

The Design Guidelines for Improved Best Practices Implementation at South African Wine-packaging Facilities

ABSTRACT

Purpose

The purpose of this study is to develop design requirements that will align supply chain management best practices and the current need existing at South African wine-packaging facilities to react in a more responsive manner towards increased customized demand requirements. The guideline will assist small- medium-sized wine-packaging facilities with the knowledge of how the identified best practices can be helpful towards improving responsiveness, while also indicating how digital technologies can assist with the realization of best practice implementation.

Design/methodology/approach

The design requirements are constructed by means of a thorough literature review dealing with the topic of supply chain management best practices and also specifically how these are applicable to the wine industry. Furthermore, the needs and challenges existing at the wine-packaging facilities are explored by conducting semi-structured interviews with experts in this industry. These are merged into design guidelines that encompass best practice design requirements with existing industry needs.

Findings

Six prominent SCM best practices are identified that can possibly improve the responsiveness of wine-packaging facilities in order to be able to manage increased customized demand. These include procurement and planning, process integration, collaboration, visibility and the level as well as quality of information sharing. These can be implemented using appropriate digital technologies outlined in this paper.

Research limitations/implications

This research provides guidelines for the implementation of best practices at wine-packaging facilities and identifies digital technologies that can be used to enhance the implementation thereof. However, the integration of these practices and technologies have not yet been tested within the industry.

Practical implications

Wine industry researchers have called for the implementation of supply chain best practices and the integration of digital technologies into the wine supply chain. This paper aims to provide guidelines to fill this gap, specifically assisting wine-packaging facilities with the integration of these components. Furthermore, it was aligned with suggested industry best practices found in wine supply chain studies, to help the wine supply chain to not only survive in difficult economic times and an ever-changing supply chain environment, but also to thrive in these conditions.

Original value

As a contribution to the reduction of this shortfall in literature, the aim of this paper is to construct guidelines that will align already explored and developed supply chain best practices with challenges experienced by wine-packaging facilities. It also contributes towards the identification of possible digital technologies that can enhance supply chain operations. It is specifically aimed at the transformation of wine-packaging facilities, which is an industry that is in growing need of both supply chain best practice and technological development as there is an increasing demand for customized packaged products.

Keywords: supply chain management, best practices, wine supply chain, digitalization, technology

1. Introduction and background

1.1 Background

The South African wine industry has been growing on an annual basis. Local wine sales for 2017 accumulated to 449.7 million liters and total wine exports of 448.4 million liters respectively (SAWIS, 2017). The total export of still (i.e. non-fortified) packaged wines in 2017 increased by 3.4 percent relative to 2016 figures and contributed a total of 170.4 million liters towards the total wine exports of 2017 (WOSA, 2018). Stellenbosch University has been conducting research for several years to improve supply chain awareness along all the channels of the wine supply chain. This research includes topics such as supply chain performance measurement and the implementation of industry-related best practices (Van Eeden *et al.*, 2014).

The current lack of industry best practices in the South African wine supply chain is one of the biggest challenges for this industry and the absence of technological innovation is very apparent (Donati, 2013; Spens, Tatham and Kovács, 2014; Kovács *et al.*, 2015). The South African wine industry aims to transform the industry into a more market and value-chain oriented supply chain, two main focuses being increased packaged exports and technology innovation and transfer, involving the incorporation and facilitation of evolving technological capabilities along the different supply chain channels. Several studies have identified industry best practices that will enhance the wine supply chain performance, while other studies emphasize the benefits that several new technological innovations can provide to different supply chain environments (Spens, Tatham and Kovács, 2014; Kovács *et al.*, 2015; PWC, 2015; Knoblauch, van Eeden and Edwards, 2016; Apprise Software, 2017; Melck, 2017; Palm and Van Eeden, 2018).

