UNIVERSITÀ DEGLI STUDI DI PALERMO

Dottorato in Scienze Agrarie, Alimentari, Forestali e Ambientali

Dipartimento di Scienze Agrarie, Alimentari e Forestali

Settore Scientifico Disciplinare AGR/01 - Economia ed Estimo Rurale

UNDERSTANDING SUSTAINABLE INNOVATION ADOPTION IN THE FOOD SECTOR.

THE PERSPECTIVES OF ENTREPRENEURS AND CONSUMERS.

LA DOTTORESSA	IL COORDINATORE
GIUSEPPINA RIZZO	**PROF. VINCENZO BAGARELLO**
IL TUTOR	LA CO-TUTOR
PROF. GIORGIO SCHIFANI	**PROF.SSA GIUSEPPINA MIGLIORE**

CICLO XXXIII

ANNO CONSEGUIMENTO TITOLO 2021

Acknowledgements

It is a great privilege to study for a Ph.D. and for me it has been the defining intellectual experience of my life.

In supporting me to do this, with immense gratitude I am indebted to my supervisors Professor Giorgio Schifani and Professor Giuseppina Migliore, who through their skilled guidance and a keen interest in the subject helped me in completing the objectives of my Ph.D. research. I express my heartfelt appreciation for their professionalism, support and encouragement, without which it would have been impossible to complete this research.

I also extend my special appreciation to Professor Luigi Cembalo. Thanks for his remarkably consistent and active engagement with me and my work, and for his support and guidance throughout my period in Naples.

It is a matter of great pleasure for me to say words of thanks to Professor József Tóth, without whom it is difficult for me to imagine how studying and staying in Hungary would have been. I appreciate his endless encouragement, professionalism, understanding, patience, and support, all of which have helped me to be here and finish my work.

Last but not least, I extend a warm thanks to the Coordinator of the Ph.D. Professor Vincenzo Bagarello, and to Professor Antonino Galati who first encouraged me to undertake this journey.

I thank you all for bestowing me with confidence, in order to cheerfully keep working hard each day and reach where I am. I can never thank you enough!

Summary

Abstract

In economic theory, innovation is a key tool for the growth of a company, allowing access to new markets and long-term sustainable development. Companies, driven by increased competition from global markets and unprecedented levels of interest in sustainable development practices, are seeking to implement more advanced sustainability practices and, at the same time, to maintain high-value products and services through innovation. Literature recognizes that companies adopting and developing innovations are more likely to thrive in highly competitive environments and that entrepreneurial figure, collaboration channels, and adopted marketing strategies play a fundamental role in these mechanisms. Among the most competitive environments, the agri-food sector is certainly receiving a significant attention, stressing the ability of agri-food companies to move from a traditional production sector focused on raw materials to an innovative and consumer-oriented approach. On the other hand, nowadays consumers are increasingly aware that their choices strongly influence both their health and sustainability in a broad sense. Food is no longer seen only as a source of livelihood, but there are also other reasons behind a purchase, such as health concerns, help to local economies, attention to animal welfare and interest for environmental protection. This has contributed to the development of important trends in food consumption, shedding light on the growing interest of consumers towards organic products.

However, it is not clear which type of sustainable innovations are preferred by consumers in the food sector, and which entrepreneurs' psychological antecedents are mainly responsible for adopting innovation in food enterprises. According to recent studies, it emerges that consumers are more attentive to their food choices, but the drivers of such choices are various; at the same time, there are several factors that can influence the successful adoption of innovation within food companies.

This Ph.D. thesis addresses the above issues and provides a multi-level research framework consisting of six complementary research articles. These papers provide a broad perspective on open innovation, analyzing different types of innovation in sufficient depth to enrich the literature on sustainable innovation adoption.

In particular, six case studies are analyzed, three concerning the antecedents to the innovation of producers and three focusing on consumers. These researches are based on archival information, experiments and investigations and take into account Italian, Hungarian and Chinese markets.

In this thesis, the study of open innovation at different levels, the multiple theoretical perspectives, the use of qualitative and quantitative data, and different methods of analysis ease future research opportunities. For this reason, this thesis concludes with recommendations for further academic researches on open innovation, for links to established literature and new methods and insights for managers interested in adopting open innovation in their companies.

Thesis Structure

For a better understanding and an easier examination of the text, the main structure of the thesis is composed of the following six main sections:

- o Section 1 introduces the state of the art in literature, starting from the birth of innovation and addressing all the aspects that most characterize this process, up to open innovation as we know it now.
- o Section 2 specifies the objectives and methodology of this research. In particular, the hypotheses formulated and the paths taken to corroborate them – or not – are specified. Each hypothesis has been verified through the development of one or more scientific researches that are described, differentiating them by type of innovation.
- o Section 3 shows the results obtained from each research work, through the creation of two different paragraphs; the first concerns the producer and the second the consumer.
- o Section 4 draws the general conclusion of this thesis and offers different perspectives for future research activities.
- o Section 5 collects the 6 papers deriving from the six studies carried out in order to achieve the set objective
- o Finally, section 6 reports all the bibliography used in the text.

Section 1

Research Background

1. Introduction

'Innovation is the formation of new products or services, new processes, raw materials, new markets and new organizations' Joseph Schumpeter (1934).

Although already in 1880, the word 'innovation' was used to describe something different, the most influential expert on this topic has been Schumpeter, who first deepened innovation (intended as new combinations) and entrepreneurship concepts (Hanush and Pyka, 2007).

In 'The Theory of Economic Development' Schumpeter (1912) focuses on the dynamic entrepreneur. He stresses the role of managers, who pose new combinations leading to economics outside a static mode (circular flow) and towards a dynamic path. In his theory, entrepreneurs create new chances for investment and growth.

Schumpeter's idea is that to do a profit you must innovate. He believes that innovations are essential to economic dynamics (Hanush and Pyka, 2007) and competitiveness (Porter and Stern, 1999); he describes progress as a historical change process, driven by innovations (Schumpeter 1939 and Schumpeter 1943).

Innovation may concern product or service, process, marketing and business organization.

Product (or service) innovation concerns the implementation of a new good (or service) that is very different from its original form (Oslo Manual, 2005). This can lead to significant improvements in materials and software or important changes in their supply (for example, improved speed). Process innovation represents the realization of a new production method. It may be related to changes in software or/and techniques, to costs reduction or to improvement in service quality. Marketing innovation consists of new methods of product promotion (for example packaging), to better place a firm's product on the market. Finally, organizational innovation concerns the creation of new methods for organizing business practices, managing workers and generating relations with other companies to increase company performance.

These different kinds of innovations can be radical or incremental. Radical innovation concerns revolutionary change (Nord and Tucker 1987; Dewar and Dutton 1986) and it is critical for long-term organizational success (Christensen, 1997). It is considered risky because involves uncertain developments and marketing process (Lassen & Laugen, 2017; Rangus & Slavec, 2017).

About that, flexibility in entrepreneurial culture has been found to foster collaboration and information inflow, both facilitating radical innovation. When companies meet external information, they want to take advantage of their 'absorptive capacity' (ability to take over external information)

and use it to their internal processes (Flor et al., 2018; Presenza et al., 2016; Ritala and Hurmelinna-Laukkanen, 2012).

Incremental innovation is also important (Utterback, 1994); it involves 'minor changes in technology and provides relatively low incremental customer benefits per dollar' (Chandy and Tellis, 1998). Usually, incremental innovation is led by internal skills (Robertson et al., 2012) or closely related to its stock of knowledge (Yamakawa et al., 2011).

Moreover, incremental innovation is 'associated with recombination that consists of combining improved components that are already connected within a technological domain or from technologically proximate domains' (Keijl et al., 2016). For this reason, incremental innovation is less dangerous for the business economy and involves fewer uncertainties than radical innovation.

Incremental innovation can be divided into three types (Herbig, 1994): continuous, modified, and process. The first represents minor changes, such as the expansion of an existing product line; the second concerns slightly more demanding innovations such as the creation of an improved version of a new product, and the last concerns improvements in production system. Schumpeter suggests that both incremental and radical innovations are fundamental to business success.

Thanks to his innovative vision, Schumpeter has been a source of inspiration for many other economists, who, in turn, have formulated new theories that have been grouped into a new economic strand called 'Neo-Schumpeterian Economics'. This branch of economic literature deals with dynamic processes that determine qualitative transformations of economies fundamentally driven by the introduction of novelties in their various and multifaceted forms.

1.1. Neo-Schumpeterian Economics

The Neo-Schumpeterian Economics finds its origins in Schumpeter's 'Capitalism, Socialism, Democracy'. The theoretical basis is the same adopted by Schumpeter, with the difference, that greater importance is attributed to the role played by the company, which, through R&D, is able to produce more innovations and integrate them into business strategies. It describes innovation as a process that takes place in conditions of uncertainty, with economic subjects that evolve dynamically through mechanisms of learning, research, and selection. In this vein, concepts of learning from experience (learning by doing), learning by using and learning from customer interaction (user engagement) are emphasized (Magnusson, 1994).

The Neo-Schumpeterian Economics develops from different fields of research.

First, in the Early Eighties, Schumpeter's studies were resumed in Evolutionary Economics (Metcalfe, 1998). In particular, Evolutionary economics proposes that economic processes evolve and that economic behavior is determined both by individuals and by society as a whole. While traditional economic theories generally see people and government institutions as complete rational

actors, evolutionary economics, instead, identifies complex psychological factors as key economic factors (Gassmann et al., 2010).

Evolutionary economists believe that economy is dynamic, constantly changing, and chaotic, rather than always striving towards a state of equilibrium. The creation of goods and procurement of supplies for those goods involves many processes that change along with the development of technology. Hence, organizations that govern these production processes and systems, as well as consumer behavior, must evolve as production and procurement processes change (Boschma and Frenken, 2006).

The second strand of Neo-Schumpeterian literature is called Complexity Economics and explores the interaction between agents in the generation of knowledge and in processes of diffusion in the evolutionary economy (Arthur, 2013). Innovation-driven Neo-Schumpeterian Economies are a perfect example of complex systems (John Casti, 2001).

Complex systems are systems whose behavior of individual economic actors, such as entrepreneurs and consumers, cannot be understood by analyzing only individual elements, as they interact with each other; the interaction between individual elements determines the global behavior of the systems and provides them properties that can be completely unrelated to single elements. So, complex processes are irreducible and deleting a single part has big consequences for their understanding.

An additional intellectual source for Neo-Schumpeterian Economics is in approaches designed to Change and Develop. They were developed in the 1990s, when industrial development gained in interest, highlighting the so-called industry life cycles (Gort and Klepper, 1982 and Klepper, 1997).

Finally, Neo-Schumpeterian Economics has inspired the descriptive approaches of Systems Theory in which knowledge is considered an interactive process, among economic actors, institutional actors, and governance structures (Malerba, 2002 and Malerba, 2005).

Indeed, innovation requires resource commitment and investments. While traditionally, companies have focused on internal forces (Lichtenthaler, 2013), in recent decades, they began to collaborate with inventors, universities and consumers, exchanging new ideas and projects with them. Gambardella and colleagues (2007) stated that, in order to be successful, companies have begun to market outside their borders.

In this context of growing technology and knowledge transfer between companies, Henry Chesbrough coined the term 'open innovation' to distinguish this growing trend from traditional closed innovation strategies, in which innovations are developed only within clearly defined company boundaries and know-how, technology, processes, and intellectual property remain under the control of the innovative company (Chesbrough 2003).
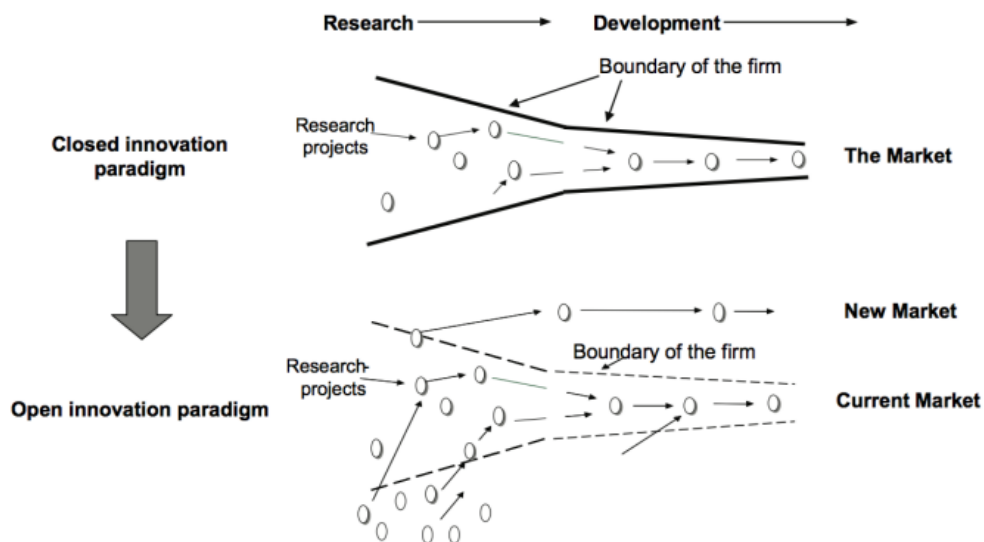
1.1.1. Open innovation

In the past companies carried out their innovative activities in-house, in order to be more competitive (Chesbrough, 2003). Companies operated according to a closed innovation model, in which innovation was only based on their internal forces (Chesbrough et al., 2006). However, globalization and technological developments conducted companies to an alternative approach and open their boundaries (Chesbrough, 2003; Chesbrough et al., 2006), combining external and internal knowledge in their innovation processes and bringing inventions to markets via external paths (Dahlander & Gann, 2010).

With increasing costs and complexity of new products and technologies, companies need to open up innovation into new or different forms of cooperation (Feller et al, 2009). Consequently, Chesbrough (2003) argued that the innovative approach applied by companies shifted from a closed system to an open system. Innovation became a good interplay of several actors who combine their knowledge to draw new designs and to create opportunities.

Chesbrough (2003) defined open innovation as 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively' (Figure 1).

Figure 1: Representation of open innovation model

Source: Chesbrough (2003)

Companies must have an outside-in and inside-out mindset that builds on external sources of innovation and commercialization (Gassmann et al., 2010). The core idea of open innovation is the collaboration of diverse actors (competitors, customers, universities, and suppliers) in various flexible ways (Keupp & Gassmann, 2009).

In this way, knowledge and competencies can be accessed from external parties (Chiaroni et al., 2011). Likewise, internal knowledge and technology are increasingly commercialized via external paths to markets (Bianchi et al., 2011). In such a context, boundaries between imitation and innovation are shaded (Brondoni, 2014).

McLaughlin (2012) states that this kind of innovation is based on openness of all actors involved. Yet this theory is difficult to apply. Open innovation must be considered as a balance: on the one hand, it helps the innovation process because a company carries out only a part of the work while other firms do the rest; on the other side, everyone needs to protect themselves to prevent competitors from playing dirty (Lichtenthaler et al., 2011). Therefore, actors must find partners with complementary knowledge and skills, and a certain level of trust must exist among partners involved (Sieg et al., 2010).

Additionally, Simard and West (2006) refer to complementary ties, since companies are involved in many collaborations that need to be managed.

In particular, in an innovative environment, collaboration is defined as an 'innovative alliance' when a company collaborates with a single one partner, while, in the case of multiple partners, it is called 'network collaboration'. The first former is easier to implement as there are fewer participants, but for the same reason, creativity is lower and some skills may be missed. The opposite applies to network collaboration because open innovation processes are difficult to be effectively managed, especially if they involve a network of partners (Feller et al., 2015). Gassmann and Enkel (2004) describe three 'open innovation process archetypes':

- o Outside-in: it enriches the knowledge base of the company through external knowledge (integration of customers, suppliers and external knowledge sourcing);
- o Inside-out: it provides new ideas from internal company knowledge sources to external users;
- o Coupled: it combines the use of the two previous approaches.

By doing so, companies should be able to improve their performance by leveraging business cooperation to create two processes:

- o Inbound innovation: acquisition and use of external knowledge internally;
- o Outbound innovation: external use of internal knowledge.

In recent years, several researches have focused on open innovation (Dominici and Levanti, 2011; Belussi et al., 2010). For example, Perkmann and Walsh (2007) examined different university company partnerships and suggested a theoretical model that can be tracked to differentiate university-company relationships and other corresponding cooperative organizational relationships. Chesbrough and Appleyard (2007) have pointed out how the open innovation approach constricts companies to revalue their strategies and to create new business models to take advantage of open innovation collective creativity.

Giannopoulou and colleagues (2010) looked upon both academic and managerial perspectives of open innovation. In the first perspective, they explored the innovative role of business organization; while, in the second one, they studied the role of the entrepreneur in motivating his employees. Lichtenthaler (2011) believes that the concept of open innovation is a form of sustainable development rather than a management fashion. However, it also recognizes that the open innovation approach is essential for business competitiveness. Schroll and Mild (2012) stated that open innovation in-bound is more frequently studied than the outbound model.

West and Bogers (2014) suggest that a company and its collaborators need to facilitate interaction among certain modes of innovation, to implement the open innovation approach.

Felin and Zenger (2014) analyzed the characteristics of the product, process, marketing, and business organization innovation, underlining how each one has different tools for communication and dissemination of knowledge.

Pustovrh and collaborators (2020) argued that public policy should help innovative activities carried out in entrepreneurial ecosystems. By exploiting open innovation, company's innovative capacity increases and it is incorporated into a global innovation system.

Finally, Bogers et al. (2020) show that open innovation and knowledge management capacity positively influence innovation, considering that the impact of outward-oriented open innovation on exploratory innovation is more evident with respect to open-oriented innovation towards the inland.

1.2. Factors influencing Open Innovation

The study by Gassmann and Enkel (2005) identified some factors that mostly influence implementation and diffusion of open innovation models. According to their study, innovation management differs in many aspects affecting both external and internal factors within company.

1.2.1. Internal factors

As regards internal factors, the authors recalled for example the economic company performance, size, company age, human capital, sector, the field of knowledge, the type of innovation, the historical period, and the country concerned (Pavitt, 2005).

First, company's performance innovation processes generate high costs that only more viable business entities can afford since they have more internal resources (Wossen et al., 2017; Nossal and Lim, 2011; Sheng et al., 2011; Adcroft et al., 2007).

Size is a further factor that affects innovation process, although in literature there are conflicting opinions. For many authors (Borgen and Aarset, 2016; Verre et al., 2014; Gonçalves et al., 2008) company big size positively influences innovation, while for others (Dalla Corte et al., 2015; Cohen, 2010), small enterprises are better prepared to collaborate with equal companies to study research and

development activities, through which they anticipate large firms and position themselves in niche markets. De Jong and Vermeulen (2006) argue that, compared to small companies, larger companies manage to achieve better results.

Company age is also an important determinant as longer-lived companies have greater experience in their sector and higher incomes (Vézina et al., 2017; Chesbrough, 2003; Jung et al., 2003). However, other authors (Sørensen and Stuart, 2000; Goode and Stevens, 2000) argue that over the years, business innovation and cooperation capabilities decrease (Ariza et al., 2013; Nossal and Lim, 2011). Another determining factor is human capital. Business activities depend above all on the entrepreneurial skills of managers (Luo et al., 2017; Davenport and Prusak, 2000). Therefore, a company's training profile can improve its capacity for innovation (López et al., 2012) or limit it (Wheelen et al., 2017).

The economic sector of a company can be influenced by the complexity of the product and, in turn, influence the integration of external knowledge: the intensity of the knowledge used for the development of the product determines the need to integrate further external knowledge. Since services are often very complex, product, process, and system innovations are often combined; integration of external knowledge is crucial to enable knowledge-intensive development.

In addition, higher degrees of competition within an industry integrate customer or partner knowledge into development processes, an essential condition for competitive advantage. Implementation of open innovation models mainly implies a systematization of innovation processes to facilitate strategic decisions on issues such as what should be developed internally, what should be integrated from the outside, and what should be developed cooperatively.

Finally, another aspect that influences the innovative activity is the sector in which the company operates (García et al., 2013; Alba et al., 2011). Not all sectors requires the same performances in the same way (Rugeles et al., 2013). For example, service companies are prone to organizational innovation, while manufacturing companies favor technological innovation (Tether, 2010).

1.2.2. *External factors*

In terms of innovation, job environment is a key element (García-Cortijo et al., 2019) as the literature emphasizes the importance of external sources of knowledge. Companies can benefit from their proximity to innovation facilitators (Läpple et al., 2016) through collaboration with firms, universities, suppliers, customers, and even competitors (Lundvall, 2007).

It has been shown that proximity to research centers would improve the company's innovation capacity, as this position would encourage interaction between the different elements of the network (Gava et al., 2017). Research and continuous updating have a positive influence on the innovative character of the company (Michelacci, 2003).

Finally, the location of company affects the scope, the quality and the speed of open innovation activities. Therefore, the territorial factor influences a company's propensity to innovate (González and Peña, 2007). In particular, as regards the agricultural sector, rural society is increasingly open to globalization and to the use of new techniques. However, various definitions exist for rural environments, due to the different perception of the elements that characterize rural life (natural, economic, cultural, etc.) and the difficulty of collecting relevant data at the level of basic geographical units (García - Cortijo et al., 2019).

1.3. Barriers of Open Innovation

Many studies argue that collaboration with other partners has positive effects on a company's performance (Tani et al., 2018; Hjalmarsson et al., 2017; Lazzarotti and Pellegrini, 2015; Bigliardi et al., 2011; Capitanio et al., 2010). Despite this, open innovation practices are various among companies since they adopt several strategies and means to implement them, everyone facing different problems, and risks (Chesbrough and Crowther, 2006).

Literature shows that open innovation performance also gives additional opportunities such as access to external markets, time and cost reduction, risk sharing and faster market launch (Ullrich and Vladova, 2016).

However, in undertaking innovative action, many companies question whether and to what extent the open innovation can enable effective external collaboration that benefits the company. This question requires a thoughtful analysis of the potential opportunities and risks of open innovation (Westerlund and Leminen, 2011).

In this regard, Lazarenko (2019) has identified six main groups, which can be described as typical difficulties of open innovation in companies:

o Technological risk: probable difficulty that companies may face in trying to adapt to continuous technological changes and/or in identifying adequate external technological sources that can help them;

o Market risk: possible lack of information on potential collaboration partners and customer expectations;

o Risk of loss of intellectual property: the possibility of losing control of the intellectual property of the company through improper collaboration with other companies;

o Risks of sharing knowledge: possible incorrect disclosure of a company's distinctive skills, which can lead to the leak of confidential information;

o Collaboration risks: probable conflicting interests and non-cooperative behavior of partners, with potential dependence on external partners;

o   Organizational risk: possible reluctance of employees to change their *modus operandi* and greater complexity in managing open innovation.

One of the most widespread difficulties is inter-organizational cooperation between actors with divergent objectives and conflicting interests (Lichtenthaler, 2010). At an intra-company level, the main challenges may depend on changes in corporate culture and organizational structure, which lead to loss of fundamental knowledge, technologies, and organizational skills and to the complexity in managing interactions with collaborative partners. Furthermore, openness can lead to difficulties for companies in protecting intellectual property and appropriating the benefits of innovation (Lichtenthaler, 2010).

The most frequent obstacle concerns the lack of corporate flexibility, through the resistance against the organizational changes necessary to promptly face the challenges the market requires (Gassmann and Enkel, 2004). This process limits successful open innovation activities (Kokanuch and Tuntrabundit, 2010). It follows that the open innovation model requires the construction of a new corporate culture that aims to improve skills and continuous learning as an important part of the company's routine operations (Coras and Tantau, 2014).

As consequence of the multiple environmental problems of the contemporary era (remember climate change, industrial pollution, smog, and toxic waste) the biggest challenge that companies must face is the adoption of sustainable innovations. Sustainable innovation is an emerging and fundamental force for change in business and society. Its potential to transform technology, products, and markets distinguishes it as an area of entrepreneurial opportunity and a force for 'creative destruction', as previously defined by economist Joseph Schumpeter (1934).

1.4.   The role of Open Innovation in sustainability

Innovation is identified among the necessary tools aimed to achieve corporate sustainability (Adams et al., 2016). This latter is meant as the ability to generate new resources to compensate for production factors, to replace obsolete assets and to continue competing with companies operating in the same business (Barbieri et al., 2010). In this vein, innovation is widely recognized as the main engine of a country's economic, social and sustainable growth (Hall and Vredenburg, 2003); furthermore, innovation and sustainability constitute an important link in the pursuit of environmental, economic, and social development (Michelino et al., 2019).

Sustainability is driven by a long-term innovation perspective. In the context of open innovation, this multi-step process includes collaboration with external partners (Chesbrough, 2003, Gassmann et al., 2010) who represent sources of knowledge that can contribute to business innovation projects. In fact, by innovating, the company manages to earn in terms of operations and management and decision-making processes, while at the same time improving the efficiency of the use of resource materials.

Innovation, therefore, has significant and positive effects on the sustainable performance of the company.

Numerous studies investigates the link between innovation and sustainability (Leach et al., 2012). They deal, with environmental innovation and approach to sustainability (Truffer and Coenen, 2012), with the relationship between supply chain innovations and social sustainability (Beltagui et al., 2019), key factors for achieving sustainability in the production chain (Orji and Liu, 2019) and the involvement of entrepreneurs in profitability through sustainability-oriented innovation (Ghassim and Bogers, 2019). Currently, companies that innovate must necessarily develop a sustainable path that addresses the multiple dimensions of sustainability, achieving positive results both for society and for the environment itself.

Indeed, sustainability has several dimensions (Barbieri et al., 2010):

- o Social dimension: concern for the social impacts of innovations on human communities inside and outside the organization;

- o Environmental dimension: concern for the environmental impacts deriving from the use of natural resources and polluting emissions;

- o Economic dimension: concern for economic efficiency, fundamental in organizations perpetuations.

Companies must consider these three dimensions, balancing economic, environmental and social justice aspects (Barbieri et al., 2010). When the dimensions of sustainability are taken into account, the whole innovation process is improved and developed, becoming more complete, sophisticated and challenging. However, the fact of being sustainable forces the company to make greater efforts throughout the production process in order to comply with the requirements of the sustainability dimensions (Lazaretti et al., 2019; Sood and Tellis, 2005). Given the importance and complexity of sustainability, it should be noted that it could not be immediately achieved. Instead, it is a slow and constant process of structural transformation of the business *modus operandi* that requires the collaboration with external sources such as universities, intermediaries, customers, suppliers and competitors, which appear to benefit in order to achieve better performance, depending on the different stages of an innovation process (Thies et al., 2019; Rametsteiner et al., 2011).

