Australian Government
Wine Australia

Curtin University

WINES OF WESTERN AUSTRALIA
Extraordinary Regions

How can small producers in Western Australia achieve economies of scale efficiencies in logistics and distribution?

FINAL REPORT FOR INCUBATOR PROJECT

Project Number: **CUT 1701**

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1. **Project summary:** This Incubator Initiative focuses on small wine producers in Western Australia (WA) in an effort to explore new business models for greater domestic and international success. More specifically, the research project focuses on collaborative cold chain logistics (Jiuyi et al., 2015). An unbroken cold chain is an uninterrupted series of refrigerated production, storage and distribution activities, along with associated equipment and logistics, which minimises any compromises in wine quality during the shipping process from producer to the end consumer.

   The project explores how small producers could collaboratively use cold chain logistics to reduce or share costs in the supply chain. We did this through consultation with the industry, including wine producers and supportive bodies (e.g. Wines of Western Australia), as well as with supply chain providers offering transportation and logistical services.

2. **Aims and background:** Recent research suggests that while WA producers have an interest in expanding the scale and scope of their businesses (Galbreath et al., 2015), they are unlikely to fully exploit market and technological opportunities because of the perception that: 1) being a small producer is an obstacle to greater success and 2) the costs of innovation are beyond the reach of small producers (Galbreath et al., 2018).

   One way that WA producers might be able to innovate is through collaboration or consortia aimed at collectively controlling costs, while opening up pathways to new growth opportunities. This project focuses on one such possibility; namely, collaborative cold chain logistics.

   Cold chain logistics is essential for quality control in the shipment of premium wine (Timotheou, 2013), yet, because of cost, may be beyond the reach of an individual WA producer who wishes to ship, for example, interstate or overseas. Hence, the aims of this project are to:

   1) Assess the interest of WA small producers in collaboratively engaging in the use of cold chain logistics to reduce costs, while improving market opportunities.
   2) Identify options that would facilitate the collaborative use of cold chain logistics among small WA producers; and
   3) Put forth recommendations based on cost and feasibility analysis.

3. **Materials and methods:** Following the principles of qualitative research methods, this project relies on the technique of interviewing participants. In order to secure participants for the interview process, a short email, with the study's aims and objectives, was distributed to the member list of Wines of Western Australia. The Chief Investigator (CI) also relied on her contacts from previous wine-related research.

   Fifteen wine producers were identified to take part in the project. Once this number was reached, through both voluntary response to the email as well as personal contacts, the CI also secured supply chain providers who specialised in the transportation and distribution of wine (four in total). In this way, alternative perspectives, from the supplier side, were obtained.

   Wine producers who participated were all small in size (Appendix A), ranging from annual production from less than 1,500 cases up to 20,000 cases annually. Producers were located from

the Swan Valley to the Great Southern, demonstrating a broad cross-section by location (Appendix B). Transportation and logistics participants included one international company, as well as three Australian-based companies.

To collect data, semi-structured, open-ended interviews were used. Semi-structured interviews involve gathering rich and multi-layered information, allowing a few prepared questions to form the skeleton of the interview, with additional questions emerging during the interview process (Hoggart et al., 2002). By pre-determining some questions, the comparability of responses is increased and the interviewer's effects and biases reduced (Kitchin and Tate, 2000).

The first four interviews were conducted face-to-face to assess the validity of the interview guide. The remaining interviews were conducted via the telephone at a time suited to participants' work commitments. Prior to the interview, the participants were given a brief description of the research objectives and all participants gave written or verbal permission for the session to be digitally recorded.

Interviews were carried out between August 2017 and January 2018 and were conducted with personnel who were mainly owners or had marketing/sales roles (although many also carried vineyard management and winemaking roles). For transportation and logistics participants, most were either managing directors/owners or sales managers. All participants demonstrated a high level of professionalism in their understanding of the issue of temperature-controlled transportation and shipping of wine and collaborative approaches to business, its specific impacts on the wine industry, and their company's response to the issue. Most interviews lasted 45 minutes, although some were considerably longer. A careful orthographic transcription was made of the interviews to accurately reproduce the semantic content of what each participant said.