The Wine Industry Strategic Exercise (WISE) initiative launched in 2015 aims at improving coherence and competitiveness. According to VinPro managing director, Rico Basson, this initiative involves the development of a strategic framework that will provide wine supply chain stakeholders with the necessary tools and methodologies to improve overall business performance and a more unified South African wine industry by 2025 (Melck, 2017). It specifically focuses on increasing the ratio of packaged wine export versus bulk wine exports from 40:60 to 60:40 (PWC, 2015). The “wine industry” in this regard includes the total value chain of the distillates and brandy sector, the grape-based products sector such as juice and wine, as well as some secondary but complementary sources of income, for example wine tourism.

A typical wine supply chain has six different stages (Spens, Tatham and Kovács, 2014; Kovács *et al.*, 2015). This includes (1) grape production, (2) wine production, (3) packaging process, (4) distribution, (5) the consumer phase and (6) end of life. For the purpose of this study the focus is on the analysis of the packaging process. The analysis that follows specifically aims to investigate the application of best practices in this node of the wine supply chain as well as the current use of digital technologies.

As the vision is to increase packaged wine exports, it will increase the degree of customization of products, as each packaged product involves different customization requirements, increasing the complexity of the supply chain. This will directly increase the need for responsiveness (in terms of both delivery time and flexibility of product delivery) of the wine supply chain and place pressure on wine-packaging facilities to improve the utilization of their bottling capacity. One of the main focus areas of the WISE initiative involves technology innovation and transfer. This aims to facilitate the development of technology and the transfer of systems in the South African wine industry (PWC, 2015; Augustyn and Heyns, 2016; Melck, 2017). One of the aims of the WISE initiative involves assessing the current state of technology usage and innovative ability, plotting the desired future state by 2025 and providing a guideline that will help with reaching this future state (PWC, 2015; Vinpro *et al.*, 2016).

1.2 Problem statement

The absence of supply chain best practices in the wine industry is very apparent (Spens, Tatham and Kovács, 2014; Kovács *et al.*, 2015). This, along with the absence of technological innovation, specifically in the South African wine industry, makes it difficult for the industry to increase global competitiveness (Donati, 2013; PWC, 2015; Melck, 2017).

As the complexity of the South African wine supply chain is increasing due to a drive towards more customized packaged exports, there is a growing need for more mature supply chains in terms of responsiveness (Du Toit, 2018; Swanepoel, 2018). The evolution of Industry 4.0 has led to significant technological advancements, translating into the digitalization of supply chains leading to the improvement of supply chains all around the world (Schmidt *et al.*, 2015; PwC, 2016; Szozda, 2017).

The problem at hand in the wine-packaging industry is the lack of guidance towards best practices that will enhance responsiveness requirements associated with increased customized orders. Furthermore, limited knowledge regarding the identification of appropriate digital technologies specifically aimed at improving the challenges addressed by best practice, prevents the greater wine industry from increasing its competitiveness.

1.3 Objectives

In order to develop an implementation guideline towards the desired future state of best practice implementation along with the use of digital technologies in this specific industry, it is required to identify the appropriate technologies and innovative strategies that comply with the required implementation of industry best practices at wine-packaging facilities. This paper focuses on the following objectives:

1. Study available literature to investigate the supply chain management best practices found in supply chain industries that can be beneficial for supply chain planning involving customized products.
2. Study available literature to identify digital technologies and digital concepts that will enhance best practice implementation at wine-packaging facilities and supply chain maturity to handle increased demand for customized packaged wine.
3. Study the supply chain planning of wine-packaging facilities, the strategy, the current configuration and need for suggested best practices due to challenges faced, using expert interviews.
4. Develop design guidelines that merge the implementation of industry best practices and the utilization of appropriate digital technologies that will improve responsiveness toward increased customized demand characteristics.

2. Methodology

This paper investigates the concept of supply chain management (SCM) along with the application of digitalization technologies by means of a literature study and supplementary semi-structured interviews with experts at a number of wine-packaging facilities. The study specifically focuses on South African wine-packaging facilities providing a service to cellars. The semi-structured interviews provided more clarity on the current wine-packing process, the challenges this industry faces and opportunities that exist for the integration of industry best practices along with digital technologies. This information is used to develop the guidelines that aim to introduce a list of several best practices that can be integrated at wine-packaging facilities, focusing on managing the increased customized demand.