Environmental sustainability has brought new concerns and pressures to the company's innovative activity, directing it towards the so-called 'green innovation'. It refers to the introduction of new ideas, products, processes, or behaviors that contribute to avoiding or reducing environmental damage and to achieving ecologically specified sustainability goals (Beise and Rennings, 2005). Green innovation would imply that innovations in products, processes or business models lead the company to higher levels of environmental sustainability (Triguero et al., 2013). The concept of environmental innovation includes every type of innovation, such as technical, economic, legal, institutional,

organizational and behavioral, which contributes to avoiding or reducing environmental damage (Huber, 2008). In recent years, green innovation has generated an increasing number of theoretical and empirical contributions from quantitative and qualitative perspectives. Most of these studies tested the link between open innovation and corporate performance (Cainelli et al., 2011); other studies have focused on the specific determinants of green innovation at the firm level, paying particular attention to the role of internal (e.g. technological drive and production sector) and external factors (e.g. market attraction) (Kesidou and Demirel, 2012).

From literature, it emerges that companies have to commit themselves to respond to the needs of consumers, who are now increasingly attentive to their health and to environmental well-being (Buerke et al., 2017). In particular, in recent years, small and medium-sized companies operating in the food business have been the ones putting the greatest effort into innovating (Avermaete and Viaene, 2002). In fact, while generally, small and medium companies have been considered a low-tech industry, due to the need to maximize profits and satisfy customers and take eco-sustainable actions, they have begun to share new and innovative strategies for the mutual benefit of all (Ferraris et al., 2020; Samadi, 2014).

1.5. Open innovation in small and medium-sized agri-food companies

Small and medium-sized food businesses represent the backbone of the European food industry and play a primary role in the continent's economic growth (Avermaete et al., 2004; Romijn & Albaladejo, 2002; Pitt and Clarke, 1999).

According to Avermaete and colleagues (2004), there are three arguments that motivate the choice to analyze the dynamics of innovation in small food businesses. First, such businesses are relevant in the global economy. The food industry is one of the most important industries worldwide and small food businesses substantially contribute to the economic performance of the industry (Aksoy, 2017). Second, small food businesses are believed to play a potentially important role in achieving sustainable economic growth in local economies; in rural areas, they operate to transform local agricultural products (Rosenbusch et al., 2011). Although producers are increasingly importing raw materials from abraod, small food businesses are still typically located in rural areas and are an important source of employment. Third, small firms produce specialized regional products different from products of large firms. Large companies generally have a national or international market approach and consequently focus on products with mass appeal. In this sense, an important component of Europe's valuable cultural identity is invested in such small businesses (Markman et al., 2001).

Although they are an engine of world economies as they represent most of the existing economic structures (Hoffman et al. 1998), food companies have few internal resources (Chesbrough and

Crowther 2006). It is clear that they suffer from the 'responsibility of smallness' (Santoro et al., 2018), but they fill this gap by exploiting external sources of knowledge (Parida et al. 2012).

The result is that the open innovation processes of food SMEs, compared to those of large companies, have characteristics of greater flexibility, fewer formalities, and faster decision-making processes (Bresciani and Ferraris 2014; Lee et al. 2010).

In recent years, even more, this consolidated innovative capacity has proved to be a winning feature. Along with the breakthrough of globalization – bringing rapid technological evolution - and greater consumer awareness in food and environmental fields, numerous changes have become necessary, making innovation an important entrepreneurial activity, essential for the profitability of the business (Cillo et al, 2019; Costa & Jongen, 2006).

In this context, the figure of the entrepreneur has taken on a crucial role because this actor is personally involved in innovative activities, in the choice of new collaboration channels and new marketing strategies.

1.5.1. *Organizational innovation - Entrepreneurial skills and knowledge management*

Small and medium-sized food businesses collaborate with each other and continuously undertake innovative activities (Mortara and Minshall 2014; Chesbrough and Crowther 2006). They use external means of innovation to broaden their skills, improve their economic position, oppose competition and rapidly manage technological progress (Parida et al. 2012; Edwards et al., 2005; Grunert et al., 2005). Through collaboration, companies should be able to absorb external knowledge to take advantage of it, without losing their identity (Brunswicker and van de Vrande 2014; Robertson et al. 2012).

Therefore, in these companies, as widely recognized in literature, the skill of entrepreneurs plays a key role in the adoption of innovation and, in turn, in the definition of the company's competitive strategy (Schaltegger and Wagner, 2011; Sen and Egelhoff, 2000; Sen and Egelhoff, 2000; Martinez & Briz, 2000).

The figure of the competent entrepreneur turns out to be a winning and necessary tool as the company's ability to withstand the pressure of the innovative process and manage it depends on him (Bercovitz & Feldman, 2007; Costa & Jongen, 2006; Martinez & Briz, 2000).

However, since the innovative choices made are frequently based on limited and uncertain tests, it is evident that the entrepreneur can react in various ways, influenced by subjective and objective variables (Shaw, 1998).

The literature shows that the degree of business innovation is positively influenced by the entrepreneur's training, by his experience, by his ability to manage risk and by psychological factors, such as managerial self-efficacy and good self-esteem (Kang et al., 2015). From the entrepreneur's innovative behavior comes higher economic returns, but also higher commercial risks (Matlay et al.,

2012). Therefore, entrepreneurs innovate only if they feel confident that they are taking successful actions (Olakitan, 2011). This suggests that entrepreneurs lead innovative companies with greater self-confidence (Pejic et al 2018). Some entrepreneurs, despite having good human capital and high opportunity costs, may not take advantage of business opportunities, while those with good managerial self-efficacy are more likely to innovate (Lukeš, 2013).

In addition to psychological factors, the entrepreneur's behavior is also influenced by objective factors, such as the age, education, and gender (Block et al., 2017). In particular, it was found that younger, more educated and female entrepreneurs are more inclined to take innovative actions (Babalola, 2009).

The entrepreneur must be able to distinguish the right collaboration channels and to choose the most appropriate, based on business needs (Brunswicker and van de Vrande 2014).

Innovative food companies may cooperate with different actors of the supply chain or/and with other external actors, such as universities and research centers, among the others. In 2007, Knudsen stated that food companies typically want to collaborate primarily with other players in their industry who have similar knowledge and skills. This choice arises because peer cooperation facilitates the management of the innovation process. However, it has also been shown that many of the food innovations have been developed through collaboration between companies at different levels (Maula et al., 2006).

Although the innovation strategies used in the field of agri-food need further study, several researches in the literature explain the innovation strategies adopted. For example, Thomke and von Hippel (2002) have shown that making consumers part of the production process, by investigating their preferences, avoids costly market research, and reduces production time. In a similar study by Vanhaverbeke and Cloodt (2006), the utility of creating a good network of relationships along the entire food supply chain was explained, to acquire complimentary resources for the success of the innovation process. Bonney and collaborators (2007) delved into the importance of the co-innovation strategy, demonstrating how small and medium-sized enterprises can have some success thanks to the comparative advantage. Awazu et al. (2009) stated that an innovative and collaborative approach to innovation is functional to the creation of new ideas. Ciliberti and co-workers (2016) stated there is a positive relationship between the acquisition of assets (i.e. external software, equipment, and machinery) and innovation. They also found that employee training about innovation by experts from outside the company is a significant determinant of innovation. Cillo et al. (2019) investigated the role of knowledge source management skills in developing successful open innovation for agri-food businesses. In particular, it was found that manager IT-based knowledge exploitation capabilities play a key role in open innovation strategies.

So, despite the benefits involved in open innovation, the increase in external collaborations creates higher costs for the company, while the resulting benefits are observable only in the long term. In addition, companies must pay attention to balancing external and internal research activities and the channels used, otherwise, they will have negative consequences for their innovative performance and will increase their costs of coordination, management, and control of the activities of the partners involved. In this context, the figure of the company manager and the chosen collaboration opportunities are of great importance. The first being the one who makes the decisions, is also the one who has the greatest responsibility for the success or failure of a company, while the second, if properly chosen, increase profits and decrease expenses.

Thus, the following hypothesis is established:

- o **H1**: The figure of the entrepreneur and the choice of suitable collaboration channels positively influence the ability of companies to face the competition of markets and the new need to apply sustainable development practices.

1.5.2. Marketing innovation – Label role

Recently, the growing competition in the agri-food market and the profound changes in supply and demand side have led companies to develop innovative solutions that could allow them to improve their position and survive even in the most competitive markets (Holmlund et al., 2016).

In this scenario, labeling has been identified as an important innovative marketing tool, increasingly recognized and used among entrepreneurs, especially within the food industry (ter Braak and Deleersnyder, 2018).

While in past years the role of labeling was linked to the provision of objective information, in recent years labels have assumed an increasingly commercial role with respect to the different marketing communication needs (Cole, 2018)

Consequently, many entrepreneurs have recognized the importance of having a good label and not just a good product, both to differentiate the products offered from those of the competition (Rundh, 2009) and to reduce the information asymmetry. Good label assists consumers in their purchase decision by giving them information and transforming quality aspects from belief to search attributes. In this sense, the quality attributes (intrinsic and extrinsic), including the visual elements that characterize the label, become the tool for effective marketing innovation. In general, the intrinsic attributes are specific to the product and cannot be manipulated without altering the physical properties of the product itself; while extrinsic ones include attributes such as brand and price (Adi and Indriani, 2017).

Literature has extensively investigated the role of labels on the market and it has emerged that ethics usually influences the consumer by three main messages: the origin of the product, the sustainability of the product, and the nutritional quality of the product.

Several studies have found that label with local and national attributes leads consumer choices (Santeramo et al., 2018; Mauracher et al., 2016). These studies show a clear preference for the national origin of food products over the imported one and that consumers are willing to pay more for the internal origin, perceived as superior in terms of quality, freshness, and safety (Banovic et al., 2019). This can be partially explained by the theory of cognitive information processing, according to which consumers value freshness more than any other quality attribute; therefore, the shortest transportation distance (implying domestic origin) plays an important role in consumer choice (Birch et al., 2012). In addition, the label with attributes on the origin of the product can also evoke a strong affective and symbolic effect; strong ethnocentric attitudes emerge in the evaluation of products from other countries (e.g. consumer ethnocentrism), using preconceptions originating from the norms and customs of people's own culture (Santeramo et al., 2018).

Regarding eco-labels, several studies state that they are becoming important factors of consumer choice (FAO, 2018). They indicate that the product was obtained without major environmental impacts and now the consumer is increasingly attentive to this ecological aspect. This interest appears to be positively correlated with consumers' environmental concerns, 'green life', and trust in public and private institutions that sponsor specific eco-labels (Salladarré et al., 2016).

Finally, the third aspect taken into consideration concerns the nutritional qualities described on the label. In light of the increase in diet-related chronic diseases and the resulting costs to public health, nutrition and health information on labeling has received considerable attention over the past two decades from both the consumer and the producer.

The amount and type of product information on a label can influence nutritional beliefs and purchasing patterns (Bender and Derby, 1992). Some researchers have empirically shown that a misinterpreted nutrition label or one containing too much information can diminish the accuracy of one's product judgments (Byrdbredbenner, 1994). Other researchers argue that more information may instead lead to higher comprehension and higher willingness to purchase the product (Lepkowska-White & Parsons, 2001). Since consumers can draw conclusions from small amounts of product information (Ross and Creyer, 1992), it may be that a small amount of correct information can still go a long way in influencing the inferences a person makes about a product (Wansink, 1994).

The increased awareness of the importance of protecting collective health also passes through the relationship with food and not only in nutritional terms but along the entire supply chain, because the environmental and social sustainability of the production is a path that begins in the field and reaches the plate.

The approach must be systemic and in this sense, labels on food can be a fundamental ally. A well-made label allows the consumer not only to make informed choices but brings them closer to the producer and their country.

In this regard, one hypothesis has been thought:

  o H2: In an increasingly sustainable market, some information reported in the label affect consumers' preference more than other informational cues.

1.6.   Consumer perceptions about innovations

Innovation in food sector depends on two factors: on the one hand, there is the 'technology-push' dynamic, which involves a transfer of technology and know-how from other companies or institutions; on the other hand, there are the 'attraction effects of demand' which depend on the acceptance of new products and processes by consumers (Grunert et al., 1997). Innovation is a lever to meet the needs of consumer-citizens (Mancini et al., 2015) and the emerging concerns of society (Roucan Kane et al., 2011). In fact, the chance of a company to turn a technological adoption into a real innovation is broadly conditioned by a good response from the market. Innovative food companies must constantly analyze the changing perceptions, tastes and preferences of the consumer (van Trijp, Steenkamp, 2005) and also embrace social and environmental changes (Earle, 1997).

Consumers choose food product innovations according to the sensation they arouse. While some innovations create skepticism, others are accepted by consumers, who include them in their diet (Bäckström et al., 2004). In food sector, the degree of innovation and its approval are important factors of consumer acceptance (Marotta et al., 2014).

In particular, Stolzenbach and co-workers (2013) argued that consumers who habitually consume traditional food products perceive innovations as being too innovative. Furthermore, consumer acceptance appears to be influenced by innovation type and product on which it is applied (Guerrero et al., 2009).

In 2008, Siegrist argued that lack of consumer awareness of the type of innovation, together with the lack of knowledge needed to assess the potential risks and benefits of innovation, are responsible for rejection of the innovated product. The risks and benefits of innovation influence consumers' acceptance by altering their perception of the product (Bearth and Siegrist, 2016). If the consumer does not perceive the benefits of innovation, he questions the real benefits obtained, increasing both the concerns and the perceived risks (Rollin et al., 2011), which in turn have a negative effect on consumer purchasing behavior (Siegrist et al., 2007).

In particular, process and product innovations have high perceived risks (Cardello, 2003) as they influence food safety and animal and environmental welfare (Miles and Frewer, 2001).

Trust in the company, control bodies, and information provided through the label influence the perceived risks and benefits associated with innovation, reducing the first and increasing the second (Frewer et al., 2003). In addition, lack of trust rises attitudes having direct effects on the consumer evaluation of the product (Dolgopolova et al., 2015). For example, people with little faith in innovation have lower expectations in terms of taste (Arvola et al., 1999) and prejudices towards food (Mustonen and Tuorila, 2010). However, their expectation increases when additional taste information is provided or when they eat foods from a known country (Siegrist et al., 2013). Familiarity influences the perception of changes affecting the sensory characteristics of the product (Hersleth et al., 2011). In this regard, Almli and colleagues (2011) revealed that consumers accept innovations that increase heritage while they reject less traditional sensory characteristics. However, familiarity and local production are less important than taste and wholesomeness (Onwezen and Bartels, 2011).

Food innovations affecting sensory characteristics of the product influence consumer consumption opportunities (Hersleth et al., 2011). In addition, since taste affects consumers' perception of food, it has a major role in the acceptance of food innovation (Schutz and Martens, 2001). In addition, information plays a similar role (Bruhn, 2008). It follows that transparent communication is essential in promoting innovations in traditional foods (Guerrero et al., 2009).

At last, cultural traits orient consumer acceptance towards innovative foods. Many studies highlight cultural differences in terms of the perception of innovation. For example, Italians and French people are more open to food innovations than Spaniards who show a higher neutral attitude (Guerrero et al., 2009).Product quality, sensory characteristics and production process are therefore crucial for food innovation (Grunert, 2005). Furthermore, the perceived risks and benefits of innovation, as well as the evaluation of current alternatives (Henson, 1995), can trigger a conflicting attitude towards food innovations (Dolgopolova et al., 2015) influencing the decision-making process of consumers.

With respect to food innovation, consumers often prefer organic and functional food (Schaafsma and Kok, 2005). These two markets are considerably evolving in recent years and consumer, albeit for different reasons, considers both of them optimal for health. Furthermore, as far as organic products are concerned, consumer also considers them to have ethical attributes, useful to the whole community (Luttikholt, 2007).

1.6.1. *Process innovation - Choice of healthier and more sustainable products*

Current trends in food demand demonstrate how consumer preferences have undergone a radical transformation in recent years (Hoek et al., 2017). The consumer, in fact, recognizes that nutrition

competes in maintaining health and physical well-being and that some production systems favor environmental protection. Personal health and respect for the environment thus become the drivers of demand for food (Aschemann-Witzel, 2015).

This increased attention can be interpreted both as a consequence of the numerous socio-demographic changes that have recently taken place in society, and thanks to greater knowledge about the interactions between the diet-health and production-environment systems (Hieke et al., 2015).

It follows that consumers' attention towards a healthy diet is no longer focused only on the elimination of negative substances, but tends to move towards attributes that positively characterize the product, such as freshness and naturalness and nutritional properties (Friel, 2014).

Food sustainability has become a critical issue in societies. Sustainable diets have been defined by FAO as "diets that are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically just and economical; nutritionally adequate, safe and healthy; optimize natural and human resources "(FAO, 2010).

From this point of view, in the last twenty years, the health food and beverage market has been achieving good results, in terms of innovation and market penetration, growing day by day.

If we want to analyze the consumer attitudes that lead to this choice, concerns for health and the environment can be explained through a combination of values that could influence food choices and therefore the quality of the diet (De Boer et al., 2007). Several studies on food choice have identified price (Blaylock et al., 1999), health (Eertmans et al., 2005), sensory appeal (Januszewska et al., 2011), mood during purchase (Steptoe et al., 1995), attitudes towards food (Rozin et al., 1996), convenience (Pula et al., 2014; Konttinen et al., 2013) and ethical concerns (Pieniak et al., 2009) as main reasons influencing consumer's choice.

It is recognized that the food system is one of the three-consumption industries most affecting environment and that, at the same time, environmental sustainability is a fundamental determinant of human health (Pearson, 2014).

In this regard, the global demands for healthy and sustainable food systems require market strategies to promote the consumption of food products derived from sustainable alternatives to conventional agriculture, such as certified organic food and functional products.

In particular, there are many empirically determined influential factors known to control organic food purchase behavior. Among them, health, product quality, and concern for natural environmental degradation are seen as the main reasons behind buying organic food (Rana and Paul, 2020).

In addition, also the functional food market is booming nowadays (Gok and Ulu, 2019). Functional foods, generally defined as foods that provide benefits beyond basic nutrition, represent an important growth strategy for economic and social sustainability in many countries around the world.

Due to widespread concerns about health risks, consumers increasingly prefer to take advantage of the potential protective health benefits of these foods formulated in response to emerging nutritional science (Sibbel, 2007).

Hence, the following hypothesis is defined:

- o **H3**: Attention to health positively influences the choice of innovative products. However, consumer prefer process innovation that emphasizes the naturalness of the product over innovation that involves changes or additions to the composition of the food.

1.6.2. *Product innovation - Choice of "all-round" sustainable products*

Consumers of organic food have very specific expectations about the organic products they buy. These expectations are linked to environmental and animal welfare, support for local development and respect for those engaged in food production (Hughner et al., 2007). In general, organic consumers are characterized by deliberately pro-social behavior (Carrigan et al., 2004). Padel and Gössinger (2008) have classified the various ethical concerns, which, in addition to the common standards of organic farming, guide consumers in their choice. First of all, social issues, such as fair working conditions, the prohibition of exploitation of foreign workers and the employment of disabled people seem to be important reasons for choice for the consumer.

Then, there are environmental issues, such as the protection of biodiversity, climate and landscapes, and economic issues, such as fair prices for farmers and support for small and medium-sized enterprises.

Otherwise, local production is difficult to assign to one of these categories since environmental aspects are associated with it, such as short transport distances, as well as economic and cultural aspects (Roinenen et al., 2006).

Over the years, in support of these aspects, the community of organic food consumption has grown significantly (Kushwah et al., 2019). More precisely, the total number of countries adopting organic farming is 178 and it covers approximately 57.8 million hectares worldwide (Willer and Lernoud, 2018). The top three countries with the highest acreage in organic farming are Australia (27.1 Mha), Argentina (3.0 Mha), and China (2.3 Mha) (Willer and Lernoud, 2018). The total market value of organic food was estimated at $ 89.7 billion at the end of 2018, where the United States, Germany, and France were reported as the top three countries in terms of market value.

However, the expansion of the organic market has given rise to a phenomenon that runs counter to the reasons why it has expanded. In fact, as it grew, it began to interest also large companies, which while maintaining organic standards, have upset the principles that characterize this market, creating a phenomenon of 'conventionalization of organic agriculture' (Baldi et al., 2013).

Conventionalization is in stark contrast to the IFOAM principles of ecology and health (Van Huik and Bock, 2006), which are fundamental for the choice of organic products by the consumer (Luttikholt, 2007).

In correspondence with this change in the sector, product innovation such as the birth of the 'organic plus' is developing rapidly. This term describes organic products with additional sustainable criteria that aim to better satisfy consumers who have approached this market and want to remain faithful to the principles that characterize it.

In this context, the 'organic plus' starts therefore from the traditional bases to try to reach higher levels and obtain greater benefits for consumers and for the whole community.

It follows that:

- o **H4:** Organic consumers appreciate product innovations that involve the creation of attributes of community interest.

Section 2

Aims, materials and methods

2. Ph.D. aim

This Ph.D. thesis aims to understand which type of innovation is more preferred by consumers in the food sector, and which factors are the main responsible for the adoption of innovation in food businesses.

Today agriculture is at the core of the sustainable development strategy and is recognized as a key role in achieving many of the goals concerning, among others, healthy eating, conserving resources, combating climate change and poverty. With this in mind, this thesis seeks to investigate the role of innovations in the agri-food sector, seen as a means of finding the perfect balance between productivity and sustainability.

The focus has shifted from intensifying the use of inputs to improving total resource productivity and using new products, processes and marketing strategies, which can be achieved through innovation and the spreading of knowledge.

The efficient use of resources is a key priority in sustainable growth strategies. Strategies to encourage the adoption of sustainable agricultural practices by farmers and to stimulate greater consumer interest include a wide range of tools such as information, education, cooperation, research and development, technology and innovation (Oecd, 2016).

Information, cooperation and innovation play a strategic role and therefore it is not surprising that, for several years, companies have decided to collaborate and innovate together, using open innovation techniques that can also involve the customer.

Tools, ideas and skills are the ingredients for innovation, but companies do not always have all these resources. The adoption of the Open Innovation paradigm reduces the main risks of producing innovation independently (high costs, wasting times before being placed on the market) and offers the possibility of accessing external technologies and skills.

However, innovative operations can also have negative implications as companies may not be able to manage them well or consumers may not appreciate them.

Therefore, from this perspective, four antecedents have been identified at the basis of the success of open innovation. In particular, the first two concerned the approach to innovations from a business point of view, while the last two investigated consumer choices and preferences:

1) Organizational innovation: having good entrepreneurial competence and appropriate collaborative channels.

2) Marketing innovation: pay attention to having good labeling and not just a good product.

3) Process innovation: choosing new production techniques that meet customer and environmental needs.

4) Product innovation: aiming at the production of all-round sustainable products.

2.1. Materials and methods

To accept or reject the four hypotheses formulated in this thesis, six different studies (Scheme 1) have been developed. Five of these have already been published in scientific journals, while one is still under review. Each study investigates a different point of view and uses econometric techniques suitable for data analysis. Several theories and theoretical frameworks have been explored.

Scheme 1. Scientific research divided by innovation types, in order to found innovation antecedents

Organizational innovation

1) Exploring Innovation Adoption Behavior for Sustainable Development: The Case of Hungarian Food Sector

2) Search Strategies in Innovation Networks: the Case of the Hungarian Food Industry

Marketing innovation

1) Label Style and Color Contribution to Explain Market Price Difference in Italian Red Wines Sold in the Chinese Wine Market

Process innovation

1) Sustainable Value Creation in the Food Chain: A Consumer Perspective

2) Organic Food Consumption: The Relevance of the Health Attribute

Product innovation

1) Would organic consumers want more ethics in organic food sector? The effects of the organic plus on the consumers' willingness to pay"

Antecedents to innovation

2.1.1. H1 - Organizational innovation

First hypothesis states that entrepreneur figure and collaboration channels are strategic for business success in undertaking an innovation. So, two different scientific researchers have been developed, leading to the elaboration of as many papers (Table 1).

Table 1. Papers about the first hypothesis

H1: Organizational innovation		
Title	**Aim**	**Methodology**
Exploring Innovation Adoption Behavior for Sustainable Development: The Case of Hungarian Food Sector	To investigate psychological constructs influencing the manager's decision-making process	- Theory of Planned Behavior - Structural Equation Modeling

Search Strategies in Innovation Networks: the Case of the Hungarian Food Industry	To investigate collaboration channels chosen by the company, with respect to the type of innovation used	- Probit Regression - OLS Regression

o   *'Exploring Innovation Adoption Behavior for Sustainable Development: The Case of Hungarian Food Sector'* (Annex 1) was created to understand which psychological constructs influence innovation decision-making process and, therefore, which managerial characteristics can have more or less successful in business management. Indeed, the entrepreneur's innovative behavior is associated with a high commercial return, but also with a high commercial risk (Liñán et al., 2001). The propensity to innovate in a company is based on its ability to resist the pressure that this process entails and so, it is clear that those who have the task of innovating can react in many different ways, influenced by different objective and subjective variables (Liñán et al., 2011).

The study in question developed in Hungary. As the Hungarian market is in strong expansion, it is required that Hungarian food processing companies continuously develop their dynamic capacities for innovation. Companies must adopt new strategies and reconfigure their businesses according to the changing needs of the market. This way of acting is in line with the preconditions for innovation, especially in an emerging market like the Hungarian one.

In order to obtain the data useful for the survey, 151 entrepreneurs (Table 2) of small and medium-sized food companies were contacted, through a four-year research project that studied the resilience of the Hungarian food industry.

Table 2. Summary statistics of age and managerial experiences of managers (years).

	Obs.	Mean	St. Dev.	Min.	Max.
Age of manager	151	53.27	9.49	32	81
Managerial experience of manager	151	18.75	8.76	1	41

In particular, the questionnaire investigated their behavioral approach to innovation (Attitude towards innovation, Subjective norm of performing innovation, Behavioral control of performing innovation, and Intention of carrying out innovation).

As this study seeks to understand which psychological constructs influence innovation decision making in the Hungarian food sector, the Theory of Planned Behavior (TPB) was used to highlight how managers' attitudes towards innovative products, evaluation of innovative products and the strategic intention to put innovative products on the market, influences the adoption of innovations by companies.

Finally, Structural Equation Modeling (SEM) was used for data analysis.

They are explained below:

- Theory of Planned Behavior

The theory of planned behavior is a model that explains human behavior as a consequence of an intention, which in turn is the result of the interaction among various beliefs, as well as attitude, subjective norms and perception of the acting individual (Figure 2).

