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HOW CAN PRODUCT SEMANTICS BE EMBEDDED IN PRODUCT TECHNOLOGIES? THE CASE OF THE ITALIAN WINE INDUSTRY

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Since the beginning of the 1990s, innovation management literature has attempted to overcome some oversimplified dichotomies coming from well-established theories (e.g., open vs. closed, external vs. internal, cooperation vs. competition, knowledge vs. learning). The design-push approach to the study of new product development has demonstrated that technology-push and market-pull are not divorced, since each successful new product is based on improvements in both technological performance and semantic features, which together sustain the new products to act as text that helps people generate new meanings in their daily sense-making activities. In this explorative study, we try to verify the extension of the design-push approach from science-based and specialised supplier industries (e.g., optical instruments, electronics, furniture) to more traditional, supplier-dominated industries (in this case, the wine industry), where its use could be counterintuitive. We then explain new product development, moving from the integration of technological and semantic dimensions of new products. We present the results of eleven case studies of successful new product development processes developed by companies located in Italy, known as one of the most innovative wine-producing areas in Europe. We assume that product innovation in traditional industry is only incremental, since technologies, operations and marketing processes are expected to be stable and predictable. Nevertheless, the empirical results show that the new product development process in the wine industry offers empirical insights that lead to a better understanding of the design-push approach; designing a new wine means not only to achieve new technical features but also to generate new product meanings. Through the identification of practices enabling a coherent innovation of product functions and meanings, this empirical research allows the enrichment of the design driven model. The coherence between the technology, function, language and message of a new wine can

be obtained with different practices and development paths: the integrated approach, the semantic-oriented approach and the function-oriented approach. Additionally, the network of actors that wine companies access changes according to the innovation approach they adopt.

Keywords: New product development; design push approach; wine industry.

Introduction

Traditional studies on the strategic management of innovation follow the dichotomous mindset typical of Western thought (mind vs. body, thought vs. action, individual vs. society, etc.), proposing several contingent dual polarisations between the technology-push and the market-pull approach, between radical and incremental innovation, between knowledge exploration and knowledge exploitation, between competence-enhancing and competence-destroying (Dosi, 1982; Henderson and Clark, 1990; Tushman and Anderson, 1990). Even though several authors have proposed theories and models aimed at improving the trade-offs between the poles of these dual approaches, e.g., simultaneously pursuing efficiency and innovativeness (Hayes and Abernathy, 1980) or exploration and exploitation (Ghemawat and Costa, 1993), few efforts have been made toward the development of a further third dimension able to enrich the comprehension of success factors underlying innovation strategies. Starting from studies developed within organisational theory and the sociology of innovation (Blackler, 1995; Flichy, 1995; Flichy and Carey, 2007), many scholars have defied this oversimplified view, advancing the concept of practice as a third way that embraces the two poles of traditional dichotomies, since each observable innovation process is made of an inseparable mix of technological and marketing competencies, of technology and semantics, of functions and uses, of embedded knowledge and pragmatic knowledge, of exploration and exploitation (Orlikowski, 2002; Carlile, 2002; Gotzsch, 2000). In this paper, we focus on the strategic management of product innovation that has been modelled as a process of generation and integration of competencies derived from two principal sources: the knowledge of the availability of new technologies, and the knowledge of explicit customers' needs. In traditional approaches, this duality shaped different models of innovation, where empirical cases could be mapped along two basic polarities: market-pull vs. technology-push innovations (Dosi, 1982), and incremental vs. radical innovations, based on different degrees of newness in technological competencies and in marketing competencies of the firm (Abernathy and Clark, 1986).

In this paper, we propose an extension of the "design driven model" developed by Verganti (2003; 2006) as a third model to add to the technology-push and market-pull approaches. With this third model, the success of innovation stems from the

combination of higher technical functions and higher semantics properties infused into new products through the integration of the multiple streams of technological and marketing competencies of the firm (Prahalad and Hamel, 1994). Indeed, the design-push approach overcomes the oversimplified "push or pull" dichotomy, focusing on innovations where the semantic dimension, rather than the market or the technology, drives the innovation process. Adding a third source of knowledge to the knowledge about user needs and technological opportunities, the author introduces the knowledge about product languages: "that is the knowledge about the signs that can be used to deliver a message to the user and about the socio-cultural context in which the user will give meaning to those signs" (Verganti, 2003). The key competency lies in the management of interdependencies between technological choices regarding functional improvements and marketing choices regarding improvements in the messages delivered by the product. Indeed, the knowledge about product languages allows the exploitation of new technologies' enabling properties as signs and symbols useful for delivering new messages, and vice versa: the exploitation of new languages' enabling properties as signs and symbols useful for improving the use of new technologies. The relationship that exists between the technology-push and design-push approaches is particularly interesting: while in the technology-push approach, the driver is the development of new technologies, in the design-push approach, the driver is the meaning or semantics of the resulting product, but product languages and messages can be modified by acting on the technologies. Plastic pieces of furniture developed by Kartell in the sixties can be considered meaningful examples: Castelli, the founder and past president of Kartell, gave furniture products a new sense of modernity through the use of plastic materials. The adoption of plastic was reinterpreted to the point where it assumed the position of a "noble" material, breaking the dominant cultural models that foresaw the diffusion of other materials, such as wood, steel, marble and glass, in the furniture industry. The more the technology represents a means of generating a change in meaning, the more the technology-push approach to innovation can be considered design driven. A potential limit of design-push approach as a third way to explain the success of strategies for new product development, could derive from its empirical basis, since the model was initially developed by studying industries where both technologies and semantics are complex and constantly changing (e.g., the furniture industry).

The first research objective of this paper is to verify the applicability of the design-push approach to the wine industry. Here, while technologies and semantics are expected to be stable and predictable, marketing issues become relevant, both in the analysis of customer needs and in the deployment of innovative communication and trade campaigns. Indeed, the wine industry has in the last few years unveiled aggressive international marketing strategies carried out by firms and networks of firms (e.g., wine makers allied with enologists, trade channels, and innovative

restaurants), coming from different competitive contexts such as the US, Australia, New Zealand, France, Chile, and Italy. The second research objective is to enrich the design driven model through the identification of practices enabling coherent innovation of product functions and meanings.

The paper is organised in the following way: in Section 2, a review of traditional dual approaches to innovation is presented, focusing on the relevance of new product development in wine industry. In Section 3, we present our adaptation of the design-push approach, identifying specific constructs for empirical research on new product development in the wine industry. In Section 4, the research objectives and methodology are described. In Section 5, the empirical results are provided, and our conclusions are discussed in Section 6.