Existing research was studied in order to understand the applicability of best practices and the application of digital technologies. Several studies have focused on the absence of best practices in the wine supply chain (Spens, Tatham and Kovács, 2014; Kovács *et al.*, 2015; Knoblauch, van Eeden and Edwards, 2016; Kruger and van Eeden, 2016), but not many studies have focused on the wine industry and the application of evolving digital technologies.

Using this literature, it is possible to identify and clarify the problem and also find possible ways of guiding the implementation of identified industry best practices, as well as provide options of possible digital technologies that can be integrated. The resources accessed included journal papers, reports, journal articles and books found on online databases. These databases included Google Scholar, Stellenbosch University online library and Scopus. Keywords used to conduct online searches included “supply chain management”, “best practices”, “wine supply chain”, “responsiveness”, “technology”, “digitalization”, “collaboration” and “South Africa”, amongst others. Informal understanding and knowledge related to this specific topic was acquired by reading online articles, wine supply chain exhibition visits and other shared documentation having valuable knowledge of this industry.

3. Literature review

As the vision of the South African wine supply chain is driving the inclusion of more customized packaged wine products, the functioning of the wine supply chain and specifically the processes of wine-packaging facilities requires the ability to react in a more responsive manner. To enhance this ability, it is worth knowing which best practices found in literature and other industries can be applied specifically to the supply chain of wine-packaging facilities in order to ensure improved responsiveness. It is also worth exploring the contribution that technology can make towards successful implementation of the identified best practices.

3.1 Supply chain management

Supply chain management (SCM) refers to the management of resources, activities and processes within and across the supply chain that maximize customer satisfaction and improve the competitive advantage of a company (Adebambo and Adebayo, 2013). This includes everything – from design, development, sourcing, production and logistics, right up until the information systems used (Vogt, Pienaar and De Wit, 2005). It can be defined as *a set of synchronized activities for integrating suppliers, manufacturers, transporters, and customers efficiently so that the right product or service is delivered at the right quantities, at the right time, to the right places* (Xu, 2011). This concept is considered a key enabler for the enhancement of supply chain reliability and responsiveness, and in return customer satisfaction and supply chain value as well.

Supply chain planning, sourcing and making are three of the six major categories of SCM identified by Done (2011) that are considered to be integral for improved responsiveness in a supply chain environment. Planning involves both upstream supply chain partners, being the suppliers, as well as customers, who are the downstream supply chain partners. Sourcing is the procurement of all the dry goods needed for wine packaging. The advancement of maturity level for this aspect involves the establishment of collaborative relationships between wine-packaging facilities and their direct supply chain partners, both upstream and downstream, enabling the sharing of information related to inventory availability and delivery. In turn, these two dimensions are crucial for delivering a product to the market and a big concern for many manufacturers and retailers globally (Enslow, 2007).

As the WISE initiative aims to increase the volume of packaged-wine export, it will lead to the production of more customized products, as packaged wine requires customized packaging components such as labels, bottles, corks or screw caps and shipment boxes (Du Toit, 2018; Swanepoel, 2018). This calls for shifting the current efficient bulk wine export supply chain strategy, toward a responsive strategy that will allow reliable delivery of products to customers.

Having a more responsive approach will allow wine-packaging facilities to react purposefully and within an appropriate time frame to meet customer demand in order to maintain a competitive advantage, which is the definition of responsiveness as defined by Holweg (2005). This is confirmed by the study of Adebambo and Adebayo (2013) which found that a higher level of SCM practice implementation improves supply chain responsiveness. This study also stresses that technology is an important enabler of this advance and that the applicability of technology types may differ from company to company.

