



Digital Service Innovation: exploration of Sicilian wineries

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Abstract

This paper intends to investigate whether wine SMEs develop Digital Servitization in their organization; and how, in this perspective, wine SMEs establish external collaborations in order to implement Digital Servitization and operate in this innovative reality. An exploratory qualitative analysis is performed based on 15 semi-structured interviews with Sicilian wineries. The results underline: the wineries are well aware that the traditional sale of wine is outdated, they have to support it with services. In fact, wineries are increasingly focusing on defining services that improve their offer. Digital services are in a seminal phase of implementation. In this context, there is a lack of collaborations with external parties (universities, sector experts, suppliers) to explore the opportunities and challenges related to digital servitization. The study provides an overview of the development of digital servitization in low-tech wine SMEs and possible external collaborations suitable for related activities. Theoretical and managerial implications are provided, suggesting possible future research directions.

Keywords

Digital servitization, Metaverse, wine SMEs, external collaborations.

Introduction

The last few decades have been characterized by a significant change in the structure of economic production. The service economy has dominated in the industrialized world (USA and Europe), accounting for over 70% of gross domestic product, and continues to grow (Schwab, 2016). To survive in developed economies, it is widely believed that SMEs can rarely remain pure manufacturing firms (Neely, 2007). The transition to an experience economy has made service innovations ubiquitous and essential for creating economic growth and prosperity (Ordanini and Parasuraman, 2011).

The literature of the last 15 years, focused on servitization, and therefore on the transition from the production of products to the provision of services, has only recently focused on product-service software systems (PSSS), properly defined Digital Servitization (DS) (Kohtamäki et al., 2020a). The software component and, more generally, digitization have been part of servitization research from the very beginning (Kohtamäki et al., 2021b). However, the research on servitization has strongly emphasized digitization only after the emergence of the need to include digitized services in its offer (Coreynen et al., 2017; Hsuan et al., 2021; Rabetino et al., 2021).

The DS emphasizes the creation of value through the interaction between products, services and software (Kohtamäki et al., 2019). Therefore, the DS represents and promises future growth and competitiveness for traditional manufacturing enterprises (Kohtamäki et al., 2021a) such as wine SMEs.

In the last period, especially with the advent of COVID-19, the DS has materialized with the inclusion of digital services in the offer of the cellars, with the aim of making remote services accessible that otherwise could not be made. In fact, due to the contingency of travel, SME wines wanted to make visits to their cellar virtual, so as not to lose the essence of knowledge of the winemaking processes that led to the production of their wine. The further digitized aspect takes the form of environmental labeling, consisting of a QR Code that allows the final consumer to have all the information relating to the cellar, the production methods, but also the organoleptic properties of the wine.

However, given the growing interest in wineries and manufacturing companies in general, the transition to DS is complex, holistic and, therefore, difficult to manage, requiring an understanding of the knowledge necessary for the development of DS (Sklyar et al., 2019). These companies, in fact, may not have all those resources and competencies necessary for implementation, especially if they operate in low-tech or mature sectors, characterized by a low rate of innovation introduction (Yoon et al., 2012).

To overcome these problems, SMEs must collaborate with external partners to obtain those resources and competencies necessary for the implementation of a new production and sales approach, such as the Product-Service-Software System (PSSS), especially in the metaverse world, which requires specific knowledge in both IT and IT engineering.

With this in mind, we try to answer the research questions: are wine SMEs developing digital servitization? How, in this perspective, can wine SMEs establish external collaborations to implement digital servitization (DS)?

To answer these research questions, this work conducted interviews with 15 manufacturing companies, belonging to the Sicilian wine sector. The interviews focused on the introduction of innovations related to the digital services in the company with or without the metaverse approach, and the establishment of collaborations with the external environment, with any reference stakeholder for the development of innovative practices.

This study made it possible to identify the general reference services that wineries develop in their offer to the public, to implement full servitization. Given the focus of this work, we wanted to reformulate the continuum from the product to the service promoted by Tukker

(2004) and Baines et al. (2009), with a new scheme, from product to digital, where the Product-Service-Software System (PSSS) is inserted as the last step for the full implementation of the DS in manufacturing SMEs, as a sort of package of digital services integrated into the product itself.

