoT)). Software, solutions and applications related to the IoT are among of the fastest growing emerging markets. In essence, this refers to the ability to connect remote or mobile machines to networks through advanced wireless connectivity and low-cost sensors. In addition, robotics technology – for example, in batch production and as service robotics with face recognition capabilities – is a growing application field.

Digitisation and the IoT are enabling real-time monitoring of production processes and product quality through computer vision systems. The digital approach is a rapid, safe, reliable and non-destructive, which requires no sample withdrawing and can be applied as in-line, at-line, on-line and off-line measurement tools for the shape, size, colour, and texture analyses.

Food processing technologies

Food processing technologies that have been assessed, based on the interviews performed, are relevant for the South Australian food industry and can be applied to industries such as dairy, meat, seafood, fruits and vegetables and processed foods.

The main drivers for the development of new food processing technologies are higher quality products, improved product safety, and longer shelf life, as well as reduced resource footprint. Non-thermal preservation technologies such as High Pressure Processing (HPP) and Pulsed Electric Field (PEF) have less impact on the (fresh) sensory characteristics of products than conventional technologies. With non-thermal preservation technologies, additives and heat treatments can be avoided. Thus these technologies are suitable for heat sensitive food materials (Saldana et al., 2014, Jermann et al. 2015). However, regulatory issues need to be considered.

High Pressure Processing, HPP, enables significant reduction of microbial levels in a very short treatment time. It is commercially used to treat numerous different types of foods including meat, seafood, dairy, fruits and vegetables, and processed foods. In the dairy industry it can be used to simultaneously pasteurise and homogenise liquid milk. Technology readiness level of HPP is 9 and beyond, the technology is already industrial-scale. The benefits of HPP are shown in Figure 8.

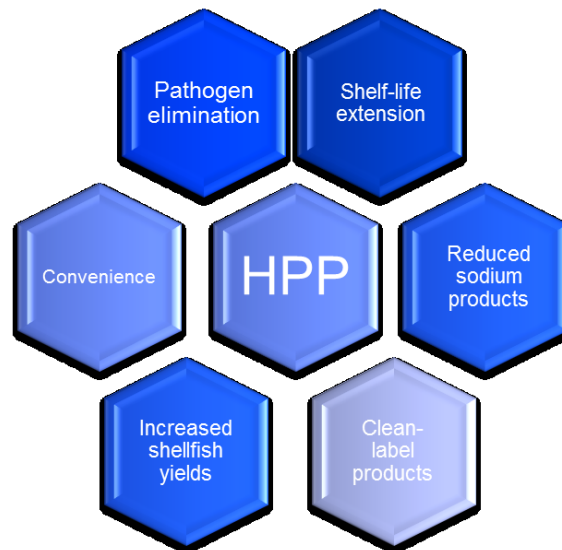


Figure 8: Benefits of HPP.

Commercial applications of HPP include:

- Meat and seafood industry – reducing or eliminating preservatives, achieving more than 2-times longer shelf-life; 100% meat separation from shells.
- Fruits, juices and vegetables industry - enabling 5 Log-value reduction in the levels of pathogens, with no changes in flavour, sugars, citric acid, pH and aromatic components.

Pulsed Electric Field, PEF, inactivates microbes but leaves proteins mostly intact (retaining flavours). It enhances mechanical disintegration and can improve enzyme hydrolysis. In addition to pasteurisation, PEF can be used to enhance cold extraction (up to 80 %) efficiency of juices, colours and bioactive compounds from mainly plant-based materials such as roots, fruits, vegetables, grass and leaves, and protein rich products. The technology readiness level of PEF for this equipment is 9 and beyond and the technology is already in industrial use.

Cold plasma is an emerging technology and it is not yet available for industrial scale food processing; technology readiness level is around 6–7. Plasma could be applied in the disinfection of equipment, surfaces, packaging, food contact surfaces and even food itself; it has been tested successfully, for example, for the microbial decontamination inside a closed package.

Some older technologies have now been scaled up for industrial processes. These include microwave treatment and UV pasteurisation (of beverages) (Rupasinghe and Yu, 2012). TRLs of microwave treatment and UV pasteurisation are at level 9 and beyond.

Biotechnology for food

Biotechnology has vast potential in the improvement and development of food and beverages. It has an important role to play in addressing emerging challenges, including those arising from climate change, pressure on global food supplies and the management of pests and diseases.

Biotechnical applications use either living microbes or microbial components (enzymes, metabolites). Biotechnology incorporates a broad scope of technology and a range of technology

readiness levels. This report presents a few case studies that could be of interest especially to the South Australian functional food industry (see Appendix 1).

Biotechnology adoption practices in the fermented beverage industry are well entrenched with a constant supply of novel yeast and bacterial products being translated, through to industry applications.

Currently the global interest in enzymatic processing is mostly in the food industry for texture and structure tailoring and functionalisation of plant proteins. Laccase is used in wine and beer stabilisation, and fruit juice processing (Osma et al., 2010).

Microbial products can be used to replace synthetic dyes (Malik et al., 2012) and flavours (Häusler and Munch, 1997). The cost of the technology for microbial pigment production on an industrial scale is still relatively high, and there is a need to develop a low cost process to produce pigments that could replace the synthetic ones. Using cheaply available agro-food-industrial sidestreams as microbial substrates through solid-state fermentation could provide interesting opportunities. In addition to pigments microbes can also be used to produce natural food additives (FDA, 2015). A specific example in wine production is the use of novel yeast protein extracts in clarification and stabilisation of white wines instead of traditionally used animal and mineral-based fining agents (Fernandes et al. 2015).

3D printing and food

There is lots of hype around additive manufacturing, and it is said that 3D food printing has the potential to revolutionise food production. 3D printing is generally stacking materials layer upon layer based on an electronic blueprint on a computer. There are many challenges in 3D printing of foods, for example how to make food materials with the right consistency so that they will not stick in the printing machine but at the same time retain their form after the printing. Another challenge is that often more than one material needs to be mixed to create a conceivably good dish (Huen, 2015a). At the moment 3D food printing is a niche technique, but it will affect the future of food – currently it is being explored, for example, as a unique and creative method to showcase food. However, in the coming five to ten years, the potential of 3D printing of food could be realised in domains of nutrition, appearance and structure-texture design, flavour, and hybrid and personalised products.

The Dutch research organisation, TNO currently combines expertise in 3D printing technology with food science to create ultra-modern technology for the production of new food products, and argues that food printing is a new way to create food products with unique quality aspects that can be fully personalised. It can make tangible contributions to people's health and sustainable production in the future. For example, together with Barilla, TNO has developed a prototype pasta printer that is capable of printing 3D pasta shapes (see Figure 9: 3D pasta printing by TNO (2015), photo courtesy of TNO.). In Australia, CSIRO provides Australian companies with access to additive manufacturing technologies, but currently only in non-food areas. Within the medical sector Australia has had a relatively long history in bioprinting, for example the Queensland University of Technology (QUT) offers masters degrees in biofabrication. In South Australia existing capabilities are more limited, but as the use of bioprinting expands as the technology matures, the potential also grows.

3D printer expert Kjeld Van Bommel from TNO, who visited South Australia in April 2015, estimates that in five years there will be a number of food printers on the market (Staight, 2015).

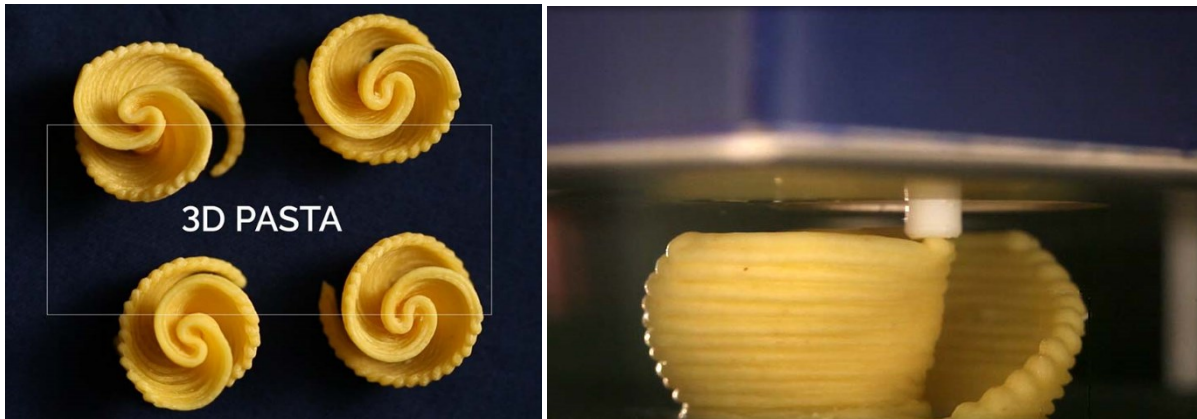


Figure 9: 3D pasta printing by TNO (2015), photo courtesy of TNO.

Technology readiness level of 3D printing varies. With some materials such as plastics, the technology is widely implemented and ready for markets (TRL 9 and beyond). For differentiated materials such as food, more development is still required (TRL around 4-6; with very special materials such as meat TRL ca. 3). Evaluation is that approximately in ten years, 3D printing will become a mainstay in restaurants, including fine dining. The most immediate effect can be seen in the food form, as chefs are able to create forms that would not be possible to make by hand, such as sculptural forms with complex curvature, intricate latticework or filigree and even structural elements that can act as vessels or scaffolding of sorts for elaborately assembled dishes.

In summary, the opportunity horizon for 3D printing is wide. When the technology advances, anyone could create new textures, new flavours, and new combinations like never before. 3D food printing makes it also possible to develop unique new products that cannot be made using other methods or to change the formula, shape, structure or texture of existing products so that, for example, the taste experience remains the same yet the salt or sugar content is reduced.

Chapter 7 - Packaging

Packaging is commonly defined as “the science, art, and technology enclosing or protecting products for distribution, storage, sale and use. The purposes of packaging generally include:

- **Physical protection** (from mechanical forces such as shock, vibration, compression, temperature, etc.)
- **Barrier protection** (from oxygen, water vapour, and dust, where permeability is also a critical factor in determining shelf life)
- **Containment or agglomeration** (the grouping of small objects into packages for efficiency in handling and storage)
- **Information transmission** (communicating information on how to use, transport, recycle or dispose of the product and package, and also offering information about the product, such as their nutrition facts and health disclaimers)
- **Marketing and presentation** (designed to encourage potential buyers to purchase the product. Presentation for consumer appeal is particularly important for functional and luxury foods, where visual elements can establish trust and communicate the benefits and quality the product embodies)
- **Security** (reducing the security risks of shipment, such as pilferage and tampering, as well as traceability and authentication seals for credibility)
- **Convenience** (in distribution, handling, display, sale, ease of opening, closing, use and reuse)
- **Portion control** (single serving or single dosage packaging with precise content amounts to control usage. Bulk commodities can be split into packages more suitable for single consumption or individual households. This also helps inventory control).

Key Packaging Types

In categorising packaging types, it is helpful to describe them at the layer or level of application. There are three widely accepted levels of packaging:

Primary packaging: The retail or consumer pack that contains the sales unit and is often closest to the product (Verghese et al. 2013). This directly envelopes the contents and is often the smallest unit of distribution or use and is the packaging that consumers interface with. Examples include bottles, cans, closures, lids, labels and wrappers.

Secondary packaging: Additional layer to protect and contain the primary packs (Verghese et al. 2013). This is often used to group primary packages, and is thus directly outside the primary packaging; for example, boxes, and shrink wraps/films (that surround smaller single units grouped together).

Tertiary packaging: Additional layer to protect and contain the primary packs, during distribution (Verghese et al. 2013). Also known as transit or transport packaging, these are used for bulk handling, warehouse storage, and transport shipping (using crates and pallets to pack units efficiently into a container, for example). The materials and design used in this type of packaging are often optimised for warehousing and distribution to retail stores, and it is typically used to package the units that are sold to an industrial consumer.

Based on these levels, packaging can therefore be developed to focus on objectives that are relevant to the respective level of application, and address the prominent challenges at each level. Many levels of food packaging may exist for one food product. For example, a single sweet may have

‘wrapping’ (primary packaging), which belongs to a ‘bag’ of sweets (secondary packaging), transported in a ‘box’ (tertiary/transportation packaging).

Global trends in food and beverage packaging

Principal trends in food packaging include:

Aesthetics: Packaging design is focusing on visual authenticity. Consumers are constantly looking for honesty, transparency and real information about the products they purchase (Creative Bloq 2015). Successful packaging aesthetics are therefore about communicating trust and a narrative or personality that encourages a human connection. This could be in the form of a hand illustration that tells a story, or declares the personality of the product and its brand through design. In the case of luxury goods, this often means packaging that is stripped down to the pure essence of what the brand represents by focusing on subtle and minimal designs that create a strong sense of composure. These considerations play a crucial role in determining consumer purchasing decisions (Quartz 2014) with package colour and picture labelling being one of the highest influencing factors affecting willingness to purchase. However, it has to be kept in mind that transparency of packaging materials is not necessarily valued as much in Asia as, for example, in the EU and the US. Visual elements seem to dictate the perception of product quality (Abdalkrim and Al-Hrezat 2013) and functional benefits, which are core to luxury foodstuffs.

Traceability and authentication: Consumers are becoming more discerning about the products they purchase and their origins. Particularly with the rise of ‘value-added’ products (Hoorfar et al. 2012), where additional quality attributes often command premium pricing, the ability to verify the origins of and authenticate products has become critical in allaying the fears of consumers about counterfeits, contamination and sustainable sourcing (Anica-Popa 2010). Barcodes, Quick Response (QR) codes and Radio Frequency Identification (RFID) have all been instrumental in supporting product identification and traceability (Nightingale 2011).

Digital packaging: Physical packaging has increasingly incorporated digital elements into its design for numerous purposes. QR codes and hashtags on packaging continue to bridge the offline and online worlds to encourage consumers to interact with their products through online channels. Given the prevalence of mobile devices in the modern consumer market, QR codes are a cheap and consumer-friendly way to provide information about the product (The Drinks Report 2014). Packaging that uses digital technology to offer more interaction and information to the modern consumer is developing rapidly, with more and more consumers engaging in mobile activities in-store (Sena 2014).

Packaging for the urban, elderly, persons with disabilities and young people: Airtight seals, strong physical and barrier protection, vacuum packing and tamper/theft resistance are all integral to the preservation of product integrity. However, packaging as a medium for consumers to interface with must be accessible. This is particularly a concern for the elderly, disabled and young, who may lack the dexterity or strength to open protective packaging, but are often the main consumers of functional foods. This also translates to the visual aesthetics of packaging; print should be large and clear, with intuitive markings to indicate openings and any instructions. Similarly, packaged foods that are ideal for the busier urban population require packaging that is conveniently accessible and resealable. Mylar Cook and Mylar Bake, for example, were developed by DuPont and Multivac as a thermoformable cook-in-bag solution, offering convenient cooking within the safety of its sealed packaging until consumption). Furthermore, it must take into consideration the portion sizes that characterise most urban-dwelling households, offering packaging sizes that are appropriate for the

common one- or two-person households, and resealable for portioned consumption (Verghese et al. 2013).

Sustainable packaging: In accordance with purity and transparency demands in design, consumers are also demanding packaging that is environmentally-friendly. These consumers can be responsive to sustainably packaged products that alleviate their guilt of purchasing an environmentally harmful product. Resealability, biodegradability and even the edibility of packaging are growing trends as a result. Interestingly, as more luxury goods also incorporate the concept of the 'luxury of less', sustainability also becomes more relevant and more applicable to these premium products.

Food and beverage packaging in Australia

The Packaging Council of Australia identifies the cost of government-provided services to be a significant determining factor in the price of packaging. The South Australian State Government has recognised this need, and has demonstrated its commitment in initiatives such as the 'Innovation Voucher Program', which in 2013, injected funding into a packaging project to improve export opportunities for Pipis (cockles) (Stewart 2013).

Credited with the birth of modified atmosphere packaging (MAP) in the 1930s, Australia is now home to packaging giants like Amcor, the third largest packaging manufacturer in the world, and one of the largest in flexible plastics, MAP and PET packaging.