3.2 Supply chain management best practices

There are several best practices that support responsive supply chains wider than the wine industry that address reliability issues and these can be applied to the specific problem experienced by the South African wine industry. In addition to pure SCM activities and SCM strategies, there are several SCM practices that can be used to effectively manage a supply chain.

The maturity level of several SCM aspects is lacking on many of the channels of the South African wine supply chain (Spens, Tatham and Kovács, 2014), degrading the competitive edge of the industry as organizations in the supply chain tend to compete against one another instead of against other supply chains. The responsiveness of wine-packaging facilities is often affected by the reliability of their supply chain partners, directly influencing their ability to meet increased customized demand (Du Toit, 2018; Swanepoel, 2018). The implementation of SCM best practices can be of value as it has proven to improve the performance of the implementing party as well as their suppliers (Hamister, 2012).

Having effective SCM has proven to be a valuable means for an industry to gain competitive advantage and improve the overall supply chain performance, as competition is no longer between organizations in one supply chain, but among different supply chains (Li *et al.*, 2006). This will help to align the goals of wine-packaging facilities, their suppliers and customers (all part of the same supply chain) in order to gain competitive advantage as a South African industry.

There are five core SCM best practices that have been identified in literature that allow organizations to be integrated with their trading partners (Li *et al.*, 2006). These include strategic supplier partnerships, customer relationships, information sharing, the quality of information sharing, and postponement. A study by Koh *et al.* (2007) concludes that these practices and several other overlapping best practices by other authors indeed have a positive influence on supply chain responsiveness. Flexibility is another word used interchangeably in literature. Spens, Tatham and Kovács (2014), provide the following framework (see Figure 1) that summarizes the “baseline practices” and “best practices” that are useful, specifically to the wine industry.



Figure 1: Best practice applicable to wine-packaging facilities (Adapted from Spens, Tatham and Vaillancourt, 2015)

This framework was constructed from the completion of a study that investigated practices found in literature as well as practices commonly observed in supply chain environments that are considered

to have excellent performance using the input from studies by various authors. The baseline practices and best practices described below (refer to Table 1) are highlighted to be of specific importance to wine-packaging facilities, in fulfilment of objective 1 of this study.

Even though these best practices are commonly found in other supply chain industries that excel in performance, Spens *et al.* (2014) found no evidence of these practices being listed in literature as common practices in the wine supply chain, which is in line with the findings of *The South African wine industry Insights survey 2013* (Blok *et al.*, 2013). In a further study conducted by Spens, Tatham and Vaillancourt (2015), the lack of the presence of these best practices was investigated. Not only did they find the absence of best practices in the wine supply chain to be very evident, but also the absence of some baseline practices, although literature suggests that baseline practices are used or known about.

Table 1: Best practice guide for wine-packaging facilities

Best Practice	Description
Planning and procurement	Includes sales and operations, range forecasting, collaborative forecasting, planning, information sharing, strategic sourcing and sourcing information, supplier development and supplier relationship management. This is a key aspect for agricultural procurement in order to realize improved reaction to changed demand characteristics (Du <i>et al.</i> , 2009).
Process integration	Aligning the supply chain and operational strategies of the supply chain partners to ensure that the entire supply chain competes as an industry unit.
Visibility	Ensure responsiveness to changing demand, with the key enabler being information sharing - a prerequisite for responsiveness as it allows for improved exception management (Enslow, 2007).
Strategic Supplier Relationship	Improves supply chain performance as responsiveness of a supply chain is influenced to a certain degree by the ability and performance of their suppliers (Hamister, 2012).
Level of information sharing	Refers to the extent that non-public information is shared and communicated amongst the different supply chain partners and channels - an aspect of successful implementation of SCM practices that contribute toward improved supply chain responsiveness (Li <i>et al.</i> , 2006; Koh <i>et al.</i> , 2007; Lee, Kwon and Severance, 2007).
Quality of information sharing	Enhances the level of information sharing and the quality of a strategic supplier partnership. Accuracy, timeliness and credibility of shared information are important factors to improve supply chain performance (Li <i>et al.</i> , 2006; Hamister, 2012).
Collaboration	Internal and external collaboration or linkages, both needed to drive innovation. It increases predictability and creates solid partnerships between wine-packaging facilities, dry goods suppliers and wine farms (Palm and Van Eeden, 2018). Supply chain collaboration or linkage is considered important for supply chain reliability (Lee, Kwon and Severance, 2007), which in return influences supply chain responsiveness.