From the results that emerged, SMEs in wine are increasingly aware of the need to establish collaborations with any type of stakeholder for the development of the PSSS, but to date they do not have a global knowledge of the main agents and their services that can help them in this difficult path.

This article is structured as follows: the theoretical background section, the methodology, the results section. On the basis of the latter, the corollaries of the DS and the development of a PSSS are discussed and explored, with the fruitful contribution that the collaboration with agents external to the company can give.

1. Theoretical background

Servitization as a concept has developed since the late 1980s (Vandermerwe and Rada, 1988), and has grown more from the work of Oliva and Kallenberg (2003) (Rabetino et al., 2021).

These authors have defined servitization as a movement in which companies are increasingly bundling different types of offerings such as "goods, services, support, self-service and knowledge" in order to provide "more customer-centric market packages" (Vandermerwe and Rada, 1988, p. 314).

While servitization has successfully generated empirical research on the integration of products and services, these studies have not placed enough emphasis on the role of software and digital devices (Coreynen et al., 2017; Kohtamäki et al., 2019; Hsuan et al., 2021). The concept of DS emphasizes the integration between digitization and servitization, but is still poorly studied and constantly evolving (Lenka et al., 2018; Ruiz-Alba et al., 2019; Tronvoll et al., 2020).

DS can be considered as the use of digital tools for transformation processes whereby a company moves from a business model focused on the product to one focused on services (Kowalkowski et al., 2017), highlighting the importance of the service and processes that allow for value in use, also focusing on devices and technologies (Sklyar et al., 2019).

That said, we can see DS as the transition from products to advanced PSS systems (Baines et al., 2009). In particular, Tukker and Tischner (2006, p. 1552) have tried to conceptualize the PSS defining it, for example, as "a mix of material products and intangible services designed and combined in such a way as to be able to jointly satisfy the needs of the final customer".

In addition to the PSS, by digitization, we mean the use of digital technology and software to provide new values that generate new revenue and opportunities. For this reason, the studies argue that DS requires reorganized orientation from product development and sales to PSSS development and sales (Baines et al., 2009; Baines et al., 2017; Coreynen et al., 2017; Huikkola et al., 2016).

To get value from DS, companies must combine and capitalize on all three dimensions of the PSSS: the product, the service and the software (Kohtamäki et al., 2020a; Kohtamäki et al., 2020b; Paschou et al., 2020).

So, in practice, the DS should be completed chronologically over the long run; as change develops through continuous interactions between actors and technologies, DS should be interpreted on a continuum that includes the transition of products and product-service systems (PSS) and, ultimately, product-services-software systems (PSSS) (Kaplan and Orlikowski, 2013; Langley et al., 2013).

The transition to DS - the process of developing a PSSS - requires manufacturing companies to redesign all internal actions for the development of this new offering (Kaplan and Orlikowski, 2013). This determines a situation of success for the company only if accompanied by changes in the strategies adopted, in the organizational culture and in the people who work and collaborate within the organization (Oliva and Kallenberg, 2003).

Therefore, the addition of digital services to physical goods requires the acquisition and dissemination of a specific knowledge of the services, not being a completely material knowledge but essentially an abstract and not easy to find knowledge, as it could be for a physical good (Kohtamäki et al., 2021b; Rabetino et al., 2017; Gebauer et al., 2008). In this sense it becomes crucial to find specific knowledge and skills that must be acquired and integrated from the outside because they are not present especially in SMEs (Davies, 2004; Paiola et al., 2013).

Acquiring knowledge is a prerequisite for change (Leifer and Steinert, 2011) which facilitates DS and the development of a PSSS (Kohtamäki et al., 2020a; Kohtamäki et al., 2019; Rabetino et al., 2021) because the transition from product production to service provision means entering new markets with a new combination of tangible products and intangible services, without fully knowing the characteristics of the latter (Baines et al., 2009).

The development of a PSSS often involves specific knowledge and resources that may not be available in an SME (Davies, 2004; Paiola et al., 2013), especially if they operate in low-tech sectors or in mature sectors, characterized by a low rate of innovation introduction (Yoon et al., 2012). Therefore, collaboration with other partners and suppliers may be necessary (Pawar et al., 2009; Spring and Araujo, 2009), underlining the importance of the exchange of knowledge between these actors: developing a correct network of relationships, concretely promoting the change of ways to generate new innovative practices (Chesbrough and Crowther, 2006; Almirall and Casadesus-Masanell, 2010; Dahlander and Gann, 2010).

