

Wine Supply Chain: a full research field? First elements of analysis

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Wine consumption is growing worldwide. The wine supply chain deals with all the operations related to the production and the distribution of wines (harvesting, process of wine bottling, expedition, etc.). Covering multiple issues, literature on wine supply chain remains disseminated. Is WSC a full research field or only a specific context for applying supply chain management?

A literature review is carried out to answer this question. First of all, a classification, based on keywords used by authors, identifies all the research themes related to WSC. Doing so, an overview of the literature regarding WSC is given. This paper shows that WSC is a full research field. This paper will help researchers by structuring the WSC as a full research field. This paper will also provide practitioners with an overview of the issues related to WSC.

Keywords: Wine supply chain, Wine industry, Systematic literature review

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WINE SUPPLY CHAIN: A FULL RESEARCH FIELD?

FIRST ELEMENTS OF ANALYSIS

Work in progress

Abstract:

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1. INTRODUCTION

Figures related to wine industry are thrilling. 10 billion litres of wine are transported overseas per year (Varsei, Christ, and Burritt 2017). In 2018, world wine trade represents 31 billion euros in value (OIV 2019). The wine industry represent a research field in itself, as wine business is characterized by several elements (Orth, Lockshin, and d'Hauteville 2007) :

- Production and consumption have been long dominated by the 'Old world' (Western Europe: France, Spain, Italy, Portugal and Germany), and challenged for several years now by the 'New World' (Australia, USA, Chile, South Africa and New Zealand)
- The wine sector gathers various company types, from large global corporation to small family-owned firms.
- As a product, wine is mainly defined by its production place; Wine is one of the most complex product category. Compared to other product, wine offers over 350 SKUs in a typical supermarket, compared to an average to ninety SKU for regular product.
- Several production methods exist, fuelling a debate on the superiority of certain methods and the perceived benefits of these methods for customers.

For several years now, the wine industry has faced several challenges (Maurel, Ugaglia, and Del'Homme 2017): increasing local and global competition, changes in consumer behaviour and consumption, structural and financial crises in old producing countries, high innovation rate. The global wine business is thus an expansive research field. Six future research topics have been identified regarding wine business: viticulture, wineries, the supply chain, social media, sustainability and hospitality (Bonn, Cho, and Um 2018).

The wine supply chain (WSC) was firstly tacked as a marketing subject and studies initially focused on exportations (Eyler and Sims 1999; Katsikeas 1996). In the 2000s, the topic related to supply chain gains importance (Bonn, Cho, and Um 2018), mainly focusing on distribution (Castaldi, Silverman, and Sengupta 2002). Gradually, supply chain becomes more and more valuable within the wine industry, as the competition went worldwide (Garcia et al. 2012). However, enterprises are just beginning to recognize the importance of managing or exploiting their supply chain (Monday and Wood-Harper 2010). Nowadays, the WSC relates particularly to heterogeneous actors, complex relationships, different legal regulations, and environmental constraints (Saglietto et al. 2016). Within academic literature, authors study several themes related to WSC, highlighting potential for supply chain initiatives (Monday and Wood-Harper 2010) and showing a broad spectrum of studies (Dapiran and Estampe 2010).

By nature, supply chains evolve through time. They change in size, shape and configuration, based on how they are managed, and on how a wide range of economic, strategic, environmental and technological factors influencing its development (MacCarthy et al. 2016). Given that the WSC has gradually developed and gained in importance, we can wonder if the wine supply chain remains an object of study within the research field of the wine industry, or if the WSC corresponds to a field of research in itself. Given the evolution of WSC, is WSC a full research field or only a specific context for applying supply chain management? This paper aims to provide a comprehensive and well-structured literature review regarding WSC, highlighting the research trends. This paper presents a systematic literature review (SLR) regarding WSC. Within the SLR, a bibliometric analysis quantifies the studied corpus of references, while statistically defining the structure of the literature concerning the WSC (Bensalem and Kin 2019). Furthermore, an analysis of keywords, listed by authors in articles, offers a classification of literature (Dolati Neghabadi, Evrard Samuel, and Espinouse 2018). Finally, the classification of literature emphasizes research perspectives regarding WSC. As this article is a work in progress, some parts of the results are missing. We do apologize for the inconvenience.

2. WINE SUPPLY CHAIN: POSITION AND CHARACTERISTICS

A brief research on Google Scholar search tool demonstrates that WSC is a rather young research field, which remains not much studied. To get an idea, a quick search is performed in January 2019. A search on Google scholar search tool for ‘supply chain’ gives 1,870,000 results. Performing a search for ‘wine supply chain’ on Google scholar website provides 1,020 results. Among those 1,020 results, more than half of them (608 results i.e. 59%) have been published since 2014. Moreover, looking at the number of publications per year highlights the growing interest of the academic community. To do so, a filter is applied, year-by-year, on the Google Scholar results pages. The number of all types of publications per year is soaring between 2009 and 2019, going from 34 up to 128 (see Figure 1). Indeed, research on WSC is recent and presents a growing interest in the academic community.