Natural resources such as coal, bauxite, iron, and gas are integral to the production of packaging such as glass, aluminium, steel, PET and other flexible plastics. With a relatively high recycling rate lowering energy consumption in production, combined with its technological capabilities and abundance of natural resources, South Australia has significant potential for its packaging, and as one of the world's leading countries in flexible plastic packaging. Additionally, the move to custom/bespoke packaging is gathering pace.

Luxury food and beverage packaging market

Market overview

A number of packaging considerations and trends are particularly applicable for luxury foods which cumulatively form a global market in excess of US\$200 billion (Frost and Sullivan estimate).

Luxury wine packaging

The following table lists some potential attributes of luxury packaging and examples:

Pack interaction	Delaying instant gratification, through user initiated discovery of the details and functionality behind a layered unveiling process can lead to stronger brand impressions. Pop-up constructions, pull tabs, unexpected uses of materials; plush suedes, smooth tyveks, ribbon closures, box toppers, or tissues.
Audible	Each sound provides the opportunity to fine tune the perceived value of the packaging design, and therefore the brand. Creaking hinges, crinkling cellophane, slide of two piece rigid boxes (low pitch if heavy weight board is used), cracking of blister packs (high pitched), etc.
Olfactive (smell)	The 'fragrant frontier' is currently being employed to provide layered brand identification and recognition across many retail environments. (It needs to be carefully assessed if and how this can be used in the context of luxury foods).
Haptic	Luxury can be recognised through both touch and the number of hand positions required to interact with packaging. The sharply folded 90° angles on boxes or bags, the smooth bevel of a perfume bottle, all communicate something at every touch point. Sharp folds and ease of use speak to quality and craftsmanship, both virtues of luxury.
Tactile	Tactile design features are able to create brand-defining cues. A classic tactile cue to luxury is pairing an all-over embossed uncoated paper with a sculpted metallic or high-gloss hot-stamp. The finish and tactile contrast presented by many top prestige retailers follow this classic rule.
Closures	Satin ribbon closures as the point of entry create a luxe in-home product unveiling experience. Custom-moulded snap closures can also add visual weight to differentiate keepsakes from throw-away packaging. Commodity products are packed with a secure, in-store, and on-shelf at-a-glance experience. Luxury products require the exact opposite, a well-designed layered unveiling process to build suspense up to the final reveal in the user's personal environment.
Contrast finishes	Light interacts with materials and finishes differently. Packaging material stock should be smooth and crisp, consistent in colour, and evenly distributing light across the sheet without imperfections regardless of texture. Matte sheets can be contrasted with gloss UV, or foil hot stamps to make a crisp impression to reflect lighting in any given environment.
Heritage	From custom papers, and fabrics, to stock materials with custom processes, luxury and prestige is a matter of restraint, not excess. The complete opposite of flaunting logos, prestige brands instead focus on projecting a look and feel rooted in the brand's heritage to visually communicate their story.
Anticipation	Creating mystery, romance, and elevating suspense using a well-orchestrated unveiling process walks the fine line between luxury, and over-packaging. The idea of opening a box and revealing the final product immediately, leaves much to be desired. As a standard practice it is preferred to add a moment of pause once the pack is opened, to create a sense of <u>anticipation</u> followed by a translucent layer to softly reveal the product below prior to delivering that final a-ha moment.
Quality control	No matter how well your design communicates luxury on screen or in photographs, the tangible mass-produced package is what has to deliver the goods. Understanding how climate impacts materials and print processes at every stage of production through final user interaction is critical to understanding luxury packaging. Humidity is the most often overlooked element in packaging design. Are materials from a humid environment being imported to a dry climate or vice versa? This critical understanding of quality control at every stage is what can make or break the sense of luxury as presented by packaging.

Wine is a time and temperature dependent product (Hopfer et al. 2013), as it can age inside its packaging and can thus change in its taste and aroma profile. Packaging must therefore consider the rate and extension of ageing related reactions, and how the packaging alters each unique wine (Ghidossi et al. 2012). While glass is the dominant primary packaging for wines, polyethylene terephthalate (PET) bottles with oxygen scavengers (PETA; antioxidant PET bottles) have also been shown to closely follow the total oxygen barrier properties of glass, slowing the oxidation process (Giovanelli and Brenna 2007). Another important consideration, particularly in Asia, is choice of closure. For ageing wines, screw top is perceived to be inferior, possibly due to strong Bordeaux influence, which has been commonly associated with corks with quality. There have also been claims that the air ingress allowed by corks is absent in screw tops – a claim countered by filter layers included in screw tops to control air ingress. However, too much oxidation (as well as too little) is also detrimental to the taste and aroma of wine, and oxygen ingress through the traditional cork has been found to be unreliably varied. Cork taint can also affect 1-3% of wines, spoiling the wine.

In response to these issues, synthetic cork solutions have been introduced, along with the convenient and cheaper screw top. However, it should be noted that many Asian consumers still typically associate the authenticity of wine with the more traditional (and thus more familiar) cork. Screw tops, in spite of their superior slowing of oxidation processes, added convenience, resealability, and reduced risk of contamination, are conventionally associated with cheaper wines, undermining the actual quality of the wine itself.

The main elements of luxury packaging are tactile quality (the feel of the packaging), anticipation (unwrapping of layers of packaging), quality control (uniform quality), and responsibility (environmentally friendly). New trends in luxury packaging include matte finishes, simple and clear over the top designs, subtle sustainability, and transparent packaging (Graphic Packaging International 2014). The packaging can be both luxurious and sustainable when, for example, fewer ink colours and recycled materials are used. In addition, minimalistic high-quality packaging can be used to convey the required luxury effect. In luxury packaging glass is favoured over plastic. New, unusual shapes of containers have been developed especially for luxury foods (Connolly 2013).

Since consumer preferences vary in different countries, it is of utmost importance to recognise the local preferences, for example regarding packaging material, colour and finish as well as labelling information. Consumer studies, which are starting to use neurosciences, are often performed to identify the local preferences.

Packaging regulations

Regulations and standards pertaining to food and beverage packaging across the Asia Pacific region are varied, country to country, and are often not well-defined. These regulations apply to all food products, and not specifically just to functional and luxury foods.

However, most are outlined under Food Contact Material (FCM) or Food Contact Substance (FCS) regulations that are primarily concerned with the migration of harmful chemicals from the packaging into the food substance, and prescribe quantitative restrictions on the presence of such substances (restricted or prohibited lists). Countries also sometimes have 'positive lists' of approved materials, although the challenge of unifying these standards across countries for cross-border trade, and updating them for new and innovative materials, remain. Key data on the food contact substances (FCS) and materials (FCM) regulations across key countries in the region are summarised below:

Market	Regulations	Standards	Positive List (PL) of approved FCS	Restricted or Prohibited List
Japan	Japanese food Sanitation Law.		Although specifications exist for packaging material, Japan does not have a specific PL.	Included within the existing regulations and standards.
China (Misco 2012) (Eldred et al. 2010)	'Food Safety Law the People's Republic of China' under the Chinese Ministry of Health	'Guo Biao' Mandatory national standard, and 'Guo Biao Technical (GB/T)' exists as recommended and voluntary national standards	'Hygienic Standards for Uses of Additives in Food Containers and Packaging Materials' covers resins, coatings, polymers, adhesives and additives allowed in packaging materials. New packaging materials are governed by 'the Management Rules for the Administrative Approval of New Varieties of Food Related Products'.	General requirements on levels of materials exist.
India (Hill & Rubistein 2012)	'Food Safety and Standards Act' (FSSA), under the Food Safety and Standards Authority of India (FSSAI), alongside the Bureau of Indian Standards (BIS), is undergoing reform to encompass the supply chain and material safety of food and food contact materials. The 'Packaging and Labeling' title of these regulations broadly cover FCMs.	BIS, FSSAI's FSSA serve to integrate standards into a harmonised regulatory scheme.	PL for additives exist within the BIS standards.	Like the PL, the BIS standards include a restricted list.
Singapore	'Sale of Food Act' governs the supply chain and packaging materials of food. Specifically, 'Food Regulations' and 'Sale of Food (Food Establishment) Regulations' cater to food packaging, under the Agri-Food and Veterinary Authority (AVA)'s Food Control Division.	None specifically; regulations generally mandate licensees to ensure that packaging are "not likely to contaminate the food"	None specifically; Market approval is not required for the import and sale of food packaging materials if they do not migrate harmful substances to the food.	"Containers for food" (Part III, No. 37 of the Food Regulations) includes broad specifications for prohibited packaging materials.
Thailand	Food Act (1979) under the Ministry of Public Health, 'Thai Food and	Ministerial Notifications specify standards and	Some specifications exist under Ministerial Notification No. 295 for	Some bans on reusing certain types of food containers under

Market	Regulations	Standards	Positive List (PL) of approved FCS	Restricted or Prohibited List
	Drug Administration' (FDA) department.	requirements with respect to levels of materials. New standards are also proposed by the Thai Industrial Standards Institute.	milk product packaging and plastic packaging.	Ministerial Notification No. 92
South Korea	Food Sanitation Act under the Ministry of Health and Welfare, and the Ministry of Food and Drug Safety (MFDS).	'Korea Standards and Specifications for Utensils, Containers and Packaging for Food Products' under the MFDS (Food Additive Standards Division).	Standards contain specifications of compliance of individual materials.	Included in the Standards to ban specific substances, printing and certain colorants.
Taiwan	Act Governing Food Sanitation, under a Department of Health agency, the Taiwan Food and Drug Administration (TFDA).	Sanitary Standard for Food Utensils, Containers and Packages.	No; Although the standard prescribes limits for materials, it is not a positive list.	The 2011 version of the Act includes prohibited limits of the final article.
Australia (Food Standards Australia New Zealand 2014b)	'Food Standards Code', under Food Standards Australia New Zealand (FSANZ). Also, the National Packaging Covenant is a voluntary agreement that establishes an environmental policy and life cycle management framework of consumer packaging (Packaging Council of Australia 2008).	Food Standards Code includes Standards 1.4.1. Contaminants and Natural Toxicants, 1.4.3. Articles and Materials in Contact with Food, 3.2.2. Food Safety Practices and General Requirements, and Standard for Plastic Materials for Food Contact Use.	None specifically; general guides and restrictions are given in the Standards. However, FSANZ has included in its recent proposal (P1034) to approve some international legislations such as the EU and the US Food and Drug Administration Legislations on packaging regulation, which include positive lists that must be complied with by both manufacturers and imports (FSANZ 2014).	Maximum level restrictions for contaminants and toxicants are given in Standard 1.4.1.

While some form of regulations exist in all countries in Asia, a common criticism is that, except China, Japan and Korea, most countries only have broad regulations applicable to final articles (i.e. regulations only addressing the resulting packaging product produced from the various constituent

food contact materials or FCMs), and thus lack specificity in regulating raw materials. Globalisation and foreign trade should also prompt regulators to update their regulatory frameworks to encompass new FCMs and achieve greater consistency between the importing and exporting countries.

Market drivers for packaging

The food and beverage packaging industry closely follows the trends identified for luxury, and is further developed from the general packaging trends discussed earlier. The following factors have been identified as key market drivers in luxury packaging:

Demographic shifts and urbanisation stresses the importance of appropriate packaging for the effective delivery of luxury food and beverage: Increasing disposable income of the consumer, and a rising demand of the emerging middle class for high quality, in large markets such as China (Kerschner and Huq 2011) have increased luxury demand, as well as demand for its accompanying packaging.

The packaging of luxury goods can be a cue for 'non-conscious priming' of consumers, that creates the product differentiation and shelf appeal that distinguishes premium products (Quartz 2014). Thus, as demand for functional and luxury foods increases, packaging will become increasingly recognised as a critical medium to provide product differentiation. Furthermore, packaging plays an important role in intuitive portioning and delivery for consumption. Major producers such as Tetra Pak have recognised globally declining birth-rates, and have launched smaller pack sizes in anticipation of the single person or two person households that are growing most quickly across the world.

Growing consumer sensitivity towards sustainability and food wastage drives demand for sustainable and active packaging in luxury: While cost has been a determining factor for packaging, for both consumers and producers in the past, environmental impact has increasingly taken precedence with consumers becoming more aware of their purchasing options, and demanding manufacturers engage in environmentally sustainable practices (Szaky 2013). In Australia, Container Deposit Legislation (CDL) has been implemented in the Northern Territory and South Australia, where a 10 cent refund scheme for bottles and cans has seen 87% recovery rates on beverage containers in South Australia (Dowling 2012). Some 52% of global consumers in a survey by Nielsen report that sustainability is a deciding factor in purchases, checking labelling for environmental impact before buying, with consumers in the Asia Pacific showing even higher interest at 63% (The Nielsen Company 2014). In fact, of a wide range of product categories, packaging alone shows the greatest acceptance of 'green premiums', with approximately 15% of consumers showing robust willingness to pay for value-added packaging with up to 25% surcharge (other categories, such as electronics, building, automotive and furniture, show less than 10% willingness at the same surcharge) (Miremadi et al. 2012). Similarly, a multinational survey by Ipsos revealed that global consumers were most inclined to pay more for packaging that is environmentally friendly. Approximately 55% of the 19,883 respondents from 26 different countries reported a willingness to embrace higher costs for sustainable packaging. Key Asian countries reported an even greater interest than the global average, with 67% of Indonesian respondents and 64% of Chinese respondents inclined to pay more for environmentally friendly packaging. As a result, packaging solutions that effectively increase shelf life and/or are environmentally friendly not only win over

consumers, but can even be leveraged to charge a premium, justified by conscious consumers who place higher regard for preservability and sustainability in their purchasing decisions (Progressive Grocer 2013).

More informative experience demanded: traceability and product information instigates demand for packaging solutions to meet consumers' requirements, as they become more health aware and status conscious. Traceability is also important to prevent counterfeiting, especially of premium and luxury food.

Globalisation and trade: Globalisation and FTAs drive demand for more imported goods that are perceived as functionally beneficial or exotic/luxury products. Packaging must be able to protect the products across storage and shipping to deliver the functional benefits or premium quality demanded. Packaging also communicates the origin (traceability) and quality of the product - it influences purchasing decisions and provides an interface for consumers to interact with and appreciate the product. It establishes trust and commitment – a key component in products that claim health benefits or demand premium pricing. In luxury goods, it must also exude premium quality – consumption must transfer these qualities to the consumer. Packaging that is culturally and lifestyle sensitive is key to successful market penetration.

Market restraints for packaging

Competition from counterfeit products: Fraudulent counterfeits of luxury can often introduce illicit competition into the market. Roughly 7-10% of the global trade is in counterfeit goods, half of which is in luxury goods (El Amin 2005). Estimates of fraudulent wine traded internationally vary dramatically from 20% to 5% (Taylor 2013, Steinman 2010, Wines & Wines 2013). Most of these imitations rely on re-packaging in both counterfeited packaging and labels, or refilling of original packaging to pass off as genuine products, and can often have a negative influence on product values, with vintage wines such as the 1900 Chateau Margaux experiencing price drops due to excessive counterfeiting (Bell 2014). Such counterfeits undermine the value of the packaging and continue to challenge anti-tampering and anti-theft measures implemented in packaging.

China's crackdown on corruption slows luxury retail and imports: China's crackdown on corruption and lavish gifting has had significant economic consequences, slowing down luxury retail sales and restaurant trade as Xi Jinping's reforms significantly reduced luxury banquet (Qian and Wen 2015). Luxury packaging is also experiencing collateral declines, as demand for symbols of status and premium goods wanes, costing the economy up to US\$100 billion in 2014 alone (Sudworth 2014).

Glass packaging presents high costs of shipping and handling: The properties of glass, being odourless, chemically inert, recyclable, impermeable, transparent and easy to shape, make it a highly attractive material for food and beverage packaging. It is typically regarded as the standard for premium food packaging (Connolly 2013) and conveys quality and purity. However, while glass is a very common medium for food product protection, its weight escalates transportation and handling costs, and its fragility must be addressed appropriately (Marsh and Bugusu 2007).

Difficulties in foreign market access: High import tariffs, import licensing and complex regulatory standards governing food contact materials and sanitary standards in several Asian countries place prohibitively high barriers for foreign exporters of food products (Packaging Council of Australia). Furthermore, labelling regulations are varied in the South East Asian region, and these variations are

the root of concern with regards to cross-border food trade and access. Whilst a harmonisation of standards has been proposed to allow freer movement of products between countries, the region has yet to conform to a common regulatory system (Jasapila and Shaarani 2011).