Approaches to Innovation

As mentioned previously, traditional dual theories provide some main models for classifying firms' approaches to innovation, such as market-pull vs. technology-push innovations, innovation based on technological competencies vs. innovation based on marketing competencies of the firm, and incremental innovations vs. radical innovations. Within this mainstream perspective, the development of new products has been modelled as a process of generation and integration of knowledge flowing from two principal sources: knowledge about the availability of new technologies and knowledge about customers' explicit needs. The market-pull approach is primarily characterised by the dominant role of the comprehension of market needs over the introduction of new technologies. In this particular approach, the main source of innovation is the market, and new product development is a direct consequence of explicit needs manifested by consumers (Stein and Iansiti, 1995; Leonard and Rayport, 1997; Seybold, 2001; Thomke and Von Hippel, 2002; Chayutsahakij and Poggenpohl, 2002). However, the primary assumption of this approach is that user needs are explicit elements that can be identified, captured and translated into requirements for new products to able to satisfy the these needs. The technology-push approach views the innovation process from a completely different perspective; in fact, this approach does not believe in a market-driven process. Instead, it believes that innovation stems from the research and development activities of the company that, through the exploration and exploitation of technological opportunities, creates new functions for products (Abernathy and Clark, 1985; Henderson and Clark, 1990; Tushman and Anderson, 1990; Christensen and Rosembloom, 1995). If, in the market-pull approach, the central role is covered by the market and the consumer, it is given to the company and its development of new technologies that subsequently drive the company's innovation processes in the technology-push approach. While the new product development process is a complex, multifaceted

phenomenon, where success depends on the firm's capability to integrate knowledge of customers' needs and knowledge of technological opportunities, the more traditional literature sees technology-push and market-pull as two discrete alternatives, or in most advanced views, as two polarities of a continuum. In any case, the firm seems to be in front of a trade-off between a coherent R&D strategy, supported by powerful marketing tests and aimed at developing new successful technologies, and a coherent marketing strategy, supported by the availability of useful technological solutions and aimed at developing higher abilities in satisfying the evolution of customers' needs. Salomo (2007) suggests a four-factor model of degree of innovativeness, where newness can be defined relative to the market, to the technology involved, to a firm's internal resources, and also to external factors, such as industry norms and values.

These studies are generally based on empirical surveys and case studies on new products developed within science-based or knowledge-based industries, such as automotive, microelectronics, information technology, advanced machinery. Consequently, we can expect that new product development in traditional industries, where technologies are mature, change follows well-defined trajectories, operations and marketing processes are stable and predictable, and where the primary sources of innovation are suppliers, and could be shaped by limited goals, such as reducing costs, by prevalence of marketing competencies and by a low degree of innovation (Pavitt, 1984; Malerba, 2002).

We contend this assertion, since it derives from the assumptions underlying the dual approaches to the study of innovation; we assume that in traditional industries, like the wine industry, innovation strategy could develop not only in order to add new technical functions deriving from a wider range of technological options now available as the result of scientific progress (e.g., avoiding limits of climatic and geographical factors thanks to advancement in biotechnologies), not only in order to add new marketing methods deriving from the openness of global electronic marketplaces, but also carrying out radical innovations based on creativity in managing interdependencies between technologies and semantics. Moreover, due to historical, cultural, and simplicity factors, the wine is a special product, since its success is deeply linked to the firms' ability to deliver delightful experiences for the consumers. In this sense, the wine seems to be a suitable product for research on innovation; as stated in the introduction of their recent book by Utterback *et al.* (2007), "... a design-inspired product delights the customers. The product emphasizes sophisticated simplicity and economy of means and low impact. If a product's use is apparent, simple, and clear, it will stand out from all those compete for our attention. Great products are those that have grown in meaning and value over their lifetimes. They capture our hearts and make our lives easier, better, or more interesting...".

Design-Push Approach to Innovation

Verganti (2003 and 2006) questions the over-simplified dichotomies of market-pull vs. technology-push and technical function vs. semantics dimension of the new product, proposing the design-push approach as a third complementary model able to embrace the polarities proposed by traditional theories. In the design-push approach (see Fig. 1), the degree of newness depends not only on the availability of new functions coming from advanced technological competencies of the firm but also, and especially, on the capability of generating new messages and new meanings for the customers (e.g., the Swatch, which generates the new meaning of watch not only as time meter, but also as fashion accessory; or the Apple iPod, which generates new meanings of mp3 player, not only as moving music player, but also as freedom and peace signal).

The relationship that exists between the technology-push and design-push approaches becomes clear: while in the technology-push approach, the driver is the development of new technologies, in the design-push approach, the driver is the meaning or semantics of the resulting product, but product languages and messages can be modified by acting on the technologies. This is because the relationship between the market-pull and design-push approaches lies mainly in the fact that a consumer can manifest explicit needs from a semantic perspective only when

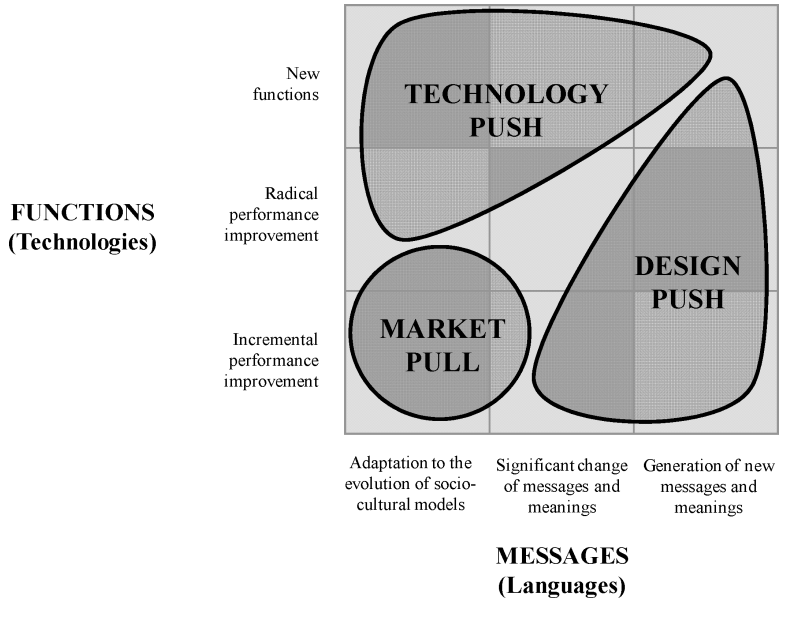


Fig. 1. Mapping different approaches to innovation (Verganti, 2003).