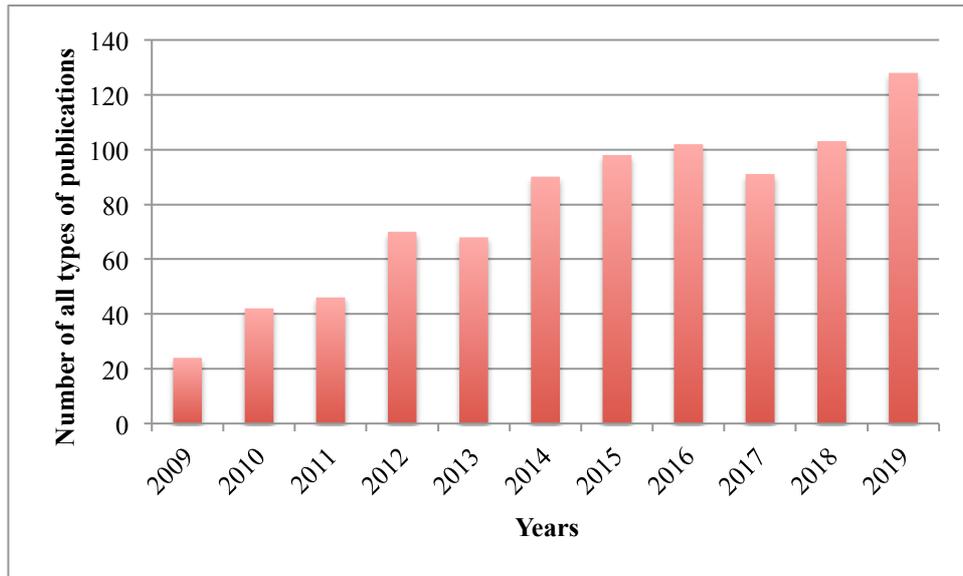


Figure 1 – Number of publications per year on WSC on Google Scholar

As WSC is an emergent field for research, there is still not a clear definition of wine supply chain given within literature. However, actors and steps regarding the process of WSC are known.

Several actors are involved in the WSC, from the raw materials to the importer, without forgetting the freight operators (Saglietto et al. 2016; Garcia et al. 2012). Indeed, role played by intermediaries is growing throughout the WSC (Tipples and Furgala 2011).

The WSC is a four-step process: grape cultivation, wine manufacturing, packaging and distribution (Varas et al. 2018). Distribution of wine can be both direct or indirect, meaning that wineries have to put in place distribution strategies according to the existing opportunities and their willingness to reach consumers (Casali et al. 2018).

However, distribution is not the only theme of research for authors studying WSC. Without being exhaustive, we can quote studies related to:

- Production: the impact of horizontal collaboration on this process of wine bottling (Basso, Guajardo, and Varas 2020);
- Postponement practises (Cholette 2010);
- Relationships within supply chains: relationships among supply chains of small- and medium-size winemakers (Monday and Wood-Harper 2010), influence of interorganizational relationships on information and communication (Mirkovski, Lowry, and Feng 2016);
- Carbons emissions analyses: impact of alternative routeing and packaging (Harris et al. 2018), carbon footprint in French vineyards (Jradi et al. 2018);

- Impact of the Internet on the wine supply chain: importance of services regarding the wine e-commerce (Festa, Cuomo, and Metallo 2019).

Research on WSC covers a broad spectrum. However, to the best of our knowledge, any review structures the existing literature on the WSC. In order to be able to understand the current status of this emerging field and to identify several aspects of WSC researches, a systematic literature review is conducted.

3. METHODOLOGY

The description of the research process, the collection and the analysis of the literature is often less rigorous than any other empirical process (Gunasekaran and Kobu 2007). In order to obtain an exhaustive list of warehouse resources, a systematic literature review (SLR) is conducted. The SLR is one type of literature review (Sangwa and Sangwan 2018). An SLR is defined as a comprehensive search for bibliographic references on a specific subject that embraces a duplicable and transparent scientific process (Tranfield, Denyer, and Smart 2003). More specifically, an SLR aims at exposing previous studies, analysing their contributions, synthesizing data, explaining gaps and highlighting future research perspectives (Thomé, Scavarda, and Scavarda 2016). SLR is more and more employed in supply chain management (Orsolin Klingenberg, Viana Borges, and Valle Antunes Jr 2019; Pilbeam, Alvarez, and Wilson 2012). The SLR is then adapted to answer to your research question.

A new paradigm is proposed to conduct SLR, along with guidelines and steps to follow (Durach, Kembro, and Wieland 2017):

- Create the baseline sample (A);
- Select relevant literature (B);
- Synthesize literature (C);
- Report the results (D).