The search for external sources aims to identify valuable inputs from customers, suppliers, competitors, universities and other public research bodies, in order to activate knowledge transfer processes outside organizational boundaries and direct efforts towards the implementation of new innovative practices (Urban and Von Hippel, 1988; Katila and Ahuja, 2002).

2. Methodology

3.1. Multiple case approach

This study uses a qualitative methodology based on the multi-case approach (Shaban and Yin, 2009). Case studies are a useful way to examine the specific phenomenon using data from different primary and secondary sources (Yin, 2009). Due to the real-life context and the complexity of the phenomenon studied, a qualitative research approach and case studies (Yin, 2009) were considered the most appropriate search strategy. In particular, the context analyzed in this study was the wine industry in Sicily (Italy).

3.2. Reference Context

The wine industry has recently undergone radical transformations all over the world, both as regards the characteristics of the market and as regards the production of wine (Archibugi, 2008). In particular, the history of the wine sector in Sicily has recorded a series of events that have radically changed the wineries both at an organizational, productive and associative level (Archibugi, 2008).

These changes already took place during the Second World War, when thanks to the creation of the Common Market Organization (CMO), only the most renowned wineries attempted mass bottling for export.

Over time, significant improvements have been recorded throughout Sicily: with over 100 thousand hectares of specialized vineyards and about 6 million hectoliters of wine produced annually, Sicily is at the top of the Italian wine scene in terms of quantity but also for the quality of the wines produced. (LaSicilia.it, 2020).

Sicily can be considered to all intents and purposes a real wine continent, independent and exceptional at the same time, with very different geographical areas of production with a high wine vocation, just think of the area of Marsala, the island of Pantelleria, to Etna, to the whole territory that goes from Vittoria to Syracuse with millennia of wine tradition behind it (Unione Italiana Vini, 2020).

If we add to these results the fact that Sicily is also in first place in Italy for the number of agricultural enterprises led by under 35s, here is a positive sign from an innovative point of view¹.

In recent years, the production of Doc wines has significantly increased, which previously concerned a very small percentage of the total regional production, as well as the quantity of packaged product, both Doc and Igt: it went from almost 130,000 certified hectoliters to Doc in 2012. to approximately 483,000 hl certified in 2017 and, again in 2017, approximately 1,700,000 hl were packaged between Doc and Igp, equal to 226 million 0.75-liter bottles (inumeridelvino.it, 2021).

A further milestone was reached with the introduction of organic farming in the region: Sicily is the first region in Italy for organic vineyard area (24% of the regional total, 29% of the total Italy) (inumeridelvino.it, 2021). The choice of cellars reflects all the innovation processes in the vineyard, in the cellar and beyond: if it is large companies that do business, it is small and medium-sized enterprises that create culture and innovation, locally, to be exploited on foreign markets, as evidenced by the high number of medals and prizes awarded to wines, companies, individual oenologists in the most important national and international magazines of the last decade (LaSicilia.it, 2020).

Currently, wine-growing Sicily is experiencing a period of great vitality with the continuous search for qualitative improvement in its numerous pedoclimatic environments, with its viticultural genetic heritage and with national and international native vines. In short, made in Sicily has conquered the social and cultural landscape by improving its image in the world. An image of quality, youth, reliability, tradition and modernity, which accompanies tradition.

A driving role for the growth of the sector, in fact, is also represented by the export of Sicilian wine, which in 2019 increased its outlet markets, although exports are still very concentrated in some countries: Germany, UK and USA as well as 55% of exports (Unione Italiana Vini, 2020).

3.3. Data Collection

As already mentioned in the previous section, this work focuses on the Sicilian wine sector thanks to its excellent reputation both in Italy and internationally, both in terms of the quality of the wine and for the excellence recorded.

Contacts were made with the 26 Sicilian companies that in 2020 won the "3 Goblets of Gambero Rosso wine", as it is an award that is not limited to the evaluation of the quality and taste of the wine, but embraces the whole external context, by also taking into account the services offered to the public.