the innovation is incremental. A radical design driven innovation, however, drives towards the development of new meanings that change the socio-cultural context. Consequently, as long as the degree of innovation is incremental, the two approaches can coincide and operate complementarily. This, however, cannot be the case when the degree of innovation tends towards the radical, since the market or consumer is not able to manifest coherent needs that can stimulate the company in developing new product meanings that break with the past. More specifically, it is presumed that the role of market factors in the design-push approach changes according to the level of novelty of product meanings. Market drivers become remarkable in the case of incremental innovation of product meanings, where, in other words, incremental adaptations of product meanings are determined by the continuous and natural evolution of explicit cultural models adopted by customers. On the other hand, market factors lose importance in the case of radical innovation of product meanings, where innovations originate from a cultural scenario developed through collaboration between companies and designers. In other words, radical innovations of product meanings require the comprehension of possible or latent social dynamics that can successfully influence consumers' lifestyles and behaviours. The above considerations can be summarised in the following two propositions (Verganti 2008):

- The more the market becomes less capable of proposing semantic innovations the more radical the change in meaning. Consequently, the more radical the design driven innovation, the less it can be generated by a market-pull approach;
- The more the technology represents a mean to generate a change in meaning, the more the technology-push approach to innovation can be considered design driven.

According to Zurlo *et al.* (2002), the relationship between product and consumer can be analysed in relation to two dimensions: *functional* and *semantic* (see Fig. 2). In this interpretive model, tools refer to the intrinsic characteristics of the product and are building blocks of both dimensions. Results describe the interaction between product and user, while effectiveness expresses an evaluation of this interaction. Tools are considered completely independent of user interpretation, while the effectiveness can change from one user to another.

By splitting up the functional dimension according to the three interpretative levels previously mentioned, it is possible to identify Technologies, Functions and Performances. From this point of view, a firm can develop new technologies that, if incorporated in the product, allows access to new functionalities and improve the performance perceived by the customer. This model illustrates that a company can innovate by creating new Languages, proposing new Messages and Meanings

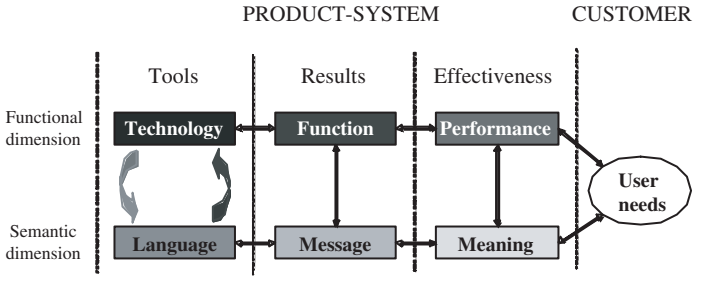


Fig. 2. Functional and semantic dimensions (Zurlo *et al.*, 2002).

in relation to the sociocultural models that govern the context in which the product is proposed. The term "product semantics" can be defined as "the study of the symbolic qualities of man-made forms in the cognitive and social context of their use and application of knowledge gained to objects of industrial design" (Butter and Krippendorff, 1984). According to Monö (1997), sets of signs can be used to convey messages to consumers and can be called design languages. Van Onck (1994 and 2000) identifies possible signs of a product language: topology (colour, material, surface, form, texture, and so on), mereology (continuity, interruptions, holes, boundaries, hierarchies, dimensions, orientation, and so on) and morphology/morphogenesis (reflection, aggregation, separation, transformation, and so on). In order to provide a concrete example, we can quickly analyse the Carlton bookcase designed by Ettore Sottsass in 1981 (see Fig. 3).

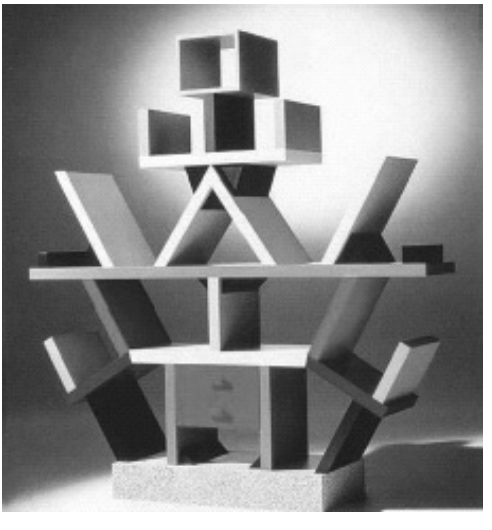


Fig. 3. Carlton, designed by Ettore Sottsass in 1981.

This product shows interesting and innovative product signs through laminated surfaces, vivid and audacious colours and bold patterns. In fact, through these signs the product speaks the languages of irony and provocation and eliminates the peaceful conformity of "good design" (see also Dell'Era and Verganti, 2007). Of course, as illustrated in Fig. 2, there is a strong interaction between these two dimensions on all three interpretive levels. This characteristic of the model underlines the reciprocal influences of each dimension. For example, the definition of a product language is typically not defined solely in semantic terms, but is often influenced by technological opportunities and user desires. If tools (Technologies and Languages) and results (Functions and Messages) can be designed, the effectiveness (Performances and Meanings) can change from one user to another. As illustrated in Fig. 2, there is a strong interaction between functional and semantic dimensions that underlines the reciprocal influences each has on the other. For example, the definition of a product language is typically not defined solely in terms of product semantics; in fact, product language is often influenced by technological opportunities and the evolution of consumer needs. Since the two variables of external layers of both product dimensions (Performance and Meaning) are generated through interaction with customers, we develop specific constructs and tools for analyzing the four variables under a full control of the single firm in our empirical research: the choices about Technologies and Functions (for the functional dimension), and the choices about Languages and Messages (for the semantic dimension).