Those four steps are adapted in this article to conduct the SLR (Figure 2)

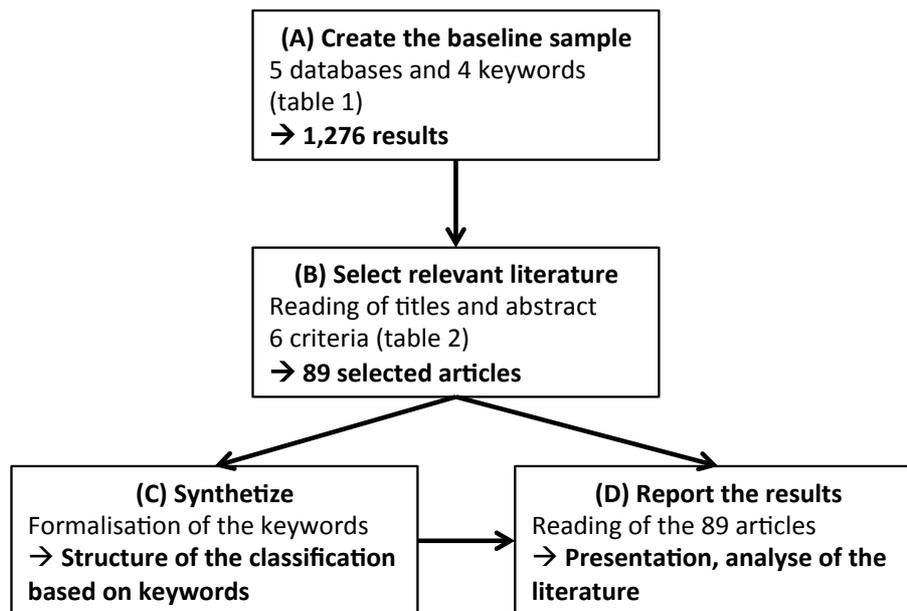


Figure 2 - Overview of the systematic literature review

(A) To create the baseline sample, four keywords are used (wine industry, supply chain management, logistics, wine supply chain) (see upper right side of Table 1). In order not to influence the results by adding specific-oriented keywords, and to reflect the overall literature on the subject, the four keywords remain generic. Three combinations of the four keywords are searched on the five databases (EBSCO, Elsevier, Emerald, Taylor & Francis, and Wiley Online) (see lower side of Table 1). The initial search provides 1,276 results (articles, conferences, patents...).

Databases (5)	Keywords (4)
EBSCO	wine industry
Elsevier	supply chain
Emerald	logistics
Taylor & Francis	wine supply chain
Wiley Online	
Keyword combinations	Combinations (3)
(wine industry) AND (supply chain management/logistics)	2
wine supply chain	1

Table 1 – Keywords and combinations to create the baseline sample

(B) To select the relevant literature, the reading of titles and abstracts of the 1,276 results obtained on the previous step is done. Several criteria are then mobilized to select relevant literature (see Table 2). 89 academic articles are extracting from the reading of titles and abstracts.

Criteria	Action
Article Type	
Articles related to both the SCM sector and the wine industry	Include
Articles related to wine industry, but not to the SCM sector	Exclude
Articles related to SCM sector, but not to the wine industry	Exclude
Time span all articles published	
	Include
Article type	
Academic articles	Include
Conferences, books, specialized magazine, patents, citations	Exclude

Table 2 – Selection criteria used to select relevant literature

(C) To synthesize the literature on WSC, keywords listed in the articles are studied (Dolati Neghabadi, Evrard Samuel, and Espinouse 2018). Out of 89 articles, 68 published articles offer at least one keyword. Out of 68 published articles, 342 keywords are listed (average of 5 keywords per article). A formalization of the keywords is needed in order to bring out categories within the literature. The process of the formalisation is exposed in section 4.3. 11 clusters of keywords are created during this formalisation.

(D) To report the results, a classification based on keywords listed in the articles is presented. The reading of the 89 selected articles enables a presentation and analyse of the literature regarding WSC. The clusters of keywords are put into categories during this step. The suggested classification aims to categorize WSC literature, in order to present the various aspects of this research field, to specify the research trends and to identify perspectives for future research. The classification is detailed in section 5.

4. BIBLIOMETRIC ANALYSIS

Bibliometric analyses are used to better understand the structure of the supply chain literature (Georgi, Darkow, and Kotzab 2013; Charvet, Cooper, and Gardner 2008). Bibliometric analyses are made regarding several subjects within the supply chain: green supply chain (Feng, Zhu, and Lai 2017), supply chain finance (Xu et al. 2018), reverse logistics (Bensalem

and Kin 2019), supply chain performance (Mishra et al. 2018) or big data (Arunachalam, Kumar, and Kawalek 2018) to name a few. The bibliometric analyse done in this article aims to unveil the structure of the literature regarding wine supply chain. More precisely, a unidimensional analysis is done to present initial data statistics and identify main journals publishing on WSC, paper regional profiles, and the dominant keywords related to the WSC.