Contradictory trends: There are several trends in packaging that pose challenging opposites for producers to compromise between. Some evidence suggests that the newer packaging materials used by innovating companies may be less compatible with the existing recycling services, pitting innovation against sustainability (Packaging Council of Australia, 2005). Growing sophistication and innovation leads to increased cost of packaging: As packaging becomes more sophisticated, the cost of innovation can also increase (Packaging Council of Australia, 2005). Whilst sustainability and other various functions of packaging were considered, cost was the determining factor for most packaging companies (Satya 2014) and innovation is not readily seized without first assessing its costs versus benefits. In a survey by Packaging Digest in 2013, respondents identified 'managing costs' as the factor with greatest impact on strategic directions (McTigue Pierce 2013).

Technology trends in luxury food packaging

The technology trends in the luxury packaging market commonly seek to address the restraining factors or capitalise on the driving factors discussed above:

Reduce: 'Light weighting', or the thinning of material without sacrificing performance, will continue to reduce packaging weight and raw materials in manufacturing. Similarly, there has been a significant transition from rigid to flexible packaging, which also helps to reduce packaging weight (Zero Waste SA 2012). Reduction of packaging weight continues to generate savings in the value chain with the maximisation of efficient material use and minimisation of transportation costs.

Authenticity, traceability and tamper evidence: Counterfeiting and tampering undermines consumers' trust in the product, leading to a loss of market share, and even risks the health of consumers (Correa 2015). Packaging often plays a key role in preventing both counterfeiting and tampering. Typical solutions to tackle counterfeiting and tampering are based on 'layered' solutions or different combinations of visible and hidden security features, and different coding and forensic technologies combined with smartphone apps and detectors (Packaging Digest 2011). Regardless of the actual technologies used, maintaining supply chain integrity is of high importance. Examples of packaging technologies protecting against counterfeiting include:

- Difficult to obtain materials such as those incorporating embedded fibres, security threads and other particles, watermarks created during papermaking, and embossing or surface texturing are often extremely efficient tools against counterfeiting (El Amin 2005). There are for example paper labels for wine bottles with a unique fibre patterns that can be scanned at point of purchase with a smartphone to validate product authenticity (Steeman 2014). In addition, various materials are also employed as shrink wraps, capsules, seals, tapes and labels to provide evidence of first opening or tampering. An intact anti-tampering concept is a sign that the product is likely to be genuine.
- Inks and dyes are suited for various anti-counterfeiting technologies (Agheyisi 2011). The most common inks for this purpose are colour-shifting, thermochromatic and holographic inks. Fluorescent dyes have also been suggested as a tamper-evident solution revealing if a polymer film has been damaged (Bertrand 2005).

- Holograms printed on seals, patches, foils or labels are often used as an anti-counterfeiting feature as they are difficult to copy. Advanced holographic images are used in anti-counterfeiting labels of Spanish wines. Holograms have also a strong market share in Asia (Agheyisi 2011).
- Drawing on forensic technologies, taggants such as micro particles are complex and generally undetectable by eye (Agheyisi 2011). Printable taggants can be customised and then added to printing ink. Embedded botanical short genetic markers (DNA) can provide covert protection embedded into inks, varnishes and laminates (Linge 2014). One Australian vintage wine producer blended DNA from a grape vine into its label ink (Werblow 2009).

Technology to address traceability and tamper evidence: Anti-counterfeit strategies often combine the use of product and packaging authentication technology with various product track and trace technologies. Tracking and tracing technologies are used to fight unauthorised distribution, which is frequently linked to counterfeiting.

- Wireless chips and radio frequency tags (RFID) can serve as anti-counterfeit and anti-tampering tools (Asanghanwa 2007). Active chips can alarm about possible tampering or whether the performance of passive RFID chips is interrupted due to damage or tampering.
- INSIDE Secure, an embedded security company, and Selinko, an object identification company, have come together to address this issue in wine, with their 'CapSeal' device. The embedded Near Field Communication (NFC) chip can verify the authenticity and provide tamper evidence of the bottle (Inside Secure 2014), and exemplifies the extent to which smart labelling is advancing to offer integrated solutions and information to their consumers.

Key enabling technologies: In active packaging, the key technologies to explore are absorbing and scavenging systems, releasing systems, and systems where substances are grafted or immobilized onto the wall of the package; also, technologies such as antioxidative and antimicrobial systems should be explored. Active packaging is an extension of the protection function of traditional food and beverage packaging. It is designed to contain a component that can release or absorb a substance into the package or the environment surrounding the product. Active packaging uses an active system that can maintain the shelf life of a product or extend it. It is based on the interaction between the molecules in packaging and the product. For example, packaging that contains absorbers (silica gel, oxygen absorbers, and odour absorbers) or releasers (preservatives, flavours, aerosols, antioxidants) falls under this category.

In intelligent packaging, the important technologies include food packaging indicators of different types, and food packaging sensors. Intelligent packaging is an extension of the communication function of traditional food and beverage packaging. It communicates information to the consumer based on its ability to sense, detect, or record changes in the product or its environment. In many cases it incorporates electronic devices onto the packaging system. For example, the sensors on the package can record the temperature or pH on the product through the supply chain. Applying RFID technology to monitor storage conditions (temperature, humidity, light) and food quality through the entire supply chain is available. Some sensor types need to be inserted into the inner side of the package, while others can be placed outside.

RFID technologies are used to precisely track and control the movement and handling of raw materials and products throughout the supply chain. RFID is grouped under the term Automatic Identification (Auto ID), together with barcodes, QR-codes, magnetic inks etc. Auto ID technologies are a relatively new way of providing information and/or controlling material flow. They are suitable for large production networks such as food supply chains. Auto ID technologies do not provide qualitative or quantitative information about the product quality status, but they are typically applied for purposes such as identification, automation, theft prevention or counterfeit protection.

Table 10: Active and intelligent packaging functions.

Need	Solution
Shelf life extension	Active packaging. Antimicrobial packaging. Developments of integrated systems include oxygen scavengers in packaging material such as closure seal liners.
Time and temperature abuse indicators	Time and temperature indicators that indicate any changes during storage
Ideal temperature indicators	Thermochromic inks
Avoiding deterioration and spoilage by oxygen	Oxygen scavenger, oxygen indicators
Microbial contamination indication	Freshness indicators and sensors
Track and trace products	Use of RFIDs and custom sensor technology to improve stock taking, product replenishment and unit price adjustment

Oxygen is known to adversely influence the microbial and flavour stability of wine. The first oxygen scavenging systems were sachets in the packaging. Today oxygen scavenging labels such as ATCO® labels from Laboratories STANDA and Ageless® labels (Mitsubishi Gas Chemical Company, Inc.) are available. The trend in commercial applications is to incorporate oxygen scavengers in to the packaging material. Cryovac® OS2000 (Sealed Air Corporation, USA) is a polymer-based oxygen scavenging multilayer flexible film activated by ionising radiation. Antimicrobial packaging, particularly silver based materials, has had success in Japan and USA. An important number of antimicrobial silver-based masterbatches are available in the market: Biomaster®, Aglon®, Irgaguard®, Surfacine®, IonPure®, d2p®, Bactiblock®.

Time and temperature indicators that are available in the market are based on physical, chemical, enzymatic or biological processes: 3M Monitor Mark® (3M Company), Keep-it® (Keep-it Technologies), Fresh-Check® (Temptime Corp.), VITSAB® (VITSAB International AB), OnVu® (Freshpoint), TopCryo® (TRACEO), FreshCode® (Varcode Ltd.), Tempix® (Tempix AB). For instance, OnVu™ indicators contain a pigment that changes colour over time at temperature dependant rates. The indicator is activated by exposure to UV light to become dark blue and the colour gradually fades with time. This system can be applied as a label or printed directly onto the package.

Integrity indicators are time indicators that provide information about how long a product has been opened. The label is activated at the moment of consumption, when the seal is broken it triggers a timer and experiences a colour change with time. Some commercial examples are Timestrip® (Timestrip Ltd.), Novas® Embedded Label (Insignia Technologies Ltd.), and Best-by™ (FreshPoint Lab.). Among the various types of gas indicators, oxygen indicators are the most common. Ageless Eye® tablets (Mitsubishi Gas Chemical Company, Inc.) are reversible oxygen indicators used in combination with oxygen absorbers. EMCO Packaging has launched non-reversible oxygen indicator labels. FreshPoint Lab. has presented O2Sense™ indicator labels to detect leakages in MAP packages.

Track and trace technologies using RFIDs and sensors have potential to reduce losses due to counterfeit products, manage recalls more efficiently in an effort to protect consumers and to reduce negative economic impacts, comply with food and beverage contact material regulations, and provide relevant information to consumers in real time. The track and trace can be exploited in food and beverage products and practically anything that can be sold in a deceptive or broken state. The main advantages of RFID over barcodes are that they allow a remote control because line-of-sight is usually not required, multiple items can be monitored at the same time, and they have capacity to store diverse information (origin, process parameters, commercial information, etc.) allowing a unique identification of the product. More evolved RFID systems allow the integration of other functions into the RFID tag, such as time-temperature indicators and sensors to monitor and communicate the temperature history and quality information of the product.

Solutions based on augmented reality (AR) will also be important in developing South Australian competencies in the luxury food segment. Augmented Reality (AR) is the technique of superimposing virtual objects in the user's view of the real world, providing a novel visualisation technology for a wide range of applications. Hence, it is a user interface technology that combines the perception of real environments with digital, virtual information. Rapid development has been taking place in this area in the past few years, and new demonstrations and commercial applications appear constantly. The growing use of smartphones and tablets is affecting people's attitudes towards constantly being online and having access to web services. This means that consumers are accustomed to receiving updated information based on their instant needs. In the case of luxury products, AR provides a possibility for sophisticated combinations of the physical and digital worlds.

Beside the hedonic aspects, user acceptance and readiness to use technology is an important factor to take into account when bringing any novel solution to the market. There may be clear cultural differences in the way people perceive and experience the use of technology. In general, there are three main factors affecting the user acceptance of mobile services: perceived value of the service, perceived ease of use and trust. Through involving the users/consumers in the development process of new service concepts (participatory design, co-creation) it is possible to find out in very early stages of the development process the major differences between different cultural areas and the most important issues in the attitudes of the people in order to take them into account in service design.

Australia's packaging industry

Australia's packaging industry is dominated by increasingly global companies with significant export markets that accompany similarly multinational processed food producers that need packaging to meet international standards. The packaging industry of Australia is characterised by high

concentration and consolidation across the market, competing intensely in a variety of packaging materials (Packaging Council of Australia 2005).

Glass: O-I and Orora (formerly Amcor) are the two major glass container manufacturers in Australia, with Orora producing wine bottles from its Gawler plant in SA since 2002.

Corrugated boxes: 95% of the country’s corrugated board production comes from three companies: Orora, Visy and Carter Hold Harvey. These corrugated boards are amongst the lightest in the world and have are significantly competitive in the international market (Packaging Council of Australia).

Aluminium cans: Orora, Ardagh and Visy dominate the Australian aluminium can production.

Paperboard cartons: Orora, Visy Packaging, Detmold, Scholle and Colorpak are the main producers of paperboard packaging (about 75% of production).

Liquid paperboard cartons: Tetra Pak and Visy dominate all liquid paperboard cartons produced in Australia.

Steel cans/drums/aerosol containers: Ardagh, Huhtamaki, Irwin & Sheehan, Morris McMahon, National Can and Visy are key players in the production of steel packaging in Australia.

Plastics: Interestingly, plastics are the least concentrated sector in packaging materials, with the exception of PET bottles, which are dominated by a few notable companies: Visy, Amcor and Brickwood. This sector also has the lowest barriers to entry, with numerous small producers still operating.

Packaging value chain

The value chain of product packaging is relatively simple and generic, with raw material suppliers feeding into packaging manufacturers, who coordinate with the producers who fill the packages, and then transport for distribution and retail. Post-consumer disposal can either go to landfills or be recycled for efficient reuse of materials that greatly reduces energy and resource consumption in future manufacture. The following value chain map can be similarly applied for most packaging industries in various materials (Figure 10):

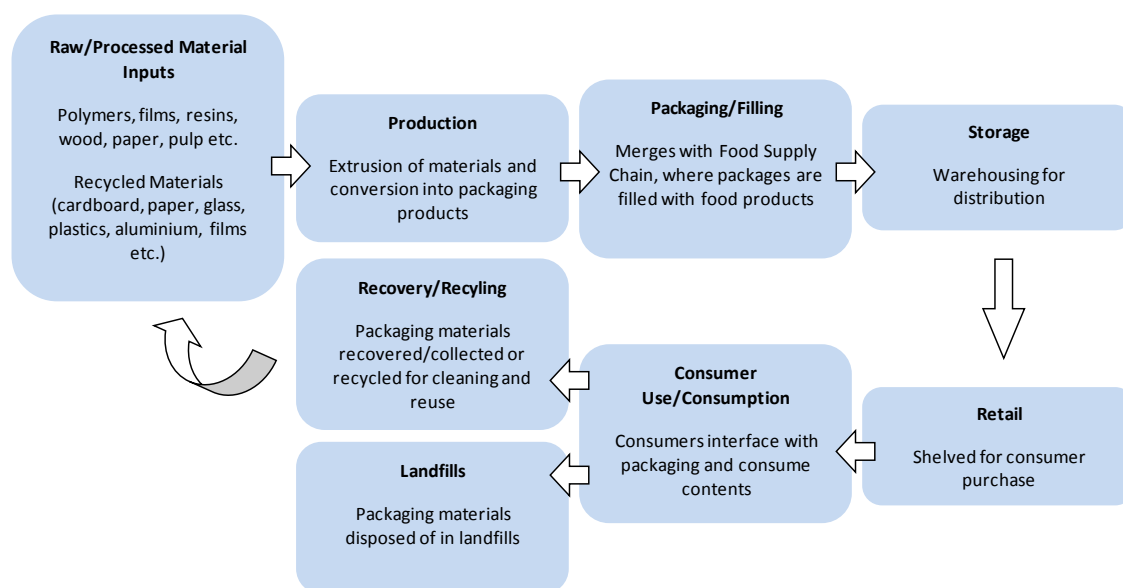


Figure 10: Indicative value chain map for packaging (source: Frost & Sullivan 2014a)

Required capabilities and competencies

South Australian food and beverages companies need to develop competencies to exploit state-of-the-art packaging solutions. The economic scale in South Australia alone is probably too limited to create demand for advanced packaging solutions. A national model should be promoted.

Companies producing packages for luxury and premium products use different business models. In general, the closer the material supplier is to the packed product business the more involved they are. For example, in the area of cans and glass/plastic bottles also large multinational companies, such as Crown, Allied Glass, O-I Glass and Amcor are present supported by packaging designers (ThreeBrand, Webb DeVlam, PET Engineering), while there are few smaller companies producing plastic films, paper and paperboard specifically for luxury packages. There are typically several international film, carton and label converters, such as Multi Packaging Solutions for cartons, with their own design departments and a set of converting and printing processes available for such materials. Alternatively, converters are specialised in a narrower material sector, and they act as subcontractors for packaging solutions providers. Solutions providers, such as MW Luxury Packaging and HH Deluxe Packaging, typically combine design, material suppliers, (manual) finishing, and delivery around the world. In addition, some of these companies have focused on secondary packages (such as boxes for bottles).

As the local packaging industry cannot supply sophisticated packaging solutions these capabilities need to be developed. The first step towards initiating national and local activities would be to promote Australian luxury and functional products through domestic and international campaigns. This would eventually result in a need for advanced packaging solutions making Australia, and South Australia in particular, an attractive market for the converting companies, certain packaging material producers, and their suppliers to invest in new production facilities and material solutions or to upgrade their current facilities. Such a change would also allow for a move towards sustainable bio- and fibre-based packaging materials, although the volumes might not be large enough without a similar step in bulk packaging, supporting new technologies and/or legislation. In addition, the proximity of Asia as a major supplier of these materials could help such steps. There are also several domestic design companies currently in Australia. However, it could also be possible either to attract international packaging solution providers to open their offices in South Australia or to establish local ones in South Australia with an adequate customer base. This could eventually increase the use of local packaging materials, although more labour-intensive process steps will likely be carried out in the lower labour cost near neighbouring countries.