The improvement of information tracking related to sourcing, procurement, labeling and bottling will have significant value in wine supply chains as tracking information will help to eliminate uncertainty along all the channels of agriculture supply chains (Du *et al.*, 2009). Furthermore, Spens, Tatham and Vaillancourt (2015) mention that collaboration efforts revolving around the mentioned best practices are a possible lever of responsiveness that can assist the wine industry to conquer logistical obstacles in order to keep up with the changing demand and customization required by customers.

3.3 Digital technologies

The increasing reliance on collaborative partnerships as a key enabler of responsive SCM calls for more supply chain integration and greater visibility along the different channels of a supply chain. This results in the significant importance of information sharing, the continuous growth of information systems and better utilization of developing digital technology (Xu, 2011). As stated in an article by Apprise Software (2017), *5 Ways Technology Can Improve Wine & Spirits Supply Chains*, wine and spirits supply chains often do not use the correct technology to improve overall supply chain management and performance. This can be attributed to the fact that players in this industry are not aware of the appropriate solutions that are available to address specific problems that exist in the current supply chain configuration and the advantages thereof or having too many options to choose from.

The implementation of digital technologies requires investment in infrastructure, either totally replacing existing infrastructure or adjusting the capabilities of current infrastructure. It is important that a specific supply chain industry knows the applicability of available digital technology to their supply chain configuration as well as the benefits that the implementation thereof can yield, in order to avoid costly inefficiencies (PwC, 2014). Having a digitized and digitalized supply chain provides companies the opportunity to have a more efficient, agile and customer-focused supply chain orientation (PwC, 2016), but it is worth noting that it does not always guarantee success.

According to the article *“How digitization makes the supply chain more efficient, agile, and customer-focused”* (PwC, 2016), future digital supply chains will consist of eight elements: integrated planning and execution, logistics visibility, Procurement 4.0, smart warehousing, efficient spare parts management, autonomous and B2C logistics, prescriptive supply chain analytics and lastly, digital supply chain enablers. These elements all form part of a digital supply chain ecosystem that consists of a wide range of digital technologies including the Internet of Things (IoT), big data analytics, the cloud and augmented reality. Having a digitally enabled supply chain will allow traditional linear supply chains to be transformed into a digitally enabled supply ecosystem. This ecosystem will have complete transparency, allowing for improved communication, collaboration, flexibility and responsiveness (PwC, 2016).

Enabling technologies include cloud platforms, smart sensors, mobile tracking solutions, connected cyber-physical systems, computer processing power as well as the IoT and related services. As most supply chains operate along the well-known SCOR processes, these technologies can assist supply chain partners such as suppliers, warehouse sites, production companies and distribution partners to have supply chain visibility enabled by the use of an integrated planning and execution platform. This allows thorough awareness and collaboration regarding the strategic, tactical and operational goals of all the parties involved (PwC, 2016).

From a supply perspective, having such a platform will allow integrated material requirements planning, vertical integrated real-time planning in production and end-to-end logistics visibility. Integrated information technology (IT) systems are a key enabler of supply chain digitalization and will realize beneficial effects for inventory levels, delivery times and SCM flexibility (Schmidt *et al.*, 2015; Israelit *et al.*, 2018). From a logistical point of view, transport data can be collected and distributed using centralized Enterprise Resource Planning (ERP) systems, supplier hubs and events platforms. These can be enhanced by real-time status information notifications related to carrier feeds as well as

track and trace devices. Track and trace technologies provide supply chain partners with the opportunity to track and trace the movements of any product or material as it is transported along the different channels of the supply chain (Schmidt *et al.*, 2015; PwC, 2016). This also allows for more reliable SCM information distribution and events management (Schmidt *et al.*, 2015).