4.1. Journals publishing on WSC

Taking a look at journals publishing on WSC delimits the first research area. Table 3 presents the top ten publishing journals. The top 10 publishing journals gather revues mainly focused on the supply chain (e.g. Supply Chain Forum: An International Journal), on wine (e.g. Journal of Wine Research) or on food (e.g. British Food Journal). The top three journals (namely Journal of Wine Research; Supply Chain Forum: An International Journal and Journal of Cleaner Production) account for the third of published articles (30 out of 89 articles i.e. 34%) related to WSC. The top seven journals have published the majority of articles (46 out of 89 articles i.e. 52%) on the filed of WSC.

Journals Title	Number of articles
Journal of Wine Research	11
Supply Chain Forum: An International Journal	11
Journal of Cleaner Production	8
International Journal of Wine Business Research	7
British Food Journal	3
International Journal of Physical Distribution and Logistics Management	3
International Journal of Production Economics	3
Journal of International Food and Agribusiness Marketing	3
Food Policy	2
International Journal of Wine Marketing	2

Table 3 – Top ten journals publishing on WSC

4.2. Papers regional profiles

As WSC is becoming more and more global, a close look at the paper's regional profiles gives information regarding the international perspective on WSC studies. To do so, author affiliations are considered (see Table 4).

First author affiliation is considered to assign an article to a country and a world region. Generally, authors only have one affiliation. Otherwise, the first affiliation was then taken

into consideration. For example, Lau has three affiliations: Hong Kong, Canada & Bristol. This author's first affiliation is taken into consideration. Lau is then considered as affiliated to Hong Kong. The articles are published in several parts of the world. Asia, Australia and North America represent a meaningful and equal part of the published articles (respectively 13, 14 and 17 published articles). However, the highest number of articles has been published by European countries (34 out of 89 articles i.e. 38%), and especially France (9 articles). Clearly, publications are distributed among continents, emphasizing that the distinction 'new versus old world' in wine business might not be the most representative (for example, see debates in Decanter¹). The publication dates of the articles also reinforce this assertion. Indeed, in our corpus of 89 articles, publications focusing on Australian wines start in 1995, even though it was not until 2003 that an article was published by a European author.

Continents	Number of articles	European countries	Number of articles
Africa	2	Copenhagen	1
Asia	13	France	9
Australia	14	Germany	3
Europe	34	Greece	1
North America	17	Italy	7
South America	9	Luxembourg	1
Total	89	Norway	1
		Portugal	2
		Spain	2
		Switzerland	2
		United Kingdom	5
		Total	34

Table 4 – Paper regional profiles by continents and by Europeans countries

4.3. Dominant keywords and their formalisation

Selected by authors, keywords give a first glimpse of subjects tackled within articles. As previously specified, 68 (out of 89) articles offer at least one keyword. In total, 342 keywords are listed from these 68 articles.

¹ <https://www.decanter.com/wine-news/opinion/the-editors-blog/should-we-stop-talking-about-old-and-new-world-wine-2291/>

Keywords are analysed without prior work, particularly in relation to the spelling of the words. Table 5 lists the top ten keywords used by authors in articles related to WSC. Thus, the top three of the listed keywords directly relates to the wine industry, and include the terms *wine* and *wines*. Among the top twenty keywords quoted by authors, several are referring to the region of origin of the wines: *New Zealand* (6 occurrences), *Chile* (5 occurrences), *Australia* and *Brazil* (2 occurrences each). The geographically distant destinations (*New Zealand* and *Finland*) reinforce the idea that the distinction between ‘new and old world’ is no longer relevant in the wine industry, given the development of local wineries, large and small, worldwide (Banks and Overton 2010). The origin of wine remains relevant, referring to the notion of *terroir*, which is still being debated today (Ballantyne et al. 2019).

Another thing to notice, keywords belong either to supply chain field or wine field. The keyword ‘wine supply chain’, representing an intersection between both, does appear only four times.

Keywords	Occurrences
wine industry	18
wine	12
wines	7
New Zealand	6
supply chain management	6
sustainability	6
Chile	5
innovation	5
internationalization	4
supply chain	4
viticulture	4
wine supply chain	4
channel relationships	3
grounded theory	3
life cycle assessment	3
performance	3
resilience	3
Australia	2
Brazil	2
business-to-business marketing	2

Table 5 – Keywords used by authors in articles related to WSC

These 342 keywords are then subject to an initial exploration, in order to formalize the terms used by the authors. This formalization assembles keywords with the same signification together. For example, the terms *wine* and *wines*, used respectively in twelve and in seven articles, are gathered under the term *wine*. The term *wine* is then mobilized in (12 + 7) nineteen articles. A first review of the keywords clusters makes it possible to group the keywords evoking the same concepts in clusters. When keywords could be assigned to two or more clusters, the most relevant one is selected for each of them. Keywords only cited once are then discarded (15 keywords out of 342, i.e. less than 5%). Both the keywords and the generated clusters are then analysed iteratively until an appropriate distribution is obtained. In total, 11 clusters of keywords are created. The diversity of keywords clusters reveals the broad scope of researchers regarding WSC. It also emphasizes the lack of a comprehensive framework to organize the literature regarding WSC. A classification is then introduced based on keywords used in the articles.