¹<https://altrasicilia.it/news/267-primato-della-sicilia-per-giovani-under-35-titolari-di-aziende-agricole-cappadona-%E2%80%9Cagci-punta-su-qualit%C3%A0-e-bio%E2%80%9D.html> (accessed 18 November 2020).

After an initial contact via e-mail, individual interviews were scheduled to understand the companies' approach to the world of servitization. The 15 wineries that gave their availability within a reasonable time were interviewed². The semi-structured interviews have been divided into three macro-areas: introduction of innovations within the company, development and integration of the DS, and finally the way in which external collaborations are established. The interviews took place in a mixed mode, blended / face-to-face, lasted on average from 40 to 50 minutes. The subjects who were interviewed were mainly Marketing Managers, sales people, communications workers and sometimes even the owners themselves.

All the companies interviewed are shown below in Table 1.

Table 1. Wineries interviewed

WINERY	GEOGRAPHICAL AREA	INTERVIEWED STAFF
Feudi del Pisciotto	Caltanissetta, Sicily, Italy	Marketing Manager, Owner
Benanti vinicoltori	Catania, Sicily	Global Sales & Marketing Manager, Owner
Cantine Nicosia	Catania, Sicily	Marketing Manager, Owner
Tasca d'Almerita	Palermo, Sicily	Marketing manager, Sustainable Manager
Alessandro di Camporeale	Palermo, Sicily	Owner, winery Director
Cantine Settesoli	Agrigento, Sicily	Marketing Manager, Communication Manager
Cottanera	Catania, Sicily	Owner
Cantine Tornatore	Catania, Sicily	Owner, Sales Manager
Cantine Palmento Costanzo	Catania, Sicily	Marketing Manager, Sales Manager
Calabretta vini	Catania, Sicily	Owner
Colomba bianca	Trapani, Sicily	Owner, Sales Manager
Tenuta di Fessina	Catania, Sicily	Owner, Marketing Manager
Pietradolce	Catania, Sicily	Marketing Manager, Communication Manager
Tenute Bosco	Catania, Sicily	Marketing Manager, Owner
Caravaglio vini	Messina, Sicily	Owner, Sales Manager

3.4. Data Analysis

The interviews carried out were analyzed using the Nvivo software: in particular, this analysis made it possible to identify a series of Nodes, which facilitated the comparison of the cases, emphasizing their expressions, in the end to highlight the methods of implementation of the DS. In addition, also the degree and the very existence of collaborations with external agents, with the ultimate goal of developing, and correctly, the DS within the cellars, keeping up with the continuous change in the sector. This research used a thematic analytical approach to data analysis. It is an iterative process of reading, evaluating and identifying emerging themes and categories that organize and describe data in detail (Braun and Clarke, 2006).

² given the spread of the COVID-19 pandemic at the time the survey was carried out, causing the slowdown of the work itself.

3. Findings

In analyzing the cellars towards the DS, we identified these structural behaviors in 3 key levels and main themes: 1) “Need of Servitization”, 2) “Digital Applications”, 3) “External Collaborations”.

1) “Need of Servitization”

It is widely believed that SMEs can rarely remain pure manufacturing companies, so SMEs have to cope with change by approaching the world of services.

These theoretical evidences were also accepted by the wineries interviewed: recently, even with the advent of COVID-19, the wineries had to reorganize their business model to adapt it to the new needs of customers, going to enhance their range of services that they go to enhance the simple purchase of wine.

Table 2 lists the main services offered by the wineries interviewed:

Table 2. Classification of the main services offered by firms

IDENTIFIED SERVICES	DESCRIPTION	WINERIES
Wine shop	Opening of a small portion of the company used for the direct sale of the wine produced in the cellar, and also of the specialties of the area that can enhance the purchase of wine	Feudi del Pisciotto, Benanti, Nicosia, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Fessina, Pietradolce, Caravaglio
Export abroad	Wine transport and delivery all over the world	Feudi del Pisciotto, Benanti, Nicosia, Tasca d’Almerita, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Calabretta, Colomba bianca, Fessina, Pietradolce, Bosco, Caravaglio
Consulting	Service that can be provided both pre and post-sale for the correct understanding of the characteristics of the wine, but also for direct interaction with the customer or intermediary, which allows on the one hand to solve any problems that have arisen after-sale, and from other to capture what are the possible needs of the customer or intermediary	Feudi del Pisciotto, Benanti, Nicosia, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Fessina, Pietradolce, Caravaglio
Tasting	Tasting proposed or carried out for technical (classification) purposes, where wines and liqueurs are consumed, generally accompanied by various types of snacks.	Feudi del Pisciotto, Benanti, Nicosia, Tasca d’Almerita, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Calabretta, Colomba bianca, Fessina, Pietradolce, Bosco, Caravaglio
Visit to the cellar	Opening the doors of the cellar for excursions that allow the customer to experience the cellar firsthand, discovering all the secrets that characterize all stages of production, from cultivation in the rows to bottling.	Feudi del Pisciotto, Benanti, Nicosia, Tasca d’Almerita, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Calabretta, Colomba bianca, Fessina, Pietradolce, Bosco, Caravaglio
Catering	Full meal preparation service for customers, where traditional local dishes are tasted accompanied by wine produced by the cellar	Feudi del Pisciotto, Tasca d’Almerita, Nicosia, Camporeale

	itself, to contextualize the wine in a typical dinner at the customer's home	
Accommodation	Reception in parts of the company where rooms are set up, with a unique atmosphere purely in symbiosis with the whole philosophy of the cellar and the surrounding environment in which it operates	Feudi del Pisciotto, Tasca d'Almerita, Palmento Costanzo, Fessina, Pietradolce, Bosco
Big events' organization	They are events directly related to wine, such as festivals or festivals that integrate and enhance all the culture behind the production of their wine	Feudi del Pisciotto, Tasca d'Almerita, Palmento Costanzo, Fessina, Pietradolce, Bosco, Nicosia, Camporeale, Settesoli

In particular, in recent years, the cellars have opened to the public a small portion of the company used for the direct sale of the wine and creating a small showcase for most of the typical products of the area that can enhance the purchase of the bottle of wine.

In fact, most of the wineries have their own Wine Shop inside the cellar, because as a manager of the Nicosia Winery says:

"For us it is a prerogative to make available to the customer a space specially designed for a more informed purchase, paying homage to our quality of wine".

L'enoteca è collegata alla visita in cantina, dove l'enologo o il responsabile della produzione illustra al cliente, con un'esperienza a 360° in cantina, tutte le fasi di lavorazione e imbottigliamento delle uve, che vanno dalla coltivazione e raccolta dell'uva, alla distillazione in barrique, imbottigliamento ed etichettatura, senza tralasciare le varie fasi di produzione, manipolazione e imbottigliamento delle uve. Come sottolineano Alessandro di Camporeale e Nicosia winery:

"I nostri viticoltori ed enologi sono molto orgogliosi di trasmettere e rendere pubbliche le conoscenze e tutti i segreti che possono essere svelati agli appassionati del settore".

To crown and conclude this experience in the cellar and in the vineyard, we pass to the moment of tasting the wine produced; this process

"It will make the customer more aware of the purchase of a single bottle of wine, knowing a priori the entire production process" (Settesoli Wineries).

This need also accompanies the organization of fairs and events in which the working phases are shown, but

"It is also a moment of aggregation, where even our employees become an active and integral part, opening the doors of their private homes, to let fans taste the typical products of the area" (Settosoli and Colomba Bianca).

The catering area is complex because it requires large spaces but also personnel specialized in the sector. In fact, sometimes this service is not administered internally but the cellar gives indications on which restaurants, taverns and trattorias to pay attention to. Despite this difficulty, some wineries have one or more restaurants within them:

"to fully grasp the quality of our wine, the glass should be tasted in our estates while admiring the whole panorama of our vineyards"(Tasca d'Almerita).

At the same time, the wineries, in order to broaden their sales boundaries, approach European and foreign markets, with the export of wine. Exports to European and foreign countries are

increasing, which greatly appreciate the quality of Sicilian wine. All the companies examined export abroad, the main countries highlighted in the interviews are America, Sweden, Germany, Japan and China.

Inevitably, alongside exports, there is a pre and post sales consultancy service, which allows you to get closer to the customer by solving problems and satisfying all his needs.

Finally, thanks to the history that lies behind the vineyard, the cellars have re-evaluated all the ancient premises, previously used for the conservation of grapes and barrels, using them as restaurants, or as real relaxation corners with rooms open to the suggestive panorama of the vineyards.