Figure 2. TPB scheme
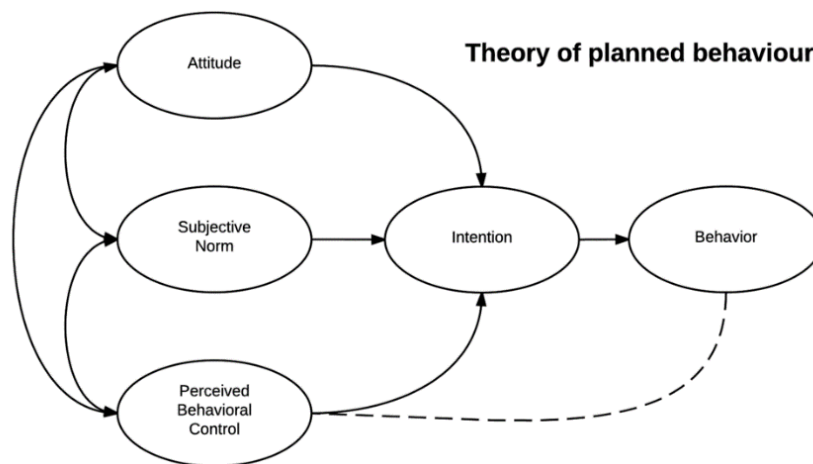
The TPB provides that the behavior is preceded by the intention to put it into practice; this, in turn, is simultaneously determined by the attitude towards behavior and subjective norms. Perceived behavioral control, or the perception that a subject has of being able to implement the desired behavior is, among all, the variable that most affects the intention to implement a certain behavior and the behavior itself (for example from a perspective of market this behavior could be the purchase of a product or the choice of a production technique).

According to the TPB, entrepreneurs are assumed to be rational and to make systematic use of the information available to them when making decisions. Entrepreneurship is the process of exploring and exploiting business opportunities to create future goods and services by creating a new organization (Venkataraman, 1997). Those who display positive, rather than negative, entrepreneurial attitudes will be more likely to act as entrepreneurs and will believe that entrepreneurship is not just a way to make a living, but a means of achieving self-fulfillment. In this regard, subjective norms influence individual perception about the behavior to adopt (Ajzen and Fishbein, 1980).

Perceived behavioral control refers to the subjective understanding of people's level of self-control and the difficulty of engaging in target behavior (Ajzen, 1991). Behavioral control perceived by entrepreneurship can therefore be defined as the subjective assessment of one's entrepreneurial skills and resources, as well as the possibility of entrepreneurial success. Although corporate resources and entrepreneurial skills are objective and important for the success of the entrepreneurial process, what

can substantially influence entrepreneurial intention is neither the absolute number of resources nor the skills of entrepreneurs, but rather the subjective assessment of the people of the resources and capabilities (Kruegeret al., 2000). People who are positive about their resources and skills see entrepreneurship as an opportunity rather than a risk and tend to show stronger entrepreneurial intention than those who are negative. It is therefore reasonable to assume that the TPB provides a good basis for an investigation into the entrepreneur. So, in order to understand which psychological antecedents have the main effect on entrepreneur behaviour, a structural equation model has been performed.

- Structural Equation Modeling

Structural Equation Modeling, or SEM, is a very general statistical modeling technique, which is widely used in the behavioral sciences. It can be viewed as a combination of factor analysis and regression or path analysis. The interest in SEM is often on theoretical constructs, which are represented by the latent factors. The relationships among the theoretical constructs are represented by regression or path coefficients between the factors. The structural equation model implies a structure for the covariance between the observed variables, which provides the alternative name covariance structure modeling.

However, the model can be extended to include means of observed variables or factors in the model, which makes covariance structure modeling a less accurate name.

o   The second scientific research, entitled *Search Strategies in Innovation Networks: the Case of the Hungarian Food Industry'* (Annex 2) investigates the research strategies on open innovation in the Hungarian food industry and examines the different sources of innovation chosen by the company, with respect to the type of innovation used. In fact, even if open innovation techniques positively influence company results, it is also true that the use of too many sources of information can lead to management problems. The increase in collaborations with external figures involves costs for the company, determining the need for additional resources. Furthermore, companies need to pay attention to balancing external and internal research activities; otherwise, there will be negative consequences for their innovative performance (Franke and Lüthje, 2020).

In order to achieve the aim paper, data from 440 Hungarian food small and medium-sized enterprises, obtained through the Community Innovation Survey (CIS - 2012), were used in this study. The CIS is a survey on innovation activity in companies. It aims to provide information on the innovativeness of sectors by type of enterprise, on the different types of innovation and on the various aspects of the development of an innovation, broken down by country, type of innovator, economic activity and size class.

The questionnaire consists of three main sections: general information about the company, type of innovation and source of information.

More precisely, the questionnaire distinguishes twelve types of innovation, divided into four groups (Table 3).

Table 3. Types of innovation.

Type of innovation	Group
New or significantly improved goods	Product innovation
New or significantly improved services	
New or significantly improved methods of manufacturing	Process innovation
New or significantly improved logistics	
New or significantly improved supporting activities	
New business practices for organizing procedures	Organization innovation
New methods of organizing work responsibilities	
New methods of organizing external relations with other firms	
Significant changes to the aesthetic design	Marketing innovation
New media or techniques for product promotion	
New methods for product placement or sales channels	
New methods of pricing goods or services	

In addition, ten sources supporting the innovation activities were considered. They have been gathered into three major sets: business, science and profession (Table 4).

Table 4. Innovation activities sources.

Information sources of innovation activities	Groups
Suppliers of equipment, materials, components, or software	Business
Clients or customers from the private sector	
Clients or customers from the public sector	
Competitors or other enterprises in your industry	
Consultants and commercial labs	Science
Universities or other higher education institutions	
Government, public or private research institutes	
Conferences, trade fairs, exhibitions	Profession
Scientific journals and trade/technical publications	
Professional and industry associations	

In order to understand the possibility of choosing a specific source of information regarding the type of innovation, and therefore, to verify how much of a source is selected in different types of innovation, the data collected were processed in three distinct phases. In the first phase, the descriptive analysis of the data was carried out in order to define the socio-demographic characteristics of the sample; in the second phase, a probable regression was made between the source of information, the type of innovation and two control variables (innovation in progress and opening up to European and world markets). In the final part, after having grouped the information sources into three large groups, the three new variables were used as dependent variables for an OLS regression with type of innovation and control variables.

The two models are shown below:

- Probit Regression

The Probit Regression Model is based on the standard normal cumulative density function (CDF), which is defined as

$$F(Z) = \int_{-\infty}^{Z} (2\pi)^{\frac{1}{2}} e^{\frac{-Z^2}{2}} dZ$$

where Z is a standardized normal variable and *e* is the base of the natural log. In a probit model, the standard normal CDF replaces the linear function, so you estimate

$$E(Y/X_i) = P_r(Y = 1/X_i) = F(\beta_0 + \beta_1 X_i) = \int_{-\infty}^{\beta_0 + \beta_1 X_i} (2\pi)^{\frac{1}{2}} e^{\frac{\beta_0 + \beta_1 X_i}{2}} d(\beta_0 + \beta_1 X_i)$$

The β terms cannot be estimated using OLS, so you need to use a technique known as maximum likelihood (ML). For any given X, the probit model provides the Z value for the observation. The standard normal PDF or CDF can then be used to obtain the probability that Y = 1 for that observation.

- Ordinary Least Squares Regression (OLS)

The OLS regression function is usually expressed mathematically as follows:

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_{i2} + \dots + \beta_{ip} + \varepsilon_i$$

The Y variable represents the outcome you are interested in, called the dependent variable, and the Xs represent all the independent (or explanatory) variables. To visualize the OLS regression and get a basic understanding of the fundamental concept, assume now that the dependent variable is influenced by only one explanatory.

2.1.2. H2 – Marketing innovation

The second hypothesis formulated states that some information reported in the label affect consumers' preference more than other informational cues. In order to verify this statement, a study was conducted, leading to the writing of an article published in a scientific journal (Table 5).

Table 5. Paper about the second hypothesis

H2: Marketing innovation		
Title	**Aim**	**Methodology**
Label Style and Color Contribution to Explain Market Price Difference in Italian Red Wines Sold in the Chinese Wine Market	To investigate the implicit price of individual labelling characteristics	- Hedonic Price Model

The document, entitled *'Label style and color contribution to explain the market price difference in Italian red wines sold in the Chinese wine market'* (Annex 3), aims to investigate the implicit price of the individual labeling characteristics of 474 Italian red wines sold in the Chinese market. One of the main elements of a successful marketing strategy in the food industry is the importance of understanding your target market. If in the past the label role was exclusively linked to the supply of information, in recent years it has assumed an increasingly commercial role with respect to the different needs of marketing communication.

Consequently, many entrepreneurs have recognized the importance of having a good label and not just a good product, both to differentiate the products offered from those of the competition, and to reduce the information asymmetry (Rundh, 2009).

Knowing the implicit price of each extrinsic attribute provided on the label helps to understand the target audience, on which managers should focus all marketing message, including those delivered through packaging and labeling (Rundh, 2013).

In particular, to answer the research question, used data were obtained through two different sources of information. First, the Wine Searcher dataset was used to identify the number and corresponding price of Italian red wines sold in the Chinese market, counting 434 observations. Subsequently, by

consulting the catalogs of the wineries available on the company's website, all the quality attributes reported on the front label were detected. In particular, the quality attributes considered in this study are related to the information on the front label (designation of origin, variety, alcohol content and production year), style of the label (eight variables), color of the label (seven variables) and other information related to wine and terroir.

The hedonic price model was used to analyze the obtained data:

- *Hedonic Price Model*

The hedonic price method is a tool for estimating the market value of certain characters or services (so-called hedonic price). It is obtained from the market prices of the goods that incorporate it, by isolating the contribution that the interest attribute makes to the observed price with multivariate regression techniques.

The general specification of the hedonic price function is expressed as:

$$Ln\ (P) = \beta_0 + \beta_1\ LI + \beta_2\ LS + \beta_3\ LC + \beta_3\ AI + \varepsilon_i$$

where ln(P) is the logarithm of the price, εi represents the stochastic error term, 'LI' groups the attributes related to the information given in the, 'LS' refers to eight different types of label style, 'LC' groups seven different color of the label, and, 'AI' refers to information related to the wine characteristics.

2.1.3. H3 - Process innovation

The third and fourth hypotheses focused on the consumer perspective.

In particular, it should be remembered that the third hypothesis states that being health conscious consumers positively influences the choice of innovative healthy and sustainable food systems. Consumers choose those innovations they consider optimal for health and best for environmental protection.

Consequently, in order to test this hypothesis, it was decided to develop two different studies, both comparing two types of food innovations (organic and functional products) considered healthy for humans, albeit for different reasons (Table 6).

Table 6. Papers about the third hypothesis

Title	Aim	Methodology
H3: Process innovation		

Sustainable Value Creation in the Food Chain: A Consumer Perspective	To analyze consumer preferences for natural attributes and health claims, exploring the factors that influence their choices	- WTP and Experimental auction - Seemingly Unrelated Regression
Organic Food Consumption: The Relevance of the Health Attribute	To assess the relative weight of the health attribute among other recognized organic food attributes	- Multiple Price List - Tobit Regression

o *'Sustainable Value Creation in the Food Chain: A Consumer Perspective'* (Annex 4) analyzes the preferences of Hungarian consumers for natural fruit juices versus enriched ones, studying factors that guide their choices. Consumers today know that their diet affects their health and, therefore, they prefer to choose foods that help them lead a healthy lifestyle. This growing interest in consumer health products has prompted the food industry to move closer to innovative production methods, e.g. organic and functional foods that can meet customer needs (Nguyen et al., 2019). From the consumers' point of view, the interest shown in these two attributes is due to their common willingness to improve or maintain their health, although the two attributes have different exceptions.

Several studies have dealt with the two food attributes in the literature, but consumer preference is still not entirely clear. The present study seeks to narrow this gap by investigating which of the two innovations is preferred by the consumer.

To achieve the goal, the willingness to pay (WTP) of 100 young consumers (Table 7) for natural and enriched fruit juices was analyzed.

Table 7. Socio-demographic characteristics of the sample.

Variables	Mean	Std. dev.	Min	Max
Gender	0.29	0.50	0	1
Age	21.65	2.23	18	28
Family Members	2.77	1.12	1	5
Monthly Income	1.81	0.64	1	3

Data were obtained by conducting experimental auctions. These represent an innovative tool for carrying out economic research with the aim of evaluating the value assigned by participants to food and non-food products, according to their characteristics and the characteristics of the participant. Through the experiment conducted in the laboratory, it was possible to detect not only the consumer's willingness to pay, but also their attitudes, using ad hoc three psycho-attitudinal scales: natural product interest (NPI), general health interest (GHI), and reward from using functional food (RFF). These scales are widely used in the literature. More precisely, GHI and NPI scales were developed by Roininen and colleagues (1999); the first consists of eight articles that reveal the consumers' attitude towards healthy eating, while the second scale includes six articles aimed at capturing the

consumers' attitude towards the consumption of unprocessed food. The RFF scale was proposed by Lähteenmäki (2004) and includes seven items that explain the declaration of gratitude coming from the use of enriched foods. These validated GHI, NPI and RFF attitude scales were collected by means of 7-point Likert scales, where 1 corresponds to totally disagree and 7 to totally agree.

Data were finally processed through an apparently unrelated regression (SUR).

These concepts are explained below:

- WTP and experimental auctions

Over the past 20 years, agricultural economists have become increasingly involved in market research. This phenomenon has come in response to the continuous evolution of the agri-food sector which has affected the entire supply chain, from the marketing of agricultural raw materials to the individual finished products. An area in which the skills of agricultural economists have been assessed is consumer acceptance and willingness to pay (WTP) research on new products and different product characteristics.

Previous studies by economists have used contingent valuation methods to form what-if scenarios for measuring WTP. A central question regarding contingent valuation is whether the values obtained from hypothetical surveys reflect the true WTP of consumers. Due to concern about the 'hypothetical nature' of the contingent valuation approach, more recently conducted research has used experimental economic procedures such as experimental laboratory auctions to obtain WTPs for new products and product attributes.

A number of different auction techniques exist, but the majority of the research has used a variant of the second- price, sealed-bid auction, frequently referred to as a Vickrey auction (Vickrey, 1961). In it, the winner is the highest bidder, but he or she only pays the second-highest bid price. The Vickrey auction and similar, uniform, nth-price auctions are assumed to be demand revealing because they provide an incentive for auction bidders to reveal their true preferences. According to Vickrey's theory, there is no gain from strategic bidding because the market price is independent of a participant's bid. The market price is defined as the nth price. Participants who bid less than their true value reduce their chances of winning the auctioned good at a potentially profitable price. On the other hand, by submitting a bid more than their true value, auction participants have a greater probability of winning, but paying a price that is in excess of their true value (Shogren et al. 1994b). The demand-revealing theory of the Vickrey auction is based on the assumed behavior of participants. This theory may fail when applied to a simulated 'real-world' laboratory setting where consumers use real money and actually experience the product in question.

Specifically, in this study, the fifth-price auction was used. This choice allows, at the same time, to increase the number of auction participants and their degree of involvement. Lusk and colleagues

(2007) showed that bidders would generally be more engaged if at least half of them could potentially win the product at auction.

- Seemingly Unrelated Regression

Apparently unrelated regressions (SUR) is a generalization of a linear regression model that consists of several regression equations, each one with its own dependent variable and potentially different sets of exogenous explanatory variables. Each equation is a valid linear regression in its own right and can be estimated separately, which is why the system is defined as apparently unrelated although some authors suggest that the apparently related term would be more appropriate, as the error terms are assumed to be related equations.

If we consider here a model comprising of M multiple regression equations, we can write the following equation:

$$Y_{ti} = \sum_{J=1}^{Ki} X_{tij}\,\beta_{ij} + \varepsilon_{ti}, \quad t = 1,2,\dots T; i = 1,2,\dots M; j = 1,2,\dots k_i$$

where Y_{ti} is the tth observation on the ith dependent variable which is to be explained by the ith regression equation, X_{tij} is the tth observation on j^{th} explanatory variable appearing in the ith equation, β_{ij} is the coefficient associated with X_{tij} at each observation and ε_{ti} is the tth value of the random error component associated with i^{th} equation of the model.

o   The second paper is '*Organic Food Consumption: The Relevance of the Health Attribute'* (Annex 5). The main purpose of this scientific paper is to evaluate the relative contribution of the health attribute, to determine the preference of organic consumers.

Organic food is peculiar because it is associated by consumers with a series of attributes, including, first of all, the perceived positive impact on human health, followed by environmental and animal protection, and interest in local development (Hughner, 2007).

It is recognized that food is one of the three consumption domains responsible for most of the environmental impact and that, at the same time, environmental sustainability is a fundamental determinant of human health.

This growing awareness has led consumers to choose more sustainable products in their daily food choice, making the consumption of organic food one of the most popular sustainable consumption options.

Therefore, since sustainability in global food systems is one of the most relevant objectives in this century, the current research was aimed to understand what could be the factors that drive consumer preferences for this category of products and therefore to create a crucial strategy to preserve environmental sustainability.

To achieve this, an online survey of 867 consumers (Table 8) of Italian Extra Virgin Olive Oil (EVOO) was conducted, in which a multiple price list (MPL) mechanism was adopted to elicit consumer WTP.

Table 8. Descriptive statistics of the sample (n = 867).

	Mean	Std. Dev.	Min	Max
Gender	0.51	0.50	0	1
Age	41.98	13.27	18	73
Family members	3.17	1.23	1	6
Minors	0.33	0.47	0	1
Level of education	3.80	0.77	1	5
Monthly income	1.81	0.64	1	3

The WTP was obtained for organic EVOO and a functional counterpart in order to isolate the health attribute of the organic product. The rationale for comparing organic EVOO with its functional counterpart lies in the assumption that a functional product carries, in some clearly isolated way, the health attribute. Therefore, by comparing the two products, it is possible to isolate consumer preference for the health attribute in the organic version.

In addition, to analyze the constructs related to consumer choices, four psycho-attitudinal scales were used to investigate the general interest in health (GHI) in food choices, interest in natural products (NPI), perceived reward for the use of functional foods (RFF), and environmental activism (NEP) (Peterson et al., 2008).

Finally, a Tobit Regression was performed to measure how the individual variables examined in the analysis can influence the price premium. The used methods are shown here:

- Multiple Price List

The Multiple Price List is a relatively simple procedure for eliciting values from a subject. In the context of eliciting a willingness to pay for some commodity, it compares the subject with an array of ordered prices in a table, one per row, and asks the subject to indicate 'yes' or 'no' for each one. The experimenter then selects one row at random, and the subject's choice then implemented.

The MPL has several attractions. First, it is easy to explain to subjects. Second, it is easy to implement. Third, it is relatively easy for subjects to see that truthful revelation is in their best interests: if the subject believes that his responses have no effect on which row is chosen, then the task collapses to a binary choice in which the subject gets what he wants if he answers truthfully.

- Tobit Regression

A Tobit model is a regression model where the observed range of the dependent variable is censored in some way. This stochastic model may be expressed by the following relationship:

$$
\begin{aligned}
y_t &= X_t\beta + u_t && if \ X_t\beta + u_t > 0 \\
y_t &= 0 && if \ X_t\beta + u_t \leq 0 \\
& && t = 1, 2, \dots, N
\end{aligned}
$$

where N is the number of observations, y_t is the dependent variable, X_t is a vector of independent variables, β is a vector of unknown coefficients, and u_t is an independently distributed error term assumed to be normal, with zero mean and constant variance ϑ^2. Thus, the model assumes that there is an underlying, stochastic index equal to $(X_t\beta + u_t)$ which is observed only when it is positive, and hence qualifies as an unobserved, latent variable.

2.1.4. H4 - Product Innovation

Finally, the fourth hypothesis states that organic consumers appreciate product innovations involving the creation of attributes of community interest. In order to verify the veracity of this statement, scientific research has been developed which led to the drafting of a paper that is currently still under review (Table 9).

Table 9. Paper about the fourth hypothesis

H4: *Product innovation*		
Title	**Aim**	**Methodology**
Would organic consumers want more ethics in organic food sector? The effects of the organic plus on the consumers' willingness to pay"	To found ethical reasons pushing consumers to buy organic food	- WTP and Experimental Auction - Ordered Logit Regression

'*Would organic consumers want more ethics in organic food sector? The effects of the organic plus on the consumers' willingness to pay*" (Annex 6) investigates consumer preferences for organic plus eggs, in order to provide a better understanding of ethical reasons that push consumers to buy organic food and to help expand this sustainable market.

Among the main reasons for organic purchasing, Hughner and colleagues (2007) noted environmental concerns, health concerns, support for the local economy and concerns for animal welfare. These four reasons can be grouped in the context of sustainability, as they all contribute to better environmental and social sustainability (Baldi et al., 2013). In fact, the main attributes that characterize the organic market are sustainability represented by the innovative and eco-compatible production method (which also leads to a product perceived by the consumer as healthier and safer) and direct contact between producer and consumer (Reisch et al., 2013).

If it is clear that initially the consumer approached the organic market because it was considered optimal for their health, today it is increasingly evident that the consumer is also moved by ethical aspects. This study sought to understand which sustainable innovations are most appreciated.

In order to achieve the set goal, experimental auctions were carried out. The auction involved the use of four products: (1) standard organic egg carton, used as a control product, (2) organic egg carton in environmentally friendly packaging, (3) organic egg carton from local agriculture, and (4) organic eggs carton from social farms. The experiment was conducted in Palermo (Italy) and involved the participation of 110 consumers of organic products (Table 10).

Table 10. Consumer socio-demographic profile

Variable	Category	Frequencies
Gender	male	55 %
	female	45%
Age	20-34 yeras	43.64 %
	35-48 years	22.75 %
	49-62 years	21.84 %
	63-76 years	11.77 %
Education	low education	40.91 %
	high education	59.09 %
Purchasing manager	yes	84 %
	not	16 %
Regular shopper organic food	yes	56.34 %
	not	43.66 %

They also filled out a questionnaire in which there were two psycho-attitudinal scales: a modified version of the New Ecological Paradigm (NEP) scale to evaluate environmental activism and people's real environmental behavior and the Prosocialness Scale for Adults (PSA) to measure the availability of consumers to prefer and thus help small and medium-sized businesses in the local area. Finally, Ordered Logit Regression was used to analyze the data.

Experimental auction type and an Ordered Logit Regression are explained later:

- Experimental Auctions

The mechanism used was the 'random nth-price auction' (Shogren et al., 2001), which combines two classic experimental auction mechanisms: the Vickrey auction and the BDM mechanism. In it, randomness allows to involve all bidders and to reduce any incentive to fix a stable market compensation price. In this way, each participant is invited to bid sincerely because he/she cannot use a random market compensation price as an indicator and all the participants should be involved because everyone has the opportunity to buy a unit of the proposed good (Shogren et al., 2001).

- Ordered Logit Regression

The ordered logit model is a regression model for an ordinal response variable. The model is based on the cumulative probabilities of the response variable: in particular, the logit of each cumulative probability is assumed to be a linear function of the covariates with regression coefficients constant across response categories.

An ordered logit model for an ordinal response Yi with C categories is defined by a set of C−1 equations where the cumulative probabilities are related to a linear predictor. Through the logit function is:

$$logit(gci) \; = \; log(gci \, /(1 - gci \,)) = \alpha c - \beta' xi \, , c \; = \; 1, 2, \ldots, C - 1.$$

The parameters αc, called thresholds or cutpoints, are in increasing order ($\alpha_1 < \alpha_2 < \ldots < \alpha_{c-1}$). It is not possible to simultaneously estimate the overall intercept β_0 and all the C-1 thresholds: in fact, adding an arbitrary constant to the overall intercept β_0 can be counteracted by adding the same constant to each threshold α_c. This identification problem is usually solved by either omitting the overall constant from the linear predictor (i.e. $\beta_0 = 0$) or fixing the first threshold to zero (i.e. $\alpha_0 = 0$).

Section 3

Findings

3.1. Antecedents to innovation by companies

In the previous section, the methodologies and reasoning followed to verify the hypotheses formulated were examined. In particular, the first two hypotheses have been verified through the drafting of three papers which, from different points of view, have tried to clarify which innovative aspects the company must pay attention to in order to make its business strategies successful.

Retracing the work done, the first paper aimed to analyze the figure of the entrepreneur, who, being the one who makes innovative decisions, is also the one on whom business success most depends. The second study, on the other hand, analyzed the adequate collaboration channels to undertake innovative activities. The first and second papers, therefore, investigated the aspect of organizational innovations. The third paper focused on marketing innovation and investigated the fundamental role of labels in differentiating an innovative product from others with different characteristics.

The results of the three published papers (Annexes 1,2 and 3) show that it is possible to accept all hypotheses. In fact, analyzing the results obtained we can state that:

1) Entrepreneurs' ability is a very value resource for companies because it supports them in competing with other companies in the same sector and in implementing an effective value creation strategy. In particular, the study showed a high level of correlation between attitude and subjective norm (0.98), subjective norm and behavioral control (0.84), and between attitude and behavioral control (0.85).

The standardized parameters confirm that attitude, behavioral norm, behavioral control and intention to innovate significantly influence the innovation process, as each of them is significant at the 1% level. In particular, the variable *Attitude* positively influences the intention, and the same is true for the subjective norm and the relation of intention. Behavioral control has a double direct influence on intention and innovation. However, the direction of these two effects is just the opposite, since while firms' control capabilities directly help formulate innovation, there is an effect that hinders intention. The analysis confirmed managers' positive attitude towards innovation directly increases the intention to put more innovation into practice; however, it was also found that this does not happen in this specific study.

It turns out that the direct effect on the innovation intention is negative, although the direct influence on the innovation is positive. This means that the companies studied would like to innovate but believe that their innovative capacities are not sufficient to carry out adequate innovation projects. The study has important implications in the Hungarian economic field, as it launches a precise message for managers: their ability to adapt to innovation should be radically improved in order to meet the needs and desires of consumers.

2) The chosen collaboration channels and the number of sources used by the innovating company are essential to minimize waste and maximize the profit obtained from the collaboration. In particular, through the reading of coefplots obtained from the econometric analyzes carried out (see annex 2), it was found that Hungarian food companies use different types of sources of innovation during their product, process, organization and market development processes.

As regards product innovation, collaboration takes place with all types of external sources (other companies, customers, and scientific institutions), but is limited to the case in which innovative internal sources are not available. Furthermore, the greater the desired product innovation, the greater the amount of information from each procurement group.

It happens differently for process and organization innovations, where collaborations with other companies operating in the same sector are preferred. In particular, process innovation favors the use of a few sources, and organizational innovation is mainly oriented towards professional sources and some business inputs.

Marketing innovation prefers first targeting consumers, as this represents a complex, delicate, and reserved business aspect of a company.

This study has important implications for the Hungarian market, which is now struggling to innovate. It suggests encouraging companies to create and maintain good networks with business, scientific and professional partners in order to help companies advance for private, social and environmental benefit.