In addition, in order to provide traceability solutions, a shared capability between the companies in the delivery chain needs to be developed. An important part of luxury packaging is also to create an experience that is in line with the product. In the case of luxury products, hedonic aspects need to be especially taken into account, while the utilitarian aspects are less important. The positive hedonic influence comes from the buying of luxury goods for enjoyment and stimulation, and utilitarian goods are items bought out of necessity and do not necessarily bring joy to the consumer. In order to understand the hedonic aspects in detail, it is important to find out what kind of mental and visual attributes the consumers associate with the luxury packages in question. Experience mapping is one possible way of understanding and visualizing how well the consumer perception and values of the brand owner/producer of the product are with each other.

Companies in the field (active and intelligent packaging)

There is a vast amount of development of smart packaging technologies. The most developed and used technology is in the food and beverage industry. A non-exhaustive list is provided in Table 11.

Table 11: Key companies in active and intelligent packaging business.

Time-temperature monitoring	3M Company, Temptime Corp., Vitsab International, Freshpoint, TRACEO, Tempix
Oxygen scavenger	Clariant Ltd, Multisorb Technologies, Standa Laboratories, Mitsubishi Gas Chemical, Sealed Air Corporation, Emco packaging systems
Oxygen monitoring	Mitsubishi Gas Chemical, Powdertech International
RFID	Smarttrac, Confidex
Antimicrobial packaging	BASF, Linpac Packaging, Microbeguard Corp., Standa Laboratories, Mitsubishi-Kagaku Foods Corp., Life Materials Technology Ltd.
Tamper-evident indicators	3M Company
Authenticity	Sinfotech.it s.r.l.s.

Opportunities for South Australia in packaging

Paired with South Australia's potential export of luxury products to major overseas markets in Asia, locally based packaging solutions support the potential to open new trade opportunities through significantly reduced costs via enhanced packaging. As mentioned previously, MAP, for example, can be used to markedly reduce transportation costs by extending product life and resilience to be viable for sea freight, which can be much more cost-efficient than airfreight. Furthermore, Australia's packaging industry receives synergy from Australia's clean food reputation in the processed food sector, and shows headroom for better labelling and traceability to better market this selling point to consumers in the Asia Pacific. Recent free trade agreements (FTAs) are expected to further liberalise trade and facilitate tariff eliminations and reductions (Food Magazine 2014) over the coming years, increasing demand for Australia's packaging industry to further conform to the regulatory standards of FTA markets, and accompany forecasted increases in processed food exports.

To summarise, the following key areas of focus in the value chain were identified or inferred from literature that may present opportunities for SA:

Smart labelling and informative design: With a highly safety-conscious export market in mind, Australia's packaging solutions should integrate informative labelling (with descriptions of functional benefits and ingredients, and pictures, where possible), and traceability and authentication devices such as QR codes, RFID and NFC, to deter counterfeiting and offer consumers greater understanding and trust in their product's origins.

Continued efforts towards sustainability: Australia should continue to leverage and encourage its high recycling rates to further reduce costs in the production of packaging. While light weighting and other measures are quickly seeing limits to reduction, recycling is a phase in the packaging life cycle that has yet to be fully realised. Significant energy and resources can be conserved using recycled materials, particularly in plastics.

Laminated plastics with antioxidants: Gas scavengers can be paired with multilayered plastics such as PET to offer ever lighter, cheaper, less fragile packaging solutions that improve the barrier properties of conventional PET to match that of even glass. Although glass is still considered premium packaging, due to its inertness and impermeability, its fragility and weight (even when thinned) are qualities that offer headroom for improvement. Innovative alternatives such as PETA (antioxidant PET) seem to circumvent these structural shortcomings while maintaining the desired antioxidant properties of glass, extending shelf life with increased physical protection, and reduced cost and weight.

Packaging to support exports of luxury foods: In light of a trifecta of free trade agreements (FTAs) secured in 2014 with key Asian markets – China, Japan, and the Republic of Korea – Australia is in an ideal position to see unprecedented export trade growth, particularly in its luxury product sectors. With 95-99.8% of Australia’s exports (by value) entering these countries duty free with full implementation of the FTAs, Australian winemakers and suppliers will continue to see an escalating need for local and advanced packaging solutions to accompany and protect these exports. As the inventor of Modified Atmospheric Packaging, Australia still has much to offer in the area of premium and advanced packaging. Its overseas clients are expanding their horizons to recognise the quality of Australian luxury goods, beyond conventionally popular markets such as Canada or the United States (US). Preserving product integrity across air and sea freight, and satisfying consumer appeal will be paramount to taking advantage of this preferential trade access, which places Australia on level footing, if not better, with competing interests such as the US or Canada. Opportunities for South Australia in packaging are concentrated particularly around an increasing focus on the traceability and consumer appeal of its wine.

Packaging to support luxury food and beverage presentation: To be perceived as ‘luxury’, wines generally need to be perceived by consumers as having a heritage (Sjostrom, 2014), and packaging can play an important role in imbuing an item with heritage. Use of high quality materials, packaging design and packaging content can all play a role in providing heritage to a wine.

Chapter 8 – Opportunities and road mapping and pathways to realise them

During the research phase of the Functional and Luxury Foods Project, VTT identified opportunities for the food industry in South Australia which may also have applications for food industries nationally. These opportunities and some pathways to realise them are presented in this chapter.

Generic opportunities in luxury food for South Australia

The following table lists the generic opportunities (across multiple product categories) outlined in the original report:

Developing luxury foods

This is the opportunity to develop a luxury connotation with a food or producer not currently considered luxury. Developing a luxury product is likely to require one, or a combination of the following factors:

- Emphasising the heritage / culture and history of the product.
- Gaining endorsements.
- Focusing on product integrity / quality / authenticity.
- Exploiting emerging situations.

Opportunities for SA

An opportunity exists to position SA products as luxury in markets where there is not a long-standing product heritage and attachment to established European brands. For example, in Hong Kong and southern China, Cognac is synonymous with luxury brandy, and SA producers of premium brandy would struggle to compete. However, in other markets, such as Thailand, Vietnam or the Philippines, the same association does not exist, and SA producers could enjoy first-mover advantage in establishing Australian products as 'luxury'. These opportunities could exist in products such as brandy, chocolates, red wine, wagyu beef, etc.

Traceability will be increasingly important in Asian markets where concerns about fake products and food safety are becoming more acute. SA producers will increasingly need to use traceability technologies and promote the traceability as a key part of differentiation in end-markets. Government support may be needed for smaller producers to advise on approaches to traceability, and to support traceability implementation.

Although functional foods and luxury foods are distinct, there are opportunities benefit from any promotion of SA as a production centre for functional foods. Consumers of luxury foods are increasingly concerned about the health aspects of consumption, and promotion of SA luxury foods as 'healthy' can play to this trend.

Certification is likely to be an increasingly important means of differentiation for SA producers, given the increasing concern over food safety, traceability and sustainability in Asia. However, the costs of gaining certification can be prohibitive for some small producers. Government support and encouragement of SA producers to become certified with relevant bodies (e.g. ASC certification for aquaculture) should therefore be explored.

Established luxury food

This involves foods which are commonly recognised as luxury in Asia and Australia. South Australia participates in the production of some foods such as abalone, Southern rock lobster and red wine but has the potential to participate in others. There is potential to model the marketing of French regions such as Bordeaux and develop a luxury branding strategy for South Australia or possibly for specific geographical indications.

Opportunities for SA

Even in established markets for luxury foods, there is a tendency for growth at the premium (as opposed to the super-premium) end of the luxury brand scale. For example, in brandy many consumers are trading down from super-expensive to merely expensive brands. South Australian producers could focus on this opportunity, positioning the State's brands as (slightly) less expensive alternatives to European luxury brands.

A holistic story of SA as a 'luxury food region' needs to be presented to Asian consumers, promoting the State's benefits of cleanliness and high environmental standards but with a lengthy and well-established heritage in luxury food production. In some luxury categories (e.g. abalone, matsutake mushrooms, truffles) Chinese production has increased significantly in recent years, but many consumers (even in China) have significant concerns about the quality and cleanliness of foods produced in China. SA has the potential to switch Asian consumers from products produced in China, particularly where the recent boost in Chinese consumption has widened the number of consumers for specific luxury foods (e.g. abalone, truffles). Additionally, in some product categories (such as olive oil) the high quality production methods used in SA can be used to differentiate the State's producers even against European competitors.

Broader value chain

These are not specific to an individual food item, and instead involve new distribution or marketing approaches such as gift packs, online sales, airport sales, branding and luxury food tourism.

Opportunities for SA

The SA story can also comprise inward-focused activities, e.g. the promotion of luxury food tourism into SA in Asian markets, and the development of infrastructure in SA to support luxury food tourism, for example, expanding the National Wine Centre into a Culinary Centre.

Many SA luxury food producers are small-scale and lack the resources to access supply chains in many Asian markets. Access to distribution partners who have the infrastructure to maintain high quality standards and provide access to consumers in the key Asian markets is critical. In many cases, this involves distribution into the food service sector, as most luxury foods are predominantly sold in restaurants and hotels rather than through retail channels (although these are also developing). Additionally, supply chains are evolving; for example, there is a much greater focus on e-commerce (online sales) for food products, even including luxury food products. Many SA producers need help and support to access these evolving supply chains, for example in establishing e-commerce platforms to sell into China, or in developing contacts and relationships with distributors in end-markets. An industry-wide e-commerce platform for SA luxury food may also be worth considering.

In many cases, SA producers are losing significant value in the supply chain, with the price charged to the end-user many times the price obtained by the SA producer. By enhanced branding and greater control and influence over supply chain partners, SA producers have the potential to capture more supply chain value. However, the small scale of many SA producers currently limits their ability to obtain more value through the supply chain.

In certain areas of luxury food production, there is likely to be a requirement for skills development to allow the SA industry to grow (e.g. in mycology).

Integrated supply chain / co-products

Where there are opportunities to add value via a blended product or a collaboration.

Opportunities for SA

There are likely to be product innovation and value-add opportunities arising from combinations of SA luxury foods, for example blended products (such as truffle infused olive oil) and from joint packaging (such as SA luxury food gift packs). Hence, encouragement of collaborative development between disparate luxury food producers in SA is recommended.

Specific opportunities for an existing luxury food in South Australia – red wine

The main challenges for South Australian wine producers is achieving historical pedigree and critical endorsement to help build traction with Asian consumers in establishing an association with luxury. Replicating the Bordeaux classification system with specific geographical indications (e.g. the Barossa Valley) is a potential strategy that could assist with drawing parallels between wines produced in both regions.

While Asian consumers have been impressed with the historical pedigree of French wine, it is anticipated that as they are increasingly exposed to the global market place a sub-category of wealthy oenophiles will emerge. This consumer group will seek to distinguish themselves from the masses, and it is this group that South Australian luxury wine producers should attempt to target, educating them on the distinctiveness of their products and potentially gaining willing brand ambassadors.

There is a growing opportunity in the self-consumption market for wines from the 'New World.' Private consumption of luxury foods is driven by a notion of self-reward. As an example, Chinese consumers who have experienced rapid financial and economic gains appear particularly prone to the need to reward themselves for their success. This has little to do with impressing others in their social circle and is more focused on the need for personal contentment.

Another increasingly important opportunity for producers is ensuring traceability through the supply chain to avoid the widespread counterfeiting of premium and luxury brands in Asia. Traceability technology could provide a source of competitive advantage against competing countries and regions.

Pathways to realise opportunities

Industry impact

The key opportunities for the South Australian food industry – to add value to the luxury and functional food value chains - were identified based on the value chain analysis and related SWOT analysis (Table 5), market analysis of functional and luxury foods, and technology assessment.

To fully tap into the identified potential, several challenges need to be tackled in South Australia. The main problems and challenges for South Australia are related to:

- the low level of differentiation
- the size of the local market
- the complexity of food standards and labels
- the declining state of the local packaging providers and materials
- the availability of a quality workforce.

In addition, companies would benefit from market intelligence and stronger international networks that are critical in exporting. Similarly, more support and knowledge sharing is needed to adopt the latest know-how related to food technology and innovation.

The identified opportunities for South Australia have been divided into 1) primary opportunities, and 2) enabling opportunities (Table 12). The primary opportunities are directly related to food,

ingredients, origin, image and experience that functional and luxury foods from South Australia could create. The primary opportunities focus on recognition and use of the specialities and resources of the region and development of products by matching South Australian capabilities with needs in the target markets. The enabling opportunities are seen as opportunities that support the value adding actions and the food industry development, and strengthen the capabilities of the South Australian food companies.

Table 12: Primary and enabling opportunities in the luxury and functional food value chains.

PRIMARY OPPORTUNITIES				
LUXURY FOOD <ul style="list-style-type: none"> Chocolate Red wine Spirit Truffles Blue tuna Caviar Abalone Oysters Lobster Wagyu Beef 	FUNCTIONAL FOOD <ul style="list-style-type: none"> Dairy based ingredients Probiotics Aloe Vera Extract Caretenoids Polyphenols and flavinoids Indigeneous plant extracts 	FOOD INNOVATION AND TECHNOLOGY <ul style="list-style-type: none"> Digitalization Education Packaging technologies 	FOOD EXPERIENCE AND BRANDING <ul style="list-style-type: none"> Safety and sustainability Food culture Social media and customer contact Inspiring stories Luxury and functional packaging and gift packs Airport sales 	CULINARY TOURISM <ul style="list-style-type: none"> Luxury food and wine Health and wellbeing
ENABLING OPPORTUNITIES				
MARKET UNDERSTANDING <ul style="list-style-type: none"> Business services Export support Market intelligence Product adaptation Demographic marketing 	COLLABORATION <ul style="list-style-type: none"> Partnership building Joint export efforts Ecosystem thinking 	ENTREPRENEURIAL ATTITUDE <ul style="list-style-type: none"> Mentoring Risk taking New types of funding 	E-COMMERCE <ul style="list-style-type: none"> Platforms development Collaboration 	

There are two visions for the South Australian food and beverage industry to exploit the identified business opportunities and the necessary actions or pathways to achieve these visions.

The two proposed visions for South Australia to be are:

- a known luxury food and wine producer and culinary destination
- a strong presence in Asian and Australian functional food and beverage markets.

A strategic roadmapping process was used to incorporate a collaborative and iterative process that was achieved through data analysis and collaborative workshops with industry as well as VTT experts. Business-related knowledge providers included companies from food, beverage, wine and food ingredient industries, the packaging industry, and from specialised knowledge-intensive service providers. In addition, information from interviews with industry organisations, government representatives, researchers from universities and research institutes as well as technology organisations were used.

An important stage in the roadmapping process is the embedding of results into the local industry context to establish pathways to achieve the vision. Building on the project’s market analysis, value chain analysis, actor mapping, technology assessment and related SWOT analysis, the VTT experts roadmaps and proposed strategic pathways to realise identified opportunities were developed.

The roadmap for luxury wine is provided below.