2) "Digital Applications"

Taking into consideration the theoretical framework and analyzing the interviews carried out, we highlight on the one hand the need for wineries to increasingly turn towards a service-oriented business model, in general:

"We cannot avoid developing ad hoc services for the customer" (Cottanera, Pietradolce).

The wineries, in fact, want to keep up with the increasingly digitalized society, recognizing increasingly important development opportunities:

"We know we can't continue to follow the traditional path of selling and delivering basic services, but we need to make the" traditional "a little more appealing by exploring the digital world, which is completely new to us" (Tenuta di Fessina, Pietradolce).

Based on the topics covered in the interviews, we can build a list of the digital services that are offered by the wineries themselves (see Table 3):

Table 3. Classification of the main Digital Services

IDENTIFIED DIGITAL SERVICES	DESCRIPTION	WINERIES
E-commerce	Purchase through dedicated platforms or directly from the company website	Feudi del Pisciotto, Benanti, Nicosia, Tasca d'Almerita, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Calabretta, Colomba bianca, Fessina, Pietradolce, Bosco, Caravaglio
Environmental label	Label characterized by a QR Code, containing information on the organoleptic properties of wine, on production and cultivation, but also on the recycling of the casing.	Feudi del Pisciotto, Benanti, Nicosia, Tasca d'Almerita, Camporeale, Settesoli, Cottanera, Tornatore, Palmento Costanzo, Calabretta, Colomba bianca, Fessina, Pietradolce, Bosco, Caravaglio
Tasting and Virtual Tour	With the purchase of the bottle of wine from home, the customer can make a virtual visit to the cellar, discovering the whole process that underlies the wine he is tasting.	Palmento Costanzo, Fessina, Pietradolce, Bosco, Caravaglio

The wineries with the world in continuous digitization, have for some years added the e-commerce sales channel to direct sales and exports, through online platforms that allow the purchase of wine by comparing the best prices but also the best wines. The best platforms in the industry are, for example, Callmewine, DoYouWine, Bernabei, Tannico, Winelivery.

From this digitized sales channel, in recent periods, especially with Covid-19, the wineries have filled those losses that have occurred due to the lockdown:

"Our e-commerce channel, with Covid-19, fortunately did not register any falls, indeed it allowed us to contain the losses inherent in direct sales" (Palmento Costanzo, Caravaglio).

"Thanks to our previous commitment to the best platforms, we were able to face the lockdown" (Calabretta, Benanti).

Another digital service is the environmental label. In detail, by 2022, through the Decree-Law 22 March 2021, n. 41, so-called "DI Sostegni", all wine bottle labels must contain all information relating to the packaging recycling method, and the materials that compose it.

In this sense, the wineries have decided to group all this information in a QR Code inserted in the label of the wine bottle.

"The QR Code was a turning point for us, it allowed us not to leave out all the possible information to enhance our wine" (Fessina).

"The QR Code also allowed us to integrate the sale of wine with all the beauties of our territory" (Tenute Bosco).

The QR Code not only contains the information required by the Decree, but illustrates all the organoleptic properties in detail, but above all gives territorial information, which the customer would not have had by purchasing wine in e-commerce. It presents all the beauties of the area, building cultural and environmental itineraries that the customer can follow at a later time.

Ultimately, the wineries also offer virtual visits to the cellar, accompanied by the tasting of their own wine.

"In recent times we have had to invent our virtual tour accompanied by tasting, the customer buys the bottle of wine through the e-commerce, then he will have access, through a dedicated link, to a virtual tour that allows him to enter in our cellar sitting comfortably on your sofa at home" (Palmento Costanzo).

"Customers asked us to be able to make visits via instant communication platforms, so we decided to "open" our virtual cellar doors, organizing virtual cellar visits" (Caravaglio).

3) "External Collaborations"

The services offered required considerable efforts: the traditional oenologist had to change the methods of sale, previously he was focused on the direct sale of bulk wine in local wine shops, now there has been a completely unexpected change, where the traditional channels are no longer available and collaboration with the external environment (customers, suppliers and universities, etc.) becomes precious:

"We alone are not going anywhere, we need the support and help of all our stakeholders" (Settesoli Wineries).