3) Label represents one of the main elements of a successful innovative marketing strategy. It emerged that knowing the target market and therefore creating a specific language is a winning strategy, on which managers should focus the entire marketing message, including those delivered through packaging in general and labeling in more detail.

In particular, the results reveal a significant overcharge observed for products with labels bearing information on the designation of origin and production area. In fact, a positive and statistically significant ratio was found for the "DOC / DOCG" labels (+ 13.13%). This result underlines the importance that the consumer attributes to belonging to the territory and to the sustainability of production.

It follows that, regardless of the preferences found in this specific case, from a managerial point of view, the label is useful for those managers who want to identify the most relevant attributes capable of influencing the decision-making process of the consumer and the following product purchase.

This work provides some managerial and political implications. From a managerial point of view, this study is useful for managers who can identify the most relevant attributes that can influence

decision making processes and wine purchase. From the point of view of political implications, however, governments should engage in activities aimed to improve the reputation of particular areas or varieties of viticulture in a region to increase the competitiveness of wine exports to new world consumption markets.

3.2. Antecedents to innovation by consumers

The two hypotheses about the consumer were the starting point for the creation of three studies that led to the drafting of three papers, two of which have already been published, while the last is under revision. These researches (Annexes 4,5 and 6) have investigated the new interests and needs of the consumer who today is increasingly looking for innovations that lead to creation of healthy, sustainable, and ethical foods.

In particular, the third hypothesis focused on the consumer's interest in his own health – and therefore the two works concerning it - try to understand what types of healthy innovations were mostly preferred by the consumer; the last hypothesis, on the other hand, focused more on the ethical aspects of the consumer and therefore the resulting study was about 'organic plus', which is a product innovation that recalls the ethical aspects of the consumer.

The hypotheses have all been positively verified. In fact, it is possible to state that:

1)   In the first case study, consumers appreciated both healthy innovations proposed as the estimated average WTP was € 1.93 for conventional fruit juice, € 2.37 for enriched fruit juice and € 2.86 for natural fruit juice.

The results indicate that consumers prefer natural fruit juices more than enriched ones, but the motivation behind consumer preferences for both products appears to be the same: attention to their own health. Looking in more detail, the RFF attitude is positively correlated with the willingness to pay for enriched fruit juice; therefore, as its value increases, the average WTP for enriched fruit juice tends to increase. Conversely, the negative attitude coefficient of GHI suggests that as they increase, the dependent variable tends to decrease. This means that the attitude towards healthy eating negatively affects the preference for enriched fruit juice.

Relative to consumers' WTP for natural fruit juice, this is also influenced by the attitudes of RFF, which in this case is related to the benefits of using natural fruit juices rich in vitamins. This suggests that interest in both attributes (enriched and natural) appears to be influenced by common drivers, i.e. rewards from using more vitamin-rich fruit juices than conventional ones. This study can help to understand how much and how consumers accept innovations in the food market, and therefore, help companies put their products on the markets. These findings offer business owners suggestions for differentiating their product offerings. Indeed, given the growing awareness among consumers of the

importance of healthy food consumption, the Hungarian fruit juice industry is called upon to develop effective marketing strategies that help consumers to identify and distinguish fruit juices on the market. From this point of view, the ability of industries to develop innovations in this direction - which could boost the competitive performance of companies - is particularly important.

2)   The growing awareness of the link between food and health led consumers to perceive and associate an additional value to those products that lead back to health attributes. Indeed, the results obtained from the research carried out reveal that 76.7% of sampled consumers are willing to pay a premium price for organic EVO, against the remaining 23.3% who do not believe that the health attribute of organic EVO justifies a premium price. For functional EVO, 67.6% of respondents said they were willing to pay a higher price for its health claim, compared with the remaining 32.4%.

The price premium averages for the two types of EVO were calculated. The willingness to pay a premium for organic extra virgin olive oil is € 1.4, while that for functional extra virgin olive oil is € 1.10.

As already explained in the methodology, the delta obtained from the difference of the two WTPs represents the relative value of the health attribute, compared to all the other attributes of organic products, and is equal to 78.9% of the total value that the consumer attributes to organic products. The results show the fundamental role of the health attribute in generating consumer preferences for organic EVO.

It was also found that willingness to pay for the health attribute is positively influenced by consumer interest in health GHI (+0.11), from perceived personal fulfillment generated by the consumption of functional RFF products (+0.24) and from monthly income (+0.04), while gender negatively affects (-0.19) the consumer's willingness to pay.

This study has important entrepreneurial implications because promoting the consumption of organic food by studying the factors that drive consumer preferences for this category of products is a crucial strategy to preserve environmental sustainability.

3)   Consumer interest in the environmental, social and economic implications of food production is increasingly evident (Basha and Lal, 2019). The study on organic plus revealed that all three discussed ethical innovations gained a greater preference over conventional organic eggs. In fact, the willingness to pay for eggs was € 1.64 for organic eggs, € 1.98 for organic eggs with sustainable packaging, € 1.85 for organic eggs from social farms, and € 1.91 for organic eggs from local farms. By comparing the WTP for organic eggs with the other types of eggs, it was possible to obtain three price rewards: consumers are willing to pay € 0.34 more for sustainable organic eggs, € 0.21 more

for social organic eggs, and € 0.27 more for local organic eggs. Consumer preferred innovation therefore concerning environmental protection.

In particular, the overcharge for organic eggs in environmentally friendly packaging was found to increase along with higher educational level and natural concerns (NEP scale), while it appears to decrease with aging. Regarding the surcharge for organic eggs from social farming, we can see four significant positive variables: age, frequency of organic consumption, NEP scale, and PROSOCIALITY scale. Therefore, the likelihood of having a higher surcharge for local organic eggs increases as the latter grow.

Finally, with regard to organic eggs from local farms, we can affirm that being men, consuming organic food frequently and having a high sensitivity towards social (PROSOCIALITY scale) and environmental (NEP scale) aspects positively influences the consumer price premium.

Furthermore, it is important to note that the NEP scale has a positive influence on all three price awards, reflecting how sustainability is an important criterion for organic consumers, regardless of the 'plus' preferred by consumers during the experiment.

This study has relevant social implications as it helps promote sustainable, local and social products. It turned out that the attributes mainly appreciated by the consumer are sustainability represented by the innovation and eco-compatible production (which also leads to a healthier and safer perceived product) and direct contact between producer and consumer. Organic food systems help local businesses access the market (Carpio and Isengildina-Massa, 2009), and consumers may therefore believe they are supporting the local community when they purchase locally produced organic food (Toler et al., 2009). Furthermore, local food can also have environmental benefits due to the reduction of 'food miles' (Denver and Jeansen, 2014) and have important social components (Rana and Paul, 2017).

In this sense, the 'organic plus' should be sponsored more, to increase the interest of consumers and producers.

Section 4

General conclusions

4. Conclusions

Sustainability is one of the most relevant concepts of the twenty-first century (Buerke et al., 2017). The high relevance attributed to this concept is closely related to a variety of unsolved problems in the globalized world, such as environmental pollution, poverty, the growth of food-related diseases, climate change and the finiteness of natural resources. Many of these problems are the result of poor management of a country's economic and political resources (Thøgersen 2005; Meadows et al. 1972). The general opinion states that companies bear a substantial share of responsibility for the current unsustainable lifestyle (Schaltegger and Wagner 2011). They are accused of making profits at the expense of sustainable development (Beschorner and Mueller 2007). Consequently, companies are increasingly expected to change their operations, seeking new innovative methods, (Lee and Carroll 2011) in order to actively contribute to sustainable development (Martínez-Ferrero and García-Sánchez 2015), as they significantly shape modern society lifestyles.

However, the way business is run is influenced by consumer behavior (Kotler 2011) because consumer-purchasing decisions are a signal for the types of innovation they expect (Caruana and Crane 2008).

It follows that responsible corporate behavior and responsible consumption are two sides of the same coin (Connolly and Prothero 1998) and that both should opt for innovations that can lead to a balance between productivity and sustainability.

In this context, open innovation plays an important role (Chesbrough, 2003). Indeed, it has been shown that to facilitate the adoption of sustainable innovative practices, companies must collaborate and integrate their knowledge with external sources (Stefan and Bengtsson, 2017). However, there are conflicting views, as while some authors consider the concept of open innovation to be very promising (Chesbrough, 2012; Gassmann et al., 2010), others raise criticisms of its conceptual ambiguity (Dahlander & Gann, 2010), the lack of clarification on the parties involved in these processes (Huizingh, 2011) and the influence of the collaboration partners on the innovative performance of the company itself (Stefan and Bengtsson, 2017).

Therefore, based on these considerations, in order to understand how to promote sustainable behaviors in modern society, the following doctoral thesis has tried to deepen what could be the antecedents to sustainable open innovation in the agri-food sector, from the point of view of companies and consumers.

Four different research hypotheses were formulated, two of which related to the business context, and two other investigating consumer preferences. To verify the first and third hypotheses, for each of them, two different studies were developed, while we carried out respectively one study to corroborate the second and fourth hypotheses.

As a result, three studies looked at the antecedents of producers and three of consumers.

4.1. Conclusion about antecedents to innovation by producers

In this first phase, our aim was to understand which factors could influence companies' practices of open innovation. From a careful analysis of the literature, it was possible to observe that choices of the manager, suitable collaboration channels and adequate marketing strategies are important antecedents to business success.

There is no doubt that open innovation is closely linked to company performance and represents one of the main driving forces for the economic and sustainable growth of a country, which is mainly carried out through small and medium-sized companies (Chesbrough, 2003). These companies represent the largest percentage of a country's manufacturing capacity, but rarely, they have the autonomous capacity to invest in research and development and heavily rely on external sources of information. Therefore, in these companies, the skill of entrepreneurs plays a key role in adopting innovation and, in turn, in defining the company's competitive strategy. The first study carried out showed that competitiveness and sustainable development require qualified entrepreneurs, with high self-esteem, able to achieve any business, environmental or social goal, together with successful innovative products on the market in order to increase the effectiveness of such innovations. The results show that the positive attitude of leaders towards innovation, the evaluation of innovation and the strategic intention to bring innovative products and processes to the market has a positive relationship with the performance of innovation; however, the lack of adequate research skills, as well as specific knowledge and skills, hinders the development of the desired process.

At the same time, in the context of sustainability innovations, collaboration with external partners has a great influence with reference to social, organizational, and ethical issues in the context of innovation (de Medeiros et al., 2014, Hossain, 2010). Higher levels of external integration of customers, supplier, and research institutes, among others, are the important skills that allow companies to implement sustainability innovations (de Medeiros et al., 2014, Lee and Kim, 2011), but , at the same time, they must be well planned in order to avoid unnecessary expenses and waste of time.

In this vein, the results of one of the conducted studied show that food companies use different types of information sources during their product, process, organization and market innovation development processes and apply different procurement strategies based on the type of innovation. The study concludes that managers need to consider the type of innovation when formulating their innovation-seeking strategies. Furthermore, if they want to focus on the European market, or even more on the world market, they must necessarily collaborate with universities and research institutes. The third factor considered was the role of marketing strategies in promoting the results of the innovations supported. Indeed, the growing competition in the food market because of the internationalization process and the profound changes in supply and demand has pushed companies

to develop innovative solutions to remain competitive and survive in national markets. In this scenario, labeling has become an integrative marketing tool, increasingly recognized among managers, especially within the wide range of "consumer goods" (Rundh, 2009). As a result, many entrepreneurs have recognized the importance of a well-structured label that serves to differentiate the products offered from those of the competition and to reduce information asymmetry. As argued by van Trijp and colleagues (1996), a quality label assists imperfectly informed consumers in their purchase decision by structuring their information environment and transforming quality aspects from belief to research attributes.

In particular, results reveal a significant interest observed for the characteristics of the label offering information on the designation of origin and the production area. This conclusion highlights the growing interest of consumers in local production and the need to strengthen the link between the product and the territory of origin. It follows that, in open innovation actions, collaboration with local authorities, companies and municipalities can help to improve market acceptance of innovation results (Niinimäki and Hassi, 2011). In addition to the known collaborative partners, such as universities or customers, sustainability innovations may require different skills and particular inputs and require wider acceptance by society.

These three studies on the antecedents to business innovation show how innovation is possible by following very specific guidelines. Sustainable partnerships encourage companies to adopt practices that offer environmental, economic, and social benefits. Once companies understand that innovation is likely to offer private economic benefits in terms of lower input costs or better business outcomes, they will make the economic decisions to make them happen. However, community interest should prioritize those innovation practices with the greatest environmental benefits to improve overall sustainability.

4.2. Conclusions about antecedents to innovation by consumers

Researchers agree that consumption and sustainability are interconnected (Dittmar 2005). However, there is rarely a distinction in the literature between consumers' responsibility for their own health and that for society as a whole (Sheth et al. 2011). Therefore, the second part of this doctoral thesis sought to study consumer behavior and preferences for innovations that have both environmental, social, economic consequences for the interest of the whole society, as well as consequences for personal health.

According to Valor and Carrero (2014), responsible consumption can be seen as a personal project of the consumer who wants to lead a more meaningful life. In this regard, it is important to recognize that each choice produces positive or negative effects for one's health, but also has direct positive or negative effects for society (Brinkmann and Peattie 2008).

Therefore, this work has tried, first of all, to clarify the choices made by the consumer on the various types of innovation mostly existent on the market, in order to safeguard their health; then it investigated choices made to help society.

As a result, nowadays consumers are aware that their diet affects their health and therefore prefer to choose food innovations that help them lead a healthy lifestyle. This has contributed to the development of important trends in food consumption, which has seen, among other things, the growing interest of consumers in foods with natural attributes and in health claims. In particular, in the two studies carried out in order to corroborate the third hypothesis, it was found that both innovations had a greater willingness to pay than the conventional counterpart. It also emerged that consumers, between the two, prefer natural/organic products because they perceive a strong connection between "natural" and "healthy". In addition, the preference for natural foods opens up space for local production in vegetable gardens or in small-medium-sized farms. This could have beneficial effects, on the one hand, for the sustainable development of the rural area, due to lower CO_2 emissions resulting from short-distance transport and the recirculation of financial capital in rural areas. On the other hand, the preference for the natural attribute could be a lever for the promotion of healthy and sustainable food systems more oriented towards sustainability in food consumption.

The second investigated aspect was the ethics of consumer choices.

According to Sheth and colleagues (2011) 'consumption is not only a fundamental necessity for survival, but it is also fundamental for our personal, social, and economic well-being'. The three pillars of sustainability can be analyzed considering the impact of consumption on the consumer in relation to each dimension. In this sense, the environmental dimension of sustainability represents the physical constitution of the consumer (e.g. human health and well-being depending on environmental influences), the social dimension of sustainability can be understood as socio-psychological well-being (e.g. quality of life), and the economic dimension of sustainability refers to the financial well-being of the consumer (e.g. financial prosperity and local development).

To analyze which of these dimensions is most appreciated by the consumer, the latest study focused on consumer preferences regarding product innovations on organic pluses. As a result, although all three types investigated had a positive price premium, consumer preferences were directed towards environmental sustainability.

It is possible to conclude that consumers are ready to make sustainable choices, under all three areas of sustainability. The hope is that the link between consumers and sustainability will further strengthen, at the same time directing food companies to modify their commercial proposals on more sustainable issues.

By keeping this in mind, the studies carried out have served to enrich scientific knowledge on the factors that facilitate companies in implementing sustainable practices and on the attitudes of consumers who choose these sustainable innovations. In this thesis, the study of open innovation at different levels, the multiple theoretical perspectives, the use of qualitative and quantitative data, and different methods of analysis have facilitated the discovery of future research opportunities. However, despite the actuality of the works developed, they also present limitations. First of all, the results obtained are based on non-representative samples of the population, and therefore can only be applied to the reference samples. Furthermore, it would be interesting to reproduce similar experiments in other countries, where the issues dealt with can be more or less felt. The studies could also be re-proposed with different methodologies and products, or with more updated data.

If these results are corroborated by other future studies, they could suggest to companies in the agri-food sector that, if they want to innovate, in order to remain competitive on the market, they could choose to undertake innovative actions that focus on naturalness and ethics. They could thus build winning marketing strategies.

Section 5

Annexes

5.1. Annex 1

Exploring Innovation Adoption Behavior for Sustainable Development: The Case of Hungarian Food Sector

József Tóth [1,2,*] ![ORCID], **Giuseppina Migliore** [3] ![ORCID], **Jeremiás Máté Balogh** [1] ![ORCID] and **Giuseppina Rizzo** [3,*]

[1] Department of Agricultural Economics and Rural Development, Corvinus University of Budapest, 1093 Budapest, Hungary; jeremias.balogh@uni-corvinus.hu

[2] Faculty of Economics, Socio-Human Sciences and Engineering, Sapientia Hungarian University of Transylvania, Piaţa Libertăţii nr. 1, 530104 Miercurea Ciuc, Romania

[3] Department of Agricultural, Food and Forest Sciences, University of Palermo, 90128 Palermo, Italy; giuseppina.migliore@unipa.it

* Correspondence: jozsef.toth@uni-corvinus.hu (J.T.); giuseppina.rizzo03@unipa.it (G.R.);
Tel.: +36-30-555-9755 (J.T.); +39-320-041-5120 (G.R.)

Abstract: Innovation plays a key role in the success and sustainable development of businesses. The innovation process derives from the combination of personal skills and company resources that influence food company managers in their choices on innovation (the decision-making process). This study is an attempt to try to understand which psychological constructs affect innovation decision-making in the Hungarian food sector, using the empirical data from a 2017 survey conducted in Hungary among the largest food processing companies. Planned behavior theory (TPB) was applied to the study of factors affecting innovation decision-making. Structural Equation Modeling (SEM) was used for data analysis. The results show that the positive attitude of Hungarian food business leaders towards innovation, evaluation of innovation and the strategic intention of placing innovative products and processes on the market have a positive relationship with innovation performance; however, the lack of adequate research skills, plus specific knowledge and skills is hindering the development of the hoped for process.

1. Introduction

In economic theory, innovation is one of the key tools for a company's growth, its access to new markets and its long-term sustainable development [1,2]. Companies, driven by increased competition from global markets and an unprecedented level of interest in sustainable development practices, are trying to implement more advanced sustainability practices and, at the same time, to maintain a high value of the products and services offered through rapid and constant innovation [3–6]. According to Schumpeter [7], innovations are related to the creation of a new product or new qualities of products, the introduction of a new method of production, the opening of a new market, or by introducing a new organizational structure. The entrepreneurship literature recognizes that companies that adopt and develop innovations are more likely to thrive in highly competitive environments [8]. Among these environments, the agri-food sector is certainly among those that have received less attention in the economic literature [9]. Only in the last few decades have innovations in the agri-food sector found space in the international literature [10–16], emphasizing the opportunity to improve the ability of the agri-food companies to move from a traditional production sector focused on raw materials, to an

innovative and consumer-oriented approach [17]. However, what emerges is that innovations adoption is mainly studied in large-size companies of developed economies [18], whereas innovation research on small and medium-sized companies have been substantially neglected [19]. Small and medium-sized food companies represent, in fact, the backbone of the European food industry, and play a primary role in the continent's economic growth [19]. Indeed, these companies rarely have the capability to invest in R&D activities, and heavily rely on external sources of information [20]. Therefore, in these companies, as has been widely recognized in the literature, the ability of entrepreneurs or professional managers plays a key role in companies adopting innovation and, in turn, for defining the company's competitive strategy [11,12]. This implies that, in small and medium-sized food companies, competitiveness and sustainable development requires qualified entrepreneurs, capable of achieving any corporate, environmental or social objectives, together with successful innovative products on the market so as to be able to increase the effectiveness of such innovations [3]. Entrepreneurs or professional managers' ability is considered a very valuable resource for companies because it supports them in competing with other companies in the same sector and to fulfil an effective value creation strategy [21–23]. The recognition of managerial behavior as a determinant factor for the success of companies on the market has a long history, dating back to Schumpeter's seminal work [24,25] who recognized entrepreneurs' characteristics and skills as fundamental for companies. Consequently, it is interesting to understand all the characteristics of those entrepreneurs, or professional managers, who facilitate the adoption of innovation and why some organizations can generate more innovations than others [26,27].

Among the several hypotheses raised by the research, the strategic orientation that emphasizes managerial behavior has been considered an effective way to understand the adoption of innovation by organizations [28]. Having a deeper understanding of this aspect is fundamental for those countries that are highly vulnerable to the challenges of globalization in agricultural markets as they are facing greater difficulties than others to "think outside the box". This challenge is particularly present in some European countries, including those of Central and Eastern Europe, where the small and medium-sized food companies could play a key role in economic growth [29]. For example, the innovation activities of the Hungarian food sector are far below the stage required to be able to strengthen competitiveness, in particular at an international level [30], as evidenced by a low level of innovation policies and, as a consequence, low quantity of implementation of such innovations in food companies. This places Hungary in a position of great disadvantage [31,32] compared to other European countries [33].

As far as we know, very few studies have explored the innovations of small and medium-sized enterprises in the agri-food sector of Hungary and, in particular, the entrepreneurs', or professional managers', psychological characteristics influencing the decision-making process in adopting innovations [30]. Considering the importance of the figure of entrepreneurs in innovation, this study tries to understand which psychological constructs influence the decision-making process of innovation in the Hungarian food sector. To be specific, using the theory of planned behavior—TPB [34], this study highlights how managers' attitude towards innovative products, the evaluation of innovative products and the strategic intention of placing innovative products on the market influence the adoption of the innovations by companies. The findings of this study contribute to a better understanding of the adoption of innovations in Hungarian food processing companies that face competitiveness problems on international markets, thereby enriching the discussion in the international literature relating to the propensity of small and medium-sized food companies to adopt innovations. Furthermore, knowing which psychological constructs or managers' characteristics influence food sector innovations adoption could have important practical implications for both policymakers and other stakeholders of the sector. The role of the decision-maker in regards of innovation is crucial: the greater is his/her interest in improving the company's production, processing, marketing and organization skills, the greater the desire to increase his/her knowledge about the subject intensifying the positivity of the approach used on the decisions about the implementation of innovation [35]. As a result of analyzing the behavioral factors that lie behind this kind of decision, we can uncover substantial interdependencies involved

in the process. The study is structured as follows. First, we introduce the theoretical considerations, which will be followed by the exploration of the hypotheses. The next part concerns the method applied. We then present the results and finally discuss and conclude.

2. Theoretical Framework

A company's propensity to innovate is based on its ability to resist the pressure this process entails and the control it perceives itself to have over the adoption of the innovation [36]. Since the decision to innovate requires decisions to be made based on limited and sometimes demanding tests, it is apparent that whoever has the task of getting the company to innovate may react in a number of different ways, influenced by different objective and subjective variables [37].

Among the existing studies on the innovative behavior of entrepreneurs, the degree of innovation was positively related to entrepreneur training [38], previous experience in the sector [39,40], the degree of risk that the entrepreneur can manage [41], personality traits [42] and self-esteem [43].

Moreover, Shane [44] argued that entrepreneurial innovation depends mainly on psychological factors, such as managerial self-efficacy and good self-esteem. The entrepreneur's innovative behavior is associated with a high commercial return, but also with a high commercial risk. Hence, it follows that entrepreneurs, although possessing high human capital, innovate only if they feel confident that they have what it takes to make it happen [45]. This suggests that innovative companies are led by entrepreneurs with a higher level of trust than those of imitative companies [46] and that human capital is a necessary, but not sufficient, precondition that influences the decisions of entrepreneurs in taking innovative paths. [47]. Some entrepreneurs, despite having good human capital and high opportunity costs, may not take advantage of entrepreneurial opportunities, while those who have good managerial self-efficacy are more likely to innovate [48]. Furthermore, cognitive characteristics, such as higher self-esteem, positively influence innovative behavior at the individual level [49,50].

Although the psychological factors are the ones that most affect the entrepreneur's decisions, as already mentioned, their behavior is also influenced by other factors, such as, for example, the age, education level and gender of the entrepreneur. In particular, the manager's age and years of experience in the sector influence his attitude towards innovations, since whereas new managers are more likely to acquire new technologies or products, those with a longer mandate have less desire to change their working method [51,52]. Furthermore, education appears to play a key role in managers adopting business innovation as new ideas require knowledge [53,54] and therefore educated entrepreneurs are more likely to use complex and diverse approaches [55].

Finally, the predisposition towards innovation is divergent between men and women, since the female subject tends to take on a more collaborative leadership style than their male counterparts, thus distributing the various roles to the competent figures and reducing the risks that innovation entails [56]. Indeed, it has been shown that a company that distributes decision-making responsibility across multiple figures reduces the difficulties arising from the choice to innovate, while increasing the chances of adopting an innovation [26]. In addition to all the variables listed above, most of them subjective in nature, the opportunities for entrepreneurial innovation are objectively influenced by the creation of new technologies, environmental, political and other social trends, such as the culture of a country [57,58].

Given this theoretical view, it is quite complex to identify the behavioral motivations and psychological drivers of food industry decision-makers. Several psychological models have been applied to explain the entrepreneur's decision-making process [59].

In this context, Planned Behavior Theory (TPB) was chosen because, among all the models proposed by the literature, it seemed to us the most complete tool for studying the behavior of entrepreneurs [60]. More specifically, in 1998, Chan [61] proposed a similar TPB model that can be applied collectively, thereby predicting the result of a company adopting innovation. However, he explained that this analogous model must ensure that all critical parameters and the interrelationships parameter are respected. We believe that the model developed for the aforementioned study meets these criteria since

in the literature there are other constructs used at an organizational level, which correspond to those within the TPB and which have been shown to influence the adoption of innovation [34]. The TPB has been widely supported in multiple disciplines [62–65] and has been shown to be suitable for the study of small businesses, as their small-scale decisions tend to be the domain of a single individual [66]; this is the case with the Hungarian agri-food sector, which is characterized by small and medium-sized enterprises. Using the TPB, we investigated the factors that influence the decisions of the subjects of the food industry about their intention to innovate. Indeed, the theory of planned behavior [34] said that attitude represents the most effective predictor of entrepreneurial intention, followed by subjective norms and then perceived behavioral control. Indeed, positive attitude is the belief in one's own ability to perform a given task [67], subjective rules act as a self-regulating mechanism that determines whether individuals will initiate actions [68] and behavioral control is instrumental in determining what individuals do with the capacities and skills they possess [69].

Based on such knowledge, we formulated four hypotheses:

Hypothesis 1. *The positive attitude towards innovative activities positively influences the intention to carry it out.*

Hypothesis 2. *Subjective rules have a positive effect on the intention of innovation.*

Hypothesis 3. *The behavioral control of the business decision maker helps the intention and realization of innovation.*

Hypothesis 4. *The greater the intention to innovate, the greater the innovation.*

3. Research Methods

The needs of the market require Hungarian food processing companies, which want to remain competitive, to continuously develop their dynamic skills for innovation. Companies must continually adopt new strategies and reconfigure their activities based on changing market needs. This way of acting is in line with the preconditions for innovation.