In the design-push approach, the new product is the result of two intertwined dimensions: the functional dimension, as a set of technical performances provided by the product, and the semantic dimension, as a set of messages carried out by the product. The success of a new product depends on the proactive behaviour of the customer, who completes the functions, generating satisfactory uses for his own rational and physical needs, and who completes the messages, generating new meanings for his own emotional and cognitive needs. In other words, the interaction between the customers and the two intertwined dimensions of the product generates customer satisfaction, both to make sense of the uncertainty of the technological environment and to make sense of the cultural environment. It is the semantic dimension rather than the market or the technology that drives the innovation process. Several recent studies underline the importance of product semantics and its relationship to competitive advantage (Gemser and Leenders, 2001; Platt *et al.*, 2001; Borja de Mozota, 2003; Boland and Collopy, 2004; Creusen and Schoormans, 2005; Hertenstein *et al.*, 2005; Veryzer, 2005; Candi, 2006). In all approaches to innovation, three sources of knowledge (knowledge about user needs, knowledge about technological opportunities, knowledge about product languages) are present, but their relative importance

is different; in the case of design-push strategy, the driver of innovation, the starting point, is not the technology or customer need but the capability to understand, anticipate and influence the emergence of new product meanings. In order to adopt the design-push approach, it is necessary to develop a particular sensibility towards the evolution of socio-cultural contexts; it is indispensable to recognise "weak" signals that might arise in future scenarios. Proper management of radical design driven innovation allows companies to interpret new lifestyles and subsequently bring a coherent system of values to the market. The factors mentioned above illustrate the necessity of access for a series of stakeholders connected to one another in order to comprehend the evolution of socio-cultural contexts and then to introduce radical design driven innovations.

Research Objectives and Methodology

As mentioned before, this paper aims to verify the applicability of the design-push approach to traditional industries such as the wine industry and also to enrich the model proposed by Verganti (2003) through the identification of practices enabling a coherent innovation of product functions and meanings. More specifically, it investigates the approaches adopted by Italian wine companies in the new product development process. Considering that, in this industry, both the technological and semantic aspects are particularly relevant in terms of competitive advantage, the paper explores the practices adopted by companies to integrate the technological (technical properties, production processes, etc.) and semantic (symbolic, cultural and emotional values, etc.) dimensions of a new product (usually defined as "new label" for a new "red" or "white" or "sparkling" wine). In this sense this paper underlines how different contributions provided by actors collaborating with wine companies in the innovation process (such as wine experts, communication agencies, dealers, wine bars, etc.) are integrated and synthesised. The Italian wine industry is in a critical position. After great development during the last decade of the 20th century, based on the expansion of Italy's position in international trade and on the stabilisation of its domestic market, the industry has since the beginning of the century faced reduced export activity and increasing imports. Despite this phenomenon, Italy is still one of the most important worldwide producers (see Table 1).

In the nineties the Italian wine industry experienced a qualitative growth in production: despite a decreasing domestic consumption, the general production constantly rose to 50 million hectolitres with a 30% growth in volume; the exports grew by 50%. The sector has been able to effectively answer to a transformation of the geography of consumption (Rabobank, 2003; Corsi *et al.*, 2004; Boccia e

Table 1. Wine production (thousand of tons; Source: FAO, USDA, OIV).

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
France	5.560	6.004	5.510	5.427	6.294	5.754	5.339	5.000	4.752	5.880	5.470
Italy	5.620	5.877	5.056	5.714	5.807	5.409	5.229	4.460	4.409	5.328	4.907
Spain	2.104	3.040	3.322	3.022	3.791	4.557	3.394	3.942	4.730	4.993	4.045
USA	1.867	1.888	2.618	2.050	2.075	2.660	2.300	2.540	2.350	2.328	2.290
Argentina	1.644	1.268	1.350	1.267	1.589	1.254	1.584	1.269	1.322	1.550	1.520
Australia	503	673	617	742	851	806	1.016	1.151	1.019	1.347	1.292
South Africa	753	845	811	770	797	695	647	719	885	1.016	905
Chile	317	382	455	547	481	667	565	574	687	655	805
New Zealand	56	57	46	61	60	60	53	89	55	119	102
Worldwide	**25.360**	**27.268**	**26.670**	**26.501**	**28.520**	**28.693**	**26.903**	**26.485**	**27.181**	**29.890**	**27.830**

Table 2. Sample overview.

Company name	Number of bottles produced in 2007 (.000)	Number of labels-wine products offered in 2007	Vineyard extension (hectares)	Product innovation (new label and wine typology) analysed in the case study
1. Casa D'Ambra	500	10	*n.a.*	Frassitelli (white wine)
2. Caggiano	150	7	20	Taurasi (red wine)
3. Cantina del Taburno	1.700	12	600	Bue Apis (red wine)
4. De Conciliis	150	5	23	Selim (sparkling wine)
5. Fontana Galardi	28	1	10	Terra di Lavoro (red wine)
6. Fontanavecchia	140	8	12	Vigna Cataratte (red wine)
7. Grotta del Sole	850	18	*n.a.*	Falanghina dei Campi Flegrei (white wine)
8. Guardiense	3.000	22	2.000	Janare (white wine)
9. Mustilli	350	9	35	Flanghina di Sant'Agata dei Goti (white wine)
10. Terredora	1.200	14	154	Fiano di Avellino Terre di Dora (white wine)
11. Villa Matilde	700	12	*n.a.*	Falerno del Massico (red wine)

Pomarici, 2005). Table 2 shows the details of the eleven case studies of our sample. All companies are located in the south of Italy; more specifically, the Campania Region is one of Europe's most innovative winemaking regions. We decided to focus on companies located in the same region in order to avoid the fact that territorial differences strongly impact wine aspects and managerial behaviour. Finally, we selected those companies indicated as most innovative by specialised magazines.[1] For each company, we show data about production capacity (in terms of number of bottles, and vineyard extension), and data about new product development strategies

[1]More specifically, we have analysed evaluations published in the following websites: www.gamberorosso.it, www.slowfood.it, www.winenews.it, www.sensonline.com, and www.mondovino.it.

(number of single "wine labels" composing the product portfolio and the most relevant new product developed in the last eight years).