To analyse the transcripts, an inductive coding process was followed (Bryman and Burgess, 1994). Inductive coding first relies on a close reading of the transcripts based on the interview guide questions. Subsequently, codes were created that consisted of ideas, words, concepts, phrases, or terms that appeared frequently between and within the transcripts. This allowed us to identify emerging patterns and themes across all the participants, which were then leveraged to develop insight and interpret findings.

4. **Results and discussion:** In the transportation and distribution of wine, any temperature above 16°C (60°F) accelerates the maturation process and could change the wine's varietal character, its sense of origin and possibly shorten its life expectancy. Temperatures above 24°C greatly and untypically age most wines, leading to undesirable aroma, flavour and colour changes. Diurnal (day vs. night) temperature spikes during the commercial transportation of wine are not unusual but should be avoided. Within the entire distribution chain from winery to wine consumer, wines should never see an even short-term exposure to temperatures of 30°C or above (see Appendix C).

   One way to control temperature in the transportation and distribution of wine is to use cold chain logistics. Cold chain logistics provides guaranteed, end-to-end temperature controlled conditions (i.e., temperature-controlled rail, road, air and sea transportation and storage and

warehousing). According to industry insiders, cold chain logistics is a big step forward in the conservation and protection of wine (especially premium wine) and needs to be adopted by all parties of fine wine at every level—from the winery to the broker, the importer to the wholesaler and to the retailer (Timotheou, 2013).

In light of the potential value of cold chain logistics for premium wine transportation and distribution and the potential opportunities for collaborative business models, the following findings were uncovered through the interview process (based on a series of questions) and coding activities decribed above.

Q1: Do producers in WA value cold chain logistics? Do producers use it in the transportation and distribution of their wine and what is current practice of transportation providers?

In general, the participants realised the benefit of cold chain logistics in the sense that end-to-end temperature-controlled transportation, storage and distribution of wine can preserve the integrity and provenance of the product. However, there were differences in perceptions of the necessity and use of end-to-end cold chain logistics. For example, in the exportation of wine some participants questioned the requirement of the need for an end-to-end cold chain solution, such as in the case of transporting the wine from cellar door to the Fremantle port. Once at the port, due to Free On Board (F.O.B.) arrangements, the responsibility and preservation of wine is left with the buyer of the wine. However, if the buyer valued and requested temperature-controlled containers (e.g., insulated liner, temperature-controlled container, temperature-controlled road or rail transport), then the buyer would generally bear the cost—not the producer. In another example, for intrastate and interstate shipping, most of the producers did see value in cold chains solutions. However, they felt it was cost prohibitive and that their customers neither requested nor are prepared to pay for the additional costs of providing a guaranteed, end-to-end cold chain solution.

With respect to current practice relative to cold chain logistics, we discovered that there were no participants using a *complete*, end-to-end cold chain solution. However, some producers are using temperature-controlled measures in the transportation of wine including the use of insulated liners for container shipment and pallets, Styrofoam packaging for cases and individual bottles, rail and road transportation that is temperature-controlled, scheduling transport during days and periods of cooler temperatures and ensuring shipments are not held up over weekend periods or in ports (to reduced storage of wine in warehouses that are not temperature controlled). In this sense, while there is effort to manage temperature in the transportation (and even storage) of wine, the vast majority of participants are not using end-to-end cold chain solutions. This highlights the fact that an understanding of the degree to which cold chain logistics is used within the transportation and distribution chain was not forthcoming, demonstrated by the following wine producer quote:

> *"…Australia Post isn't [necessarily offering temperature-controlled transport], I think maybe some of their trucks are, but you know, once it's gone to the post office not sure what happens [with respect to any temperature-controlled transportation]" (P11)*

In terms of the interviews with transporation and logistics providers and their offerings around cold chain logistics, we discovered that there is consideration of temperature control when using road, sea shipment and airfreight in the transportation and distribution of wine. However, although their customers (i.e. wine producers) see value in cold chain logistics, they cannot guarantee an end-to-end cold chain solution to all locations. Further, due to associated costs of an end-to-end cold chain solution, many of their customers are unwilling to pay the extra associated costs or are not inquiring about how temperature control in transport and distribution is handled. In fact, one transportation provider suggested the following:

> *"[There are] only 10 or 15 percent of wineries that really…push us…to the extreme [with respect to an end-to-end guaranteed cold chain solution]. They're not wanting to know cradle to grave what…the climate control conditions that we're providing" (IR4)*

Q2: What level of interest is there in 'collaborating' with other producers in using cold chain logistics?