Roadmap for Luxury Food (Wines)

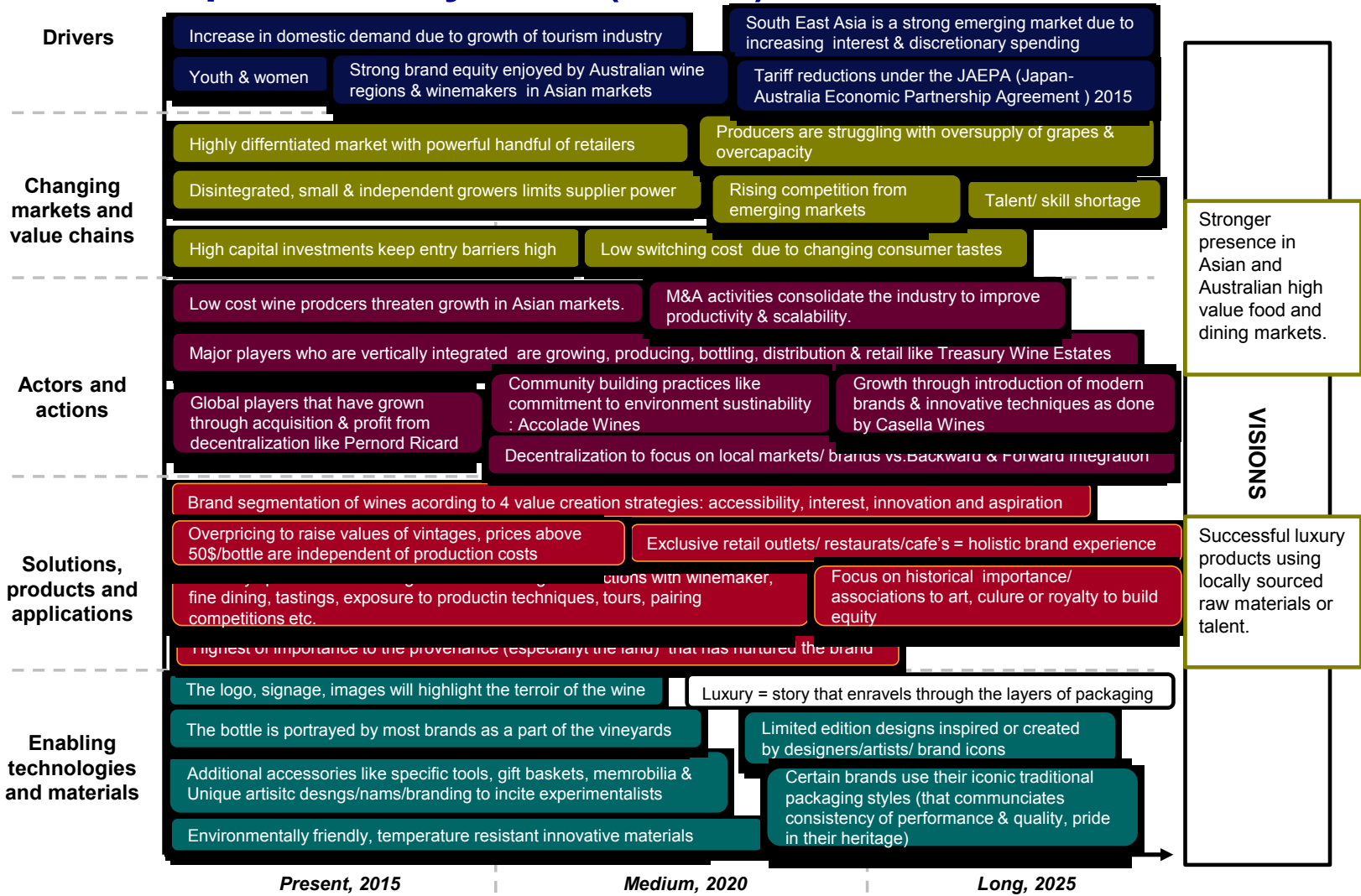


Figure 11: Roadmap for wine.

A collaborative workshop was held in Adelaide in September 2015 to:

- create joint commitment to and engagement in reaching the proposed visions and pathways
- review and refine the strategic pathways proposed by VTT experts
- establish short term (0-1 year), mid-term (2020) and long term (2025) targets.

Finalised strategic visions, pathways and policy recommendations were then established.

The six primary pathways identifying actions to be taken by PIRSA, the food and wine industry and relevant industry stakeholders to achieve these visions are:

1. food technology upgrading
2. functional food products
3. ingredients for functional foods
4. active, intelligent and polysensual packaging
5. luxury food business strategy uptake and export promotion
6. luxury wine-driven culinary tourism.

Successful implementation of technologically-driven pathways (pathways 1-4) will require close collaboration with technology suppliers and cooperation with research and knowledge providers.

The luxury export pathway and luxury culinary food tourism pathway are less driven by technological development and adoption. Instead, progress depends more on effective customer understanding, collaboration in marketing, networking, and supply chain management. Nevertheless, information and communication technologies, such as social media and traceability solutions, do play an important role as necessary capabilities.

The pathways most relevant to the wine sector and towards achieving effective luxury business strategy, namely Pathways 1, 4, 5 and 6, have been summarized below.

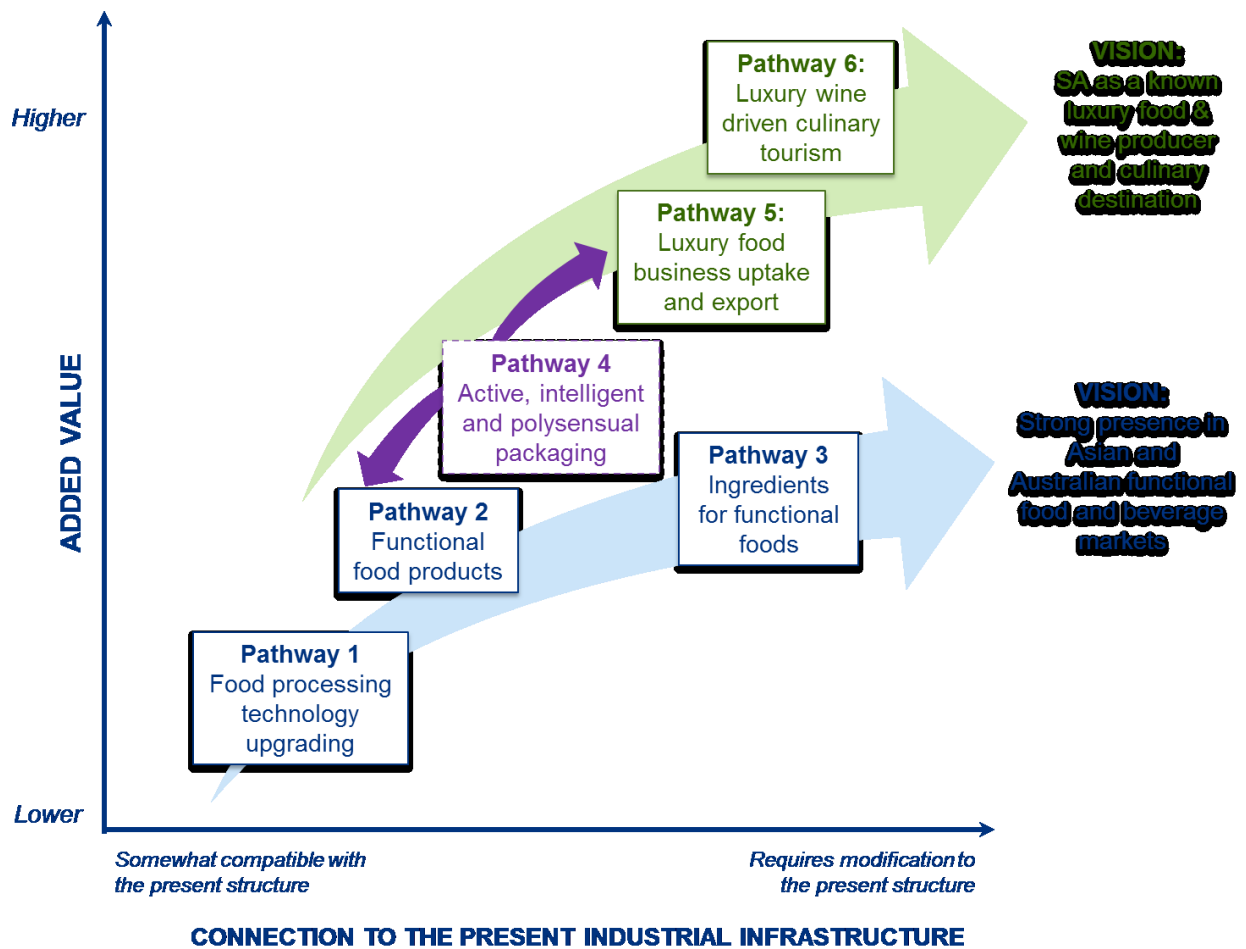


Figure 12: Future pathways.

Pathway 1: Food processing technology upgrading

Purpose

Adoption of new processing technologies has the potential to reduce cost, increase productivity, improve quality, consistency and safety of products, and facilitate the introduction of new product features. The technical capability within the South Australian food industry is generally considered low when compared internationally. Partly this is due to the small average size of firms in this area. Up-to-date food processing equipment is a prerequisite for future success in food businesses.

Capability building is required across all business sizes with unique needs in each size category. Small businesses have the capacity to be nimble and agile and therefore innovate quickly; however they are often limited by capital constraints and technical expertise. Larger businesses while they might have access to capital, are often limited by the need to retrofit into existing infrastructure and large-scale requirements. Innovation considerations tend to be limited in scope to specific strategic growth priorities.

Requirements

Upgrading food processing technology requires the following activities:

- increased understanding of the benefits of using technology and access to technical capability to capitalise on it

- development of a technical innovation ecosystem incorporating international technology suppliers and local manufacturers.

The technical competence base of SA producers needs to be improved to trigger increased technology use and adoption. Many businesses currently view the purchase of technology as a cost and a risk rather than a sound enabling investment. Improved use of food technology in South Australia requires the benefits to be demonstrated to food businesses. This includes the provision of information identifying technologies with potential value for any individual firm and help in assessing the required size of the investment and the expected payback time for various production parameters.

For SA producers to gain a sustainable competitive advantage through technology requires the development of a world-class local ecosystem to foster uptake. Most of the food technology suppliers are global players. Some key global suppliers have representation in Australia but most of their activities are related to marketing and sales. There are very few food processing equipment retailers with representation in South Australia.

SA producers currently have a small and fragmented demand for technical innovation which creates little incentive for global technology suppliers and local manufactures to establish development activities in SA. The foundation of a regional centre for food innovation is proposed to aggregate and bring sufficient scale to technology and product development efforts. The centre should incorporate an applied research capability and programs focused on piloting, scale-up, use and uptake of innovative products and technology. As such, it would also serve as an attraction point for collaboration with global technology suppliers and foster the development of a local technical innovation ecosystem.

The centre could be set up in three stages as follows:

- Launch stage (1-2 years) – build basic functions of the centre
 - Develop a detailed regional strategy with key actors (research organisations, industry, government etc).
 - Conduct benchmarking of global best practice relevant to technology use and areas of focus identified by the strategy.
 - Establish a research capability integrating relevant capabilities from existing research organisations.
 - Start a workshop program to share information between researchers and industry. Workshops should aim to share research results to relevant industry issues and establish an understanding of emerging industry needs.
 - Start research projects aligned with the regional strategy, which could include evaluation of the efficacy of novel production technology and new industry practices.
- Set-up stage (2-3 years) – implement the regional strategy
 - Conduct applied research programs in relevant fields defined by the strategy
 - Provide industry access to specialised equipment and associated training and technical support.
 - Provide industry training forums.

- Establish a start-up company incubator and associated support functions.
- Full-scale stage (4-5 years) – continue activities at full adoption, review the regional strategy and align with local and global operational environments.

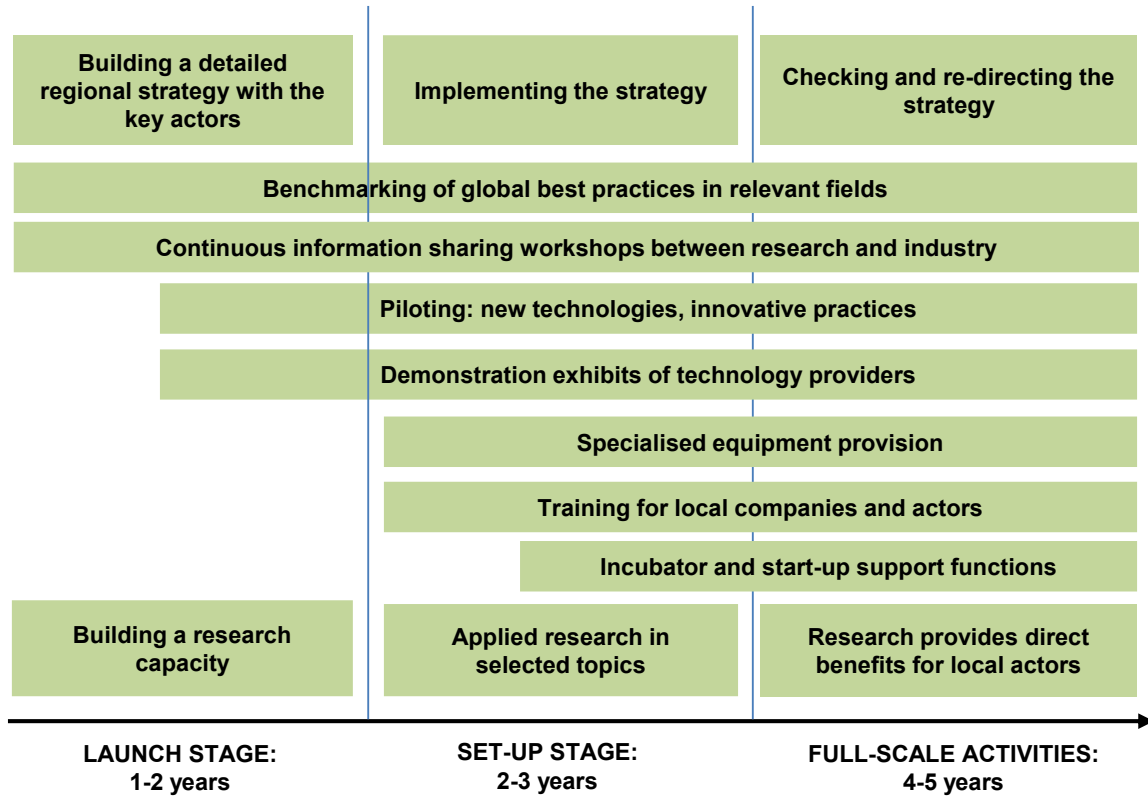


Figure 13: Functions of a centre of food innovation and research: a stylised overview.

Policy recommendations for SA Government

State Government intervention is necessary to support industry technology upgrading due to the low level of awareness of available options, risk aversion and limited technical capability among South Australian businesses.

Policy recommendation 1 – The South Australia Government, together with the key industry stakeholders, should consider establishing a food technology adoption and upgrading program for the food industry. The program should aim at increasing the uptake of state-of-art food processing technologies through a portfolio of activities including support for awareness raising campaigns, technology scan studies, supplier searches, invitations to global vendors to demonstrate their technology in South Australia, and financial and technical feasibility studies preceding technology uptake.

Policy recommendation 2 – In association with the technology adoption and upgrading program, mentoring and coaching services should be set up. These services would link experienced business managers with SMEs whose upgrade process is restricted by limited in-house management capabilities.

Producer-focused pathway guidelines

Pathway steps

1. Audit current processes/operations; this involves:
 - Identifying the processing bottlenecks (typically the people who work in the process know the problems).
 - Identifying the variability of incoming raw material (do you process only one raw material or many; how homogeneous is it?) Some pieces of equipment are more tolerant towards variability in the processed material whereas others need very homogeneous material.
 - Identifying the intrinsic characteristics of the raw material; for example, shelf life (how easily will it spoil?), sensitivity to adverse conditions (light, heat/cold, oxidation, sensitivity to absorbing external flavours etc.). Stability of the raw material is a very important factor in process design. With perishable materials, pre-processing (e.g. drying or cooling/freezing) is often needed to stabilise the raw material – this adds an additional processing step and cost into the system.
2. Rank the improvement opportunities by business impact based on the needs assessment.
Output: a list of things desirable to achieve in priority order.
3. Decide between two options: (1) buying a piece of equipment and producing the product yourself or (2) making a service contract to buy a 'solution' for your business case. Typically, the latter option involves only part of the final food product; you might buy ready-made components for ready-to-eat foods/meals).

This is a strategic decision you have to make. Are you in the business of owning and operating machinery to produce food; or are you in the business of hiring someone to operate the machinery through a service contract so that you can focus on other aspects of your business?

If you choose the first option (buying the equipment and producing yourself) the next step is an initial technology and market review.