Due to the complex system of variables that characterise the problem and our intent to develop a holistic and contextualised analysis, we adopted the case study methodology. We feel that this method is suited to the exploratory nature of this research as it allows us not only to explore the phenomenon in its complexity but also to discover those variables that we deem critical to better understanding the problem. Consequently, the conducted case studies focus on the wine industry, are exploratory, retrospective and multifaceted in nature, and have literally been replicated (Yin, 1984, see Table 2). Moreover, the state of prior theory and research can be classified as intermediate (Edmondson and McManus, 2007); data collection is based on interviews and observations with the purpose of exploring established constructs and relationships in a new setting (i.e., the wine industry). Each case study was then developed using a brief questionnaire, in order to gather background information, and two in-depth interviews. The questionnaire allowed us to collect general data on turnover, employees, number of bottles, vineyard extension, number and list of labels, and awards. Both interviews were planned around a protocol that was able to track the decision making process in the development of a new wine and composed of three main sections: the concept generation phase (trigger of innovation, initial idea, sources of stimuli, key actors), the development phase (eventual concept changes, implementation, eventual technical problems, key actors) and the launch phase (communication mix, key actors). The first interview was organised with the management, while the second with was a critical external actor participating in the process of new product development (e.g., enologist, innovative dealer, R&D provider) identified in collaboration with management during the first interview. Both interviews were developed by the two authors. Prior to the data analysis phase we retrieved additional data through secondary resources, especially regarding awards received by specific labels. The content analysis was done with each author coding the principal phases of the innovation process (Eisenhardt, 1989). More specifically, adapting the model represented in Fig. 2, we described the contribution made by each actor (producer, wine experts, communication agencies, dealers, wine bars, etc.) in the different phases of the new product development process and in relation to the several aspects that characterise a new wine. Finally, a synthetic report about each case study was shared during the interviews to obtain a final approval. As mentioned before, if tools (technologies and languages) and results (functions and messages) can be designed, the effectiveness (performances and meanings) can change from one user to another; for this reason, we focus the analysis of each new wine on four main aspects: technologies, functions, languages and messages (see Table 3). In order to increase the robustness of the interpretations,

Table 3. Framework about technologies, functions, languages and messages of a new wine.

Technologies	
T1. Vines	vine (age, geographical location); grapes (autochthonous or not)
T2. Cultivation	vine density; manual or mechanical; suspension system ("pergola", "spailer", etc.); training method (simple Guyot, double Guyot, unilateral cordon, bilateral cordon)
T3. Winemaking or Vinification	primary and secondary fermentation (enzymes and yeasts); maceration
T4. Refinement and Aging	period; barrel
Functions (*or technical characteristics*)	
F1. Complexity	a combination of richness, depth, flavour, intensity and balance
F2. Roundness	a tasting term, states whether the fruit, acid, wood flavours, etc. are in the right proportion
F3. Softness/Finesse	a tasting term to describe a wine with low acid and gentle tannins
Languages	
L1. Name	meanings or references to places, stories, etc.
L2. Aesthetics	colours and perfumes
L3. Packaging	label, shape of the bottle, etc.
L4. Promotion	launch of the new wine (places, communication, etc.)
Messages	
M1. Values and emotions	terroir, status, socialisation, preciousness, entertainment, etc.
M2. Context of consumption	social events, special occasions, daily, etc.

few different interpretations by two authors were verified by re-contacting the interviewees by phone.[2]

Empirical Results

Coherently with the explorative nature of this research, the case studies allow us to uncover the key issues of new product development process in the wine industry, identifying some specific patterns or linkages between the variables described in the previous section. Each case study was developed according to the structure described in the following box, in which we present an in-depth case study on the new wine Bue Apis developed by Cantine del Taburno. In order to verify the applicability of the design-push approach to traditional industries such as the wine industry, each new wine has been analysed using the framework presented in Table 3 and identifying the most innovative aspects of each product. During the interviews, we also identified key actors that have provided critical contributions in terms of concept generation.

[2]As seen from two case studies: Caggiano and De Concilis.

Box: Case study about the new wine Bue Apis developed by Cantine del Taburno

The Company

Recently enlarged and modernised, Cantine del Taburno has become popular among grape growers of the regional area, with its wine production and promotion. For Cantine del Taburno quality is a result of the gradual walk that starts by giving its members the results of its laboratory studies. The best varieties — those that better adapt to the soil, to the climate, to the enological requirements, to the market demands — are chosen.

The New Product

First produced in 2001, Bue Apis is probably the most prestigious red wine currently proposed in the product portfolio. It was conceived as a new wine able to express values such as terroir, tradition and history. It is particularly appreciated because it is produced by completely autochthonous vines that are more than 200 years old: Aglianico is the most prestigious and noblest of Southern Italy's native grapes, growing in an area where the Apennines overlooks three seas — the Tyhrrenian, the Ionian and the Adriatic — and it sets the standard for the great red wines of the South. Aglianico is an austere, tannic grape, which traditionally requires years of barrel maturity before using it to make the wine. Aglianico is bottled as a monovarietal wine, located in the foothills of Mount Taburno. Bue Apis is a pure concentration of Aglianico that comes from a century-old philoxera-free vineyard with roots that penetrate 15 metres deep, located in the foothills of Mount Taburno. The delayed vintage of 15 days and the subsequent refinement in oak barrels produce a complex, structured wine, particularly in terms of tannins. The colour is dark with shades that range from purple to black, while the bouquet assumes blackberry and black currant colours. Cantine del Taburno chose the name Bue Apis with the purpose of underlining the connection with local culture and origins; in fact, Bue Apis is the name of an Egyptian god that has a statue located in Benevento. In the figure below underlined items indicate innovative and key elements of the Bue Apis.