The findings suggest two aspects with respect to this question. First, there was a very strong interest in collaborating with other producers in the transportation and distribution of wine. Reasons for this include cost savings, economies of scale, administrative time efficiencies, access to new markets, dedicated transportation (e.g. a dedicated temperature-controlled vehicle to transport wine for the collaborative members), negotiating power, reliability of set transportation schedules for the collaborative members and increased sales due to more competitive pricing of wine. Overall, there were several benefits acknowledged for collaboration, regardless of the geographic location of the producer.

Second, with respect to collaboration using end-to-end cold chain solutions, there was acknowledgement among producers of this solution being best practice. However, in practical terms and associated costs, there was reservation whether such a solution would be economically valued and viable amongst customers and producers alike. The general view was that some aspects of a cold chain solution (e.g., temperature-controlled road transport of wine) should be implemented in a collaborative arrangement, based on the benefits noted above.

With repsect to collaborative business models, in theory, a collaborative arrangement could occur between just two producers. However, based on our discussions with both producers and transporation providers, the more members in a collaborative group the higher the potential of realised benefits, such as scale economies and better pricing for the transportation and distribution of wine. Collaborative groups could be self-organising (e.g. producers who already have close relationships or share common interests in selling wine to a particular locale) or could be driven by regional wine associations (e.g. Great Southern Wine Producers Assocation) on behalf of interested members (we further explore the establishment of collaborative groups in *Recommendation 6*).

Q3: What are some of the options available for collaboration among producers in the transportation and distribution of wine?

[We preface response to this question with the view that the options outlined below may be part of a cold chain solution—although not necessarily options for a complete end-to-end cold chain solution. We further note that our research findings are exploratory and are not a definitive statement on solutions or options, and their associated costs, with respect to collaborative arrangements in the transportation and distribution of wine]

The participants indicated several potential options for collaboration in the transportation and distribution of wine. Based on the coding and analysis of the interviews, the following options emerged:

Negotiation with transportation and logistics providers on behalf of collaborative group members for better pricing of the transportation and distribution of wine to individual consumers as opposed to intermediaries (e.g. distributor)	In the process of collaborative transportation and distribution arrangements, solutions need to ensure that members of the collaborative group can track their own individual order(s)
Provide a consolidation of shipments from a single collection point for a given region so that economies of scale can be achieved on behalf of the collaborative group	The collaborative group require recommended guidelines around exporting processes and pricing (e.g. how the group functions together and the processes needed to realise collaborative opportunities, lessons learned about exporting, pricing considerations, how to deal with international customers)
Establishing a preferred transportation provider for export shipments (for F.O.B.) on behalf of a collaborative group so that buyers (e.g. importers, distributors, wholesalers) in the targeted export country can benefit from competitive pricing due to economies of scale—which could drive higher demand of wine from collaborative group members	In addition to collaborative transportation and distribution of wine, some producers expressed interest in the collaborative group positioning and marketing themselves to different markets. This could include a branded retail store in a given country, in-country sales people representing a collaborative group, or an in-country warehouse owned (or warehouse space rented) by the collaborative group that supplies local customers
Schedules (e.g. a regularly scheduled weekly or monthly shipments to a given locale) for consolidated shipments	For producers in the southwestern regions of Western Australia, when and if the Busselton/Margret River international airport becomes operational, utilise this as a shipping point for collaborators if more cost effective than the Perth airport and alliances can be crafted with airlines for air freight services
Development of a mobile phone application ('app') or web site which will facilitate the consolidation of the individual members wine to ensure shipping loads are at maximum capacity—this is expected to facilitate economies of scale for the collaborative group	

Q4: What are the disadvantages of participating in a collaborative arrangement for the transportation and distribution of wine?