One such technology that has proven to be worthy is radio frequency identification (RFID), as tags can be attached to any cargo and traced, even having the ability to monitor environmental conditions such as humidity and temperature if these conditions are of importance for the cargo being transported (e.g. rising temperature might affect the quality of fruit). This concept relies on cloud-based tracking and cloud-based global real-time availability of SCM data and synchronized IT systems, while also eliminating paper-based systems (Schmidt *et al.*, 2015).

Procurement of raw materials is integral for the development of digital supply chains as digital tools and interfaces allow closer supplier collaboration, which in return helps with the supplier co-creation, supplier integration in planning and development, risk management and key performance indicators (KPIs) (PwC, 2016). Thus, supply chains should focus on improving this specific node in order to reap the benefits of digitalization.

4. Wine-packaging process analysis

Wine supply chains, classified as an agri-food supply chain, have proven to be one of the more complex supply chains of this type (Ahumada and Villalobos, 2009). Factors contributing to the complexity of this supply chain include food safety and quality, limited shelf life, weather variability and seasonal changes which cause demand and price variability. Wine supply chains have even more factors increasing the complexity: the nature and quality of wine, the multidisciplinary partners involved in the supply chain, the multitier distribution cycles, legal constraints of distribution, highly competitive nature of local and external competitors in the market as well as ever-changing requirements of the customers along the different channels of the supply chain (Spens, Tatham and Kovács, 2014).

4.1 Wine-packaging process

The wine-packaging process consists of several operations including filling, corking or capping, capsuling, labeling, packaging of finished products and palletization for shipping. Actors involved at this node of the wine supply chain include the filler/packer and then the wine producers (or wine cellars) and dry goods suppliers.

The *wine producer* is responsible for the manufacturing and/or blending of wine products and is reliant on the quality of the supplies such as packaging materials, corks and labels. The *raw material suppliers* are responsible for delivering the necessary dry goods required for the actual filling and packing of wine and separate raw material suppliers are mostly responsible for a single dry good item that is required during the filling/packaging stage.

The *filler/packer* is responsible for wine packaging. This entails receiving bulk wines and dry goods which are used as inputs for the filling and packing operations. The bulk wines are packaged according to the customers' (in this case the wine producer/wine cellar) specifications and can vary widely between different container types, branded corks or screwcaps, labels and boxes for distribution.

Filler/packer operations are subjected to a high degree of customization as there is a big variety of customization options related to all the input components required for packaging. Furthermore, this node in the overall wine supply chain merges several separate supply chain entities and a delay at one of the upstream entities causes production problems for the filler/packer. Also any changes in the product requirements downstream, filter upstream and escalate the impact through this merge point.

Interviewees mentioned that there is a large amount of information sharing between supply chain partners and as there is no shared information database that is visible to all, duplication of information sharing efforts and communication often occurs (Du Toit, 2018; Swanepoel, 2018). The nature of the

current information sharing patterns and the lack of visibility between these supply chain partners often results in communication delays, transferred to bottling plant scheduling constraints and dry goods sourcing delays. These are identified as root causes for responsiveness issues in the South African wine industry (Knoblauch, van Eeden and Edwards, 2016). Interviewees mentioned that improved information sharing capabilities, visibility and supplier collaboration are some of the main needs identified by filler/packer stakeholders (Du Toit, 2018; Swanepoel, 2018).

Dry good sourcing in particular proves to be a challenge for fillers/packers and wine producers and requires a large coordination effort. The basic business model of facilities functions on just-in-time (JIT) delivery of dry goods supply. It is mainly the responsibility of clients to order their own dry goods and have them delivered to the packaging facility three days before production, especially when customized materials such as corks and labels are required. In some cases a standard set of unbranded dry goods are supplied by packaging facilities. As there is currently no means of visible information sharing amongst the supply chain partners, dry goods sourcing delays are one of the top three causes of bottling plant production delays that were identified during interviews with wine-packaging facilities (Du Toit, 2018; Swanepoel, 2018). During these interviews it was established that wine-packaging facilities have a well-defined partnership with their suppliers and clients, but coordination and integration along the channels of the supply chain can be improved by having more visibility of aspects such as order placing, dry goods availability, order delivery tracking, changing requirements and performance measurement.