- Contact available networks who have knowledge about technology and equipment. These include information centres, universities and research institutions, vendors, consultants, industry and government support organisations (e.g. the AWRI, PIRSA etc). This will enable you to find suitable technologies available for purchase. The purpose is to collect information enabling you to decide who to engage with in more specific talks.
- Information about vendors is typically available on the internet and trade journals.
- Engage with vendors and request proposals. There are typically many options for a piece of equipment and therefore a purchase decision can only be made on the basis of the specific needs of your own process. You should compare the different vendors and their offers on cost, performance and risk, resulting in a risk-weighted return on investment (ROI) as a basis for decision-making. This results in issuing a more formal Request for Quotation (RFQ), to be submitted to the most promising vendors.
- During the proposal evaluation and contract negotiations with the vendor it is advisable to create a formalised evaluation process with pre-set criteria and weightings. Without this you run the risk of getting lost in details from initially incompatible offers.

- Adoption and training in the use of new equipment requires understanding whether you need to get recertified. It is important to have a realistic view on adoption costs since they are frequently underestimated.

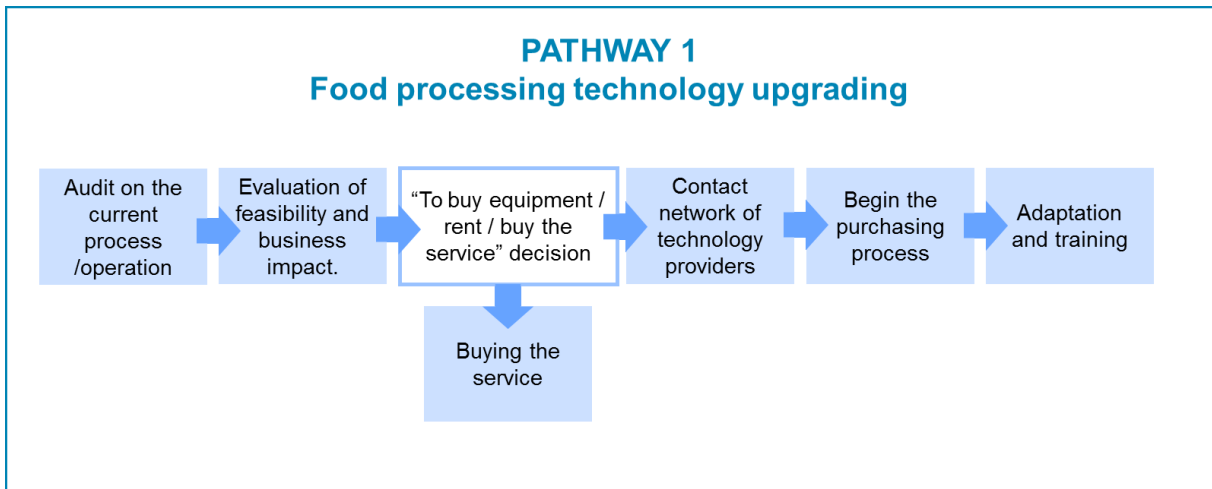


Figure 14: Pathway 1 - steps to upgrade processing technology at the company level.

Pathway 4: Active, intelligent and polysensual packaging

Purpose

High quality packaging is essential for luxury businesses for several reasons:

- to ensure product integrity and quality
- to create the brand/product experience and deliver emotive cues. This includes aspects such as uniqueness, quality perceptions, fostering a sense of anticipation, haptic and tactile attributes
- To confirm authenticity and provenance.

Currently in South Australia (and in Australia), packaging supplies are largely limited to the standard packaging solutions. This limits the capacity of local food and wine producers to create perceptions consistent with luxury product attributes. Therefore, there is need for increasing the quality of packaging design, functionality and diversity of packaging material suitable for luxury food and beverage products.

Requirements

Pathway 4, using platforms available in Pathway 1 and knowledge developed through Pathway 5, seeks to establish increased access to effective packaging available to SA producers. This includes fostering the creation/adaptation of packaging solutions from South Australian food value chain actors (i.e. packaging suppliers and food producers). Mechanisms should also be explored to increase producer awareness of packaging competencies on a global scale and support adaptation to SA producer value-adding needs. An outcome of this pathway should be sufficient customised packaging demand to encourage key suppliers to establish or develop core competencies locally (e.g. design centres, materials providers, converters and solutions providers).

Along with luxury packaging design, intelligent packaging, such as anti-counterfeit and traceability solutions, can be used to protect luxury food and wine brands and products, especially in markets

where counterfeiting and tampering is a real problem. Through activities in Pathway 1, SA should seek to establish a position as a testing ground for new packaging ideas and innovation.

The pathway is closely linked with and supports pathway 5 (Luxury foods business strategy uptake and export promotion).

PATHWAY 4

Active, intelligent and polysensual functional and luxury packaging solutions

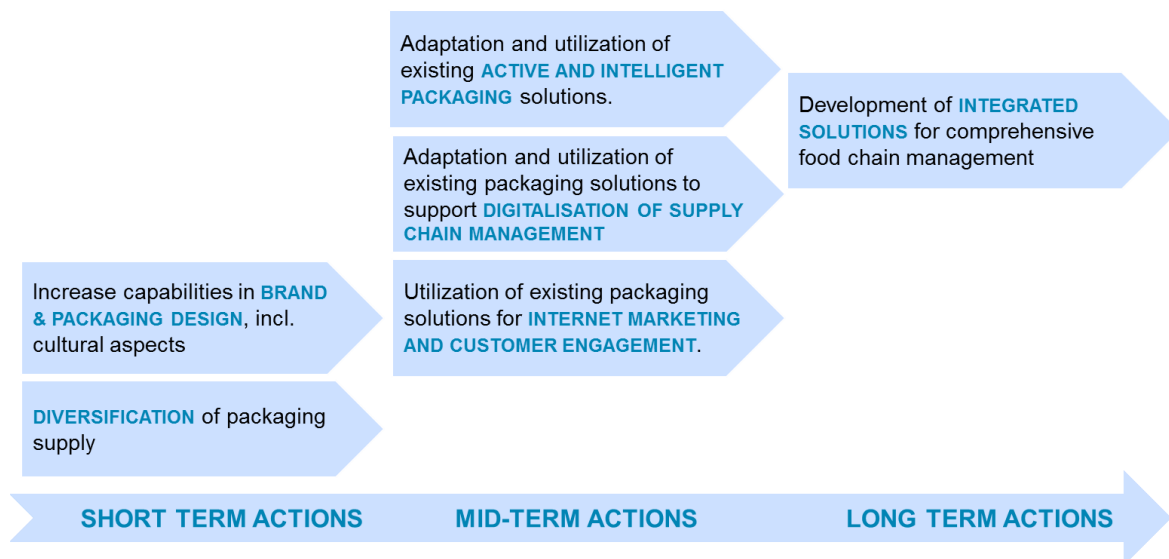


Figure 15: Pathway 4 steps.

Policy recommendations for SA Government

Policy recommendation 7 – The South Australian Government should consider establishing a strategic development program to build local capabilities in the specification and design of active, intelligent and polysensual packaging solutions.

Policy recommendation 8 – There could be a complementary initiative to attract global packaging solution providers to increase their presence in South Australia. By pooling demand from multiple food producers and indicating willingness to adopt state-of-art packaging solutions, South Australia could become a more interesting market for global packaging suppliers. As the local packaging volume will not suffice to attract the global providers in South Australia, it can only be accomplished by pooling the fragmented demand in a larger pool and increasing the level of sophistication in requirements.

Producer-focused pathway steps

When considering an improvement to packaging technology a producer should:

1. Become familiar with existing sustainable and luxury packaging solutions. Contact global solution suppliers and local suppliers. If your purchase power is limited, or options are limited by scale, consider aggregating demand through collaboration. Evaluate the suitability of novel materials 1) to meet the packaging requirements of the product and 2) to suit existing packaging machines.

2. Improve the brand and packaging design consistent with desired brand DNA symbolism and polysensuality. This can be achieved by:
 - Contacting local or global branding and packaging design agencies.
 - Designing the packaging focused on the target market and customer needs.
3. Build on the megatrend of digitisation that is creating major opportunities for the food and beverage industry. In the case of South Australia, the digitisation should be connected with supply chain management, and the functions of the company in the value network.

Key technologies should be considered to provide solutions for: supply chain management, internet marketing, electronic data interchange, inventory management systems, and automated data collection systems. Also intelligent packaging solutions will eventually play an important role in product authentication and the digitisation of the food and beverage industries. Intelligent packaging technologies include: sensors, indicators, and radio frequency identification (RFID) systems.

4. Consider that public acceptance of products in smart packages will depend on associated marketing campaigns. Consumers must understand the idea of active and intelligent packaging and must believe that the new product is as good as or even better than the old.

Pathway 5: Luxury foods business strategy uptake and export promotion

Purpose

South Australian food and beverage industries operating in a high cost environment need to have an attractive offering in high premium markets in order to be competitive. There is an opportunity to develop luxury food products which respond to identified demand in the Asia Pacific, which is the fastest growing global market for luxury foods. Several industries have been successful in export businesses to these markets including tuna, prawns, southern rock lobster, abalone, oysters and wine. However, there is significant scope to broaden industry participation across other food and beverage categories and increase the percentage of production obtaining profits consistent with luxury industries to 5%.

Capabilities and expertise necessary to successfully implement luxury business strategy include:

- **Expertise in market cultural drivers and purchase motivations.** As discussed in Chapters 1 and 2, attitudes to luxury food consumption are often determined by the prevailing cultures and dietary tastes in each country. In China, for example, many types of luxury seafood are consumed partly because of their links with a range of Chinese cultural ideals, such as traditional Chinese medicine. As many markets outside China (such as Singapore, Malaysia and Korea) have large Chinese populations, they draw cultural cues from China. In order to be successful, luxury brands must adapt to local consumer preferences and target retail and marketing strategies to appeal to the target consumer groups.
- **Design expertise for high-profile packaging and labels.** The present packaging supply and packaging and branding expertise is rather limited in SA and is addressed by Pathway 4.

Complementing this, an understanding of packaging design to create emotive cues necessary for successful luxury business strategy is also required.

- **Narrative creation.** A primary cue for purchase of luxury goods is the emotional response they invoke. A critical skill for a luxury business is to develop an effective narrative to build meaning and create value associated with food and beverage products.
- **Marketing skills including e-commerce.** Knowledge of luxury food marketing channels such as prestige magazines or events is needed. In countries where e-commerce is an important element of the retail experience (like China), luxury brands must consider their e-commerce presence when entering the market. Local social platforms and target efforts should be adopted to align with local retail culture.
- **Highly personalised customer relationship management.** Luxury consumers have high expectations of what their experience with the brand should be like. While in the past the quality and lure of the products alone could tempt buyers, today's customers expect more. Developing an emotional attachment between the brand and the customer is vital to the survival and growth of the luxury retailer, and is one way to retain and cultivate brand loyalty. To do this, it's important to ensure that prestigious clientele have a personalised and memorable shopping experience. Attracting new clients, retaining loyal ones and continuously delivering a service which exceeds their ever-growing expectations can be a challenge. By keeping a carefully maintained history of purchases, preferences, likes and dislikes, you are able to develop accurate and detailed insight to deliver a personalised service which is synonymous with flawless customer service, customer retention, and a unified and memorable brand experience.

Requirements

The key requirements identified include:

- Marketing activities to support entry into, and establishment of channels to, key luxury markets. The specific emphasis in this export program should be to build and communicate an effective narrative for SA producers to engage with the luxury food market.
- Access to necessary luxury business skills through building a cluster of luxury food producers which are supported by a sophisticated ecosystem, including packaging, design, and cultural insight.

Also identified was a need for increased consumer, behavioral neuroscience research into the target markets to help SA producers build a unique and appealing value proposition.

Policy recommendations for SA Government

Policy recommendation 9 – More awareness raising activities should be established to increase understanding of available opportunities and identify best practices from overseas.

Policy recommendation 10 – Marketing activities need to be initiated to enter and establish channels to key markets. An export support program would lower the risk for SMEs to take up a luxury food business strategy oriented to export markets. Best available marketing approaches for the specific needs of the luxury food market need to be adopted and this kind of insight is not easily available in the marketplace.

Policy recommendation 11 – The export support activities for luxury food products should create a promotion concept to be piloted with one selected Asian target market. If the concept proves successful and receives positive assessment from the food businesses, it should be then replicated in other markets with local variations.

Policy recommendation 12 – The SA or Federal Government could explore possibilities to establish identifiable country of origin product labelling for Australia.

Producer-focused pathway steps

1. Ensure you have full stakeholder support to implement luxury business strategy
 - Many South Australian business stakeholders are philosophically opposed to implementing product lines that are exclusive – does your business have this backing?
 - Do you understand the impact pursuing luxury business strategy will have on your existing domestic customers and have plans to manage this risk?
2. Define your target luxury market demographic or product use scenario and the emotive cues or needs motivating purchase. Define your brand DNA or narrative to be developed that will engage your target demographic.
3. Determine if incorporating unique craftsmanship will enhance the capacity of your product to meet the target market emotive cues.
4. Determine if you can use local production facilities that can build authentic basis to the craftsmanship behind your product.
5. Do you have a legitimate basis to build product exclusivity and inaccessibility?
6. Determine your pricing strategy. Contrary to conventional wisdom, when the imagined price of a product is higher than the actual price, it creates higher perceived value. Also in contrast to tradition of pricing as a function of demand, luxury pricing is supply-based.
7. Establish a promotional strategy that fits your brand and product. In the luxury world, the dream is what sells. There is no need for a rational reason to justify a purchase. Content is very important.
8. Establish a product positional strategy. The competition for retail space is fierce as availability of spaces for luxury brands are limited.
 - You have three options: physical retail space, on line shopping, and own brand shops.
 - Outstanding customer service that represents the brand DNA is essential.

Pathway 6. Luxury wine-driven culinary tourism

Purpose

Food tourism is a growing market, driven by travellers seeking the authenticity of the places they visit through local cuisine and experiences. Research has shown that tourists spend almost 40% of their budget on food when travelling.

This market does not just include high net worth individuals. Mid-income earners are willing to trade up and purchase luxury products if these are perceived to offer experience and gain higher status amongst their peers (Leppanen and Gronroos 2009). One potential customer group for luxury tourism and hospitality can thus be mid-income individuals with a desire to experience a once in a lifetime opportunity.

Japan and Australia have traditionally been the source of highest luxury tourist numbers in the Asia-Pacific region. More recently, the large emerging markets, most notably China and India, have been

increasing rapidly. For wealthy Chinese, travel is the preferred leisure activity with an average 18-22 annual vacation days. Wine tasting is among the top ten most popular activities with 10% of the Chinese rich showing preference to it. Other leisure activities which can be combined with tourism offering are fishing (8%) and yachting/sailing (4%). The sports preferred by the Chinese wealthy are swimming (37%), golf (23%) and yoga (22%).

A crucial point to acknowledge is that tourists seeking luxury experiences are not a homogeneous group, except in the sense that they are ready to pay big sums of money for memorable experiences. There is an opportunity for South Australian businesses to attract such clientele including:

- Wine connoisseurs and wine collectors who are looking for authentic wine and food experiences
- Asian HNWI's seeking to experience Australian and Western food in an authentic environment
- Celebrities, business executives, political leaders or other influential people seeking privacy and willing to pay for exclusive leisure services with top class food and wine
- Increasing numbers of upper middle class Chinese seeking to be educated on the wine industry
- People keen to learn about wine and food through wine masterclasses
- Honeymoon travellers seeking a unique, once-in-a-lifetime experience.

Requirements

Current challenges to realising this opportunity include:

- the current 'cottage industry' mentality of wine tourism
- lack of cooperation between the wine industry and the tourism industry
- creating an overall tourist experience rather than seeing wine tourism as cellar door sales
- getting local planning and development consent for development of infrastructure suitable for luxury offerings
- lack of investment funds
- lack of available data, information and research (Beames 2003).

Beames proposed a solution to develop experience-based wine tourism. This could be achieved by drawing on Quadri-Fellitti and Fiore's (2012) 4E strategy in experience economy studies. The "Es" here stand for: entertainment, education, esthetic and escapist (see Figure 15). South Australian businesses could develop an array of offerings with broad appeal to luxury tourists including those that seek luxury either in a traditional sense (globally accepted luxury items), and that seek unique experiences.