While there was clear interest in participating in a collaborative arrangement in the transportation and distribution of wine (including cold chain solutions), participants suggested a number of potential disadvantages, including the following:

Possible time delays for delivery of product (e.g. time delays resulting from having to consolidate multiple orders among producers)	The possibility of engaging with members who are not likeminded
Potentially complex coordination efforts	Contractual commitment to minimal levels from collaborative members
The risk of not having buyers all in the same location (e.g. not having a single buyer at an export destination who can ease the burden of managing and coordinating distribution to end customers)	Producer commitment to organise transport to consolidation warehouse
Challenges in price estimation to customers due to variations in transportation costs dependent upon volume shipped	Possible increased risk if consolidated shipment does not provide tracking for individual members
Culture of independent work practices within the industry could limit opportunities to collaborate	Required levels of commitment and contractual obligations for each individual member
Loss of flexibility (e.g. possible wait time due to consolidation processes; infrequency of shipping schedules)	Having to lead or manage the collaborative arrangement
Conflict of interest (e.g. potential loss of competitive advantage for an individual producer)	Potentially time consuming

5. Conclusion and recommendations:

With respect to the aims of the project, providing information on cost and feasibility (aim #3) of *all* possible collaborative options/recommendations cannot be fully explored at this time due to the unanticipated complexity of our findings and a lack of a one-size-fits-all solution. However, we make the following key recommendations.

Recommendation #1: Collaborative group price negotiations with transportation providers for shipment to individual end consumers

Bargaining power of wine producers can be increased by leveraging larger collaborative groups in order to negotiate (e.g. group negotiation rather than individual winery negotiation) better pricing with transportation and logistics providers. For example, a collaborative group of wine producers are better positioned to create a contract committing to exclusive use of one transportation and logistics provider. There was evidence to suggest that some transportation and logistics providers, as well as most of the wine producers, were willing to engage in such an opportunity. One participant suggested:

> *"If you're looking at shipping to an individual customer, I'll tell you what would be beneficial for the industry is getting some collective collaborative rates" (P6)*

With respect to this recommendation, from preliminary discussions with transportation providers, we were able to determine that there are cost savings to be realised through price negotiations on behalf of a collaborative group. For example, in one scenario, we determined that a collaborative group could realise ***cost savings of up to $50 per case*** on the transportation of wine, depending on the final destination point.

Recommendation #2: Overseas or interstate warehousing and distribution hub collaborative concept

This concept relies on the establishment of a warehouse and distribution process in a given location (e.g. Singapore, Melbourne) among the collaborative group. The warehouse could be owner-occupied (at a cost) or rented space (which could be more ad-hoc and cost-effective). More specifically, the collaborative group builds scale by aggregating shipments of wine (e.g. shipping a container versus a palette of wine) to the warehouse location. The warehouse then becomes a distribution hub to reach end customers in the given location. The hub approach is noted in the following quote:

> *"So you have to have shared warehousing and then you have to have a shared sales model, whatever that may be. So there is going to be a cost associated with warehousing, but then people pay for their product to be warehoused here anyway, so that's not a huge one. So whether you're paying for your product to be warehoused in Margaret River or in Singapore on a shared basis—because your cost of warehousing [one producer's] pallet a month are incredible, compared to your cost of warehousing [a collaborative group's] pallets" (P6)*

Recommendation #3: Regularly scheduled transportation of wine for the collaborative group

Here, the development of a technology platform (e.g. mobile phone app, website) will enable the collaborative group to more readily maximise capacity of volume shipments (e.g. containers or palettes) to a single location. Such aggregation affords the ability to achieve economies of scale in the transport of wine. This solution would most likely entail regular (e.g. once a month) transportation schedules tailored to meet the transportation demands of the collaborative group (e.g. container transported via rail or road from Perth to Adelaide). As capacity increases in terms of the aggregation of wine for transportation, pricing to individual members of the collaborative group is expected to decrease. Insights into this recommendation include:

> *"There are things…that exist in sort of a similar way…. So, you know…fruit comes up for sale and you know the wine association has a bigger website, which as far as I can tell is fairly automated. You can just go and have a look at what's for sale and what the going rate is and they'll give you some information on the vineyard, all that. If you could have a similar sort of [schedule] saying, you know, a container for Singapore, for Hong Kong, for Shanghai, wherever it's going. Then it can become steadily filled I would imagine and then you'd be filling it as you go. I mean that would be…the way I'd think of it" (P1)*