Consequently, we used the data of a survey carried out among Hungarian food processing companies, and in particular, relating to their innovation characteristics (including their behavioral approach to innovation), obtained thanks to a four-year research project which has studied the resilience of the Hungarian food industry.

We wrote an official letter to the managers of 297 food companies, asking them to take part in our survey. We received 152 positive answers out of them. Either the manager him/herself (in case of smaller companies) or a responsible person (who was authorized to provide data from the company) supplied the answers. After the data clearing, 151 companies remained in the sample. Table 1 shows the age and managerial experience of the managers.

Table 1. Summary statistics of age and managerial experiences of managers (years).

	Obs.	Mean	St. Dev.	Min.	Max.
Age of manager	151	53.27	9.49	32	81
Managerial experience of manager	151	18.75	8.76	1	41

Managerial decisions are also influenced by management culture. In this respect it is important to know whether the Hungarian food companies are isolated from the international management culture. For this reason, we have also counted the firms with foreign ownership in the sample (Table 2).

Table 2. Ownership structure of companies.

	Freq.	Percent
Hungarian ownership	117	77.48
Foreign ownership	34	22.52
Total	151	100.00

We can see that almost one-quarter of the firms has foreign owners. This share is rather high (Table 3). As a result, we can suppose that the Hungarian food company managers are influenced by—and align with—international manager standards, including the decision-making process.

Table 3. Summary statistics of foreign ownership (%).

	Obs.	Mean	St. Dev.	Min.	Max.
Foreign ownership share	25 *	86.36	31.38	1	100

* 9 companies out of 34 did not report foreign ownership percentage.

The average turnover of the companies involved was around seven million euros, with an average of 195 employees, in 2016. We have quite high representativeness in the categories of food companies examined (Table 4).

Table 4. Representativeness of the sample.

Total Number of Food Companies in Hungary, 20–250 Employees, 2016 *	803
Company number in sample, 20–250 employees, 2016	132
Representativeness of (20–250) employee category	16%
Total number of food companies in Hungary, 50–250 employees, 2016 *	320
Company number in sample, 50–250 employees, 2016	127
Representativeness of (50–250) employee category	40%

* Source: http://statinfo.ksh.hu/Statinfo.

The whole Hungarian food industry consists of rather micro-, small- and medium-sized companies with very few exceptions (Table 5). The micro category is not covered in this research, because the food produced in this category is devoted mainly for self- and local consumption and the innovation usually is not a result of strategic thinking, but much more that of a contingent action.

Table 5. Number of companies with regard their employees *.

Year	Total	Number of Employees					
		1–4	5–9	10–19	20–49	50–249	>250
2014	6638	4256	841	679	486	309	67
2015	6668	4226	881	678	499	322	62
2016	6622	4208	892	660	483	320	59
2017	6459	4122	861	607	504	302	63

* Source: http://statinfo.ksh.hu/Statinfo.

The number of companies with more than 250 employees is less than one percent. Regarding these circumstances, the innovation decisions are within the very close reach of the general managers, therefore the behavioral characters of the decision-making process are of high importance.

The methodology involved the development of SEM, using Stata 15. SEM is a widely used multivariate multiple dependence technique and one of its main advantages is that it is used to study the relationships between latent constructs (such as attitude, subjective regulations, behavioral control,

intention and innovation) which are indicated by several measures. The model consists in verifying the hypotheses through the multivariate analysis of the structural theory, which identifies the causal relationships between several variables [70].

It is based on multiple regression and integrates path analysis and factor analysis, through two fundamental characteristics:

(a)　creates models of causal processes, through a series of regression equations;
(b)　creates the possibility of using latent variables and takes into account the measurement error.

In line with this, the SEM process focuses on two phases:

(1)　validation of the measurement model—carried out through confirmatory factorial analysis
(2)　adaptation of the structural model—realized through the analysis of the path with latent variables.

In our case, this measurement model was used to identify the factors that create appropriate constructs for "attitude", "subjective norm", "behavioral control", "intention" and "innovation". We then used the latent variables.

The constructs were verified through Cronbach's alpha.

4. Results

4.1. Results—Latent Constructs

Following the methodological design, we developed the latent constructs (Table 6) from the individual variables analyzed. The individual items in the construct were questioned during the survey. All questions of each latent construct were constructed according to Aizen's methodological recommendations [34]. Following his guide proved to be rather efficient because we have experienced unusually high alpha values.

Table 6. Latent constructs.

LC1: Attitude Towards Innovation	
Item	Alpha
It is part of our business policy that we place at least one innovative food product on the market	0.97
For our firm it is desirable to place at least one innovative food product on the market	0.96
To place at least one innovative food product on the market has got an intrinsic value for us	0.96
For us it is profitable to place at least one innovative food product on the market	0.96
To introduce at least one innovative food product on the market is exciting professional challenge for our company	0.97
Test scale	**0.97**
LC2: Subjective norm of performing innovation.	
Item	Alpha
My colleagues whose opinion is important for me think that we need to place at least one innovative food product on the market	0.99
The market requires the introduction of new innovative food product continuously	0.99
My colleagues whose opinion is respected by me think positively about introducing a new innovative food product on the market	0.99
Our most important partners place at least one innovative food product on the market	0.99
The market always awards the introduction of innovative food product on the market	0.99
It is important for me that our company introduces at least one innovative food product on the market for the specific nutrition people	0.99
Our most important competitors introduce at least one innovative food product on the market	0.99

Table 6. *Cont*.

LC2: Subjective norm of performing innovation.	
Item	**Alpha**
Our management think that we have to place at least one innovative food product on the market	0.99
Our management evaluates positively if we introduce at least one innovative food product on the market	0.99
Some specific nutrition people (flour sensitive, high blood sugar, etc.) need to have innovative food products on the market	0.99
Test scale	**0.99**
LC3: Behavioural control of performing innovation	
Item	**Alpha**
We do have enough resources as well as research capacities in order to place at least one innovative food product on the market	0.97
Our company is able to place at least one innovative food product on the market without any difficulties	0.95
We do have enough specific knowledge and skills in order to place at least one innovative food product on the market	0.95
We do have enough external R&D capacities in order to introduce at least one innovative food product on the market	0.97
LC4: Intention of carrying out innovation.	
Item	**Alpha**
For the future we plan to place at least one innovative food product on the market	0.98
We intend to place at least one innovative food product on the market a year	0.97
Next year we try to introduce at least one innovative food product on the market	0.97
Test scale	**0.98**

The high values of Cronbach's alpha both at item and scale level seem to show the high reliability of our items and scales.

4.2. Results—Structural Model

The structural model created highlights the relationship between attitude to innovation, subjective norm of performing innovation, behavioral control of performing innovation and Intention to achieve Innovation.

From Figure 1, we can see that the relationship created is quite complicated: based on the standardized parameters we experience high level of correlation between attitude and subjective norm (0.98), subjective norm and behavioral control (0.84), but there is also a strong connection between attitude and behavioral control (0.85) as well. This is a specific feature of the SEM because it allows the explanatory variables to be correlated in the model. The solution procedure of SEM is that each regression model is solved simultaneously, so the correlation between the variables does not lead to biased results. The standardized parameters confirm that all latent variables (attitude, behavioral norm, behavioral control and intention to innovation) significantly influence the innovation process—each of them is significant at 1% level. In particular, the Attitude variable positively influences the intention, and the same applies in the subjective norm and intention relation. Behavioral control has a double direct influence on intention and innovation. However, the direction of these two effects is exactly the opposite, as while the control abilities of enterprises directly help to formulate innovation, there is an effect that hinders the intention.
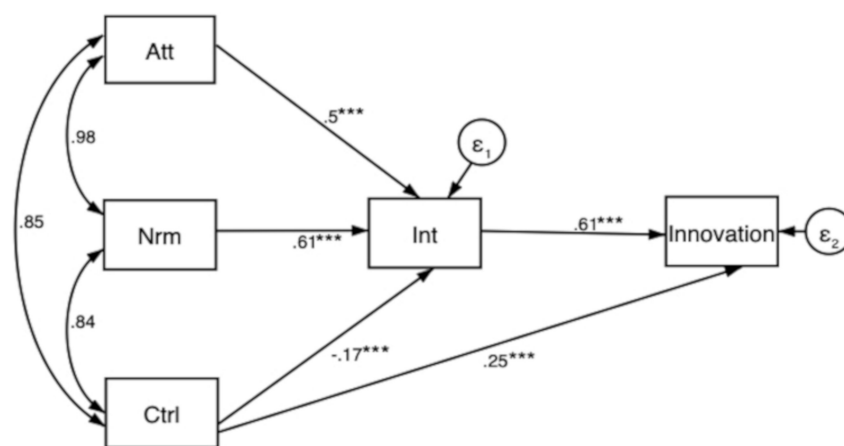
Figure 1. Structure and parameters of TPB. *** Significant at 1% level.

Table 7 shows the fit statistics of the SEM model.

Table 7. Fit statistics of the SEM.

Fit Statistic	Value	Description
Likelihood ratio		
chi2_ms(2)	2.729	Model vs. saturated
$p >$ chi2	0.256	
chi2_bs(7)	572.74	Baseline vs. saturated
$p >$ chi2	0	
Population error		
RMSEA	0.049	Root mean squared error of approximation
90% CI, lower bound	0	
upper bound	0.177	
pclose	0.379	Probability RMSEA <= 0.05
Information criteria		
AIC	1601.9	Akaike's information criterion
BIC	1656.2	Bayesian information criterion
Baseline comparison		
CFI	0.999	Comparative fit index
TLI	0.995	Tucker-Lewis index
Size of residuals		
SRMR	0.005	Standardized root mean squared residual
CD	0.934	Coefficient of determination

The highly significant results prove the validity of theory of planned behavior with empirical data.

5. Discussion and Conclusions

Innovation is closely linked to the company's performance and represents one of the main driving forces for a country's economic and sustainable growth. The ability of a company to innovate has direct consequences on its ability to compete with other companies in the same sector, in a global market. If we consider a company as a complex set of resources, skills and competences, the effect of innovation can be portrayed as an improvement of these skills, making it more competitive and cutting edge.

In this context, analyzing the behavior of entrepreneurs could help understand their attitude towards innovations and therefore their contribution to the development of a country.

This study sought to understand which psychological constructs influence decision-making on innovation in the Hungarian food sector, using empirical data from a 2017 survey conducted in 151

food processing companies. Planned behavior theory (TPB) was applied in order to explore the nature of individual drivers in innovation decision-making, using SEM for analysis. It has been found that TPB effectively explains the development of the decision-making processes and that, in accordance with previous studies [34,71] once more in Hungary, the positive attitude of business leaders towards innovation, the positive evaluation of the innovative products and processes together with the intention to market new products, has a positive relationship with the performance of the innovation.

The current effort to improve quality, the design of the company and the technological conditions is very low [72], confirming our study as 57.5% of the food processing companies indicated that they had no made innovations in the three years preceding the interview. Our analysis confirmed that managers' positive attitude towards innovation directly increases the intention to put into practice more innovation; however, we have seen that this does not happen here.

We see that the direct effect on the intention of innovation is negative, although the direct influence on innovation is positive. This means that the companies studied would like to innovate but believe that their innovative skills are not enough to carry out adequate innovation projects.

The study has important implications in the Hungarian economic field, as it launches a precise message for managers: their ability to adapt to innovation should be radically improved in order to meet the needs and desires of consumers. Furthermore, these results could be a good starting point for policymakers in accompanying and facilitating, through appropriate economic policy measures, Hungarian companies in the adoption of innovations, so as to increase their competitiveness in international agri-food markets. However, despite the importance of our results, the following study shows some limitations. It refers only to the Hungarian market, and the results do not extend to other countries of Central and Eastern Europe, where the agri-food sector plays a crucial role in economic growth.

Even though the study uses the most recent data available (2017), it would be interesting to repeat the analysis with further figures from future studies, to extend our research to other sectors.

We are confident that this would help to understand whether future results collected from other countries will follow the highlighted patterns of this study and/or how the difficulties encountered in innovation have been addressed.

References

1. Sulistyo, H.; Ayuni, S. Competitive advantages of SMEs: The roles of innovation capability, entrepreneurial orientation, and social capital. *Contaduría y Adm.* **2020**, *65*, 156. [CrossRef]
2. Habanabakize, T.; Meyer, D.F.; Oláh, J. The Impact of Productivity, Investment and Real Wages on Employment Absorption Rate in South Africa. *Soc. Sci.* **2019**, *8*, 330. [CrossRef]
3. Schaltegger, S.; Wagner, M. Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Bus. Strategy Environ.* **2011**, *20*, 222–237. [CrossRef]
4. Kim, S.J.; Kim, K.H.; Choi, J. The role of design innovation in understanding purchase behavior of augmented products. *J. Bus. Res.* **2019**, *99*, 354–362. [CrossRef]
5. Artz, K.W.; Norman, P.M.; Hatfield, D.E.; Cardinal, L.B. A longitudinal study of the impact of R&D, patents, and product innovation on firm performance. *J. Prod. Innov. Manag.* **2010**, *27*, 725–740.
6. Rajapathirana, R.J.; Hui, Y. Relationship between innovation capability, innovation type, and firm performance. *J. Innov. Knowl.* **2018**, *3*, 44–55. [CrossRef]

7.　Schumpeter, J.A. Entrepreneurship as Innovation. In *Entrepreneurship*; Swedberg, R., Ed.; Oxford University Press: Oxford, UK, 2000; pp. 51–75.

8.　Ross, R.B.; Westgren, R.E. An agent-based model of entrepreneurial behavior in agri-food markets. *Can. J. Agric. Econ.* **2009**, *57*, 459–480. [CrossRef]

9.　Knudson, W.; Wysocki, A.; Champagne, J.; Peterson, H.C. Entrepreneurship and innovation in the agri-food system. *Am. J. Agric. Econ.* **2004**, *86*, 1330–1336. [CrossRef]

10.　Barth, H.; Ulvenblad, P.O.; Ulvenblad, P. Towards a conceptual framework of sustainable business model innovation in the agri-food sector: A systematic literature review. *Sustainability* **2017**, *9*, 1620. [CrossRef]

11.　Sen, F.K.; Egelhoff, W.G. Innovative capabilities of a firm and the use of technical alliances. *IEEE Trans. Eng. Manag.* **2000**, *47*, 174–183. [CrossRef]

12.　Pitt, M.; Clarke, K. Competing on competence: A knowledge perspective on the management of strategic innovation. *Technol. Anal. Strateg. Manag.* **1999**, *11*, 301–316. [CrossRef]

13.　Hua, S.Y.; Wemmerlov, U. Product change intensity, product advantage, and market performance: An empirical investigation of the PC industry. *J. Prod. Innov. Manag.* **2006**, *23*, 316–329. [CrossRef]

14.　Harwiki, W.; Malet, C. Quintuple helix and innovation on performance of SMEs within ability of SMEs as a mediator variable: A comparative study of creative industry in Indonesia and Spain. *Manag. Sci. Lett.* **2020**, *10*, 1389–1400. [CrossRef]

15.　Domínguez-Escrig, E.; Mallén-Broch, F.F.; Lapiedra-Alcamí, R.; Chiva-Gómez, R. The influence of leaders' stewardship behavior on innovation success: The mediating effect of radical innovation. *J. Bus. Ethics* **2019**, *159*, 849–862. [CrossRef]

16.　Li, R.; Du, Y.F.; Tang, H.J.; Boadu, F.; Xue, M. MNEs' subsidiary HRM practices and firm innovative performance: A tacit knowledge approach. *Sustainability* **2019**, *11*, 1388. [CrossRef]

17.　García-Cortijo, M.C.; Castillo-Valero, J.S.; Carrasco, I. Innovation in rural Spain. What drives innovation in the rural-peripheral areas of southern Europe? *J. Rural Stud.* **2019**, *71*, 114–124. [CrossRef]

18.　Trott, P.; Simms, C. An examination of product innovation in low-and medium-technology industries: Cases from the UK packaged food sector. *Res. Policy* **2017**, *46*, 605–623. [CrossRef]

19.　Avermaete, T.; Viaene, J.; Morgan, E.J.; Pitts, E.; Crawford, N.; Mahon, D. Determinants of product and process innovation in small food manufacturing firms. *Trends Food Sci. Technol.* **2004**, *15*, 474–483. [CrossRef]

20.　Grunert, K.G.; Harmsen, H.; Meulenberg, M.; Traill, B. Innovation in the food sector: A revised framework. In *Products and Process Innovation in the Food Industry*; Springer: Boston, MA, USA, 1997; pp. 213–226.

21.　Aksoy, H. How do innovation culture, marketing innovation and product innovation affect the market performance of small and medium-sized enterprises (SMEs). *Technol. Soc.* **2017**, *51*, 133–141. [CrossRef]

22.　Rosenbusch, N.; Brinckmann, J.; Bausch, A. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. *J. Bus. Ventur.* **2011**, *26*, 441–457. [CrossRef]

23.　Markman, G.D.; Balkin, D.B.; Schjoedt, L. Governing the innovation process in entrepreneurial firms. *J. High Technol. Manag. Res.* **2001**, *12*, 273–293. [CrossRef]

24.　Schumpeter, J.; Backhaus, U. The theory of economic development. In *Joseph Alois Schumpeter*; Springer: Boston, MA, USA, 2003; pp. 61–116.

25.　Schumpeter, J.A. *Capitalism, Socialism and Democracy*; Routledge, Taylor & Francis e-Library: Abingdon, UK, 2013.

26.　Chen, J.S.; Tsou, H.T.; Huang, A.Y.H. Service delivery innovation: Antecedents and impact on firm performance. *J. Serv. Res.* **2009**, *12*, 36–55. [CrossRef]

27.　Guan, J.C.; Yam, R.C.; Mok, C.K.; Ma, N. A study of the relationship between competitiveness and technological innovation capability based on DEA models. *Eur. J. Oper. Res.* **2006**, *170*, 971–986. [CrossRef]

28.　Wagner, M. The links of sustainable competitiveness and innovation with openness and user integration: An empirical analysis. *Int. J. Innov. Sustain. Dev.* **2009**, *4*, 314–329. [CrossRef]

29.　Harms, R.; Reschke, C.H.; Kraus, S.; Fink, M. Antecedents of innovation and growth: Analysing the impact of entrepreneurial orientation and goal-oriented management. *Int. J. Technol. Manag.* **2010**, *52*, 135–152. [CrossRef]

30.　EFOSZ. Hungarian National Association of Food Processors. 2016. Available online: http://www.efosz.hu/prioritasok/versenykepesseg/ (accessed on 8 December 2016).

31.　Caiazza, R.; Richardson, A.; Audretsch, D. Knowledge effects on competitiveness: From firms to regional advantage. *J. Technol. Transf.* **2015**, *40*, 899–909. [CrossRef]

32. Husti, I. General problems related to innovation and its potential in the Hungarian agro-food sector. *Stud. Agric. Econ.* **2009**, *109*, 5–23.

33. Roper, S. Product innovation and small business growth: A comparison of the strategies of German, UK and Irish companies. *Small Bus. Econ.* **1997**, *9*, 523–537. [CrossRef]

34. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]

35. *CIS (2012): Data of Community Innovation Survey of the European Union*; Conducted in Hungary; Eurostat, European Union: Brussels, Belgium, 2012.

36. Unsworth, K.; Sawang, S.; Murray, J.; Norman, P.; Sorbello, T. Understanding innovation adoption: Effects of orientation, pressure and control on adoption intentions. *Int. J. Innov. Manag.* **2012**, *16*, 1250004. [CrossRef]

37. Bernardo, A.; Welch, I. On the evolution of overconfidence and entrepreneurs. *J. Econ. Manag. Strategy* **2001**, *10*, 301–330. [CrossRef]

38. Robson, P.J.; Haugh, H.M.; Obeng, B.A. Entrepreneurship and Innovation in Ghana: Enterprising Africa. *Small Bus. Econ.* **2009**, *32*, 331–350. [CrossRef]

39. Popp, J.; Oláh, J.; Kiss, A.; Temesi, Á.; Fogarassy, C.; Lakner, Z. The socio-economic force field of the creation of short food supply chains in Europe. *J. Food Nutr. Res.* **2018**, *58*, 31–41.

40. Simmons, S.A.; Wiklund, J.; Levie, J. Stigma and Business Failure: Implications for Entrepreneurs' Career Choices. *Small Bus. Econ.* **2014**, *42*, 485–505. [CrossRef]

41. Hsieh, R.M.; Kelley, D.J. The Role of Cognition and Information Access in the Recognition of Innovative Opportunities. *J. Small Bus. Manag.* **2016**, *54*, 297–311. [CrossRef]

42. Marcati, A.; Guido, G.; Peluso, A.M. The Role of SME Entrepreneurs' Innovativeness and Personality in the Adoption of Innovations. *Res. Policy* **2008**, *37*, 1579–1590. [CrossRef]

43. Bayon, M.C.; Lafuente, E.; Vaillant, Y. Human Capital and the Decision to Exploit Innovative Opportunity. *Manag. Decis.* **2016**, *54*, 1615–1632. [CrossRef]

44. Shane, S. Why Encouraging More People to Become Entrepreneurs is Bad Public Policy. *Small Bus. Econ.* **2009**, *33*, 141–149. [CrossRef]

45. Liñán, F.; Urbano, D.; Guerrero, M. Regional Variations in Entrepreneurial Cognitions: Start-up Intentions of University Students in Spain. *Entrep. Reg. Dev.* **2011**, *23*, 187–215. [CrossRef]

46. Koellinger, P. Why are some entrepreneurs more innovative than others? *Small Bus. Econ.* **2008**, *31*, 21. [CrossRef]

47. Li, J.; Qu, J.; Huang, Q. Why are some graduate entrepreneurs more innovative than others? The effect of human capital, psychological factor and entrepreneurial rewards on entrepreneurial innovativeness. *Entrep. Reg. Dev.* **2018**, *30*, 479–501. [CrossRef]

48. Simon, M.; Houghton, S.M. The Relationship between Overconfidence and the Introduction of Risky Products: Evidence from a Field Study. *Acad. Manag. J.* **2003**, *46*, 139.

49. Damanpour, F.; Schneider, M. Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers. *J. Public Adm. Res. Theory* **2009**, *19*, 495–522. [CrossRef]

50. Simon, M.; Houghton, S.M.; Aquino, K. Cognitive Biases, Risk Perception, and Venture Formation: How Individuals Decide to Start Companies. *J. Bus. Ventur.* **2000**, *15*, 113–134. [CrossRef]

51. Damanpour, F.; Schneider, M. Phases of the adoption of innovation in organizations: Effects of environment, organization, and top managers. *Br. J. Manag.* **2006**, *17*, 215–236. [CrossRef]

52. Kearney, R.C.; Feldman, B.M.; Scavo, C.P.F. Reinventing government: City manager attitudes and actions. *Public Adm. Rev.* **2000**, *60*, 535–547. [CrossRef]

53. Tóth, J.; Rizzo, G. Search Strategies in Innovation Networks: The Case of the Hungarian Food Industry. *Sustainability* **2020**, *12*, 1752. [CrossRef]

54. Mumford, M.D. Managing creative people: Strategies and tactics for innovation. *Hum. Resour. Manag. Rev.* **2000**, *10*, 313–355. [CrossRef]

55. Lee, S.H.; Wong, P.K.; Chong, C.L. Human and social capital explanations for R&D outcome. *IEEE Trans. Eng. Manag.* **2005**, *52*, 59–68.

56. Stetler, N.Z. Gender differences in leadership: Current social issues and future organizational implications. *J. Leadersh. Stud.* **2002**, *8*, 88–99.

57. Borsi, B.; Dőry, T. Perception of Multilevel Factors for Entrepreneurial Innovation Success: A Survey of University Students. *Acta Oeconomica* **2020**. (in Press).

58. Eckhardt, J.; Shane, S. Opportunities and entrepreneurship. *J. Manag.* **2003**, *29*, 333–349.

59. Migliore, G.; Schifani, G.; Romeo, P.; Hashem, S.; Cembalo, L. Are farmers in alternative food networks social entrepreneurs? Evidence from a behavioral approach. *J. Agric. Environ. Ethics* **2015**, *28*, 885–902. [CrossRef]

60. Maes, J.; Leroy, H.; Sels, L. Gender differences in entrepreneurial intentions: A TPB multi-group analysis at factor and indicator level. *Eur. Manag. J.* **2014**, *32*, 784–794. [CrossRef]

61. Chan, K. Mass communication and proenvironmental behavior: Waste recycling in Hong Kong. *J. Environ. Manag.* **1998**, *52*, 317–325. [CrossRef]

62. Fishbein, M.; Ajzen, I. *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*; Addison-Wesley: Reading, MA, USA, 1975.

63. Tonglet, M.; Phillips, P.S.; Read, A.D. Using the Theory of Planned Behaviour to investigate the determinants of recycling behaviour: A case study from Brixworth, UK. *Resour. Conserv. Recycl.* **2004**, *41*, 191–214. [CrossRef]

64. Johnston, W.J.; Lewin, J.E. Organizational buying behavior: Toward an integrative framework. *J. Bus. Res.* **1996**, *35*, 1–15. [CrossRef]

65. Thompson, K.E.; Panayiotopoulos, P. Prediciting Behavioural Intention in a Small Business Context. *J. Mark. Pract.* **1999**, *3*, 89–96. [CrossRef]

66. Southey, G. The theories of reasoned action and planned behaviour applied to business decisions: A selective annotated bibliography. *J. New Bus. Ideas Trends* **2011**, *9*, 43–50.

67. Bandura, A.; Freeman, W.H.; Lightsey, R. Self-efficacy: The exercise of control. *Comput. Educ.* **1999**, *67*, 208–218. [CrossRef]

68. Bandura, A. Human agency in social cognitive theory. *Am. Psychol.* **1989**, *44*, 1175. [CrossRef] [PubMed]

69. Yang, J. The theory of planned behavior and prediction of entrepreneurial intention among Chinese undergraduates. *Soc. Behav. Personal. Int. J.* **2013**, *41*, 367–376. [CrossRef]

70. Lei, P.W.; Wu, Q. An NCME Instructional Module on Introduction to Structural Equation Modeling: Issues and Practical Considerations. 2007. Available online: http://ncme.org/linkservid/47EFEB5A-1320-5CAE-6EC90BFDF09AA39E/showMeta/0/ (accessed on 18 April 2013).