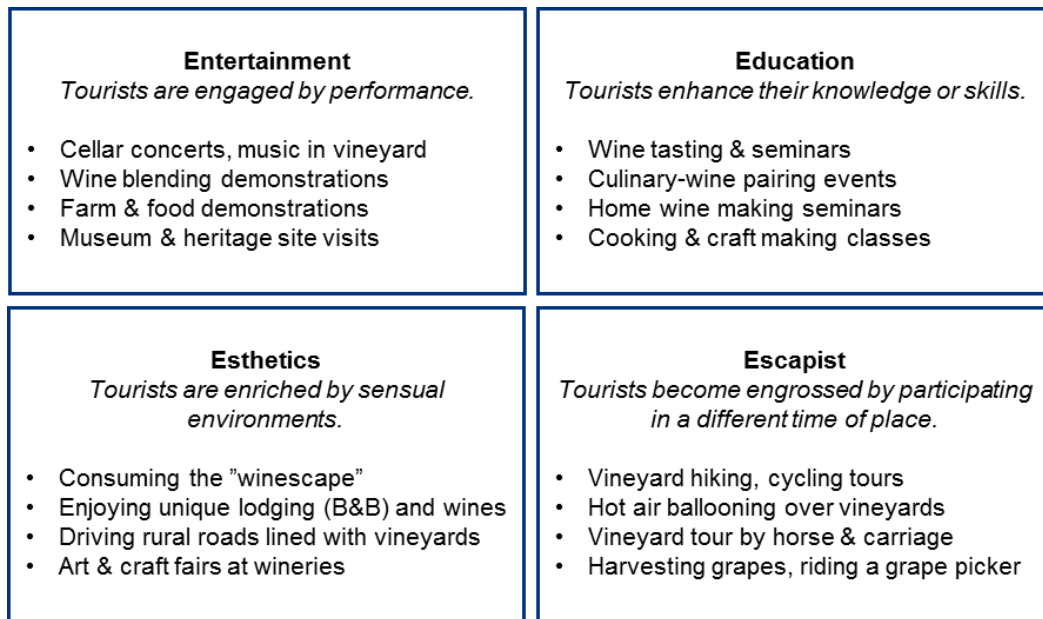


Figure 16: 4E model of experience economy in the context of wine tourism (adapted from Quadri-Fellitti and Fiore 2012).

An important thing to acknowledge with this pathway is that the notion that luxury is primarily based on experience. It means that although the use of certain expensive luxury items could create an "aura of luxury" around some item or practice, the luxury is something that primarily operates at the register of emotions: the overall feeling of luxury and uniqueness is more important than exploiting a specific luxury item.

Espousing the feeling of luxury must be established through a combination of initiatives. It is not just wine or food that attracts the luxury tourists to a given destination, but a combination of these and additional factors such as the local landscape and scenery (Bruwer and Alant (2009), people and their hospitality, diversity of wine estates, and overall hedonic experiences available. It is critical that the offerings are unique, memorable and differentiated towards a given region's local culture and heritage.

Key requirements for developing a competitive luxury tourism offering include a comprehensive offering of complementary services, such as luxury accommodation, premium dining and wine experiences, facilities for recreation and sports, shopping and cultural entertainment. None of the companies can provide the set of services alone, and thus collaboration is a key requirement. Clustering between local service providers is needed.

South Australia currently lacks a critical piece of infrastructure, namely luxury hotels and accommodation. Hotels are a critical piece in the luxury experience chain, and it is likely that the current standard of hotels, and the related services, does not currently comply with the expectations of the luxury-seeking customer.

Policy recommendations for SA Government

Policy recommendation 13 – The South Australian government can play an important role in facilitating industry collaboration for luxury wine and culinary tourism. As no single firm in the

hospitality sector is likely to be capable of producing the necessary set of services to cater for all luxury tourist expectations, there is a need to build regional collaboration networks.

Policy recommendation 14 – The South Australian government could consider supporting even stronger specialised regional profiling to develop luxury wine-driven culinary tourism. For instance: wine regions/Barossa, McLaren Vale, Adelaide Hills; premium seafood capital/Port Lincoln; beef/Mt. Gambier etc.

Producer focused pathway steps

Since luxury and wine-driven tourism is still nascent in South Australia, a lot of work is needed to realise this pathway. Some of the important pathway steps are provided:

1. Identify the key experiences in your region/locality that high net worth individuals or travellers would pay a premium for.
2. Establish networks of likeminded service providers such as luxury accommodation, fine dining experiences, luxury transport, and high-end recreation services.
3. Create offerings of luxury service packages. A commercial entity is needed which can package the various services into a single offering and ensure that everything works together smoothly. These include services directly related to travel arrangements, such as concierge services, as well as any emerging personal needs during the trip, such as health services. Well-trained staff, educated in local wines and food, to provide service to the clients is a must. An understanding of the importance of regional products throughout the travel experience can add to the service experience.
4. Establish channels to market by creating linkages with luxury travel service providers such as Mr & Mrs Smith.com or Luxury Lodges Australia.
5. Determine how to fund the investments required. Think about actions needed, size of investment, and investment range: Payback time is likely to be in the range of 3-5 years.
6. Target marketing towards influential customers. Build reputation through networks of influential HNWI's. In countries with established culinary tourism (e.g. France, Italy) the Michelin Guide 3* rating is an absolute must.

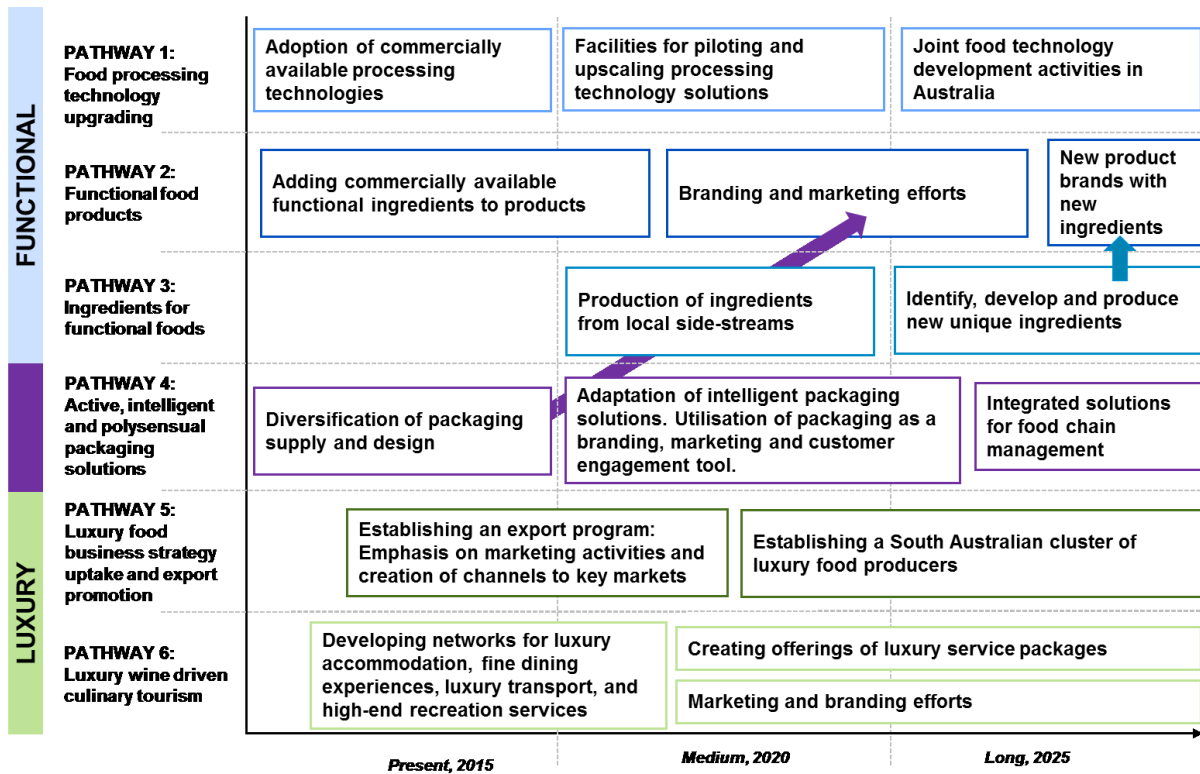


Figure 17: Summary of recommended pathway steps.

Chapter 9 - Conclusions and recommendations

The primary objective of the Functional and Luxury Food project was to provide the South Australian Government with a roadmap outlining where food value chains could be transformed to have higher added value for functional and luxury food and beverages, with emphasis on domestic and Asian markets. The general conclusions from the study are as follows:

- Most food companies in South Australia are small in size with limited capabilities and willingness to change their ways of working, processes and product portfolios.
- Foods produced in South Australia are currently fairly standard or traditional, and knowledge about functional foods is limited. The awareness of the existing potential in the functional food area is largely missing among the South Australian food industry.
- There is more existing potential in the luxury foods area; mainly due to the advanced wine industry.
- Food packaging is also very standard; it needs to be upgraded to meet the international standard required both in functional and luxury foods.
- The Asian functional and luxury food markets analysed in this study were forecasted to grow significantly providing opportunities for the South Australian food industry. However, market entry and differentiation in these highly competitive markets pose several challenges.
- There are a few companies in the current value chain that are innovative, ambitious and future-oriented as well as export-focused; these should be used as inspiring examples for the others.
- There are various opportunities available in adopting and upgrading current food processing technologies to improve product quality, yield and capacity to produce larger volume. Other relevant technologies available on the global marketplace include digital solutions for e-commerce, supply chain management, traceability, safety, anti-counterfeiting and customer engagement.
- Due to the fairly stagnant nature of the current South Australian food industry, a change in mindset is needed to initiate a change towards more added value food production systems. This change is not likely to emerge without encouragement and incentives from the government and key industry stakeholders.
- Pilot R&D services that would be easily accessible also for small companies are currently missing in South Australia. For the future development of the food industry, these kinds of services are needed. Lack of R&D services in South Australia is not such an issue for big companies because they can obtain these services interstate or abroad. Thus special care needs to be taken that the services developed and provided will benefit small companies.
- As prerequisites for successful penetration into Asian markets, there is a need for innovative products, excellent quality (acknowledged, not only perceived), and differentiation (e.g. through branding). Since South Australia is lagging behind its global competitors, fast growing Asian markets should be primarily targeted. However, since markets vary for any given product and country, a case by case analysis of the market potential is needed.

The single most apparent gap identified in the South Australian food industry is the lack of applied research and food process piloting capacity necessary to develop new products and processing technology.

A related need is the capability for new technology adoption involving training, benchmarking, demonstration and technology transfer in particular for SMEs with limited own resources.

A third important issue is the need to improve collaboration between businesses. There is a need for the government to work together with industry to facilitate networking between firms, universities and other stakeholders to build more synergy in developing new products and services. Partnerships and alliances are needed to build more comprehensive offerings, create local demand for new products, and build avenues for export markets.

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Appendix 1 – Case studies

Pathway 1

Case study: Liquid egg white produced by Munax Ltd using HPP (high pressure processing) treatment

Munax is an egg processing company, which was established in 2004. Last year, its turnover was over €25 million and it packed more than 19 million kilograms of eggs. Munax forecasts that it will heavily increase the amount of exported products in the near future. Recently, Munax has developed a unique process for making a Protein Smoothie with cold pasteurised egg white without milk. This product, uses HPP technology to keep the egg white in liquid form.

The company has constantly invested in new production facilities and equipment. It took eight years to increase the turnover from less than €1 million to more than €20 million. It has benefitted from the HPP processing technology as it allows the use of egg white in a liquid form without heat-based pasteurisation. The investments in HPP equipment has been around €500,000.



Figure 18: Protein smoothie by Munax. Picture courtesy of Munax Ltd.

Case study: Fruit juice production using high pressure processing (HPP) by Preshafruit

An example of technology adoption and commercialisation is found in pressed juice production. The Australian research institute, CSIRO investigated the high pressure processing technology and looked for businesses to adopt it. A small start-up, Preshafood, from Victoria took up the challenge to develop a range of fruit-based beverages using this promising technology. In HPP pathogens and other organisms causing spoilage are removed while retaining the original taste, colour, aroma and nutrition which are usually lost in heat pasteurisation conventionally used to treat fruit juices. Preshafruit juice products have been on the market for more than four years now. The Preshafood case is an excellent example of using new technology to address a need in the market to drive the beverage sector which has largely been in decline. The approach where CSIRO makes available the technology and the space to manufacture is a rare example in this market on how to fast-track innovation. Preshafood now operates a state of the art HPP and food processing facility in Melbourne.

Case study: Pulsed Electric Field (PEF) in food processing

Commercial examples of PEF include fresh juice processing, potatoes processing to make French fries and crisps, sugar beet processing (sucrose extraction), tomato peeling and lycopene extraction,

fermentation and extraction of olives (vegetable oil extraction), and grape processing for wines. Another commercial application is cotton seed oil; PEF processing enhances the oil extraction of cotton seeds at ambient temperature by oil pressing. Application areas in dairy include production of milk powders by combining PEF treatment and spray drying with low temperatures, without destroying the activity of bioactive molecules.

Except for Hoogesteger, not one single company applying PEF for juices advertises the use of PEF on their website or on the product label. Hoogesteger is the only company communicating that it uses 'Fresh Micro Pulse-treatment'. Other industrial users include Orchard house (UK) which makes PEF orange juice for retailer M&S and American Beverage Corporation USA which applies PEF to cocktail fruitmixes.

All major potato processors now use PEF for French fry production. As with the juices processors, the potato processors prefer confidentiality about the process and do not mention the use of PEF (Mark de Boevere, Pulsemaster).

Case study: Contract food processing

Due to the high price associated with investment in new food processing technology there are also companies which provide food processing as service. These companies operate industrial scale processing equipment and sell their processing capacity and associated services to food producers. Some examples of different contract technologies include:

High pressure processing

Fresh Advantage (USA) provides contract high pressure processing for various food products (meat, fruits and vegetables, meals, juices, seafood, dairy products etc.). Services include customer product pick up, cold storage, thawing of frozen products, packaging, tracking and scanning and product delivery.

Milling and air classification

Particle Control Inc. (USA) provides contract milling and air classification for a variety of dry products including proteins, cocoa mixes, rice flour, colloidal oat flour, rice fibre, corn fibre, corn starches, oat fibre, soya four, cottonseed, pea flour, pea fibre, fruit fibre, wheat fibre, beans, etc. It provides particle size reduction, particle classification and separation by air classification or screening, reprocessing out of specification ingredients, blending and repackaging.

Distillation, evaporation and fractionation

Pope Scientific Inc. (USA) provides contract high vacuum molecular distillation, evaporation and fractionation. Its product range includes edible oil deodorisation and deacidification, vitamin and nutritional supplement purification, food, flavour and fragrance isolation, and omega - 3 fatty acid distillation. Additional services include assistance with upstream or downstream distillation process development and scale-up, feasibility testing prior to toll processing, custom manufacturing, processing to good manufacturing process requirements, complete turnkey processing equipment manufacturing, sales and service, tolling contract services.

Pathway 4

Packaging design tapping the product origin

Case study: KURA smoothie powders

KURA Nutrition is a food company from New Zealand that produces dairy protein-based smoothie powders. In 2015 they launched Smoothie Powder, which contains high amounts of proteins, vitamins and minerals, and instead of being a traditional food supplement (found in the supplement aisle) the company has launched the product as a 'new breakfast' which can be found in the breakfast aisle. The product family is available throughout Sprouts Farmers Market locations, Whole Foods (Southwest), and on Amazon.com.

The packaging concept was created in collaboration with Brooklyn-based branding company, Red Antler, to highlight the product origin. The packaging was designed to be clean, modern, and premium, while telling the story of Kura's New Zealand origins without feeling too rustic. By simply delivering a new brand design and packaging, the company and the KURA brand have gained international awareness.

Biobased packaging concept for functional food

Case study: Eila® lactose free milk

Finnish dairy producer, VALIO, was the first company in the world to sell products to consumers in the Tetra Rex® Bio-based carton which is made from a combination of paperboard and bio-based polyethylenes made from sugarcane. The price of these green polyethylenes was clearly higher than that of oil-based counterparts, but processability should have been exactly the same. Valio trialled the package with one of its functional milk products (Eila® lactose free semi-skimmed milk) during spring 2015. The same format has been used in Sweden for specific milk products and in Norway for fish products.