> *"But having a fixed schedule I think has some legs for the industry here, I really do" (P6)*

> *"I'm starting to even picture it, if there was a schedule, for here, here, here or here—you would look at it and see if it would work" (P15)*

When exporting, for example, from preliminary discussions with transportation and logistics providers, there is evidence to suggest that there are ***cost savings of 50 percent (or more)*** when transporting a container load as compared to a pallet. With respect to technology platforms to facilitate a regularly scheduled transport option, discussions with developers suggest that a mobile phone app with basic functionality would cost approximately $20,000 to create.

Recommendation #4: Intermediary business development for a collaborative group

Intermediaries for this recommendation include shared agents, distributors, wholesalers and retailers (on-trade and off-trade channels). Such intermediaries would be sourced by the collaborative group to ensure that single locations of customers can be serviced (e.g. an intermediary in the United States who sources an assortment of wine from collaborative group members), which will provide more streamlined or a less complex process of aggregation of members' wine for shipment. This recommendation provides economies of scale due to volume purchases by the intermediaries of the collaborative group rather than individual members. However, we believe this recommendation, based on our discussions with producers of various sizes, would be of most interest to those who produce more than 5,000 cases annually. This is due to the fact that the business model of such producers is based on a larger volume of wine sales. Many of the smaller producers (< 5,000 cases) suggested they have little interest in engaging with intermediaries (as opposed to selling directly to end consumers) as profit margins can possibly be sacrificed and they have a business model or objective that is not based on a larger scale (i.e. very low volume and higher margins). Representative views include:

> *"I think that you need to be the conduit from market to grower, producer. And have forums or whatever, and expressions of interest to sign up, to a marketing program or something, that would coordinate and combine all of the freight together [of a collaborative group]. Maybe introduce overseas purchases [by intermediaries] to the group...you know, the group that have signed on for the expressions of interest" (P13)*

> *"....whether it's someone in the market knocking on doors of retailers and restaurants and offering a selection of WA wines [for the collaborative group]...you may have [a group of] producers that would really like the assistance in terms of a joint marketing program" (P6)*

Of note, this recommendation could be combined with or be an extension of Recommendation #2.

Recommendation #5: The use of end-to-end cold chain logistics in a collaborative context

Based on our findings, the use of a complete end-to-end cold chain solution for the transportation and distribution of wine in any of the above collaborative recommendations is unlikely to be an acceptable option. This is due to the increased cost of using an end-to-end cold chain solution which makes it more likely to be economically prohibitive. However, certain elements of a cold chain solution (e.g. insulated liners, timing based on weather forecasts) can be used collaboratively. Our recommendation is for producers to determine which aspect or 'leg' of a cold chain solution is most applicable and leverage the collaborative group to share the costs. Our perspective is reflected in the following comment:

"A lot of the wineries would love [an end-to-end] refrigerated supply chain available to ship their wine everywhere. But…it's not a system in Australia. You're just not going to get it. And if you do have it on some of the legs, you still have parts of the leg that won't be refrigerated. That's just the reality…Pretty much [an end-to-end cold chain solution] is financially prohibitive..." (IR3)

Recommendation #6: Establishing a collaborative group

There are potentially several options to establishing a collaborative group with respect to the transportation and distribution of wine (Appendix D). Here, we suggest most likely pathways. As a representative perspective, other industries are engaging in collaborative arrangements. For example, Bulla Burra (http://www.collaborativefarmingaustralia.com/) is a collaborative farming initiative which was established through common friendship, shared goals and objectives and proximity. Similarly, our findings suggest that establishing a wine-related collaborative group could follow a similar pathway; i.e. individual producers electing to be part of a collaborative group that are self-managed. However, this type of arrangement, while certainly a probable option, could be challenging because concern was expressed over a single member having to lead and manage the collaborative effort and the associated time commitments involved with such a role (as noted above in the disadvantages of a collaborative group).