71. Verdugo, G.A.B. Innovative Self-concept of Micro-entrepreneurs: Perception of Barriers and Intention to Invest. *BAR-Braz. Adm. Rev.* **2018**, *15*. [CrossRef]

72. Tóth, J.; Torok, A.; Balogh, J.M. Networking theory of innovation in practice A Pan-European overview based on the Community Innovation Survey. In Proceedings of the 30th International Conference of Agricultural Economists, 2018 Conference, Vancouver, BC, Canada, 28 July–2 August 2018.

5.2. Annex 2

Search Strategies in Innovation Networks: the Case of the Hungarian Food Industry

József Tóth [1,2,*] and Giuseppina Rizzo [3,*]

[1] Department of Agricultural Economics and Rural Development, Corvinus University of Budapest, 1093 Budapest, Hungary
[2] Faculty of Economics, Socio-Human Sciences and Engineering, Sapientia Hungarian University of Transylvania, 530104 Miercurea Ciuc, Piața Libertății nr. 1, Romania
[3] Department of Agricultural, Food and Forest Sciences, University of Palermo, 90128 Palermo, Italy; giuseppina.rizzo03@unipa.it
* Correspondence: jozsef.toth@uni-corvinus.hu (J.T.); giuseppina.rizzo03@unipa.it (G.R.); Tel.: +36-30-555-9755 (J.T.); +39-320-041-5120 (G.R.)

Abstract: In the food sector, open innovation has become of particular interest. This paper considers open innovation search strategies in the food and beverages industry and examines the probability of using different innovation sources with respect to the type of innovation. Although the information search for new ideas, tools and solutions in the innovation process regarding the scope and depth is well explored and interpreted in the literature, the probability of using the different sources with respect to type of innovation is rarely investigated. To answer these questions, first a probit, then OLS regression model is adopted, in order to understand the chance of a specific source of information being chosen, and then, to verify how much of these sources are selected in different types of innovation. Findings show that food companies use several kinds of information sources during their product, process, organization and market innovation development processes and apply different sourcing strategies based on innovation type. The study concludes that managers have to take into consideration the type of innovation when they formulate their innovation search strategies. Moreover, if they would like to strive on the European, or even more on the world market, they necessarily have to cooperate with universities and research institutes. Our recommendation for policymakers is that they should encourage the food companies in creation of a viable information network with their business, scientific and professional partners. It is also important that they help the food producers in their continuous innovation activities as well as in expanding their business to European, or even more, to world level.

Keywords: innovation network; innovation sourcing strategy; policy implication; food industry; Hungary

1. Introduction

Innovation is one of the main economic activities that lead the company to organizational success and high results, independently of its size and the sector in which it operates [1]. It brings a positive change within the enterprise and it is led by many factors such as, for example, competition and customer demand. For this reason, every company must adapt its behavior to external demands, in order to maintain or raise the level of its performance [2]. Over time, innovation has also gained interest in the agri-food sector, where the open type of innovation is very much appreciated in the recent decades [3,4]. Open innovation is an effective driving force to promote innovation performance [5,6]. It is based on obtaining technical resources and market information, to increase the company's internal resources, thus improving the original level [7]. It is possible to distinguish

four types of open innovation [8]: product innovation (which concerns a good or a service); process innovation (which involves a new production method); marketing innovation (which refers to a new marketing method, such as changes in product packaging, product promotion or prices); and organizational innovation (which involves improvements in the organization of work or in the company's external relations).

Among the main advantages of open innovation, we can list the improvement of business efficiency [9], which makes late companies keep up with the technological development of the reference market [10]. On the other hand, open innovation can lead the company to a reduction in marginal returns, caused by the time spent on search [11] and by collaborative activities with other entrants or companies [12], which require significant coordination efforts [13].

The openness assumes that firms construct several ties with business, science and professional partners in order to create bi- and multilateral connections for acquiring innovation ideas, making development progress, as well as promoting and marketing new products and services [3,14]. Indeed, companies that want to innovate, can turn to external sources of information for innovation, in order to seek specific knowledge useful for their purpose [15]. In particular, four specific sources of external knowledge sources have been identified in the literature [16], including suppliers [17], customers [18], competitors [19] and universities [20]. Through these relations the in- and outflow of information related to innovation can more efficiently and smoothly be managed [21]. The effectiveness of open innovation activities, as well as creating links with the external environment is now consolidated [22]. It is clear that sourcing needs resources (financial, managerial and specific knowledge) and that each of them competes with other possible uses. This rivalry of resources for recruiting outside information should be explored, as, net of our knowledge, the topic has received scant attention in the existing literature. In addition, using too many information sources can lead to management problems [23]. Consequently, our research question focuses on the information acquiring strategy of the firm. We are interested, from which directions it is appropriate that information arrives to the company and how much information is really needed. Our assumption is that this strategy differs based on the type of innovation. Therefore, the present study positions a double research question: 1. What is the chance that a specific source of information is selected in relation to the type (product, process, organization and market) of the innovation? and, 2. By grouping the sources into three different ones (business, science and professional), how many of them are selected in different types of innovation? In order to answer the two research questions, we use the Community Innovation Survey—2012 Hungary data [24] filtering for the Nace. Rev 10-12 categories (food, beverages and tobacco industries—more precise breakdown is not possible within this database). We apply probit and OLS regression for exploring our answer. Hungary is an interesting case from an innovation point of view, because according to the European Innovation Scoreboard (2017) report [25], Hungary's summarized innovation score is 67.4 against the EU28 average of 102. This implies that the Hungarian economy has got rather serious disadvantages in the EU community. This statement is more pronounced in case of the food industry. From an innovation point of view, food industry is seen as a slow one, which is lagging behind the technology pushed possibilities, but sometimes behind the customers' desires and requirements as well. One possible way of boosting the food economy is, therefore, to speed up the innovation.

The remaining part of this paper is structured as follows: first we shed light on some basic theoretical concepts and empirical findings in the related fields. Next, we introduce our data and methodology. After that, we comprise the results. At the end, we discuss, conclude and draw the limitations of our findings.

2. Theoretical Considerations and Empirical Evidences

Open innovation can be defined as "the use of inflows and outflows of knowledge that improve internal innovation and at the same time widen the markets for the external use of innovation" [26]. It involves the use of multiple internal and external sources, integrating this activity with company resources and exploiting these opportunities through multiple channels [27]. Indeed, based on the theories of inter-organizational knowledge flows and organizational learning, many authors [28–33]

have stated that the use of a limited number of external channels facilitates the performance of the innovative company. This approach refers to the depth of the research strategy [34], according to which the term "depth of open research" indicates from how many intense channels the company gets ideas for innovation.

The incremental nature of innovation is a realistic hypothesis in the case of the food industry, because the fundamental attributes of the food we eat today are only slightly different from what humanity ate a hundred years ago. For this reason, previous researches [e.g., 21,32,35] have shown that organizations that do not use current external knowledge, do not have the means to be effective competitors. Therefore, companies often establish collaborations with other actors in the supply chain, such as suppliers, customers in the public and private sector, competitors, universities, professional and sector associations for self-improvement [1]. Suppliers and industry associations are an important source of knowledge, and collaboration is usually an opportunity to get more information about the competition. At the same time, consumers and universities are valuable sources of knowledge as they know the product better than the manufacturer [36].

However, the increase in external collaborations entails higher costs for the company, while the advantages of this open innovation system may only be observable in the long term [37], connecting this scheme to strategic thinking. The costs of selecting suitable partners are also likely to increase, leading to the need for supplementary resources. In addition, companies must pay attention to balancing external and internal research activities as otherwise, they will have negative consequences for their innovative performance [11] and their costs of coordination, management and control of partner activities involved will increase [38]. Furthermore, in transition to an open research and development system, the company's internal research and development structure requires a fundamental transformation, as its role shifts "from the generation of discovery as a primary activity to the design and integration of systems as a function key" [26].

Open innovation concept has sparked the interest of both academics and practitioners, as illustrated by the multiple studies on this topic. In this vein, many debates have developed in managerial literature and several studies have investigated the innovating company's methods of accessing knowledge from external channels. Although these empirics and theories touch and sometimes describe the different ways of information acquisition for certain types of innovation, they do not develop applicable information search strategies. For illustrating this shortcoming, we summarize the main findings of several papers from the last one and a half decade.

In 2006, Cassiman and Veugelers [39] analyzed complementarity between internal research, development and external knowledge acquisition, suggesting that they are complementary innovation activities, but the degree of complementarity is sensitive to other elements of the firm's strategic environment. In the same year, Emden and colleagues [40] developed the process theory of partner selection for collaboration, using a theory development approach. Laursen and Salter [11] studied the effect of open research strategies with other companies that rely on the product life cycle theory. They used data from the UK's Innovation Survey and found that the more important the innovation is, the deeper the influence of external research on the company's innovative performance will be.

In 2007, Perkmann and Walsh [41] analyzed links between university and industry and they have emphasized how important the collaboration is between companies and the scientific sector. Subsequently, Knudsen [36] analyzed the employment of inter-organizational relationships in product innovation by European manufacturing in the food sector. It appeared that all the companies interviewed had collaborated with at least one other organization in order to increase their production. He also has found that these companies preferred to collaborate with customers, suppliers and competitors rather than with public/private research organizations or consultants, preferably in the phase of initial research rather than during the development of the innovations acquired.

Gumusluoglu and Ilsev [42] found that transformational leadership positively affects organizational innovation in small businesses.

In 2010, Dahlander and Gann [43] studied the advantages and disadvantages of innovation in the procurement and acquisition processes, creating a guideline for the development of the research agenda. In the same year, Zhou and Wu [44] supported the argument that technological capability has an inverted U-shaped relationship with exploration. That is, a high level of technological capability prevents exploratory innovation. Capitanio and co-workers [45] stressed that the ability to build relationships on product markets is a key factor in successfully developing and introducing product innovation.

In 2013, Xiaobao and co-authors [21] analyzed the effect the size of a company has on innovation, using data from a survey of 420 innovative SMEs in China from the point of view of social networks. Garcia Martinez and collaborators [34] studied the impact of companies' open behavior on their performance, considering the breadth and depth of collaboration. Subsequently, Bayona-Saez and colleagues [46] wanted to extend our knowledge on the relationship between open innovation and the company's innovative performance. In particular, the authors aimed to determine whether the benefits of open innovation practices are different for food businesses than for other industries.

Ferraris, Santoro and Dezi [47] verified the positivity of using moderate external knowledge. This means that branches with superior Knowledge Management are more capable of managing external information, improving their innovative performance. Giacosa, Ferraris and Monge [48] in their study concerning an Italian company, stated that the company's competitiveness is the result of a balanced management of innovation and tradition.

In 2019, Török, Tóth and Balogh [49] studied how external impulses and internal knowledge resources influenced the development of innovation in the Hungarian agri-food sector, finding that tacit knowledge is more important than explicit knowledge.

Apparently, there are many studies that take into consideration the different channels of information acquisition and their methods of attainment. Although in the field of open innovation there are different research findings and empirical results, we could get convinced that there were no investigations which linked the type of innovation with the search strategy.

Understanding these dynamics is therefore essential for the development of specific programs for the promotion of each type of innovation.

Table 1 comprises all the studies mentioned in the section.

Table 1. Open innovation publications.

Authors	Year	Title	Aim	Methodology	Findings
Cassiman, B. Veugelers, R.	2006	In search of complementarity in innovation strategy: Internal R&D and external knowledge acquisition.	To analyze complementarity between internal research and external knowledge acquisition,	Empirical methodology.	Development of internal research and acquisition of external knowledge are complementary innovation activities.
Emden, Z., Calantone, R. J. Droge, C.	2006	Collaborating for new product development: Selecting the partner with maximum potential to create value.	To develop a process theory of partner selection for collaborative NPD alliances using a theory development approach.	Narrative analysis.	Development of a new theory of the partner selection process, which envisages relational and strategic alignments as well as technological alignment of the partners.
Laursen, K. Salter, A.	2006	Open for innovation: The role of openness in explaining innovation performance among UK manufacturing firms.	To link search strategy to innovative performance.	Open search strategies that involve the use of a wide range of external actors and sources.	Link between research strategy and innovative performances (wide and deep research is curvilinear and correlated to performance).
Perkmann, M. Walsh, K.	2007	University-industry relationships and open innovation: Towards a research agenda.	To explore the diffusion and characteristics of collaborative relationships between universities and industry.	Literature review.	The organizational dynamics of university-business relations are still poorly explored.
Knudsen, M.P.	2007	The Relative Importance of Interfirm Relationships and Knowledge Transfer for new product development success.	To investigate the nature and relative importance of different types of interfirm relationships for new product development success.	Empirical methodology.	Suppliers and universities are important external sources of knowledge for innovative performance. The combination of suppliers and competitors has had a positive effect on innovative performance.
Gumusluoğlu, L. Ilsev, A.	2009	Transformational Leadership and Organizational Innovation: The Roles of Internal and External Support for Innovation.	To determine whether internal and external support for innovation as contextual conditions influence transformational leadership on organizational innovation.	Hierarchical regression analysis.	Existence of the positive influence of transformational leadership on organizational innovation.
Dahlander, L. Gann, D. M.	2010	How open is innovation?	To clarify the definition of 'openness' as currently used in the literature on open innovation, and to re-conceptualize the idea for future research on the topic.	Combination of bibliographic analysis with a systematic content analysis of the field.	Subdivision between inbound and outbound innovation in pecuniary and non-pecuniary interactions, with relative advantages and disadvantages.
Capitanio, F. Coppola, A. Pascucci, S.	2010	Product and process innovation in the Italian food industry.	To develop an econometric analysis using information from one of the most important national datasets for innovation analysis.	Exploratory analysis.	A determinant to successfully develop and introduce product innovation is the capacity to built relationships on the product markets.

Zheng Zhou, K. Wu, F.	2010	Technological capability, strategic flexibility, and product innovation.	To examine the role of technological capability in product innovation.	Use of a technological capability has curvilinear and differential effects on exploitative and explorative innovations.	Though technological capability fosters exploitation at an accelerating rate, it has an inverted U-shaped relationship with exploration.
Xiaobao, P. Wei, S. Yuzhen, D.	2013	Framework of open innovation in SMEs in an emerging economy: firm characteristics, network openness, and network information.	To propose a network framework by bridging the resource-based view and the social network perspective with their respective emphases on the importance of EM SME innovation capacity.	Structural equation modelling (SEM).	Importance of innovation capacity and innovation barriers for understanding open innovation in EM SMEs.
Garcia M., M. Lazzarotti, V. Manzini, R. Sánchez G., M.	2014	Open innovation strategies in the food and drink industry: determinants and impact on innovation performance.	To examine the determinants of openness and the impact of open behaviors by companies on innovation performance.	Cluster analysis.	Food companies can be grouped into three open innovation modes in terms of an external knowledge search strategy ranging from limited collaboration with traditional partners to a broad and profound openness approach.
Ferraris, A. Santoro, G. Dezi, L.	2017	How MNC's subsidiaries may improve their innovative performance? The role of external sources and knowledge management capabilities.	To explore the effect of knowledge management (KM) practices on the relationship between external research and development (R&D) and innovative performance.	OLS regression analysis.	The authors found positive evidences in favor of a moderator effect of KM.
Giacosa E. Ferraris, A. Monge, F.	2017	How to strengthen the business model of an Italian family food business.	To focus on how a medium-sized company operating in the food sector should strengthen its business model.	OLS regression analysis.	The company's competitiveness is the result of a balanced management of innovation.
Bayona-Saez, C. Cruz-Cázares, C. García-Marco, T.	2017	Open innovation in the food and beverage industry.	To extend our knowledge into the relationship between open innovation and firm innovative performance.	Tobit and Logit models by random effects.	Presence of the classic inverted U-shaped relationship between OI and solid innovative performance for FnB and non-FnB companies.
Török, Á. Tóth, J. Balogh, J. M.	2019	Push or Pull? The nature of innovation process in the Hungarian food SMEs.	To explore how external impetuses and internal knowledge resources influence the innovation development in agri-food industry.	OLS and hurdle regressions.	The use of internal tacit knowledge is significant and relevant in the innovation production process.

3. Data and Empirical Strategy

The empirical analysis in this paper is based on data from Community Innovation Survey (CIS-2012) [24], filtering for the Nace. Rev 10-12 categories (food, beverages and tobacco industries—more detailed breakdown is not possible within this database). We use the openness of firms to European and global markets and continuous innovation activity as control variables. This is because the European food companies are mainly SMEs, and they usually do not have enough resources for doing their own serious R&D activities. However, the openness and past innovation activities force them to be innovative in the present.

This survey covers 6317 Hungarian firms that are distributed across all major sectors of economic activity. Out of them, there are 440 companies which belong to food, beverage and tobacco industries. The questionnaire includes three main sections: general information about the enterprise, type of innovation and source of information.

In particular, we have twelve types of innovation, which are divided into four groups according to the questionnaire (Table 2).

Table 2. Types of innovation.

Type of innovation	Acronym	Group
New or significantly improved goods	INPDGD	Product innovation
New or significantly improved services	INPDSV	
New or significantly improved methods of manufacturing	INPSPD	
New or significantly improved logistics	INPSLG	Process innovation
New or significantly improved supporting activities	INPSSU	
New business practices for organizing procedures	ORGBUP	
New methods of organizing work responsibilities	ORGWKP	Organization innovation
New methods of organizing external relations with other firms	ORGEXR	
Significant changes to the aesthetic design	MKTDGP	
New media or techniques for product promotion	MKTPDP	
New methods for product placement or sales channels	MKTPDL	Marketing innovation
New methods of pricing goods or services	MKTPRI	

In addition, we considered ten sources supporting the innovation activities which, by factor analysis, are being grouped into three major sets: business, science and profession (Table 3).

Table 3. Innovation activities sources.

Information sources of innovation activities	Acronym	Groups
Suppliers of equipment, materials, components, or software	SSUP	
Clients or customers from the private sector	SCLPR	Business
Clients or customers from the public sector	SCLPU	
Competitors or other enterprises in your industry	SCOM	
Consultants and commercial labs	SINS	
Universities or other higher education institutions	SUNI	Science
Government, public or private research institutes	SGMT	
Conferences, trade fairs, exhibitions	SCON	
Scientific journals and trade/technical publications	SJOU	Profession
Professional and industry associations	SPRO	

In order to understand what is the possibility of choosing a specific source of information regarding the type of innovation, and then, to verify how much of a source is selected in different types of innovation, the data collected through the questionnaire were processed in three distinct phases, using the STATA 16.0 integrated statistical software. In the first phase, the descriptive analysis of the data were conducted in order to define the socio-demographic characteristics of the sample; in the second phase, a probit regression was made between source of information, type of innovation and two control variables (ongoing innovation and openness to European and world markets); in the final part, after doing a Factor Analysis in order to group information sources into

three large groups, the three new variables were used as dependent variables for an OLS regression with type of innovation and control variables.

4. Descriptive Statistics

The sample consists of 440 small- and medium-sized Hungarian enterprises, with data from Community Innovation Survey (CIS-2012) [24]. The mean enterprise employed 135.52 people and had a turnover of € 68,594.9. The average of enterprise employees, who in 2012 had a tertiary degree, was 1.657.

Table 4 shows the data set characteristics in terms of turnover, size, and percentage of enterprise employees having a tertiary degree. Table 5 displays the innovation types and *control variables*, and table 6 illustrates the quantity of information sources.

Table 4. Data set characteristics.

Variable	Obs	Mean	Std.Dev.	Min	Max
Turnover (€)	440	68,594.9	178,000	290.407	1,710,000
Size (number of employees)	440	135.523	157.703	10	500
% of tertiary degree*	440	1.657	1.24	0	6

* Categorical variable, 0 = 0%, 1 = 1–4%, 2 = 5–9%, 3 = 10–24%, 4 = 25–49%, 5 = 50–74%, 6 = 75–100%.

Table 5. Innovation Types.

Variable	Obs	Mean	Std.Dev.	Min	Max
Product innovation	440	0.195	0.414	0	2
Process innovation	440	0.166	0.475	0	3
Organizational innovation	440	0.266	0.629	0	3
Market Innovation	440	0.659	1.106	0	4
Openness*	440	0.927	0.845	0	2
Ongoing innovation**	440	0.1	0.3	0	1

* Categorical variable, 0 = Domestic, 1 = European, 2 = world market; ** Dummy variable, 1 = Yes and 0 = No.

Table 6. Information sources.

Variable	Obs	Mean	Std.Dev.	Min	Max
Business	440	0.695	1.363	0	4
Science	440	0.359	0.858	0	3
Professional	440	0.527	1.08	0	3

5. Results

In order to comprise the results, we have used the coefplot [50] procedure of STATA for graphical interpretation. The first six charts show the coefficients of individual information source contingencies (Figures 1–6), while the other six analyze the quantity of information sources applied in innovation activities (Figures 7–12). In all Figures, the horizontal axis shows the value of the estimated parameters, while "*p*" denotes the significance level.

We summarize the probit and OLS coefficients and significances in the Appendix – Table A1.
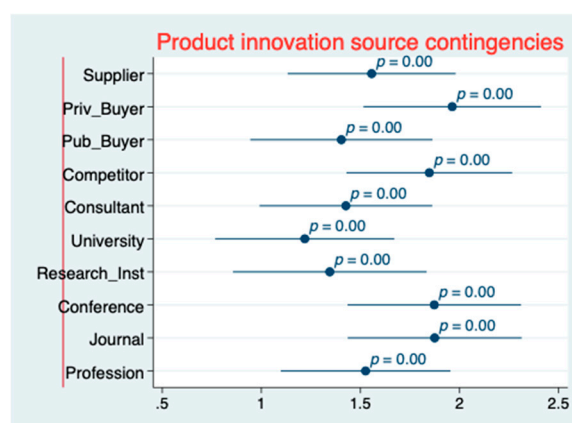
5.1. Information source contingencies

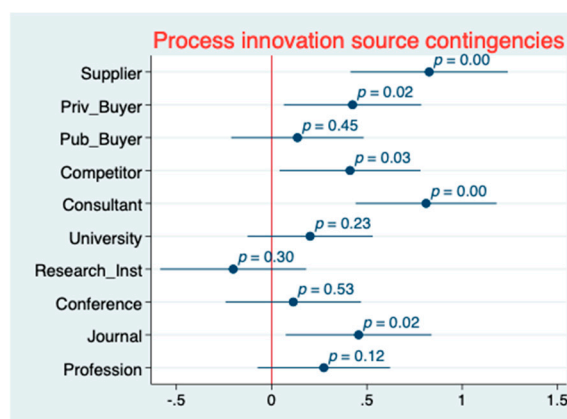**Figure 1.** Product information source contingencies.

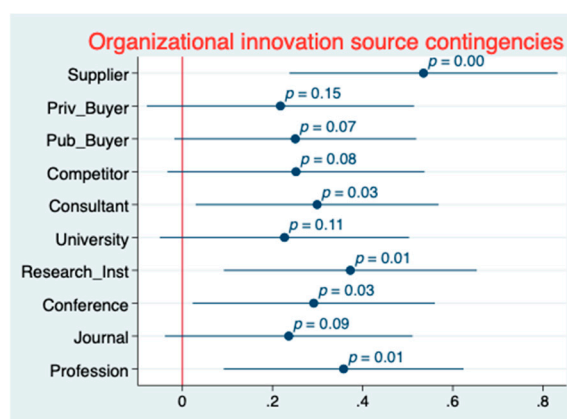**Figure 2.** Process information source contingencies.

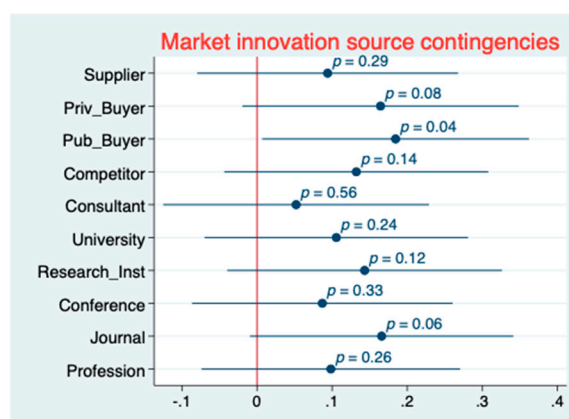**Figure 3.** Organ. information source contingencies.

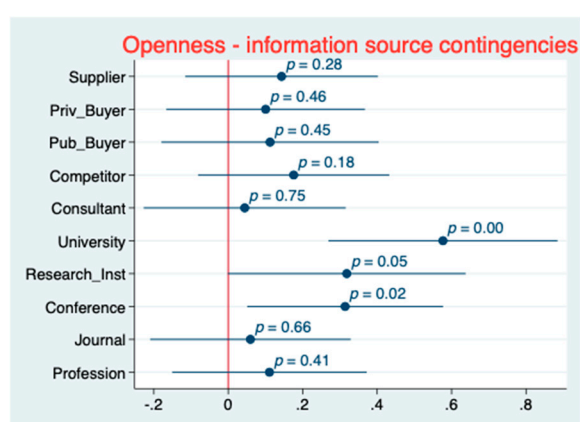**Figure 4.** Market information source contingencies.

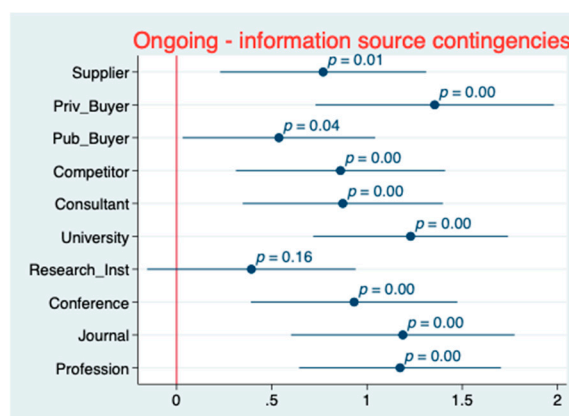**Figure 5.** Openness information source contingencies.