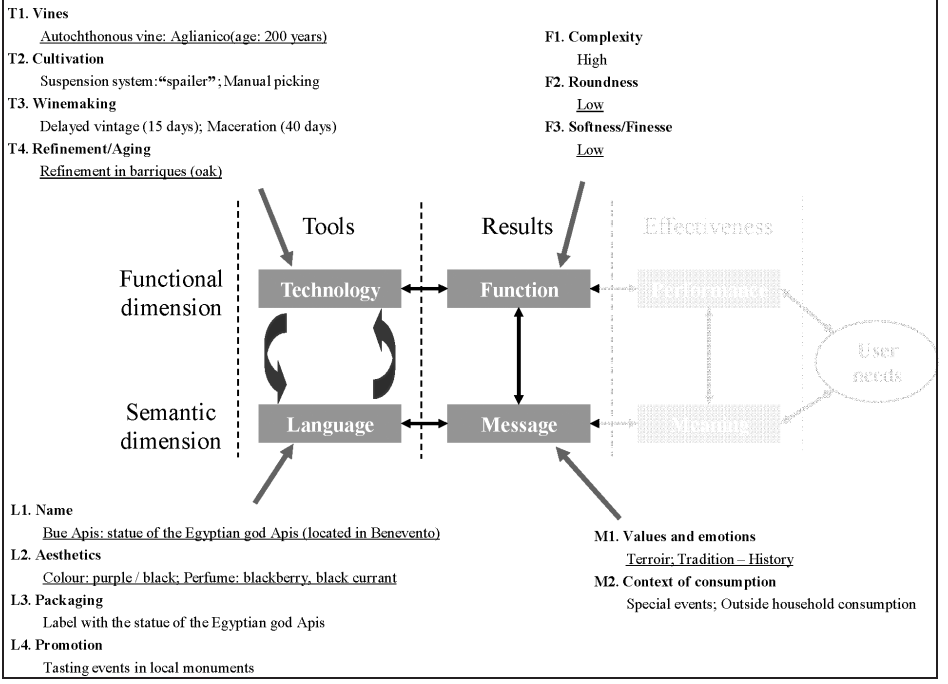
The Key Actors

In the development process of the Bue Apis, the winemaker consultant Luigi Moio, professor of Enology at the Universities of Naples and Foggia respectively, played a critical role from a concept generation point of view. After completing research studies in Bordeaux and Dijon, in 1994 Moio decided to dedicate himself wholeheartedly to his native Aglianico. "This is Moio's prize

(*Continued*)

(*Continued*)

project," says Filippo Colandrea, an agronomist responsible for Cantine del Taburno. "We started working with Moio some years ago, and in addition to a range of Aglianico del Taburno this is a very special wine, which is kept in the barrel for 18–20 months. It has been an incredible success, and its limited production of 10,000 bottles is much in vogue." In this case, the integration of semantic and functional dimensions was particularly high: in order to propose a wine for special occasions, able to convey messages such as terroir and tradition, Cantine del Taburno decided to develop a wine particularly complex and structured. They chose to adopt a unique autochthonous variety (Aglianico) coming from a century old vineyard; moreover, they introduced a delayed vintage and a long refinement in oak barrels to obtain a dark and particularly dense wine. Finally, they chose the name Bue Apis to strictly connect the product to the local history.



Through the comparative analysis of data and insights coming from the eleven case studies, we identified three different groups of companies that adopt specific approaches to new product development (see Table 4). Similar to Cantine del Taburno, three other wine companies (Casa D'Ambra, Grotta del Sole, Villa

Table 4. Groups of wine companies that adopt different approaches to innovation.

Company name	Innovative and key technologies	Innovative and key functions	Innovative and key languages	Innovative and key messages	Key actors
			INTEGRATED APPROACH		
1. Casa D'Ambra Biancolella della tenuta Frassitelli (white wine)	**T1. Vines** Autochthonous vine **T2. Cultivation** Completely manual	**F2. Roundness** Low **F3. Softness/Finesse** Low	**L4. Promotion** Tasting events	**M1. Values and emotions** Tradition — History; Geographical location	— External wine experts
3. Cantina del Taburno Bue Apis (red wine)	**T1. Vines** Autochthonous vine (age: 200 years) **T4. Refinement/Aging** Refinement in barriques (oak)	**F2. Roundness** Low **F3. Softness/Finesse** Low	**L1. Name** Bue Apis: statue of the Egyptian god Apis (located in Benevento) **L2. Aesthetics** Colour: purple / black; Perfume: blackberry, black currant	**M1. Values and emotions** Terroir; Tradition — History	— External winemaker
7. Grotta del Sole Falanghina dei Campi Flegrei (white wine)	**T1. Vines** Autochthonous vine **T4. Refinement/Aging** Refinement in barriques; Grapes differentiation	**F1. Complexity** Low **F2. Roundness** High **F3. Softness/Finesse** High	**L1. Name** Campi Flegrei: wide caldera that includes the town of Pozzuoli and the Solfatara crater, mythological home of the Roman god of fire, Vulcan **L3. Packaging** Label with Serapide Temple of Pozzuoli	**M1. Values and emotions** Terroir; Tradition — History; Youthfulness	— External winemaker — Communication agency — Glassworks
11. Villa Matilde Falerno del Massico (red wine)	**T1. Vines** Autochthonous vine **T4. Refinement/Aging** Refinement in barriques; Grapes differentiation	**F2. Roundness** Low **F3. Softness/Finesse** Low	**L3. Packaging** Bottle with "amphora" shape	**M1. Values and emotions** Terroir; Tradition — History	— External winemaker — Research institutes and local universities

Table 4. (*Continued*)

Company name	Innovative and key technologies	Innovative and key functions	Innovative and key languages	Innovative and key messages	Key actors
			SEMANTIC-ORIENTED APPROACH		
2. Caggiano Macchia dei Goti Taurasi (red wine)				**M1. Values and emotions** Preciousness; Geographical location	— External winemaker
4. De Conciliis Selim (sparkling wine)			**L1. Name** Selim: from the famous jazz player Davis Miles (reading the surname from right to left) **L4. Promotion** Tasting events in wine bars/ historical locations	**M1. Values and emotions** Socialisation; Conviviality **M2. Context of consumption** Special events; Outside household consumption	— In-house winemaker — Wine bars and shops
6. Fontanavecchia Vigna Cataratte (red wine)			**L3. Packaging** Label representing "Ponte Manfredi", symbol of the end of past dominations **L4. Promotion** Tasting events in wine bars/ historical locations	**M1. Values and emotions** Socialisation; Tradition — History **M2. Context of consumption** Special events; Outside household consumption	— External winemaker — Wine bars and shops
8. Guardiense Janare (white wine)			**L1. Name** Janare: legend about witches of Benevento **L3. Packaging** Label with international and sober style **L4. Promotion** Tasting events in wine bars/ historical locations	**M1. Values and emotions** Preciousness; Tradition — History	— External winemaker — Communication agency — Wine bars and shops — End users

Table 4. (*Continued*)

Company name	Innovative and key technologies	Innovative and key functions	Innovative and key languages	Innovative and key messages	Key actors
		FUNCTIONAL-ORIENTED APPROACH			
5. Fontana Galardi Terra di Lavoro (red wine)	**T2. Cultivation** Spurred cordon **T3. Winemaking** Delayed vintage (10 days) **T4. Refinement/Aging** Refinement in barriques	**F1. Complexity** High **F2. Roundness** High			— External winemaker — In-house agronomist — Research institutes and local universities
9. Mustilli Falanghina di Sant'Agata dei Goti (white wine)	**T1. Vines** Autochthonous vine **T3. Winemaking** Soft pressing; Static clarification	**F1. Complexity** High **F2. Roundness** High			— External winemaker — In-house agronomist — Research institutes and local universities
10. Terredora Fiano di Avellino Terre di Dora (white wine)	**T2. Cultivation** Guyot system; Biodynamic treatments **T4. Refinement/Aging** Grapes differentiation	**F1. Complexity** High **F2. Roundness** High			— In-house agronomist and winemaker — Research institutes and local universities