Alternatively, participants suggested the involvement of regional wines associations and Wines of Western Australia as the basis to start or form collaborative groups. For example, a regional wine association or Wines of Western Australia facilitates the development of a collaborative group (e.g. promotes collaborative opportunities, determines interested parties, liaising between collaborative members and transportation providers). The regional wine association or Wines of Western Australia could then facilitate the development of a collaborative group and provide management support. This could include negotiation with transportation and logistics providers, coordination of the shipments of the collaborative group, development of technology to support the collaborative group (e.g. mobile phone app or website) and market development on behalf of the collaborative group. Such examples were noted in the following quotes:

"Yeah, it's going to require someone with a lot of time or…being paid to organise it and understanding logistics. And paperwork, even just like getting stuff delivered…does require a lot of input from someone. And so…it would require a person to oversee it. So that's why, in my head…going through [a Regional] Association would sort of make sense" (P4)

"I guess from a central point of view, Wines of Western Australia would be the logical sort of coordinating point" (P5)

With respect to the findings and recommendations noted here, we believe they could be applied to other States (and their regions) as the requirements are likely to be similar and many transportation providers operate nationally or internationally. In fact, there could be benefit of broader application across the country as this would stimulate and facilitate more collaborative business models, where applicable, within the Australian wine industry. Given the state of profitability across the industry, models that can help facilitate improvements in the bottom line is expected to be welcomed.

Future research directions should include professionally facilitated focus groups/workshops that include both producers and transportation and logistics providers to determine the preferred options for collaborative arrangements. This would also include exploring the processes, management, clarity on scope, rules of engagement and roles and responsibilities of collaborative arrangements.

6. **Extension:** In terms of communication, we elaborated on the progress of this Incubator Initiative project through the Wine Industry Newsletter of Western Australia (March 2018 edition--https://www.agric.wa.gov.au/newsletters/win/win-volume-126?page=0%2C1#smartpaging_toc_p1_s0_h2)**.** Further, a story on the research will be published in July 2018 in the *Countryman/The West Australian* by Ann Rawlings. Development of publications aimed at leading academic and trade journals are currently in progress. For example, we aim to submit a short article to the *Australian & New Zealand Grapegrower & Winemaker* by the end of 2018, where Project Supervisor Galbreath has published previously.

   Given the current stage and progress of the research project at the time of this writing, extension material has yet to be prepared. However, extension opportunities could include regional presentation of the findings through seminars and workshops, advertised through Wines of Western Australia and regional wine associations to gain uptake of participants. Such seminars and workshops could also include transportation providers to speak to the specifics of potential collaborative solutions from their perspective.

7. **Researcher benefit and feedback:** This research has provided the CI with greater insight into supply chain management and logistics solutions with a specific focus on cold chain logistics for the wine industry. The project also has provided an opportunity to expand networks within the wine industry and within the transportation/supply chain sector. In addition, the CI has benefited her professional and research profile through media exposure and coverage. Qualitative research skills have been further developed through the in-depth interviewing techniques used in this project.

   The CI and Project Supervisor are grateful to have participated in the Incubator Initiative and see clear value in the process and benefits of the program.

8. **Appendices:** To follow.

References

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APPENDIX

Recommended readings

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Marquez, L., Dunstall, Bartholdi, J., & MacCawley, A. 2012. 'Cool' or 'hot': A study of container temperatures in the Australian wine shipments. *Australasian Journal of Regional Studies,* 18: 420-443.

Robinson, A.L., Mueller, M., Heymann, H., Ebeler, S.E., Boss, P.K., Solomon, P.S., & Trengove, R.D. 2010. Effect of simulated shipping conditions on sensory attributes and volatile composition of commercial white and red wines. *American Journal of Enology and Viticulture,* 61: 337-347.