Figure 6. Ongoing information source contingencies.
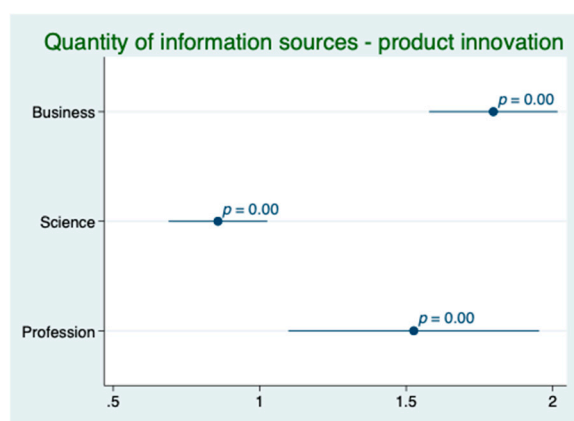
5.2. Quantity of Information Sources

Figure 7. Product innovation.
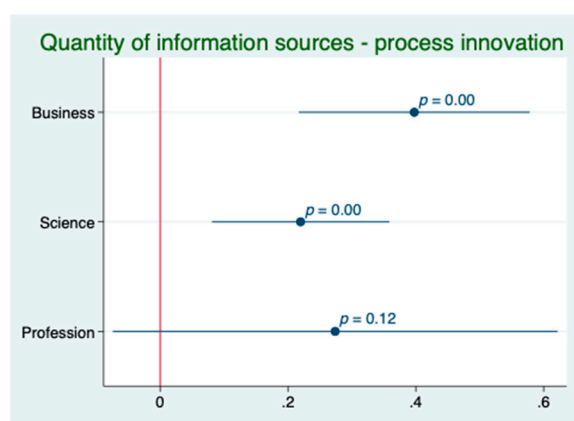
Figure 8. Process innovation.
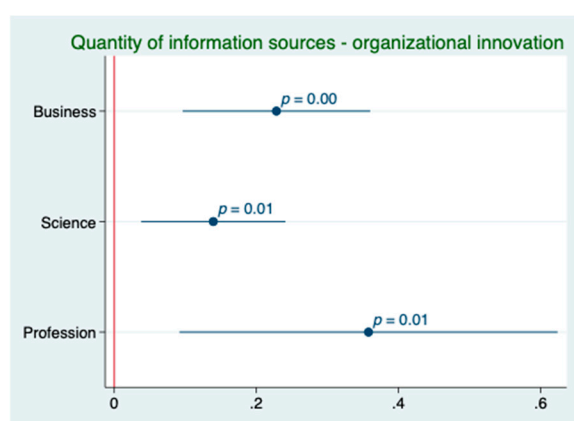
Figure 9. Organizational innovation.
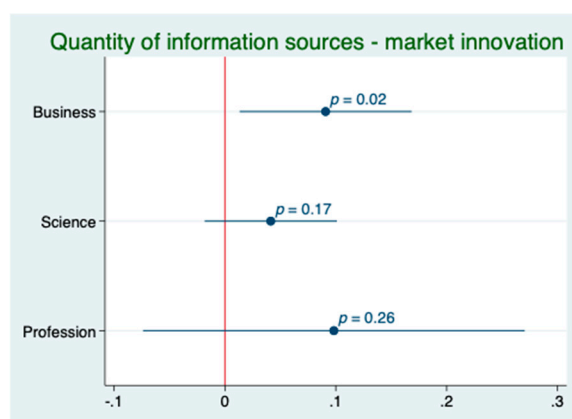
Figure 10. Market innovation.
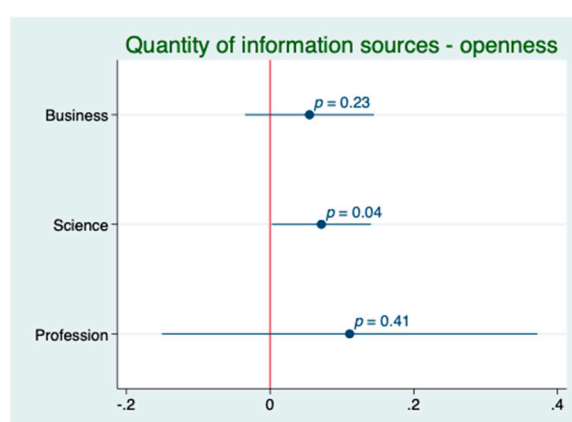
Figure 11. Openness - information   quantity.
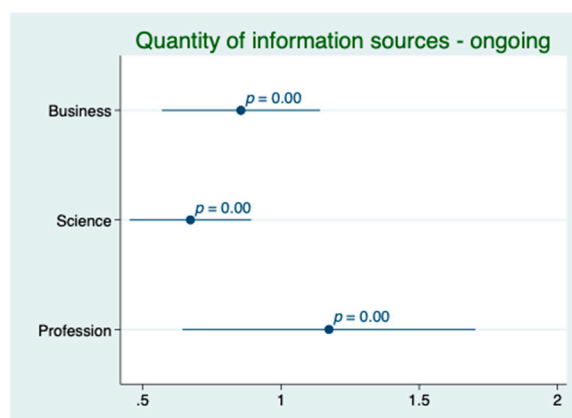
Figure 12. Ongoing – information quantity.

We have explored the role of 10 different information sources in innovation with regard to the Hungarian food and beverage processing companies. Using the CIS 2012 data [24], we have learned that search strategies applied by food companies are greatly different depending on the type of innovation in question. The results can be discussed at two connecting, but distinct layers. First, we evolve the strategy orientation, which relies on whether the chance of being selected is significant in case of the particular information source. Then, we have estimated the number of information sources used by companies in three appropriate groups of sources: business, science and profession, which refers to the quantity of information.

According to these two layers, we can postulate the findings below:

5.3. Strategy Orientation

- For *product* innovators, the chance for an individual innovation source being used in the innovation development process is equally positive and significant for all sources. It is very much in line with the open attribute of innovation which derives basically from the SMS nature of the Hungarian food manufacturing companies.

- For companies concentrating on *process* innovation, mainly business sources (extended with some professional information) have the possibility of becoming information source. These firms do not rely on science.

- *Organizational* innovators orient mainly towards professional sources and some business inputs.

- For *market* innovating firms, the probability of becoming an appropriate innovation information source is given almost exclusively for the information coming from the downstream partners. This is very articulate, because they necessarily need to trust in their buyers' opinion and recommendations.

- Companies with more *openness* to European and world markets align themselves with information for innovation originating from the scientific world. This is because they need to compete with global challenges. Therefore, they have to follow the latest trends, achievements and results of the science in order to sound on the European, or even on the global market.

- Those enterprises, which have been carrying out innovations for a long time, expect new ideas and hints from everywhere to successful completion of the *ongoing* innovation projects. Therefore, any kind of sources—except the research institutes—may become a springboard for innovation.

5.4. Quantity of sources/information

- In case of *product* innovation, each of the sourcing groups are relevant, significant and positive: the more product innovation the firms proceed with, the more sources they use from each of the sourcing partner groups.

- The picture is different with *process* innovation: the application of business and science sources' quantity is positively related to the process innovation. However, the professional sources' connection is not significant.

- The *organizational* innovation shows the same picture as product innovation: positively and significantly relates to each information source group; consequently, the more organizational innovation a company can accomplish, the more sources it acquires from any source group.

- The *market* innovation confirms our previous ascertainment that companies are looking at marketing innovation as a very confidential one, therefore, they are not willing even to consult with their partners, except the business ones.

- The *openness* proves also in this case, that if the firms are more exposed to global market contests, they use more scientific information sources in their innovation process.

- The more *continuous innovation* activity is running within the frame of the company, the more information sources will be applied, independently from the type of information source groups.

6. Discussion and conclusions

In line with Rosa, Chimendes and Amorim [51], we can claim that an open innovation model guides companies towards opportunities in a more interactive way, seeking the integration of knowledge between them. Companies need to innovate constantly, faster and more original than

competing companies [31], and this makes communication, networking and collaboration between knowledge producers and users fundamental [52].

The present study aimed to investigate the probability of using different sources with respect to the type of innovation, since through the analysis of these relationships it is possible to manage the in- and outflow of information related to innovation in a more efficient and easier way [21]. To answer our research questions, Hungary's data on Community Innovation Survey have been used, and probit as well as OLS regressions were applied.

The above examination unequivocally supports our perception of the different nature of innovation source strategies based on the type of innovation. We can derive that food companies in Hungary use different types of sources of innovation during their product, process, organization and market development processes. It has also been shown that at least two different, but connecting layers are formulating the sourcing strategy, namely (a) orientation and (b) quantity decision. Based on the analysis, food companies can compile their search strategies according to the nature of their planned innovation activities. They can also use the results related to open innovating companies: if they want to engage on the European market, or even on the world market, they must necessarily cooperate with universities and research institutes.

Our results follow the footsteps of studies already present in the literature, which have shown that collaboration is a worthy way for improving the innovation capacity of companies [41,53–56].

With regard to product innovation, previous literature argues that collaboration with other external sources plays a fundamental role, provided the resources necessary for business success are not available within the company [57,58]. In addition, our contribution discovers that in this specific case, the more the desired product innovation is, the greater quantity of information from each sourcing group is used.

It happens partly differently for process and organization innovations, where business sources are preferred. In particular, process innovation favors the use of just a few sources, the organizational innovation evolves more or less in the same way as product innovation. These results find their basis of reasoning in the study of Gumusluoglu and Ilsev [42], Dressler and Paunovic [59], Amit and Zott, [60] and Capitanio and colleagues [45], which highlight the importance of external support in organizational and process innovation.

In accordance with Storbacka and Nenonen [61], we finally found that market innovation prefers to turn to a few, mainly downstream sources, as this represents a complex, delicate and confidential division of a company.

A very important aspect to consider in relation to innovation is that of sustainability, too [62,63]. Sustainable partnerships encourage companies to adopt practices that offer environmental, economic and social benefits to their wider communities [64]. Once companies understand that innovating is likely to offer private economic benefits in terms of lower input costs or better business results, they will make the economic decisions to carry them out. However, the community's interest should prioritize those innovation practices with the greatest environmental benefits to improve the overall sustainability [59]. If the Hungarian food companies follow the strategical sourcing recommendations developed in this study, they really can contribute to better economic sustainability of the society, but they are also supposed to prefer those innovations, which have more environmental and social benefits.

We deem this study has important implications for the Hungarian market, which is now struggling to innovate. We suggest to policymakers that it is worth considering support and encouraging companies in their creation and maintaining good networks with commercial, scientific and professional partners in order to help companies' progress for private, social and environmental advantage. It is also important to help companies in continuous innovation activities by different means (e.g., tax reduction). We also believe that our results can help the politics of inspiring food companies to cooperate with their competitors on the world market rather than locally, thus managing to improve innovation adequately.

However, despite the gap-filling nature of our study, there are mainly two limitations that affect the validity of our results. The first is that there is a geographical boundary which should be dissolved

by extending the survey to other countries which are included in the CIS system. The second limitation is given by the time constraint which ought to be reduced. Although the data of CIS 2014 are available, these do not contain data on the sources of information on innovation. It would therefore be interesting to see how the sourcing strategy changes over time. Based on the above, an interesting future research area could be to extend the analysis to other sectors of the economy as well, and make a comparison between "slow" (such as food and agriculture) and "fast"(like IT) industries. Furthermore, it may be useful to make a further comparison with the markets of the more or less developed countries compared to Hungary, to see the significant differences.

Appendix

Table A1. Probit Regression (Information source contingencies)**.**

	Supplier		Private Buyer		Public Buyer		Competitor		Consultant	
	Coef.	*Sig.*	*Coef.*	*Sig.*	*Coef.*	*Sig.*	*Coef.*	*Sig.*	*Coef.*	*Sig.*
Product innovation	1.556	***	1.963	***	1.404	***	1.847	***	1.426	***
Process innovation	0.826	***	0.424	**	0.135		0.411	**	0.810	***
Organizational innovation	0.535	***	0.218		0.251	*	0.252	*	0.299	**
Market innovation	0.094		0.164	*	0.184	**	0.132		0.052	
Openness—information source	0.143		0.100		0.112		0.176		0.044	
Ongoing—information source	0.769	***	1.355	***	0.537	**	0.860	***	0.873	***
CONSTANT	-2.164	***	-2.089	***	-2.517	***	-2.137	***	-2.168	***
Pseudo R²	0.577		0.616		0.454		0.579		0.536	
	University		Research Institutes		Conference		Journal		Profession	
	Coef.	*Sig.*	*Coef.*	*Sig.*	*Coef.*	*Sig.*	*Coef.*	*Sig.*	*Coef.*	*Sig.*
Product innovation	1.219	***	1.345	***	1.872	***	1.874	***	1.526	***
Process innovation	0.202		-0.202		0.114		0.456	**	0.274	
Organizational innovation	0.227		0.373	***	0.291	**	0.236	*	0.358	***
Market innovation	0.106		0.143		0.087		0.166	*	0.098	
Openness—information source	0.577	***	0.318	*	0.314	**	0.060		0.111	
Ongoing—information source	1.229	***	0.393		0.932	***	1.188	***	1.173	***
CONSTANT	-2.873	***	-2.824	***	-2.304	***	-2.155	***	- 2.168	***
Pseudo R²	0.522		0.415		0.556		0.596		0.526	

References

1. Bigliardi, B.; Galati, F. Models of adoption of open innovation within the food industry. *Trends Food Sci. Technol.* **2013**, *13*, 495–522, doi:10.1016/j.tifs.2012.11.001.

2. Damanpour, F.; Schneider, M. Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers. *J. Public Adm. Res. Theory* **2008**, *19*, 495–522, doi:10.1093/jopart/mun021.

3. Van Lancker, J.; Wauters, E.; Van Huylenbroeck, G. Open Innovation in Public Research Institutes—Success and Influencing Factors. *Int. J. Innov. Manag.* **2019**, *19*, 50–64, doi:10.1142/S1363919619500646.

4. Bresciani, S. Open, networked and dynamic innovation in the food and beverage industry. *Br. Food J.* **2017**, *119*, 2290–2293, doi:10.1108/BFJ-08-2017-0458.

5. Caridi-Zahavi, O.; Carmeli, A.; Arazy, O. The influence of CEOs' visionary innovation leadership on the performance of high-technology ventures: The mediating roles of connectivity and knowledge integration. *J. Prod. Innov. Manag.* **2016**, *33*, 356–376, doi:10.1111/jpim.12275.

6. Jin, H.K.; Kim, S.; Kim, K. The Role of Learning Capability in Market-Oriented Firms in the Context of Open. *J. Prod. Innov. Manag.* **2016**, *33*, 356–376.

7. Clauss, T. Measuring business model innovation: Conceptualization, scale development, and proof of performance. *RD Manag.* **2017**, *47*, 385–403, doi:10.1111/radm.12186.

8. Rebelo, J.; Muhr, D. Innovation in wine SMEs: The Douro Boys informal network. *Stud. Agric. Econ.* **2012**, *114*, 111–117.

9. McMillan, G.S.; Mauri, A.; Casey, D.L. The Scientific Openness Decision Model: "Gaming" the Technological and Scientific Outcomes. *Technol. Forecast. Soc. Chang.* **2014**, *86*, 132–142, doi:10.1016/j.techfore.2013.08.021.

10. Chen, Y.; Chen, J. The Influence of Openness to Innovation Performance. *Stud. Sci. Sci.* **2008**, *26*, 419–426, doi:10.1109/ICIII.2011.9.

11. Laursen, K.; Salter, A. Open for Innovation: The Role of Openness in Explaining Innovation Performance among U.K. Manufacturing Firms. *Strateg. Manag. J.* **2006**, *27*, 131–150, doi:10.1002/smj.507.

12. Bader, K.; Enkel, E. Understanding a Firm's Choice for Openness: Strategy as Determinant. *Int. J. Technol. Manag.* **2014**, *66*, 156–182, doi:10.1504/IJTM.2014.064590.

13. Ben Letaifa, S.; Rabeau, Y. Too Close to Collaborate? How Geographic Proximity Could Impede Entrepreneurship and Innovation. *J. Bus. Res.* **2013**, *66*, 2071–2078, doi:10.1016/j.jbusres.2013.02.033.

14. Sun, Y.; Liu, J.; Ding, Y. Analysis of the relationship between open innovation, knowledge management capability and dual innovation. *Technol. Anal. Strateg. Manag.* **2020**, *32*, 15–28, doi:10.1080/09537325.2019.1632431.

15. Albers, A.; Miller, S. Open innovation in the automotive industry. *RD Manag.* **2010**, *40*, 246–255.

16. West, J.; Gallagher, S. Challenges of open innovation: The paradox of firm investment in open-source software. *RD Manag.* **2006**, *36*, 319–331, doi:10.1111/j.1467-9310.2006.00436.x.

17. Schiele, H. Early supplier integration: The dual role of purchasing in new product development. *RD Manag.* **2010**, *40*, 138–153.

18. Grimpe, C.; Sofka, W. Search patterns and absorptive capacity: Low-and high-technology sectors in European countries. *Res. Policy* **2009**, *38*, 495–506.

19. Lim, K.; Chesbrough, H.; Ruan, Y. Open Innovation and Patterns of R&D Competition, Ph.D. Thesis, Institute of Australia Alan Gilbert Building, The University of Melbourne, Parkville, VIC, Australia, 2008.

20. Serrano-Bedia, A.M.; López-Fernández, M.C.; García-Piqueres, G. Complementarity between innovation knowledge sources: Does the innovation performance measure matter? *BRQ Bus. Res. Q.* **2018**, *21*, 53–67.

21. Xiaobao, P.; Wei, S.; Yuzhen, D. Framework of open innovation in SMEs in an emerging economy: Firm characteristics, network openness, and network information. *Int. J. Technol. Manag.* **2013**, *62*, 223–225.

22. Menrad, K. Innovations in the food industry in Germany. *Res. Policy* **2004**, *33*, 845–878, doi:10.1016/j.respol.2004.01.012.

23. Franke, N.; Lüthje, C. User Innovation Oxford Research Encyclopedia, Business And Management: Oxford University Press USA. In *Oxford Research Encyclopedia of Business and Management*; 2020.

24. *CIS (2012): Data of Community Innovation Survey of the European Union. Conducted in Hungary*; Eurostat, European Union: Brussels, Belgium, 2012.

25. Rethinking the European Innovation Scoreboard. A New Methodology. 2017. Available online: http:/www.merit-unimass.nl (accessed on 25.11.2019).

26. Chesbrough, H.; Vanhaverbeke, W.; West, J. *Open Innovation: Researching a New Paradigm*; Oxford University Press on Demand: Oxford, UK, 2006.

27. de Oliveira, R.T.; Indulska, M.; Steen, J.; Verreynne, M.L. Towards a framework for innovation in retailing through social media. *J. Retail. Consum. Serv.* **2019**, doi:10.1016/j.jretconser.2019.01.017.

28. Habanabakize, T.; Meyer, D.F.; Oláh, J. The Impact of Productivity, Investment and Real Wages on Employment Absorption Rate in South Africa. *Soc. Sci.* **2019**, *8*, 330, doi:10.3390/socsci8120330.

29. Kiss, A.; Popp, J.; Oláh, J.; Lakner, Z. The Reform of School Catering in Hungary: Anatomy of a Health-Education Attempt. *Nutrients* **2019**, *11*, 716.

30. Popp, J.; Oláh, J.; Kiss, A.; Temesi, Á.; Fogarassy, C.; Lakner, Z. The socio-economic force field of the creation of short food supply chains in Europe. *J. Food Nutr. Res.* **2018**, *58*, 31–41.

31. Henttonen, K.; Ritala, P. Search far and deep: Focus of open search strategy as driver of firm's innovation performance. *Int. J. Innov. Manag.* **2013**, *17*, 134–146, doi:10.1142/S1363919613400070.

32. Chen, J.; Chen, Y.; Vanhaverbeke, W. The influence of scope, depth, and orientation of external technology sources on the innovative performance of Chinese firms. *Technovation* **2011**, *31*, 362–373, doi:10.1016/j.technovation.2011.03.002.

33. Chiang, Y.H.; Hung, K.P. Exploring open search strategies and perceived in- novation performance from the perspective of inter-organizational knowledge flows. *RD Manag.* **2010**, *40*, 292–299, doi:10.1111/j.1467-9310.2010.00588.x.

34. Garcia Martinez, M.; Lazzarotti, V.; Manzini, R.; Sánchez García, M. Open innovation strategies in the food and drink industry: Determinants and impact on innovation performance. *Int. J. Technol. Manag.* **2014**, *66*, 2012–2242, doi:10.1002/agr.21347.

35. Desouza, K.C.; Awazu, Y.; Jasimuddin, S. Utilizing external sources of knowledge. *KM Rev.* **2005**, *8*, 16–19.

36. Knudsen, M.P. The relative importance of interfirm relationships and knowledge transfer for new product development success. *J. Prod. Innov. Manag.* **2007**, *24*, 117–138, doi:10.1111/j.1540-5885.2007.00238.x.

37. Ardito, L.; Messeni Petruzzelli, A.; Albino, V. Investigating the antecedents of general purpose technologies: A patent perspective in the green energy field. *J. Eng. Technol. Manag.* **2016**, *39*, 81–100.

38. Gulati, R.; Singh, H. The architecture of cooperation: Managing coordination costs and appropriation concerns in strategic alliances. *Adm. Sci. Q.* **1998**, *43*, 781–814.

39. Cassiman, B.; Veugelers, R. In search of complementarity in innovation strategy: Internal R&D and external knowledge acquisition. *Manag. Sci.* **2006**, *52*, 68–82, doi:10.1287/mnsc.1050.0470.

40. Emden, Z.; Calantone, R.J.; Droge, C. Collaborating for new product development: Selecting the partner with maximum potential to create value. *J. Prod. Innov. Manag.* **2006**, *23*, 330–341, doi:10.1111/j.1540-5885.2006.00205.x.

41. Perkmann, M.; Walsh, K. University–industry relationships and open innovation: Towards a research agenda. *Int. J. Manag. Rev.* **2007**, *9*, 259–280, doi:10.1111/j.1468-2370.2007.00225.x.

42. Gumusluoğlu, L.; Ilsev, A. Transformational leadership and organizational innovation: The roles of internal and external support for innovation. *J. Prod. Innov. Manag.* **2009**, *26*, 264–277.

43. Dahlander, L.; Gann, D.M. How open is innovation? *Res. Policy* **2010**, *39*, 699–709, doi:10.1111/radm.12186.

44. Zhou, K.Z.; Wu, F. Technological capability, strategic flexibility, and product innovation. *Strateg. Manag. J.* **2009**, doi:10.1002/smj.830.

45. Capitanio, F.; Coppola, A.; Pascucci, S. Product and process innovation in the Italian food industry. *Agribusiness* **2010**, *26*, 503–518, doi:10.1002/agr.20239.

46. Bayona-Saez, C.; Cruz-Cázares, C.; García-Marco, T. Open innovation in the food and beverage industry. *Manag. Decis.* **2017**, *55*, 526–546, doi:10.1108/MD-04-2016-0213.

47. Ferraris, A.; Santoro, G.; Dezi, L. How MNC's subsidiaries may improve their innovative performance? The role of external sources and knowledge management capabilities. *J. Knowl. Manag.* **2017**, *21*, 540–552.

48. Giacosa, E.; Ferraris, A.; Monge, F. How to strengthen the business model of an Italian family food business. *Br. Food J.* **2017**, *119*, 2309–2324.

49. Török, Á.; Tóth, J.; Balogh, J.M. Push or Pull? The nature of innovation process in the Hungarian food SMEs. *J. Innov. Knowl.* **2019**, *4*, 234–239, doi:10.1016/j.jik.2018.03.007.

50. Jann, B. Plotting regression coefficients and other estimates. *Stata J.* **2014**, *14*, 708–737.

51. Rosa, A.C.M.; Chimendes, V.C.G.; Amorim, G.F. Measuring open innovation practices in small companies at important Brazilian industrial centers. *Technol. Forecast. Soc. Chang.* **2020**, *151*, 119805, doi:10.1016/j.techfore.2019.119805.

52. Nieto, M.J.; Santamaría, L. The importance of diverse collaborative networks for the novelty of product innovation. *Technovation* **2007**, *27*, 367–377.

53. Miotti, L.; Sachwald, F. Co-operative R&D: Why and with whom? An integrated framework of analysis. *Res. Policy* **2003**, *32*, 1481–1499.

54. Becker, W.; Dietz, J. R&D cooperation and innovation activities of firms—evidence for the German manufacturing industry. *Res. Policy* **2004**, *33*, 209–223.

55. Faems, D.; Van Looy, B.; Debackere, K. Interorganizational collaboration and innovation: Toward a portfolio approach. *J. Prod. Innov. Manag.* **2005**, *22*, 238–250.

56. Rybnicek, R.; Königsgruber, R.J. What makes industry–university collaboration succeed? A systematic review of the literature. *J. Bus. Econ.* **2019**, *89*, 221, doi:10.1007/s11573-018-0916-6.

57. Belderbos, R.; Carree, M.; Lokshin, B. Cooperative R&D and firm performance. *Res. Policy* **2004**, *33*, 1477–1492.

58. Das, T.K.; Teng, B.S. A resource-based theory of strategic alliances. *J. Manag.* **2000**, *26*, 31–61.

59. Dressler, M.; Paunovic, I. Towards a conceptual framework for sustainable business models in the food & beverage industry: The case of German wineries. *Br. Food J.* **2019**, doi:10.1108/BFJ-03-2019-0214.

60. Amit, R.; Zott, C. Creating value through business model innovation. *MIT Sloan Manag. Rev.* **2012**, *12*, 140–151.

61. Storbacka, K.; Nenonen, S. Learning with the market: Facilitating market innovation. *Ind. Mark. Manag.* **2015**, *44*, 73–82.

62. Lubell, M.; Fulton, A. Local policy networks and agricultural watershed management. *J. Public Adm. Res. Theory* **2008**, *18*, 673–696, doi:10.1093/jopart/mum031.

63. Wejnert, B. Integrating models of diffusion of innovations: A conceptual framework. *Annu. Rev. Sociol.* **2002**, *28*, 297–326, doi:10.1146/annurev.soc.28.110601.141051.

64. Lubell, M.; Hillis, V.; Hoffman, M. Innovation, cooperation, and the perceived benefits and costs of sustainable agriculture practices. *Ecol. Soc.* **2011**, *16*, 296–310.

5.3. Annex 3

Label Style and Color Contribution to Explain Market Price Difference in Italian Red Wines Sold in the Chinese Wine Market

Antonino Galati, Salvatore Tinervia, Antonio Tulone, Maria Crescimanno & Giuseppina Rizzo

Published online: 27 Nov 2017.

Submit your article to this journal 🗗

Article views: 18

View related articles 🗗

View Crossmark data 🗗

Routledge
Taylor & Francis Group

Check for updates

Label Style and Color Contribution to Explain Market Price Difference in Italian Red Wines Sold in the Chinese Wine Market

Antonino Galati, Salvatore Tinervia, Antonio Tulone, Maria Crescimanno, and Giuseppina Rizzo

Department of Agricultural, Food and Forest Sciences, Università degli Studi di Palermo, Palermo, Italy

ABSTRACT

This study employs a hedonic price methodology to investigate the implicit price of individual labelling characteristics of Italian red wines sold in the Chinese market. Our results highlight the most important quality attributes (extrinsic and intrinsic) given in the label capable to explain price difference. In particular, reveal significant premium price for wine origin, identified in particular through the DOC/DOCG appellation given in the label, and for clean labels or labels with particular designs. On the contrary, a price discount has been revealed for Italian wines produced with local grape varieties and with a label characterised by warm colors. These results, partly in disagreement with other empirical evidence, contribute to enrich the existing literature in this field by providing useful suggestions both to the producers and other stakeholders operating in the wine industry.