Matilde) balance their effort in the proposition of radical innovations between technological and semantic dimensions. They use both new cultivation or refinement systems and new aesthetics or packaging in order to propose new messages (especially terroir and tradition) and technical characteristics (mainly angular and much tannins). Four other wine companies, Caggiano, De Concilis, Fontanavecchia and Guardiense, strongly focus on the semantic dimension, conveying precise meanings such as socialisation, preciousness and tradition, promoting tasting events in wine bars and historical locations or proposing names with precise external references. Finally, three wine companies (Fontana Galardi, Mustilli and Terredora) base their innovations on the technological dimension, focussing on the development of new cultivation and refinement systems and creating new wines that are complex and round. These three groups show interesting differences with reference to approaches to innovation:

- *Group 1 — Integrated approach*. Starting from the messages they want to convey and from the identification of different scenario of consumptions, companies belonging to the first group take on a series of design decisions both at functional and semantic levels. Although in all case studies the role of the winemakers is particularly important, in this group it seems really crucial. They not only support companies in the identification of appropriate organoleptic characteristics but also focus on the vision about possible values and meanings to embed in a new wine. Luigi Moio and Riccardo Cotarella, two of the most important Italian winemakers, work with many of these companies trying to design higher technical features and attain a higher capability of generating new ways to experience wine. The critical role played by winemakers in the innovation process is emphasized by Francesco Martusciello as follows:

  > "*We looked for an external winemaker in order to introduce a new vision able to go over our way of looking the industry, able to know what happens at the global level. The collaboration with Attilio Pagli was immediately characterised by a compete alignment in terms of values and identity.*"

  Francesco Martusciello, Manager of Grotta del Sole.[3]

- *Group 2 — Semantic-oriented approach*. Companies that are categorized under this group focus on the semantic aspects of the products. Packaging and promotion are given attention in order to communicate new possible contexts of consumptions. For example, the Vigna Cataratte developed by Fontanavecchia was developed with a focus on new possible contexts such as the aperitif. This is a relevant

[3]Interview (20 March, 2008).

innovation, since high quality wines are usually perceived as an experience connected to a high-quality dinner. In this case, wine becomes a direct competitor with other products (e.g., beer, aperitif liquors, long drinks, cocktails) operating in growing market, while the growing attention to reduction of calories affects the consumption of wine during meals. In this group, communication agencies, wine bars and shops collaborate in the innovation process from the beginning, providing critical contributions for the identification of possible values to embed in a new wine and suggesting opportune strategies for proposing them. The relevance of communicative aspects is mentioned by Antonio Caggiano as follows:

> "*I narrate the 'Macchia dei Goti Taurasi' from 2001 in all national and international events. Every time I start from the history of the Italian wine, gradually introducing Piedmont, Tuscany, Sicily and finally Campania. Then I present Irpinia*[4] *and finally Taurasi*.[5] *Foreign people want to know stories and territories from where wine comes. It is necessary to narrate stories . . .*"

Antonio Caggiano, Manager of Caggiano.[6]

- *Group 3 — Functional-oriented approach*. Companies under this group adopt a sort of technology-push approach. The analysed wines are particularly sophisticated and complex, obtained with innovative cultivation and refinement systems. In this group, agronomists and research institutes play the key role in the innovation process, while the semantic dimension is under-exploited to the point where they do not convey a precise identity except a strong connection with a niche of wine specialists.

> "*The research investments must be promoted in the optics of an improvement of the quality respecting however the characteristics of the territory. Chemistry is important but it has only to support the necessary corrections, it doesn't have to completely change the original taste . . .*"

Paolo Mastroberardino, Consultant for Terredora.[7]

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[4]Irpinia is a region of the Apennine Mountains around Avellino, a town in Campania, South Italy about 40 km east of Naples.

[5]Taurasi is a town in the province of Avellino, Campania, Italy. Taurasi is a historic town located in the region of Sannio. The town's name probably derives from the Latin *Taurus*. Taurasi is best known for its wine. Taurasi has an increasingly famous red wine, also named Taurasi, made from Aglianico grapes along with Piedirosso and Barbera.

[6]Interview (28 February, 2008).

[7]Interview (21 January, 2008).

Discussion and Conclusions

The case studies confirm that the design-push approach, initially developed within innovative industries such as furniture and interior design may be extended to traditional industries such as the Italian wine industry. This is significant since it could be counterintuitive that the wine industry shows some patterns typical of knowledge-based industries, like furniture, where both technical capabilities (e.g., industrial design, material engineering) and marketing capabilities (e.g., creativeness, communication, social analysis) are decisive. Usually we could assume that product innovation in traditional industry is only incremental, since technologies, operations and marketing processes are expected to be stable and predictable. Nevertheless, the empirical results show that the new product development process in the wine industry offers empirical insights for a better comprehension of the design-push approach. Designing a new wine means not only to achieve new technical features (e.g., improvements in organoleptic performances, better balanced taste), but also to generate new product meanings (e.g., wine as luncheon beverage, as a social experience or as a journey experience in a specific region). The peculiarity of the new product development process in the wine industry is that different approaches to innovation (e.g., integrated, semantic-oriented and functional-oriented) seem to be not contingent but capability-based. All the firms our sample could access the same strategic resources (e.g., the limited availability of the original autochtonous vines), but each of them developed different networking capabilities (e.g., higher for firms that adopt an integrated approach), different manufacturing capabilities (e.g., higher for firms that adopt a functional-oriented approach), or different marketing capabilities (e.g., higher for firms that adopt semantic-oriented approach). More specifically, companies that adopt an integrated approach to innovation embed product semantics in product technologies: as by Filippo Colandrea, these companies exploit different technologies to convey specific meanings on the market.