Appendix A

Type of Participant	Position/Title	Affiliation/Location	Number of Cases Produced	Coding Designation
Industry Representative	Sales manager	International transportation and logistics	NA	IR1
Industry Representative	Owner	Australian transportation and logistics	NA	IR2
Industry Representative	Owner	Australian transportation and logistics	NA	IR3
Industry Representative	Managing director	Australian transportation and logistics	NA	IR4
Producer	Manager	Yallingup	1,500-2,000	P1
Producer	Owner	Yallingup	10,000-19,999	P2
Producer	Owner	Cowaramup	1,500-2,499	P3
Producer	Owner	Porongurup	2,500-4,999	P4
Producer	Owner	Waroona	1,500-2,499	P5
Producer	Owner	Dunsborough	10,000-19,999	P6
Producer	Owner	Wilyabrup	1,000-1,499	P7
Producer	Sales/marketing manager	Cowaramup	10,000-19,999	P8
Producer	Owner	Wilyabrup	5,000-9,999	P9
Producer	Co-owner	Margaret River	10,000-19,999	P10
Producer	Owner	Wilyabrup	10,000-19,999	P11
Producer	Owner	Herne Hill	5,000-9,999	P12
Producer	Owner	Newlands	2,500-4,999	P13
Producer	Owner	Yallingup	2,500-4,999	P14
Producer	Owner	Wilyabrup	5,000-9,999	P15

Appendix B

Western Australia wine regions

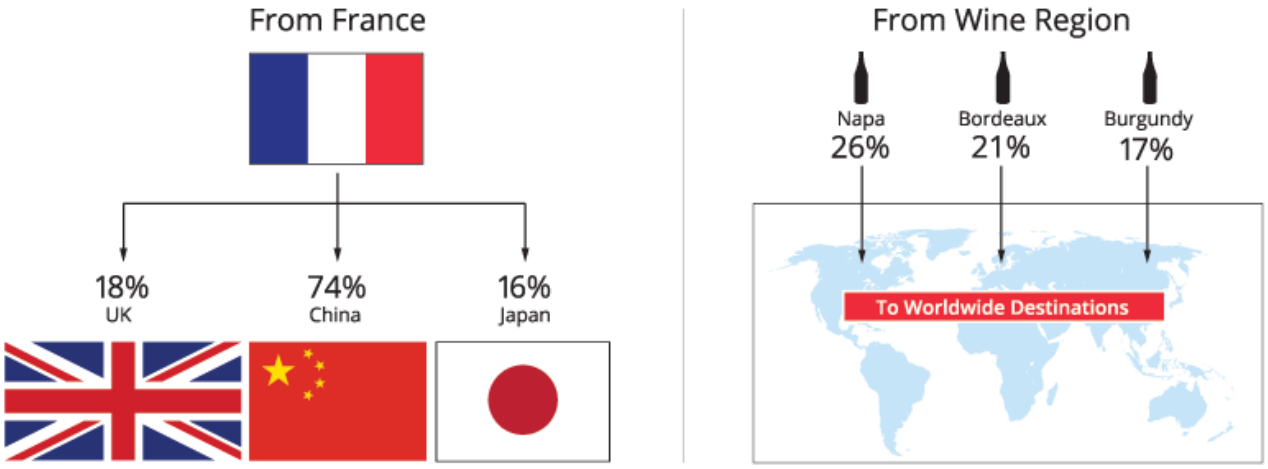
Appendix C

Recommended wine transport and storage conditions

Heat Exposure	
Storage Time	*Temperature*
Never	30°C (86°F) or above
Spikes of 30 min or less	29°C (85°F) or below
1-4 weeks	24°C (75°F) or below
Long-term storage	10 to 16°C (50 to 60°F)
Cold Exposure	
Storage Time	*Temperature*
Never	-5°C (23°F) or below
Spikes of 30 min or less	0°C (32°F) or below
1-4 weeks	10°C (50°F) or below
Long-term storage	10 to 16°C (50 to 60°F)