The vision of the South African wine industry to increase the amount of packaged exports will increase the amount of pressure on wine-packaging facilities and dry goods suppliers to be more responsive to demand changes and respond to increased complexity. As concluded from expert interviews it will require a combined effort from wine producers, dry goods suppliers and wine-packaging facilities to improve their daily planning operations in order to cope with increased amounts of customization possibilities.

4.2 Use of digital technologies at wine-packaging facilities

Interviewees confirmed that the level of technology use and the advanced technological concepts is relatively low in the South African wine supply chain. The current supply chain functioning of wine-packaging facilities relies largely on a paper-based system as a means of daily data collection (Expósito, Gay-Fernández, & Cuiñas, 2013; Du Toit, 2018; Swanepoel, 2018). This data is manually entered into spreadsheets, resulting in duplicated efforts to have all the information and data gathered available electronically. Furthermore, revising a large number of spreadsheets is a very inefficient method of data revision, while interviewees mentioned that the absence of a common communications platform that provides the opportunity for supply chain visibility, creates challenges in managing deviations and exceptions in this environment. This calls for a more innovative system that can be used for data collection, storage and recovery, without duplicating data in the process.

Having limited visibility and information sharing restricts the ability of supply chain partners to collaborate. The restriction of visibility and appropriate information sharing can partly be attributed to the lack of technological use. According to Palm and Van Eeden (2018), the occurrence of these root causes has been verified and these are linked to Supply Chain Operations Reference (SCOR) processes and relevant best practices as defined by SCOR. Best practices relevant to the root causes mentioned in Section 4.1 includes vendor collaboration and Electronic Data Interchange (EDI).

Implementing vendor collaboration along with an integrated EDI system between wine producers, wine-packaging facilities and dry goods suppliers will allow the alignment of dry goods supply leading to production being on time for the bottling slot scheduled at the wine-packaging facility. Utilizing digital technologies will equip the supply chain partners with capabilities such as real-time order and inventory tracking, visible information availability along the different supply chain channels and improved decision-making in order to manage increase customized demand.

4.3 Design guidelines for best practice implementation at wine-packaging facilities

The need to improve information sharing, information tracking and the daily operational requirements for planning and execution of operations at wine-packaging facilities is evidently rising. Fixing operational processes without making complementary technological improvements will not allow full effectiveness of changed practices. The integration of specific digital technologies will allow the wine supply chain to enhance specific best practices.

Marrying these best practices, industry needs and digital technologies, will equip wine-packaging facilities with the ability to reach the desired transformation capabilities. This will not only benefit wine-packaging facilities, but also the wine supply chain as a whole. Figure 2 provides a guideline for aligning SCM practices at wine-packaging facilities to industry related best practices with the assistance of enabling digital technologies. The implementation of such an initiative will all rely on having strategic supplier (and customer) relationships in place as a best practice to ensure success, as it is crucial that all the parties involved commit to the initiative.