5. LITERATURE CLASSIFICATION

A classification of literature is created, based on the clusters of keywords. The clusters are organized in several categories, to gain an overview regarding the literature. Please note that all clusters and categories names are derived from the keywords extracted from the literature (Dolati Neghabadi, Evrard Samuel, and Espinouse 2018).

5.1. Classification's structure

The classification consists of five categories: perimeters of the WSC, relationships among WSC, environmental impact of WSC, WSC metrics and theories and methods (see Figure 3). Each category gathers several clusters of keywords. In total, the five categories groups 327 formalized keywords. Numbers in brackets show the number of associated keywords for each category and clusters.

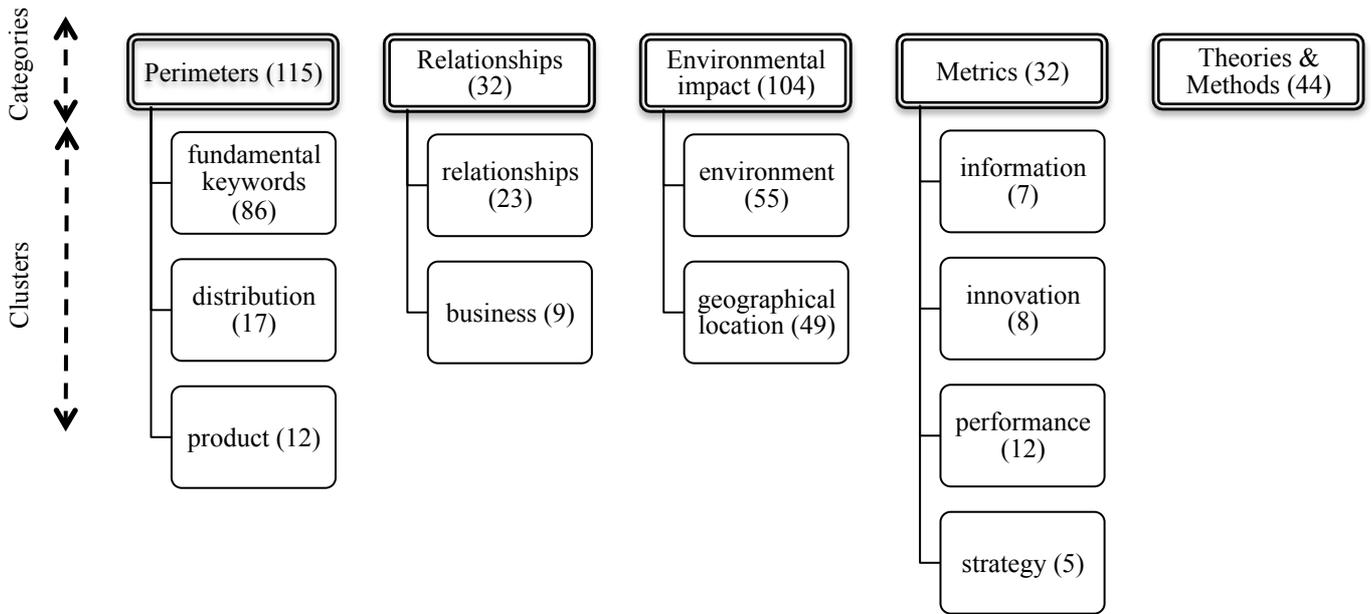


Figure 3 – Classification based on the 327 formalized keywords

The perimeter of the WSC is defined thanks to fundamental keywords. Moreover, the aim of the WSC is defined mixing two clusters: distribution (from a supply chain perspective) and product (from a wine industry perspective). Then, a second category tackles the importance of relationships between the WSC members issue. This category gathers two clusters: relationships (from a supply chain perspective) and business (from a wine industry perspective). A WSC worried about the environment is then analysed, also combining two clusters: environment (from a supply chain perspective) and geographical indication (from a wine industry perspective). WSC metrics are then specified. Finally, the theory and methods category summarizes the theories and methods mobilized by authors regarding the study of WSC.

5.2. Perimeters of the WSC

This category aims to provide insights regarding perimeters of the WSC and its aim of distributing products. This category gathers three clusters: fundamental keywords, distribution (from a supply chain perspective) and product (from a wine industry perspective).

5.2.1. Fundamental keywords

The cluster *fundamental keywords* gathers the keywords *wine*, *wine industry*, *supply chain* and *wine supply chain* (see Figure 4). The keywords *wine* and *wine industry* accounts for more than two third of the fundamental keywords (52 out of 73 i.e. 71%) at the expense of the keyword *supply chain* (14 occurrences). This can be explained by the journals from which the articles of the studied corpus are extracted. Indeed, the keywords *wine* and *wine industry* allow the authors to specify the study of the wine or the wine industry. For example, the keywords *wine* and *wine industry* are used eight times within the Journal of Cleaner Production, a supply chain oriented journal.