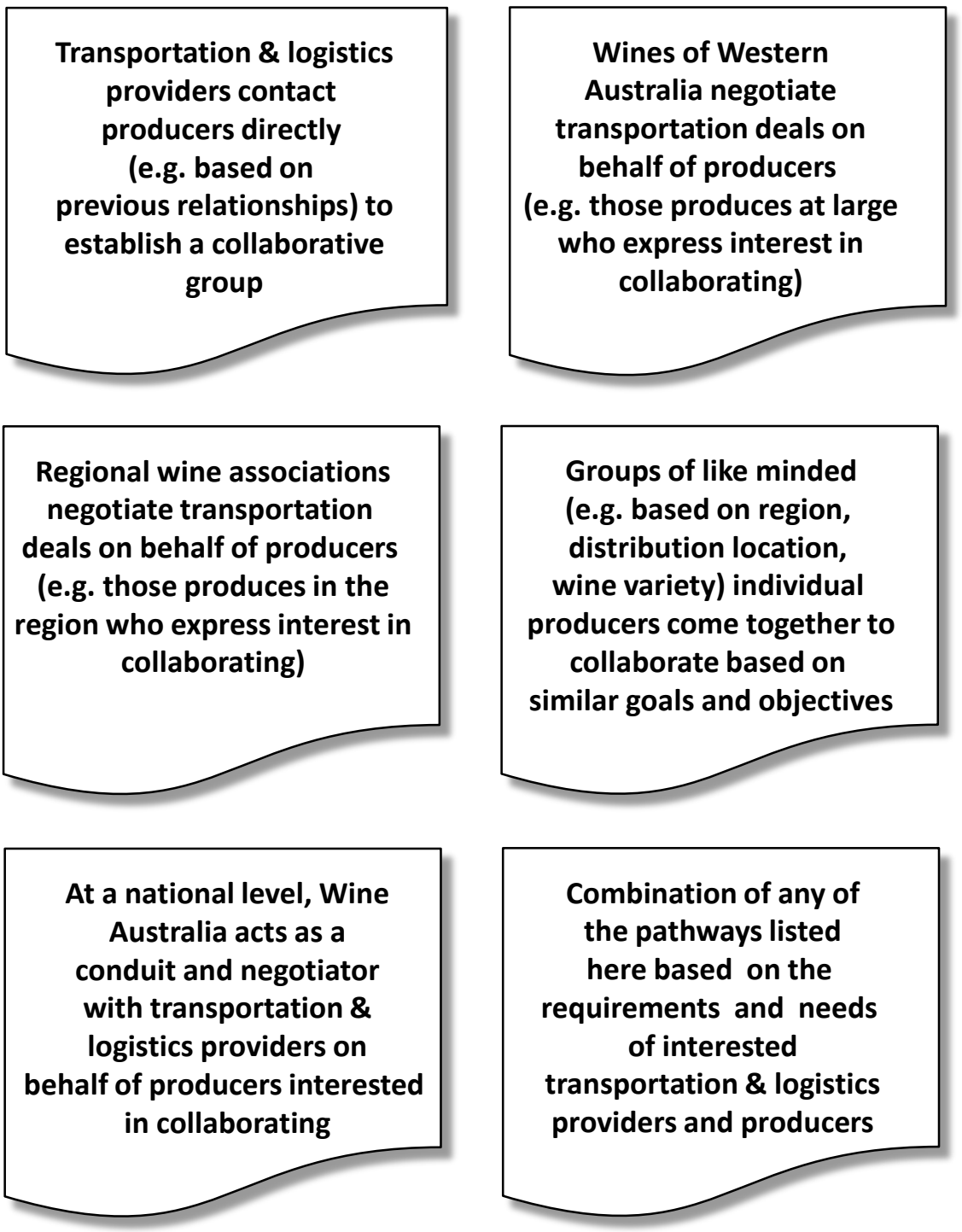
Source: www.foodsci.purdue.edu/research/labs/enology/Wines2008.pdf

Percentage of shipments reaching above 25°C (77°F) (example)



Source: https://www.eprovenance.com/home/science/research/

Appendix D


Transportation & logistics providers contact producers directly (e.g. based on previous relationships) to establish a collaborative group
Wines of Western Australia negotiate transportation deals on behalf of producers (e.g. those produces at large who express interest in collaborating)
Regional wine associations negotiate transportation deals on behalf of producers (e.g. those produces in the region who express interest in collaborating)
Groups of like minded (e.g. based on region, distribution location, wine variety) individual producers come together to collaborate based on similar goals and objectives
At a national level, Wine Australia acts as a conduit and negotiator with transportation & logistics providers on behalf of producers interested in collaborating
Combination of any of the pathways listed here based on the requirements and needs of interested transportation & logistics providers and producers