It is precisely here that the need arises for a fruitful collaboration with external agents at all levels, not having all the competencies and knowledge necessary to develop the services that will result in a PSSS offer.

"We are not born as service providers, we need external help that allows us to know the methods of internal development, but also that allows us to better approach the new needs of customers, who are increasingly smart" (Tenute di Fessina, Tornatore).

All this, however, is not as easy as expected: the interviews show the desire to establish collaborations with external agents, but often there are difficulties in understanding but also difficulties in direct links with experts in the digital sector.

"We have no idea who to contact, on the one hand we need to have an expert in Digital Marketing in our team, on the other hand we need to have a clearer view of the partners who can help us in the development of intelligent services" (Calabretta, Benanti).

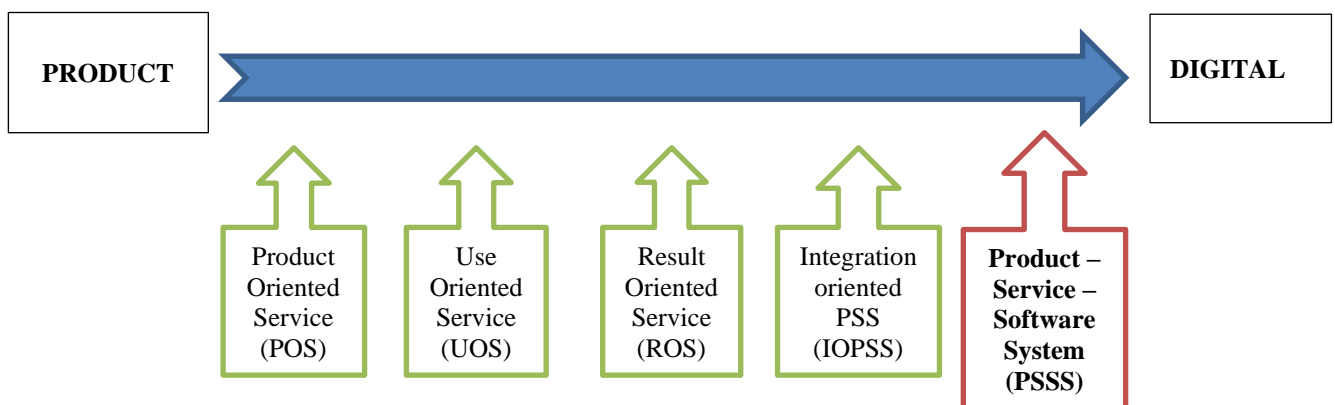
4. Discussions

From the results obtained, the wineries are undertaking a seminal approach towards Digital servitization and therefore the new way of organizing their offer to the public. Now they have to open up to new customer needs that are getting smarter. Therefore, in line with the literature (Kowalkowski et al., 2017) wineries must redesign their business model, highlighting the importance of service and processes that allow value in use, also focusing on new devices and technologies (Sklyar et al., 2019).

This change requires considerable effort. The DS, therefore, must be completed in the long run; as change develops through continuous interactions between actors and technologies, the DS should be interpreted on a continuum that includes the transition of products and product-service systems (PSS) and, ultimately, product-services-software systems (PSSS) (Kaplan and Orlikowski, 2013; Langley et al., 2013).

Thanks to this we have built a continuum from the Product to the PSSS, a product that integrates the characteristics to arrive at a complete DS: the product, the service and the software or digital application at all levels. This continuum will extend the one already elaborated by Tukker (2004) and Baines et al. (2009), where at one extreme there is the traditional manufacturer who mainly offers products, while services are rarely offered or are considered ancillary to their products. At the other extreme is the provider of platforms or digital services in general, whose main offer is to provide new purchasing opportunities, such as building a metaverse of one's cellar to make the purchase of a bottle of wine unique to experiential level (see Figure 1).