Another interesting fact is that the keyword *wine supply chain* is quoted only seven times. This demonstrates that WSC remains an emerging research field.

The WSC is considered to be a ‘very complex system’ (Garcia et al. 2012). Regarding the multiple actors of the wine supply chain, a distinction is made between mass production wineries and farm wineries (Williamson et al. 2012). The role played by a wine logistics services provider can also become crucial within the wine industry (Lau et al. 2018). The keyword *wine supply chain* refers to wine production and WSC as a whole.

Regarding wine production, the environmental impact of wine production, as well as its evaluation, remains little studied (Christ and Burritt 2013). Among all the activities related to wine production, the grape harvesting is the most studied. In particular, the scheduling of harvesting is studied (Bohle, Maturana, and Vera 2010; Ferrer et al. 2008). Please refer to Moccia (2013) for a review on production (viticulture, harvesting and winery processes) and post-production activities related to wine industry.

Concerning the WSC as a whole, a Grand Cru supply chain model is proposed (Bouzdine-Chameeva and Ninomiya 2011). Any supply chain is compounded of several actors, and Williamson et al. (2012) study the impact of a distributor for a wine producer. Performance is also a recurrent theme related to supply chain. A framework to measure logistics performance in the wine industry is suggested (Garcia et al. 2012). A model to evaluate logistics costs when localizing gateways and distribution centres in China is also offered (Lau et al. 2018).

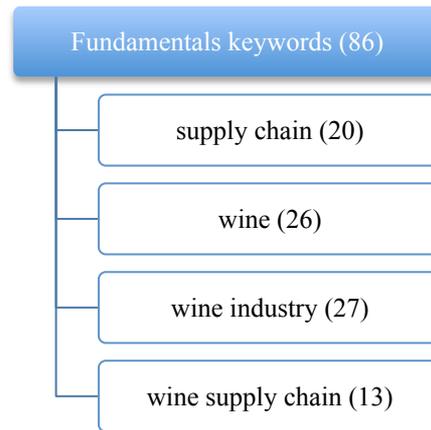


Figure 4 – The cluster fundamental keywords gathers four distinct keywords

5.2.2. Aim of the WSC: the distribution of products

Two clusters of keywords characterize the aim of the WSC: the cluster distribution (from a supply chain perspective) and the cluster product (from a wine industry perspective) (see Figure 5). Indeed, as any supply chain, the aim of the WSC is to distribute products. Distribution *‘represents the storage and flow from the final production point through to the customer or end user’* (Rushton, Croucher, and Baker 2010, 4). The wine industry is currently booming at an international scale with in particular a reduction in tariffs and a reduction of nontariff barriers to wine marketing (Atkin and Gurney 2013). According to the Wine Institute of California², US wine exports, mostly from California, have reached \$1.46 billion in revenues in 2018. Overall, California wine exports have grown nearly 60% by value in the past decade. These striking figures are also found in the wine industry in Australia and Europe. One of the recurring themes linked to distribution is the import and/or export of wine from China (Lau et al. 2018), California (Olsen, Thach, and McCampbell 2007) and even Chile (Wickramasekera and Bianchi 2013). The role played by the distributor, within the WSC, is also discussed in the literature (Beaujanot, Lockshin, and Quester 2004).

Concerning the wine distributed within the WSC, the authors question in particular the differentiation of wine, in connection with the concept of territorial brand (Begalli, Capitello, and Codurri 2014), the logic of service within the e-commerce of wine (Festa, Cuomo, and Metallo 2019) and the generation of wine value (Ewert, Hanf, and Schweickert 2015). The packaging of the wine is also studied within literature. Packaging refers to the glass bottles, the wood corks and kraft paper labels, but can also refer to waste (Amienyo, Camilleri, and

² <https://www.wineinstitute.org>

Azapagic 2014). The quality of packaging is a driver of export performance for wine (Wickramasekera and Bianchi 2013). Packaging is also considered as a solution to reduce the environmental impact of wine industry (Amienyo, Camilleri, and Azapagic 2014).

As a result, the WSC is also gaining importance for regions and countries around the world. The WSC plays a leading role in the Australian economy (Varsei and Polyakovskiy 2017) and in any countries listed in the top producers of wine in the world (Australia Grape and Wine Authority 2012). So WSC, whose primary role is to distribute the product, is becoming increasingly important.