Luxury brand packaging as a marketing media

Case study: Bombay Sapphire Electro

Design office Webb deVlam and packaging manufacturer Karl Knauer created a travel and retail exclusive gift pack Bombay Sapphire Electro for Bacardi in 2013. The carton lit up whenever someone touched it. The illustration was produced by electroluminescent ink with a battery hidden in the bottom of the packaging. This package won several design prizes and it has become a collector's item on eBay. Consumers have also constructed lamps out of the bottles possibly inspired by the unique packaging design. Bacardi has also developed a specific product for Asian markets (Bombay Sapphire East).

Brand-building packaging solution

Case study: Fazer Magic luxury pralines for cosmopolitan travellers

Fazer, a Finnish confectionery company, has recently launched a new chocolate brand called Fazer Magic. This product is especially targeted to high-end travellers with one of the key sales channel being airport duty free shops. To support the launch and to promote the product Fazer teamed with

Finnair, a Finnish airline company, and organised a 'magical flight' event on Finnair's flight from Beijing to Helsinki.

The packaging is unique form and kaleidoscopic appearance is produced by VG Kvadra Pak, and designed by Illumination. The packaging design and the package have received positive attention and won a Scanstar Award 2014, a respected packaging award in Scandinavia. The package is seen to be "a distinct luxury product that makes people curious and activates an incredible brand experience".

Design-led innovation combining packaging and wine experience

Case study: VALO wine vessel

VALO wine vessel is a purple hand-blown glass amphora by South Australian glass artist Nick Mount which is combined with a magnetic, 3D-printed titanium closure. The product is a design-led innovation carried out in collaboration between the Australian Wine Research Institute, the McLaren Vale Grape Wine & Tourism Association, Scholle Industries and 12 McLaren Vale wineries.

What differentiates VALO wine from other products is not just the luxurious package but also the service incorporated in the concept. By purchasing the product consumers receive the wine along with wine experiences including events, lunches and tastings with winemakers. The design of the wine vessel will evolve each year. VALO tickets cost \$8,800 and are capped at 100.

The program behind the VALO concept is not for profit. It aims at creating a trust to manage the investment of net proceeds into McLaren Vale community enrichment initiatives. Funding is aimed at cultivating wine craftsmanship skills, supporting rising stars, fostering environmental custodianship and investing in regional infrastructure – which all in turn enhance the McLaren Vale experience.



Figure 19: VALO wine vessel. Picture courtesy of VALO wine.

Brand enhancement and protection

Case study: connected smart bottle

Thin Film Electronics (Thinfilm), an electronics and smart systems developer, and G World Group, a global authentication company, created a partnership to deliver a 'smart wine bottle' based on OpenSense™ NCF technology. The technology can detect both the sealed and opened state of a bottle. The tags and the sensor information they contain will allow sending personalised communications to consumers who read the tags with their smartphones. A field trial is being carried out in collaboration with a Chinese-owned, premium wine company in Western Australia. The concept helps to provide an anti-counterfeit framework.

Château Le Pin, a producer of prestigious Bordeaux wine, is collaborating with NFC object identification specialist Selinko to attach NFC tags to wine bottles so users can authenticate the vintage by using smartphones. The same technology is also being used by Rémy Martin, which is launching a connected cognac bottle equipped with an NFC tag. The solution is targeted at Chinese markets and enables consumers to check the product authenticity and detect whether the bottle has been tampered with.



Figure 20: Smart wine bottle by Thinfilm and G World Group. Picture courtesy of Thinfilm.

Food branding failure

Case study: Tropicana's packaging redesign

Not all brand packaging facelifts succeed. Tropicana's 2009 redesign and launch of new packaging serves as an example of branding failure due to the packaging design. Tropicana, a PepsiCo-owned brand, decided to replace the existing packaging design for its orange juice with new one for the North American market.

In North America Tropicana invested US\$35 million in the launch of the new packaging for Tropicana's Pure Premium orange juice. The packaging design and the campaign were created by Arnell.

Only a few days after the launch consumers started criticising the new packaging, social networks playing an important role in the process. The new packaging design lacked any of the main reference

elements to recognise the product, which include the orange with the straw, the original logo and the focus of '100% Orange' instead of 'Pure Premium.' Therefore many consumers failed to recognise the product on supermarket shelves. In addition, the company underestimated the deep emotional bond the customers had with the original packaging.

Only two months later, sales of the product dropped by 20% (equivalent to US\$30 million). Meanwhile competitors took advantage of Tropicana's distress and increased their market share. The company was forced to drop the new design and return to the original packaging design. Only a couple of months after the launch of a new packaging, Tropicana announced to return to its original packaging. The overall cost for Tropicana of this failed branding effort was more than US\$50 million.

Pathway 5

Case study: Prosperitas - Selling premium Australian wine to Asia – an example of a created luxury product (Courtesy of Dr Gjoko Muratovski)

Prosperitas is an award-winning South Australian wine label, designed and branded exclusively for exports to the luxury Asian market. The wine has been promoted as a limited edition, premium Australian wine (McLaren Vale Shiraz, vintage 2006). The project, which was initiated at the height of the Australian wine crisis in 2009, was a success in Asia. The whole wine stock was sold out in Singapore shortly after its debut in early 2010, where the label had a stealth launch at a high profile event hosted by the Prime Minister of Singapore.

The plan was to invest in small quantities of premium wine, lavishly branded and packaged, and sold with high profit margins to the Asian luxury market. The Prosperitas wine label development was a fully research-driven project. Every single decision behind the strategy, whether in terms of wine acquisition, the brand name, or the label design, was based on market intelligence, reviews of existing research, and new strategic design research. The primary objective was to understand the Chinese attitude towards wine, and what is the best way to sell wine in China and in the broader Asian market.

First knowledge of the state of the Chinese wine market and the best-selling foreign wines in China was gained. Target demographics were identified along with an understanding of drinking preferences according to age groups, prevalent cultural values, and traditions. Research revealed that Chinese people may purchase foreign wines for a dinner with friends or business partners at a restaurant in order to impress them. In such cases, the price and the look of the bottle, the label and/or the packaging are as important as the quality of the wine itself. Most of the studies indicated that the Chinese market has a higher preference for red wines over white or sparkling. A well-known fact is that Chinese regard cold drinks (including cold water) to be unhealthy, which is probably the reason why red wines are regarded as more preferable to wines that are consumed chilled. To ensure that the choice of wine was well made, wine vintage reports on McLaren Vale were consulted. According to reports the McLaren Vale 2006 vintage was considered to be of very good quality, with Shiraz, Mouvedre, Cabernet and Petit Verdot being the highlights of the year.

It is common mistake for Western companies interested in selling products to Asia to attempt to develop Asian-looking designs for their products. Consumers at this end of the market do not want something from the West that is specially targeted at Asia. Instead, they prefer to have premium goods that Western consumers would prefer to use. However, not everything that is designed for the Western market may be appealing to them. That is why a number of cultural codes need to be taken into account when looking at exports to Asia.

For example, the name of the wine label, Prosperitas (a Latin variation of the word prosperity), is based on one of the most popular well-wishing sentiments in China. The label design features an overly decorative coat-of-arms that features a phoenix. According to Chinese legends, the phoenix is a symbol of heaven's favour, virtue and grace, luck and happiness. However, in order not to make it obvious that this is a specially designed element for Asian consumers, the aesthetics of the design are distinctively European. Other elements, such as the choice of the bottle, were also carefully selected so that they appeal on a cognitive level to the Chinese consumers. To further match the

Chinese expectations for a premium wine, first class corks were used and the tops were hand sealed with black wax. No expense was spared for the label and the packaging. Even the cardboard delivery boxes were individually assembled and hand printed with rubber stamps. Overall, the cost of the packaging was at least five times more than what the wine cost.



Figure 21: Prosperitas bottle and packaging. Picture courtesy of Dr. Gjoko Muratovski.

Case study: World winning rye distillers from Finland – Kyrö Distillery Company

The idea for the all-rye distillery was conceived in a sauna in 2012. In Finland rye is commonly grown and consumed but nobody was producing rye whisky. Two years' later the production was started with Juuri ('origin'), unaged spirits made from malted Finnish rye in an old cheese factory in Ostrobothnia. Napue Gin, flavoured with meadowsweet, sea-buckthorn, cranberries and birch leaves, soon followed. Napue Gin won a gold medal at the annual International Wine and Spirit Competition in 2015. Currently the company is in the process of producing its own whisky (which will be available after three years' maturation).

After the initial idea it took two years to start the production. The company was founded by five men who had no specific expertise in this area. Market analysis was done based on publicly available material and by using contacts created during distillery visits in Scotland, Sweden, Denmark, USA and Japan. These personal contacts have been extremely valuable for the business. From the beginning the intention was to enter international markets. The initial investment was made by the five shareholders of Kyrö. The company received grants from Tekes, the Finnish Funding Agency for Innovation. These grants facilitated branding and international marketing. The Local Centre for the Economic Development, Transport and the Environment supported the infrastructure (including equipment) investments. Since the production of alcoholic beverages is heavily regulated, authorities needed to be involved early on in the process. In this case the

authorities (National Supervisory Authority for Welfare and Health and Customs) provided detailed guidance during the process. The first product launch happened in Helsinki in a pop-up bar that was active for four months. The pricing of the products was based on market and competitor analysis (Napue Gin is about €80/L).

Branding was developed well before production (9 months). The company who is responsible for the branding (Werklig) was carefully selected for their high quality. Since in Finland advertising of spirits in media is forbidden, another marketing route was collaboration with bars and bartenders. Branding has been of utmost importance in the success of these products. Marketing has been successful and the gold medal won at IWSC has been a great asset.

In 2016 Kyrö Distillery will open a new product line. Also in 2016 more active marketing to other EU countries, Japan, Korea and Singapore will commence.



Figure 22: Napue Gin, Kyrö Distillery. Picture courtesy of Kyrö Distillery.

Case study: A beer with an amazing story

In the summer of 2010, five bottles of beer were lifted from an old shipwreck, in the Åland archipelago. The ship probably sunk in the 1840s, but the origin and the exact age of the wreck is still unknown. The owner of the wreck, the regional Government of Åland, had the beers analysed at VTT Technical Research Centre of Finland, with the aim of recreating the beer. The story spread quickly through media, indicating a huge public interest. The government gave the right to produce the beer to a local microbrewery, Stallhagen, on the condition that part of the financial surplus generated by the sale of each beer bottle will go to marine archaeological work and environmental measures for improving the quality of water in the seas.

The first recreated beer was released as a limited edition of 2,000 numbered bottles of Stallhagen Historic Beer 1842 and sold at a price of €113.50 per bottle. The beer was bottled in hand-blown

glass bottles resembling the bottles retrieved from the wreck. The second recreated beer was developed to be sold in supermarkets, but at significantly higher price (about €6/bottle) than premium brands in general, and has now also been launched in Belgium.

The key to success was the story behind the beer and the way it was presented to the public. The Government of Åland and Stallhagen saw the value and potential of the discovery, and fed news through interviews, press releases and videos. Science was also used to build a solid ground for the product, and the science also became an essential part of the story.



Figure 23: Historic beer Stallhagen. Picture courtesy of visitaland.com, Photographer; Marcus Boman.

Case: Seppeltsfield Port Wine

South Australian winery Seppeltsfield has partnered with luxury French crystal house Lalique and released a rare 100-year blend of tawny in an exclusively crafted decanter for \$10,000. Only 150 of the pieces have been made worldwide. The association with Lalique puts Seppeltsfield in the same realm as global luxury brands such as Bentley, Salvatore Ferragamo, Hardy Cognac and Macallan, all of which have chosen the French fine crystal maker to collaborate in bespoke releases.

Founded in 1888 by Rene Lalique, regarded as a leading Art Nouveau and Art Deco artist and by many as the creator of modern jewellery design, Lalique is famed for its artisan craftsmanship and distinctive clear and frosted finish glassware. The Seppeltsfield Decanter design reflects the iconic palm trees surrounding the western Barossa estate, as well as reflecting the winery's famous tear-shaped Para Liqueur bottle of the 1950s. The wine adds to Seppeltsfield's portfolio of celebrated 100-year-old vintage specific tawnies, the name now used instead of 'port', with a rare blended fortified wine stretching over 12 different vintages between 1886 and 1970 assembled by winemaker Fiona Donald and managing director Warren Randall. The wine is considered to be the first 100-year-old average aged tawny port of its type in the world. The history and craftsmanship of Seppeltsfield attracted Lalique chairman Silvio Denz to the partnership.

Case study: Caviar House & Prunier – caviar and luxury salmon

Caviar House & Prunier, was founded by the current chairman's Peter Rebeiz's father George Petros Rebeiz – the 'King of Caviar'. In the 1950s he was appointed the Lebanese Consul for Copenhagen, and it was there that he began to set up a new food trade concept - Caviar House. (The 'Prunier' was

added to Caviar House in May 2004 when the French producer of farmed caviar was acquired). From small beginnings it has grown into the world's largest importer and distributor of caviar (as well as being associated with other top quality seafoods, notably the Balik salmon which it also produces). The company has also become synonymous with successful airport seafood bars, particularly since 2007 when it struck a global partnership with leading concessionaire, SSP.

The Caviar House online shop offers 12 different Prunier Caviar products (prices up to €1100), Balik salmon (prices range €200-500/kg) and salmon based products and gift packages.

Case study: Luxury chocolate truffles

The Chocolate produces luxury chocolate truffles using ingredients that have been carefully selected, sourcing the finest chocolate in the world, Toscano Black 63% chocolate. The cocoa beans for this chocolate are refined using the traditional granite stone mill, thus creating a smoother tasting experience. These cocoa beans are ground to no more than 15 microns – this makes the smoother texture in the mouth because it can only detect a granule size of over 18 microns. Industry standards are approximately 30 microns.

Chocolate truffles are flavoured with Armand de Brignac, Brut Gold champagne, the world's top-rated champagne. Armand de Brignac Champagne is entirely produced using traditional artisan methods and values. Truffles are enrobed in edible pure 24 carat gold.

The chocolate champagne truffles are available freshly handmade to order online and are stocked by Harrods. The Boutique box (for 200g of chocolate; price £190) is made from recycled material. Each one is hand crafted so no two will ever be the same. More than 450 Swarovski Crystals adorn each box inside and out. To maintain individuality each box is numbered with its own certificate. Each single part of the product is hand made in the UK.

Case study: South Australian luxury honey

“From the Beerenberg family farm” is the slogan of Beerenberg, a family owned producer of premium jams, condiments and sauces. The company is located in Hahndorf, SA. The Paech family has built the brand strongly on the family heritage of the current owners. For example, the sauces have been named after members of the family.

The company offers also range of luxury goods within the Beerenberg Signature Collection, which is based on uniqueness, rarity, high quality, and craftsmanship. One of the luxury products is honey which is produced by the Ligurian bees on Kangaroo Island. The company has produced a limited edition honey (2,000 jars, \$99 each) which are sold via a reservation system. The packaging design of both the primary (honey jar) and secondary packaging (black coloured gift pack), intensifies the sensation of luxury. The company also has a dedicated website for Chinese customers, to promote the Ligurian bee honey.

Pathway 6

Case: Franschhoek Wine Valley in South Africa

In recent years' rural town of Franschhoek, in the province of Western Cape, has become the 'food and wine capital' of South Africa. Franschhoek is located in relatively close proximity to Cape Town (approx. 70 km / 45 minutes' drive). The town was founded over 300 year ago by French Huguenots who discovered area's suitability for the wine production. The region taps to its French heritage and the French reputation for fine food and wine is clearly visible in the area. Many of the old farm houses presenting the Cape Dutch architecture still exist today and together with Franschhoek Valley's pristine natural beauty they create a unique ambience in the region.

What makes Franschhoek notable is that despite of small size, it has large number of prestigious, award-winning restaurants and accommodation within its borders. The area has succeeded in establishing a sound reputation as a top destination for world-renowned wines and world-class cuisine. The high standards are promoted by several awards granted to the restaurants, wines and accommodation. Besides wine tours arranged to the valley's 40 wine cellars, the area offers versatile range of other leisure activities including hiking, cycling and horse-riding, trout fishing, and gourmet shopping.

Some of the key success factors include the close proximity to Cape Town, French heritage, beautiful scenery and surrounding nature, winemaking tradition, local high quality food produce, and authenticity.