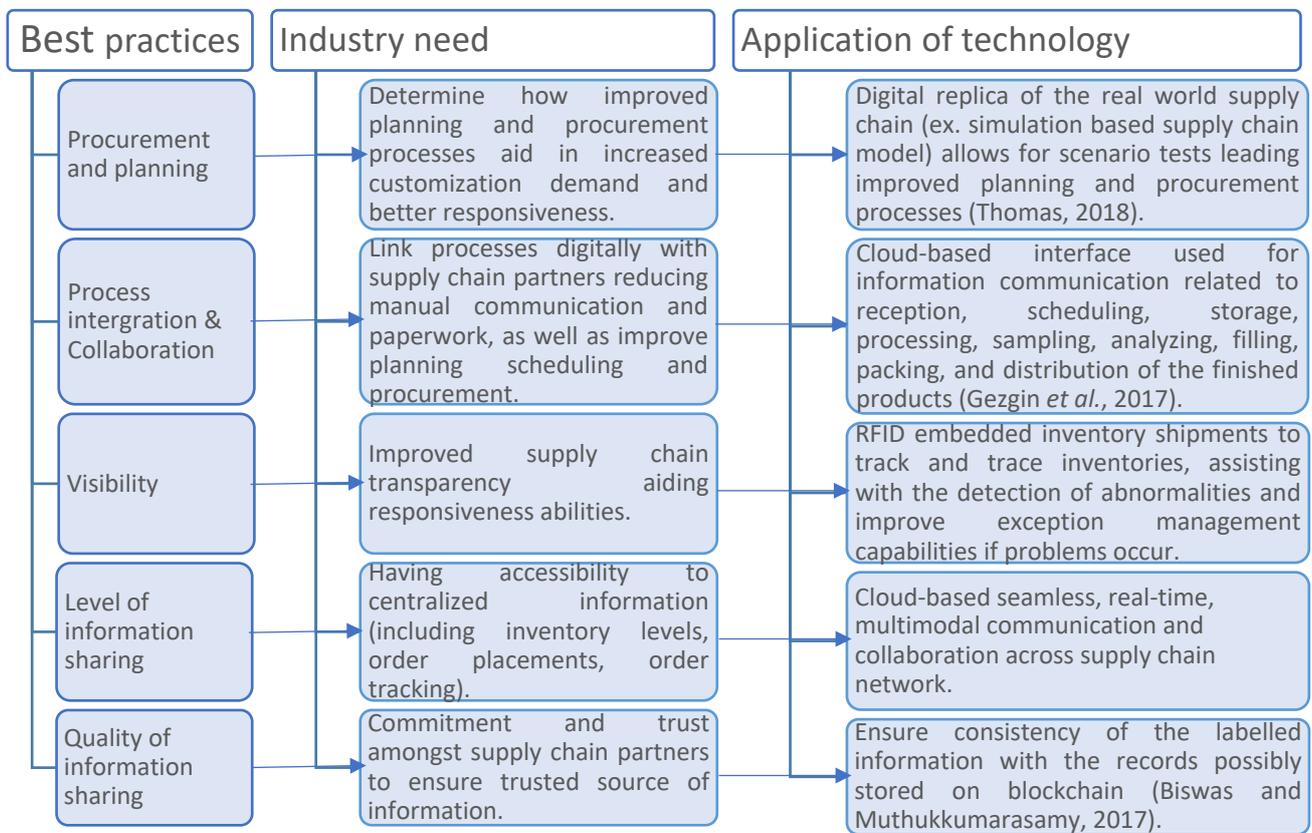


Figure 2: Best practice design requirements

5. Conclusion

Literature related to SCM best practice implementation specifically applicable to the wine industry is very limited. Furthermore, integration of technology in the wine supply chain leaves room for significant improvement. As the focus of the South African wine supply is shifting towards increasing the quantity of packaged exports, the implementation of best practices can assist supply chain members to manage the increased customization requirement.

The best practice design guideline developed aims to make stakeholders at wine-packaging facilities aware of the exciting best practices implemented by other supply chain industries, while all of the best practices identified typically aid improved responsiveness. The technologies identified serve as guidance towards the identification of possible digital technologies that can make a contribution

towards the implementation of best practices. However, implementation has not yet been tested and verified. This is a suggested field for further research.

Aligning best practice with digital technologies as suggested will help the wine-packaging industry to address challenges currently experienced in the daily operating environment and also give other wine supply chain stakeholders a stepping stone towards improved SCM. This will help the wine industry to better align the supply chain of wine production from farm to table in order to satisfy increased customized demand.

SPEAKER/S PROFILE/S + PHOTOGRAPH

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