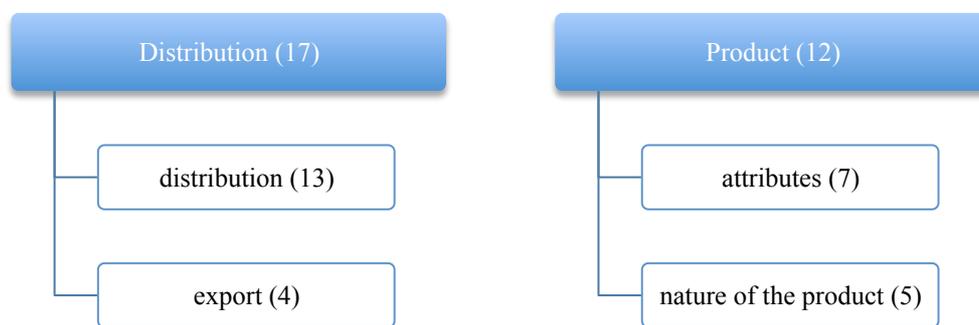


Figure 5 – Aim of the WSC: Distribution of products

5.2.3. Discussion and perspectives for future research

A clear definition of wine supply chain is still missing. A clear definition could be relevant to define several aspects, expectations and objectives of research on WSC. It could also be interesting to consider WSC as a subset to supply chain researches.

Defining the keywords ‘wine supply chain’ will also increase its use, and so the visibility of this emerging research field.

It is interesting to note that the theme of bulk wine is not appearing in the classification offered in this article. Indeed, two papers have the term ‘bulk’ in their titles but not in their keywords (Ewert, Hanf, and Schweickert 2015; Rainer, Pütz, and Steiner 2019). In fact, wineries have three options regarding the wine distribution (Harris et al. 2018): (1) wine in bulk, in containers and trucks (2) cases of bottled wines, palletised and transported using trucks (3) cases of bottled wines, palletised and moved mainly by sea shipment. The bulk wine facilitate wine transportation (Rainer, Pütz, and Steiner 2019), and enable the reduction of carbon emissions (Varsei, Christ, and Burritt 2017). Moreover, bulk wine distributors are

full participants within the WSC (Saglietto et al. 2016). Deepen the research concerning the bulk wine distribution could be interesting.

5.3. Importance of relationships between the WSC members

The main theme linked to the relationship within the WSC is collaboration. The latter appears necessary regarding the different stages of the WSC, for example during the wine bottling process (Basso, Guajardo, and Varas 2020) or the distribution (Sequeira and Crespo de Carvalho 2012). Collaboration has a role to play within wineries network (Dalmoro 2013; Varsei, Christ, and Burritt 2017), clusters (Carneiro Zen, Fensterseifer, and Prévot 2011) or even broader wine homogeneous territorial system (Begalli, Capitello, and Codurri 2014). Finally, collaboration also impacts the spatial organisation of the open innovation model (Doloreux and Lord-Tarte 2013). The relationship between WSC members is the best way to do business (Beaujanot, Lockshin, and Quester 2004; Olsen, Thach, and McCampbell 2007), enhancing relationship between the WSC members (Somogyi et al. 2010). The business within the WSC is rather international, and related to small-to-medium sized wineries.

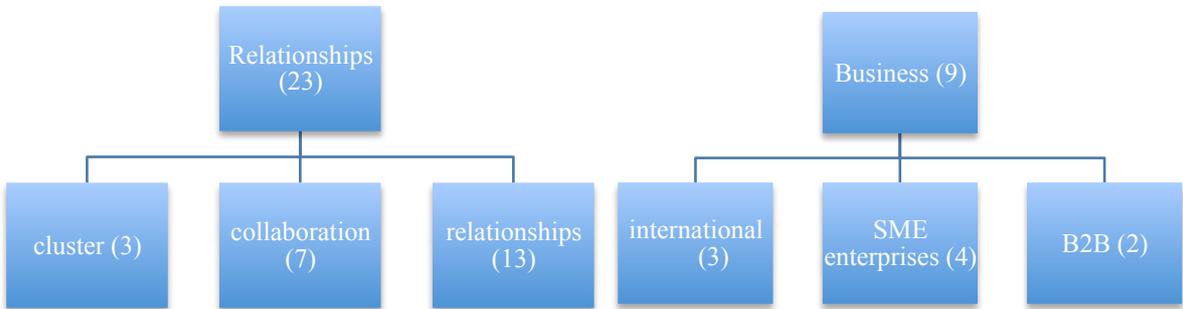


Figure 6 – Importance of relationships among the WSC members – Two clusters: relationships and business

5.4. A WSC worried about the environment

The cluster *environment* gathers eight different keywords (see Figure 7). The cluster geographical indication emphasises the regional perspectives adopted in studies tacking WSC.

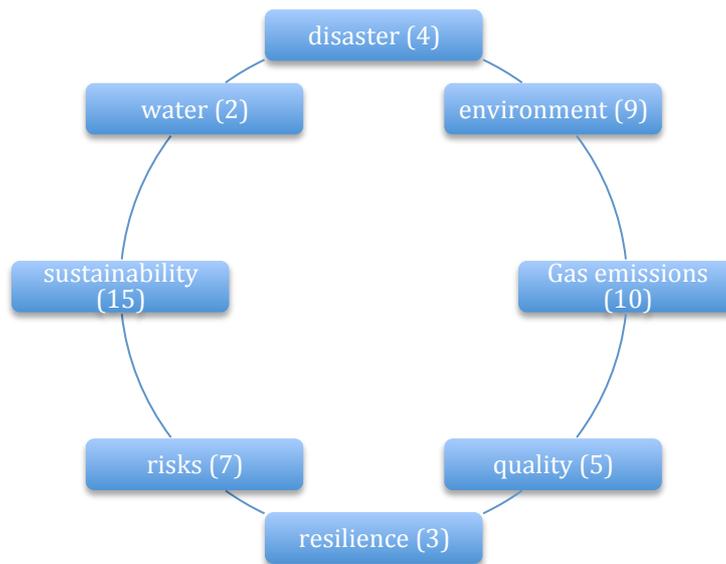


Figure 7 – Eight keywords related to the cluster ‘Environment’