> "*Every grape must be worked adopting ad hoc processes and techniques. They have to be chosen with the purpose to express values and meanings such as terroir in the best way. In other words appropriate technologies have to be selected for each vine . . .*"

Filippo Colandrea, agronomist of Cantine del Taburno.[8]

If companies that adopt a semantic-oriented approach focus on languages and messages, those companies that adopt an integrated approach create value using new technologies to propose new meanings and messages. This approach seems

[8]Interview (30 October, 2007).

to guarantee a longer-term competitive advantage since it is based not only on a new system of promotion but also on new cultivation and refinement processes. Moreover, the case studies allow the enlargement of the map of the design-push model, highlighting many similarities and some differences in comparison to the furniture industry (see Table 5). In terms of key actors participating in the innovation process, we can identify intriguing parallels between designer and winemaker, prototyper and agronomist, showrooms and wine shops, or Design and Agriculture Schools. If the winemaker is in charge of developing new languages/messages and interpreting new/latent customers' needs, the agronomist is mainly involved in the identification of cultivation and refinement technologies. They can be compared to the designer and prototyper in the furniture industry, where the former chiefly develops the concept and the latter defines the production process. Wine bars and shops act as antennas to capture weak signals coming from the market. Similar to furniture companies that use their showrooms to "sense" the evolution of customers' desires, leading wine companies are investing in their own restaurants and wine bars not only to differentiate their offerings but also to establish a direct channel with their customers. Considering that many wine companies are particularly small, collaboration with agriculture schools and research institutes allows sharing in investments in new cultivation and refinement technologies. Verganti (2008) defines the design discourse as a collective research process on meanings and design languages (a continuous dialogue on socio-cultural models, foreseen and desired). Furniture manufacturers highly exploit their interaction with several actors (designers, users, suppliers, universities, journalists, artists, etc.). They consider these actors interpreters of the evolution of future scenarios. Even if wine companies also show rich and well-articulated innovation networks, their research process is less collective than that of the furniture companies. The concept generation is mainly managed by the winemaker and only in the following phases does the dialogue with the agronomist and other actors become rich and frequent. In the furniture industry, suppliers are very frequently able to propose innovations regarding new materials or technologies, whereas this phenomenon is almost absent in the wine industry.

Finally, the case studies allow for a better structuring of the design-push approach to innovation in light of the observed results, since the eleven companies also underline interesting differences. Examples include the coherence between technologies, functions, languages and messages can be obtained with different practices and development paths, or the changes in the network of actors that wine companies access according to the innovation approach they adopt. In the case of integrated approach, the importance of winemakers who very often collaborate as freelancers significantly increases. In the semantic-oriented approach, the collaboration with wine bars and shops is crucial to interpret customers' latent needs

Table 5. Analogies between furniture and wine industries in the innovation process.

Furniture	Wine
KEY ACTORS	
DESIGNER *"Designers are moving from their traditional roles in the development process, in which they chiefly address issues of styling and ergonomics, to a more creative contribution in generating new product concepts. Their input ranges from product and process engineering to field support in understanding customer needs; from brand design to strategic consulting."* (Lloyd and Snelders, 2003; Verganti, 2003; Durgee, 2006)	WINEMAKER Principal tasks of the winemaker are: — Development of new languages and messages — Interpretation of new/latent customers' needs
PROTOTYPER *"While designers propose scenarios and develop the basic idea behind products, product developers* [prototypers], *who are responsible for the project from a company perspective, support them. In fact, while semantic inputs are provided by designers and refined by socio-cultural researchers, their role, given their technical background, consists in the generation of technological solutions that can convey messages belonging to the product scenario."* (Dell'Era *et al.*, 2008)	AGRONOMIST Principal tasks of the agronomist are: — Identification of cultivation/refinement technologies — Development of iterative cycles (develop-test)
FLAGSHIP STORES, SHOWROOMS *"Artemide* [Italian leading lighting company, example of a design driven company] *is surrounded by several other actors that share their same problem (i.e., understanding future domestic mindsets and lifestyles), such as: firms in other industries but that address the same user-person in the same domestic context, product designers, architects, magazines and other media of interior design, suppliers of raw materials, universities and design schools, showroom and exhibition designers, artists."* (Verganti, 2008)	WINE BARS AND SHOPS, RESTAURANTS (DIRECT SALES) Wine bars and shops act as antennas to capture weak signals coming from the market. Leading wine companies are investing in their own restaurants and wine bars to differentiate the offerings, but also to establish a direct channel with their customers

Table 5. (*Continued*)

Furniture	Wine
DESIGN SCHOOLS AND UNIVERSITIES *"Artemide* [Italian leading lighting company, example of a design driven company] *is surrounded by several other actors that share their same problem (i.e., understanding future domestic mindsets and lifestyles), such as: firms in other industries but that address the same user-person in the same domestic context, product designers, architects, magazines and other media of interior design, suppliers of raw materials, universities and design schools, showroom and exhibition designers, artists."* (Verganti, 2008)	AGRICULTURE SCHOOLS AND RESEARCH INSTITUTES Considering that many wine companies are particularly small, the collaboration with agriculture schools and research institutes allows sharing in investments in new cultivation and refinement technologies
INTERACTION BETWEEN KEY ACTORS	
DESIGN DISCOURSE *"Design discourse is a collective research process on meanings and design languages, i.e., a continuous dialogue on socio-cultural models (foreseen and desired) and its implications on patterns of consumption and product languages, occurring through several explicit and tacit interactions among several actors both in the global and local setting."* (Verganti, 2008)	WINE DISCOURSE Wine research process is mainly managed by a *unique actor* (the winemaker) in the concept generation phase; only in the following phase does it becomes more collective. The research process in the wine industry is less collective than that in the furniture industry. The concept generation is mainly managed by the winemaker and only in the following phases does the dialogue with the agronomist and other actors become rich and frequent. While in the furniture industry suppliers are very frequently able to propose innovations about new materials or technologies, in the wine industry this phenomenon is almost absent.

and propose innovative languages/messages. Finally, in the case of the functional-oriented approach, it seems that the agronomist covers the most critical role in the innovation process.

At the same time, the case studies show that there is something interesting enough to justify further research aimed at verifying this extension, since the explorative nature of this research suffers for some limits in the generalisability of results. They could be affected by the specific context of the Campania region, where all the companies studied are located. In the wine industry, the climatic conditions could shape the historical tradition of the technical dimension of new products (e.g., techniques for grape cultivation, winemaking scheduling), while the local culture (e.g., values, religions, behaviours) could shape firms' ability to design new semantic dimensions for global consumers living in very different contexts (e.g., industrial metropolises of North America, Europe, Asia). A second limitation of this research is the poor definition of different variables described in the theoretical framework and in the research objectives and methodology section. In future, we will verify the results identified in the present paper, estimating more precisely all the variables influencing the relationships among companies, strategic contexts and local environment, as well as what triggers the new product development process.

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