Figure 1. Digital Continuum



Source: Adapted to Tukker (2004) and Baines (2009)

In fact, according to the Digital Continuum presented in the results (see Figure 1), the wineries are unconsciously placed in two opposite positions: on the one hand, they carry out the supply of the bottle of wine, enhancing it with related services, such as transport, export abroad and pre and post sales consultancy (POS) (Tischner et al., 2002; Baines et al., 2007; Tukker, 2004; Neely, 2008); on the other, they created business units (Leoni, 2015) who deal

with hospitality, tasting and entertainment managed by industry experts (IOPSS) (Neely, 2008). As for the last step of the continuum, PSSS, wineries are lately taking the first steps towards digitalised services. As can be seen from the results, the digital services presented are very limited and mainly "simple", not going to apply advanced technologies for their development and implementation. However, from this new point of view they have begun to recognize the high potential and the elevating benefits that the introduction of digital services can bring to local and traditional realities like them. This behavior could be a reflection of the type of context in which wineries traditionally operate, because we are talking about companies that operate in low-tech sectors or in mature sectors, characterized by a low rate of innovation introduction. (Yoon et al., 2012).

In fact, the addition of digital services to physical goods requires the acquisition and dissemination of specific and technical knowledge of the services. Given the nature of the wineries (low-tech SMEs), as all the interviewees pointed out, they do not have the competencies but also all the useful information to develop a winning PSSS. This practical evidence is also supported by the literature, Davies (2004), Paiola et al. (2013), they state that the development of a PSSS often involves specific competencies and resources that may not be available in an SME. In fact, in the considerations that emerged from the interviews, wineries are increasingly carrying out collaborations that allow them to develop new projects with a technological content and not for the efficiency of their company. In fact, experts in the sector, such as engineers, oenologists, agricultural experts, have made a significant scientific contribution, preparing workers for the elaboration of feasible environmental plans, studying new winemaking practices, introducing new genetically modified grape varieties, and many other contributions aimed at to improve the quality of wine more and more.

In this sense, collaboration with other partners and suppliers is necessary (Pawar et al., 2009; Spring and Araujo, 2009), underlining the importance of the exchange of knowledge between these actors: developing a correct network of relationships, concretely promoting the change of ways to generate new innovative practices (Chesbrough and Crowther, 2006; Almirall and Casadesus-Masanell, 2010; Dahlander and Gann, 2010).

5. Conclusions

This study aims to verify the coherence between consolidated concepts in literature and business reality, focusing on the development of digital servitization in Sicilian wine SMEs, and how, in this perspective, wine SMEs can establish external collaborations in order to implement digital servitization and operate in this innovative reality.

This in-depth analysis made it possible first of all to identify the digital and non-digital services that wineries develop in their offer to the public, and subsequently facilitated the construction of the Digital continuum, which leads wine-growing SMEs to the development of a PSSS.

Due to the complexity of introducing a PSSS in wineries, being low-tech SMEs, profound changes are required in the business model, resources and competencies at all levels of the company, as this is a global redesign of the company. traditional offer in a new offer, which includes all those basic and digital services for an efficient PSSS. All this radical change, in turn, generates the need to collect unknown information and knowledge within the cellars due to the different traditional concept and mentality of producing and selling bottles of wine.

Here lies the need to establish fruitful collaborations with external partners that allow for the enhancement and efficiency of all those practices that lead to a more conscious development of a PSSS.

From the results illustrated above, theoretical and practical implications can be extrapolated which are very useful for managers operating in low-technology sectors. This study attempted to reconceptualize the Product-Service continuum conducted by Tukker (2004) and Baines et al. (2009), building the continuum that leads from product sales to PSSS development. Wineries managers, in addition to improving their digital services already offered, could take advantage of the new digital orientations that have been presented at sector fairs, such as the opening into the world of the metaverse, which could bring advantages not in terms of relationships with customers but also with the entire production sector. Not aiming for exhaustiveness, further studies on this direction are recommended. On a practical level, the will on the part of SMEs to go beyond the borders is often not enough, so it is necessary to undertake fruitful collaborations with any external reference interlocutors, to develop innovative practices completely new to traditional business. Rather than trying to do anything on your own, it is more beneficial to undertake a focusing strategy, to better organize existing internal knowledge and integrate it more consciously with what may come from the external environment.

The study carries within itself the limitations common to any qualitative analysis. In particular, it uses an exploratory analysis based on multiple case studies of a single region, so the results cannot be generalized to the entire population of wine producers. To extend the validity and generalizability of the results, other cases belonging to different regions should be examined and then compared. Subsequently, in order to be reliable, this study should be accompanied by a quantitative analysis.

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