5.4.1. Gas emissions & geographical indicators

The keyword ‘gas emissions’ gathers carbon emissions (Cholette and Venkat 2009) and other greenhouse emissions (Ponstein, Ghinoi, and Steiner 2019). The wine industry greenhouse gas figures speak for themselves. For example, one bottle of wine represents up to 1.6 kg of CO₂ emissions (Ardente et al. 2006). On a global scale, the wine sector is responsible for around 0.3% of annual global GHG emissions (Rugani et al. 2013). Most of the research on carbon emissions focus on estimating the carbon footprint of wine bottles (Harris et al. 2018). Logistics activities related to the wine industry, and more specifically, the post-wine production logistics are an especially carbon-intensive activity (Colman and Păster 2009; Point, Tyedmers, and Naugler 2012).

Authors analyse gas emissions from a global scale, related to the international distribution of wine (Harris et al. 2018; Cholette and Venkat 2009), or from a more geographically restricted area, focusing on French vineyards (Jradi et al. 2018), Finnish WSC (Ponstein, Ghinoi, and Steiner 2019) or wine industry in Australia (Varsei and Polyakovskiy 2017). Indeed, these worries about environment are to put into perspective with the geographical indications, which structure the wine industry. Indeed, the cluster *geographical indication* lists seventeen countries where wine is produced: Argentina, Italia, New Zealand or Finland to quote a few. All continents are represented (see Table 6). Comparison between regions or countries producing wines is also done by authors (Saglietto et al. 2016; Agostino and Trivieri 2014; Dalmoro 2013).

Regions of the world	Number of keywords
Africa	2
America	11
Asia	3
Europe	16
Oceania	8
Internationalization	9

Table 6 – Keywords spread among continents (cluster geographical indication)

5.4.2. Disaster, risks and resilience

WSC also faces several disasters, for example earthquakes (Forbes and Wilson 2018). The notion of disasters relates to the risks and the resilience of the WSC. The risk is mainly studied through the concept of control system. Effects of control is studied for small-scale winegrowers's performance (Jiao et al. 2012) or regarding handling incident in a wine storage (Lam et al. 2013) are analysed by authors. Resilience can be defined as the handling of all risks: avoidance, control and elimination (Peck 2006), even if the notion still under discussion (Yao and Fabbe-Costes 2018).

5.4.3. Sustainability

(Work in progress)

5.5. Metrics

(Work in progress)

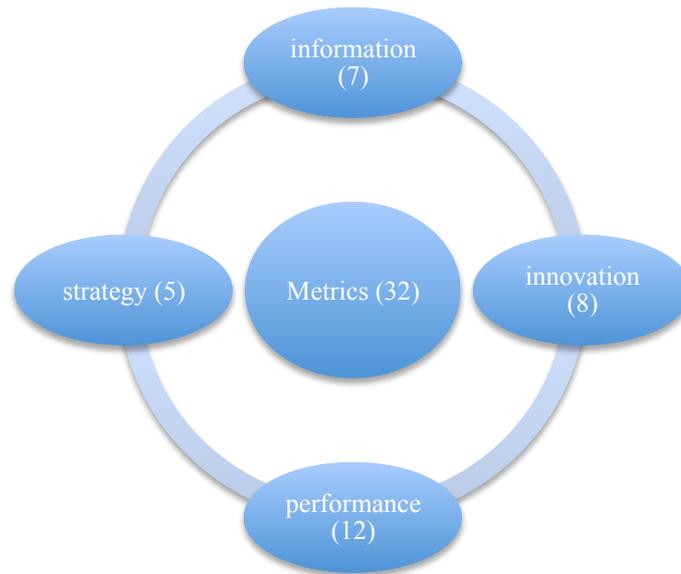


Figure 8 – Four keywords related to the cluster ‘Metrics’

5.6. Theories & Methods

(Work in progress)

6. CONCLUSION

The number of studies related to WSC is booming. Several issues are studied, interdisciplinary by nature. However, it is possible to structure the WSC literature around several categories. This paper offers a classification of the categories tackled within the WSC literature. This classification is based on the keywords extracted from the body of articles analysed within an SLR. For each category of the suggested classification, research perspectives are highlighted.

Those categories are related to supply chain management, but require specific answers to be applied to WSC. So WSC is a full research field. This paper helps researchers by unveiling the WSC literature structure, while giving a general view on the WSC issues for practitioners.

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