Introduction

In recent years, the increasing competition in the world market place, as a results of internationalization process and the deep changes in the supply and demand, has pushed firms to develop innovative solutions to remain competitive and survive in the global and domestic markets. In this scenario, packaging, and labeling have become important integrative marketing tools, increasingly recognized among managers, especially within the wide range of "consumer good" (Rundh, 2009; Rundh, 2013). While in the past the role of packaging and labeling was exclusively related to the protection of the product and to provide information, in recent years they have taken on an ever more commercial role concerning different requirements for marketing communication. Consequently, many businessmen have recognized the importance to have a good packaging and not just a good product, both to differentiate the offered products than those of competitors (Rundh, 2009), and reduce the information asymmetry. As argued by van Trijp, Hoyer, and Inman (1996), a quality label

assists the imperfectly informed consumers in their purchasing decision because it structures their information environment, and transforms quality aspects from credence to search attributes (Fotopoulos & Krystallis, 2003).

Despite the fact that packaging and labeling have become a strategic marketing tool for firms to compete in the business environment, very few studies have been performed in the marketing literature to explore the relative effect of extrinsic cues on product evaluation when multiple attributes such as brand, labeling, packaging and price are existent.

With the aim to fill this gap, this study explores, by recourse to a hedonic price model, the implicit price of quality cues of Italian red wines sold in the Chinese wine market. In particular, we consider alongside the traditional attributes related to the information given in the label, also labeling characteristics as extrinsic and intrinsic quality cues capable to explain the price differences.

Wine has been chosen as a suitable product for this study, due to its specificity, high recognition, and total value, which is the result of a wide range of intrinsic and extrinsic quality attributes (Carew & Florkowski, 2010; Corsi & Strøm, 2013; Olson & Jacoby, 1972). As extrinsic quality cue, wine packaging is, among others, an important communication tool used both by producers, to transfer the brand identity and the product value to customers, and by consumers to obtain information about products (de Luca & Penco, 2006). Into the wine packaging, it is possible to identify four interrelated components such as wine label (design, color, logo, and information), bottle shape and color, and type of closure (Barber & Almanza, 2006).

The interest for the Chinese market is tied to a positive dynamic of the wine market and in particular of the wine consumption. According to the *Organisation Internationale de la Vigne et du Vin* data (OIV), in the world wine market, China has recorded in the last decades the fastest growing. Even though the total vineyard area of the China is now the second largest in the world, experiencing a growth from 2006 to 2015 of more than 86.0% (OIV, 2016), only 10% are for wine production (Li and Bardaji, 2017). The most interesting data refers to the exponential growth of wine consumption that shifts in ten years from 13.2 million of hectoliters to 16 million of hectoliters. The stagnation of wine production and the increase in consumption level have led to a rise in imports with an average annual growth of 38.5%. China today is the world's fifth largest wine importer in terms of volumes (5.6 million of hl in 2015) and the fourth in terms of value (1.8 billion of euros). The growing interest of Chinese people in drinking wine are linked to different factors, among which the general improvement of the Chinese living standard over the past decades that, on the one hand, has caused a rise in consumption and changing in eating and drinking habits with a specific emphasis toward health aspects and, on the other hand, has encouraged international suppliers to export wine to China (Mitry, Smith, & Jenster, 2009). This change was

supported mainly by the increased efforts of producers, importers and distributors that have altered consumer behavior by favoring healthier red wine consumption as opposed to the traditional beverages, and by the Chinese government policies that have encouraged the grape wine consumption also to free up more grain for food production (Corsi, Marinelli, & Sottini, 2013; Masset, Weisskopf, Faye, & Le Fur, 2016; Thorpe, 2009). Among Chinese trading partners, Italy is the fifth largest supplier of China. According to UN Comtrade data, Italian wine export in the Chinese market increased in then years, from 2007 to 2016, of 5.5 times, showing an increasing appreciation of Italian wines among Chinese consumers (UN Comtrade, 2017). The increasing competition of bottled wine in the Chinese market is tied to a sustained growth in the consumption of premium and super premium wines thanks to consumers who have worked abroad or a foreign workers resident in China (Corsi, Marinelli, & Sottini, 2013; Crescimanno & Galati, 2014)

Taking into account the increase of the wine consumption in China and the potential further expansion, a better understanding of the main attributes affecting the choice of wine is required. The knowledge of the implicit price of intrinsic and extrinsic quality attributes has important implications in particular for a relative young market with a different culture compared to other countries.

The paper is organized as follows. The next section presents a detailed analysis of the literature review regarding the influence on the consumers purchasing decisions of intrinsic and extrinsic attributes, followed by an analysis of the use of hedonic price method in the wine sector. The methodological approach is reported in the third section. The results are presented and discussed in the fourth section. Concluding remarks are presented in the end section.

Literature review

The profound changes in the eating and drinking habits, lead a growing interest of researchers and practitioners on the impact of quality attributes (intrinsic and extrinsic), among which visual elements that characterize wine packaging and label, on the wine choice. The intrinsic cues are product-related attributes that cannot be manipulated without altering the product's physical properties (Richardson, Dick, & Jain, 1994), such as grape variety, taste, texture, aroma, producer, vintage, alcohol degree, and wine style. The extrinsic cues, instead, include attributes such as price, brand and packaging style that, even if are not part of the product itself inasmuch are controlled by marketers, and are, in many cases, used as proxies for the intrinsic nature of the product being evaluated (Lockshin & Rhodus, 1993; Quester & Smart, 1996). Barber and Almanza (2006) in their study on the US wine market confirm the idea that consumers are not indifferent to the wine packaging during the decision making process inasmuch they ascribe particular importance to the image, and

color of front label, as well as, to the overall packaging (closure, color, and shape of bottles). Indeed, consumers derive the perceived value of a product not exclusively by intrinsic quality attributes, related to the physical aspects of a product, but also from a set of intangible elements contained in packaging and labeling, like information and brand name. Packaging and labeling, like price and origin, can be considered as quality cues related to the consumer expectation, able to affect the purchasing decision-making process.

Some authors have focused on the wine labels design and its effect on the consumers' purchase decision, showing different results in relation to the reference market and other socio-demographic characteristics. Boudreaux and Palmer (2007) found that among the elements of wine label design, the illustration used on the label, color and layout, had the greatest effect on the American consumers' choice. Specifically, consumers show a greater preference for labels with traditional/full-color layout and with grape motifs. For New Zealand consumers, instead, labels with château symbol and a sophisticated headline are more appreciated (Jarvis, Mueller, & Chiong, 2010). A similar result has been obtained by Celhay and Passebois (2011) in the French market where the preferred wines are those with the most traditional labels in which a château is depicted and characterized by a dominant white color, letters in black or burgundy, typography containing both upper-case characters and cursive script, and centered layout.

Taking into account that visual elements can affect the purchase of a bottle of wine, Laeng, Suegami, and Aminihajibashi (2016), using a novel approach based on the monitoring of eyes fixation and the measure of changes of the eyes' pupil diameters of consumers during the observation of wine labels, find that consumers prefer wine bottles with label characterized by pictorial elements rather than verbal information, confirming their relevant importance.

An interesting aspect that emerges from empirical studies is the association between the label color and the consumers' flavor expectations. In light of the findings of Lick, König, Kpossa, & Buller (2017) emerges a relationship between color of wine label and expectations of flavor and formation of flavor profiles, created by images, and by the others cues such as brand, vintage, and grape variety. Generally, consumers' experience in the label colors, at the physiological and cultural level, gives involuntary reactions which influence consumers' wine choice.

Furthermore, label design can influence the purchasing decision also in according to the purchase purpose. Sherman and Tuten (2011) found that consumers base their buying choice on the type of wine and the wine vintner, mainly, when they consume the product alone at home, while they take the label design and brand name into consideration when wine is purchased to make a gift. Other authors emphasize the association between label design and age of consumers. In this respect Elliot and Barth (2012) and Henley, Fowler, Yuan, Stout, and Goh (2011) found that the attributes of label design are significantly

more important to millennials wine consumers than intrinsic factors of product. In particular, younger wine consumers give more importance to the images, the color and the design layout, rather than to the other product characteristics, such as the producer's name or the Country Of Origin (COO).

The choice of a bottle of wine is a particularly difficult decision, especially when wine drinkers have a little knowledge and experience, as Chinese wine consumers. In this case, consumers can use one or more sources of information to evaluate the wines, among which wine guides, reviews, advertising, point of sale materials, and labels (Barber & Almanza, 2006; Chaney, 2000; Sherman & Tuten, 2011). With regard to the latter and as previously emphasized, information given in the label and its design, as extrinsic and intrinsic cues, can exert a relevant influence on the decision-making process.

With specific reference to the intrinsic cues given in the label, several authors (Balestrini & Gamble, 2006; Hu, Li, Xie, & Zhou, 2008; Li, Hu, & Zhuo, 2006; Tang, Tchetchik, & Cohen, 2015) found that Country Of Origin (COO) is the most important information for wine quality assessment and the most influencing attribute affecting the decision making process and the wine choice of Chinese consumers. In addition, Agnoli, Capitello, and Begalli (2014) emphasize that beyond the COO information, Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI), as geographical brands, exert a relevant influence on the consumers' choice of foreign wines in the Chinese market. Chinese consumers, as founded by Tang, Tchetchik, and Cohen (2015) also pay a special attention to the grape variety that is the second most important attribute able to influence the wine preference. A similar results is obtained by Lockshin, Corsi, Cohen, Lee and Williamson (2017) which found a greater appreciation of Chinese people living in the major cities (Shanghai, Guangzhou, and Chengdu) for international varieties such as Cabernet Sauvignon, Ruby Cabernet and Riesling. On the contrary, Williamson, Lockshin, Francis, and Mueller Loose (2016) reveal a low influence of grape variety on consumer choice of wine bottle. With specific reference to the alcohol contents, empirical evidences differ. Indeed, if on the one hand Liu and Murphy (2007) found that Chinese consumers prefer wine containing less alcohol, on the other hand Liu, McCarthy, Chen, Guo, and Song (2014) highlight that Chinese consumers, and in particular the older consumers, drink wine with a high level of alcohol.

Alongside the traditional attributes such as wine origin, grape variety, and brand name, consumers are guided in their wine purchasing decision by the label design and color, as extrinsic cues (Tang, Tchetchik, & Cohen, 2015). In particular, as found by Tang, Tchetchik, and Cohen (2015) traditional labels with château are the most appreciated among Chinese consumers, who also pay attention to the modern and contemporary labels. Furthermore, in terms of label color, there is a greater prevalence of consumers that they prefer red label, a color traditionally linked to luck, rather than yellow, black, or white.

The latter results is in line with the findings of Convey (2011) according to which Chinese consumers prefer burgundy red, black and white labels, than blue, green, yellow and orange color.

Implicit price for extrinsic quality wine attributes

As already stated, quality wine is the result of a wide range of quality attributes, extrinsic and intrinsic, that can affect the satisfaction and, consequently, the consumer's loyalty. The hedonic price method allows, through a regression-based approach, to explain the price of products as a function of its attributes, describing consumers' marginal utility associated with each of theme (Boatto, Defrancesco, & Trestini, 2011). The core implication of the hedonic hypothesis is that the utility of the consumers depends on the underlying attributes and not on the good purchased (Fogarty, 2006). Since the first study of Waugh (1928), who study the influence of specific characteristics of asparagus (color, size of stalks, and uniformity of spears) on his price in the Boston market, a considerable number of studies applied the hedonic price method to differentiated food and agricultural products, among which the wine, to explain the price of the product as a function of specific attributes. The sum of the implicit prices, interpreted as a willingness to pay at the margin of consumers in each of these attributes, creates the market price of a given product.

With specific regard to wine, numerous studies analyze the influence of the combined effect of intrinsic and extrinsic quality attributes on the final price. However, consumers' difficulty to know intrinsic characteristics of the wine (visual, olfactory, and gustatory characteristics) at the time of purchase has fueled a growing interest of scholars on the influence of attributes observed by consumers on the label (variety, appellation, vintage, labeling characteristics). Combris, Lecocq, and Visser (1997) in their analysis of Bordeaux wine price considered simultaneously both the objective characteristics appearing on the label of the bottle (vintage year, the name of the chateau, the eventual ranking of the wine, etc.), and the sensory characteristics. Their findings indicate that the market price of Bordeaux wine can be explained primarily by the objective characteristics appearing on the label of the bottle. However, as emphasized by Brentari, Levaggi, and Zuccolotto (2011), the effect of intrinsic and extrinsic quality attributes on the final price is different in relation to the place of purchase. Indeed, in the large-scale retail trade the wine price depend mainly on the label characteristics, while in wine shop, sensory characteristics assume a greater influence. Other studies exclude the technical characteristics of the wines (such as the sugar content or acidity of the grapes, observed in other studies) little known to the majority of consumers. This is the case of the study performed by Morilla Critz and Martinez Valderrama (2002) that shows that ageing, denomination and variety are the most influential

attributes capable to explain the price difference. The explanatory power of attributes observed by consumers on the label (color, variety, appellation, vintage, etc.) was also analyzed by Steiner studying French and Australian wines sold in the UK market (Steiner, 2004a, 2004b). The results of these studies show a premium price for the attribute "aging", for wines produced in a specific areas of production (Côte de Beaune for French wines and Coonawarra for those Australians), with certain grape varieties (Muscat for French wines and Pinot Noir for those Australians) and sold in supermarket chains. These results have been corroborated in subsequent studies according to which the region of origin, which incorporated the concept of appellation, and grape variety are search attributes which explain most of the wine price differences (Defrancesco, Estrella Orrego, & Gennari, 2012; Florkowski, Carew, & Senhui, 2008; Galati, Crescimanno, Abbruzzo, Chironi, & Tinervia, 2017; Galati, Crescimanno, & Tinervia, 2017; Roma, Di Martino, & Perrone, 2013; Troncoso and Medardo Aguirre, 2006).

Little attention has been paid in the economic literature to the role of packaging and labeling in explaining wine price through and hedonic model. Mueller Loose and Szolnoki (2010) analyze the impact of various extrinsic and intrinsic quality cues (brand, grape variety, origin and packaging) on informed product evaluation and the response of Germany consumers. They found that packaging and in particular label style, color and form of bottle, are the strongest drivers for informed liking of wine, while grape variety and origin are the less important. In another study, the same Authors (Mueller Loose & Szolnoki, 2010) used an hedonic pricing model to analyze the impact of packaging characteristics on the price differences of red wine marketed in two US markets and to investigate whether this effect is different for domestic and imported products. Findings show that region of origin, label design type, label color, information contained in the label and grape variety explain the largest price difference. Furthermore, imported wine was more strongly price differentiated by packaging element than domestic products.

Finally, as is evident from several empirical studies (Fan, 2007; Lockshin, Corsi, Cohen, Lee, & Williamson, 2017; Somogyi, Li, Johnson, Bruwer, & Bastian, 2011; Xu & Zeng, 2014) Chinese consumers chose wine not exclusively in relation to the prestige and price, like in the past, but also taking into account other motivations. The latter are related to good health, the possibility to relax and to create a friendly atmosphere, to demonstrate a connotation of status, and for the affluent western lifestyle consequently to an increased economic and political openness in particular after the China's entry into the World Trade Organization (Atkin & Gurney, 2013). These are just some factors which make wine a middle class beverage, replacing some spirits distillated from sorghum and maize, such as Baijiu (Mitry, Smith, & Jenster, 2009).

Methodological approach and data

In this study, we adopt a hedonic price model to estimate the implicit price of the wine quality attributes. The theory underlying the proposed method is derived from the consumer theory of Lancaster (1966) and the theory of market behavior for differentiated goods developed by Rosen (1974). Data used has been obtained through two different information sources. In particular, Wine Searcher dataset has been used to identify the number and the corresponding price of Italian red wines sold in the Chinese market, counting 434 observations collected in March 2017. Prices refer to wine bottles of 0.75 liter and do not take into account any special offers. After the wines identification, we detected, through the consultation of wineries catalogues available in the company's website, all the quality attributes given in the front label. In particular, the quality attributes take into consideration in this study are related to the front label information (appellation of origin, grape variety, alcohol content and age), label style (eight variables), label color (seven variables), and other additional information linked to the wine and the terroir. Table 1 provides key information and sample statistics for the variables included in the proposed model.

The likelihood ratio test (LRT) guided the choice toward a log-linear function that has been widely used in numerous works (Angulo, Gil, Gracia, & Sánchez, 2000; Brentari, Levaggi, & Zuccolotto, 2011; Combris, Lecocq, & Visser, 1997; Defrancesco, Estrella Orrego, & Gennari, 2012; Galati, Crescimanno, Abbruzzo, Chironi, & Tinervia, 2017; Levaggi & Brentari, 2014). The general specification of the hedonic price function is expressed as:

$$\ln(P) = \beta_0 + \beta_1 * LI + \beta_2 * LS + \beta_3 * LC + \beta_4 * AI + \varepsilon_i$$

where $\ln(P)$ is the logarithm of the price, ε_i represents the stochastic error term, "LI" groups the attributes related to the information given in the label (grape variety, age, alcohol, appellations), "LS" refers to eight different types of label style (clean, clean highlighted, natural, natural highlighted, delicate/elegant, animal graphic, artistic graphic, nondescriptive), "LC" groups seven different color of the label (cream/grey, black, white, unicolor warm, unicolor cold, multicolor warm, multicolor cold), and, "AI" refers to information related to the wine characteristics (alcohol, age, and grape variety), and to the wine origin (appellations, bottling plant location, and area of origin). To estimate the percentage impact of the variables included in the model we use the Kennedy method (Kennedy, 1981) specific in the empirical studies that use a semi logarithmic functional form with dummy variables. According to the proposed method the percentage impact is:

$$\left[\exp\left(\hat{\beta} - \frac{1}{2}\hat{V}\left(\hat{\beta}\right) \right) - 1 \right] * 100$$

where V-hat of beta-hat is the estimated variance of β. The variance is the square of the standard error of the coefficient.

Table 1. Sample characteristics (%) and descriptive statistics.

Observations (n. 434)	n	%
Appellation of origin		
DOC[a]/DOCG[b]	299	68.9
IGT[c]	135	31.1
Variety		
Italian native varieties[d]	289	66.6
International varieties[e]	75	17.3
Blend [f]	70	16.1
Alcohol content		
<13° alcoholic degrees	50	11.5
13°–15° alcoholic degrees	373	85.9
>15° alcoholic degrees	11	2.6
Price segmentation		
Premium (€5–€7)	3	0.7
Super premium (€7–€14)	26	6.0
Ultra premium (€14–€150)	358	82.5
Icon wine (>€150)	47	10.8
Label style		
Clean	38	8.7
Clean highlighted	97	22.3
Natural	19	4.4
Natural highlighted	68	15.7
Delicate/Elegant	68	15.7
Animal graphic	13	3.0
Artistic graphic	95	21.9
Non descriptive	36	8.3
Label color		
Cream/Grey	130	30.0
Black	74	17.0
White	145	33.4
Unicolor warm	49	11.3
Unicolor cold	17	3.9
Multicolor warm	14	3.2
Multicolor cold	5	1.2

	Mean	Standard deviation	Min	Max
Alcohol degree	13.7	0.8554	11.0	17.0
Age (number of years)	7.7	3.7974	1	48
Price (€)	80.5	115.5801	6.6	1,093.8

[a]Denominazione di Origine Controllata.
[b]Denominazione di Origine Controllata e Garantita.
[c]Indicazione Geografica Tipica.
[d]Main Italian native varieties: Barbera, Corvina-Corvinone-Rondinella, Nebbiolo, Nero d'Avola, Sangiovese.
[e]Main international varieties: Cabernet Sauvignon, Merlot and Syrah.
[f]Blend of Italian native and international varieties.

The variance inflation factor (VIF) was used to see whether there was any correlation between the variables. Since the square root values of these indexes were less than 2 for each of the covariates, and with a mean VIF of 1.38, we can conclude that there is no problem with multicollinearity. Test for heteroscedasticity were conducted using the Breusch–Pagan test. The test confirm that there was no problem of heteroscedasticity as the independent variables are jointly significant.

Results and discussion

The results of regression for the semi-logarithm model proposed in this study is presented in Table 2. The estimated model explains the log-price of a 0.75 L bottle of Italian red wine sold in the Chinese market as a linear combination of the variables related to the quality attributes easily acquirable in the label. The results, with an adjusted R^2 equal to 0.403 and a significant F-value offer a good explanation of wine price variation.

The model assumes as baseline a wine labelled as Denominazione di Origine Controllata (DOC)/Denominazione di Origine Controllata e Garantita (DOCG) which is sold in the Chinese market at the expected geometric price of € 52.3 per bottle, with 13.7% of alcohol degree, and almost 7 years old (7.0), with a marked predominance of Italian native varieties (87.5%), and with a style of the label clean highlight and white in color.

Table 2. Hedonic price model estimation (percent price or discount).

	Estimated ß	Std. error	t-value	Pr(> |t|)	Premium price (%)
Front label information					
Blend[a]	−0.007	0.0520	0.128	0.899	−0.83
Italian native varieties[b]	−0.121	0.0430	−2.826	0.005**	−11.48
Vintage	0.025	0.0040	6.298	0.000***	0.03
Alcohol	0.213	0.0180	11.942	0.000***	0.24
DOC[c]/DOCG[d]	0.124	0.0360	3.43	0.001**	13.13
Label style					
Art graphic	0.086	0.0470	1.838	0.067*	8.86
Non-descr	0.072	0.0600	1.206	0.228	7.27
Clean	0.230	0.0600	3.807	0.000***	25.63
Natural	0.061	0.0780	0.779	0.436	5.97
Natural_high	0.001	0.0490	0.025	0.980	−0.02
Delicate_elegant	0.034	0.0530	0.654	0.514	3.31
Animal_graph	0.027	0.0910	0.291	0.771	2.31
Label color					
Cream_grey	0.056	0.0380	1.458	0.146	5.68
Black	0.032	0.0490	0.643	0.520	3.13
Uni_warm	−0.123	0.0510	−2.415	0.016**	−11.69
Uni_cold	0.076	0.0800	0.952	0.342	7.55
Multi_warm	−0.141	0.0860	−1.634	0.103	−13.47
Multi_cold	0.136	0.1400	0.972	0.332	13.45
Other information					
Wine_info	−0.029	0.0200	−1.459	0.145	−2.88
Terroir_info	0.048	0.0180	2.666	0.008*	4.90
Constant	−1.540	0.2460	−6.257	0.000***	
n. observation	433				
R^2	0.431				
Adj. R^2	0.403				
Average price ($)	52.26				

Notes: For alcohol degree and vintage the value in the last column express the price increase for each degree of alcohol content or year in the aging of wine. Sign. Codes: 0 "***", 0.001 "**", 0.01 "*."
[a]Blend of Italian native and international varieties.
[b]Main Italian native varieties: Barbera, Corvina-Corvinone-Rondinella, Nebbiolo, Nero d'Avola, Sangiovese.
[c]Denominazione di Origine Controllata.
[d]Denominazione di Origine Controllata e Garantita.

Concerning the variable "LI" related to the information contained in the front label, there appear to be a higher premium price for wine labelled as "DOC/DOCG" (13.13%). Similarly, previous empirical evidence suggests that the wine origin and in particular appellation, such as PDO and PGI, strongly affect the Chinese consumer choice of foreign wines (Agnoli et al., 2014; Goodman, 2009; Hu, Li, Xie, & Zhou, 2008; Tang, Tchetchik and Cohen, 2015). In addition, the results of our analysis confirm the obsession of Chinese consumers, as defined by Masset et al. (2016), for red wines, generally, characterized by an higher alcohol degree and forecast aging is synonymous of quality. Indeed, as expected, wine price coefficient for the alcohol content of wine and for aging of wine register a premium price with an increase of price of 0.24% for each additional degree and 0.03% per each additional year of aging. This result is justified by the fact that Chinese consumers traditionally consume alcoholic drinks such as baijiu, with an alcohol contents ranging from 20 to 60 percent (Jenster & Cheng, 2008; Liu, McCarthy, Chen, Guo, & Song, 2014). On the other side, our findings, show a higher price discount in particular for wine produced with Italian native varieties (−11.48%) showing a greater appreciation for the international varieties. This is in line with the result of Lockshin, Corsi, Cohen, Lee, and Williamson (2017) according to which there is, among Chinese consumers, a greater appreciation for international varieties.

As far as the variables related to the label style, a positive and statistically significant relationship has been found for clean and artistic graphic labels, that produce a premium price of 25.63 and 8.86%, respectively. These data are in conflict with the empirical evidences of Tang, Tchetchik, and Cohen (2015) that in their study on the Hong Kong market found that Chinese consumers prefer more label with a château depicted, than modern and contemporary labels. Furthermore, our results show a negative but statistically significant association with label unicolor warm for which there is a price discount of 11.69%. Once again the obtained results is in contrast with other empirical evidences by which Chinese consumers prefer warm color, such as red, than cold color (Convey, 2011; Tang, Tchetchik & Cohen, 2015).

Finally, an interesting result is related to the variable "Terroir" that include some aspect attributable to the territory in which wine is produced, for which has been found a premium price of 4.90%. This results under which consumers pay more attention to the terroir, understood as a set of environmental factors and then the culture of a particular wine region, than the wine characteristics (alcohol and age), is probably related to the affluent western life style of Chinese consumers.

To verify the contribution of packaging characteristics and in particular style and color of label in term of price difference, we compare the previous model with the same model that not include packaging variables. As can be seen in Table 3, packaging variables contribute about 3.3% to explained

Table 3. Contribution of packaging and information variables.

	Adj. R^2 (%)
No packaging variables	37.0
Including packaging and information variables	40.3
Contribution of packaging and information variables	3.3

variance, which is a modest improvement if it takes into account the importance of these attributes as a marketing tools, highlighting, however, the need to pay more attention to these integrative marketing tools. This need arises from the awareness that the China is an emerging market, where consumers, having a low wine and knowledge experience, primarily take into account visual attributes during their decision making process (Goodman, 2009).

Conclusion

One of the major elements in the successful marketing strategy in the wine industry is the importance of understanding the target reference market. Knowing the implicit price of each extrinsic attributes given in the label contributes to understanding the target audience, on which managers should focus all the marketing message, including they provided through the packaging and labeling.

This study assesses, using a hedonic price model, the premium price and discounts related to labeling characteristics of a highly differentiated product such as wine. In particular, we consider both the information provided in the labels, and their design and color, focusing on Italian red wines sold in the Chinese market.

The results reveal a significant premium price observed for label characteristics and particularly for labels when give information of appellation of origin and production area, and of clean and artistic graphic style. While a significant price discount has been observed for label with the information of Italian native varieties and with warm colors.

This work provides some managerial and political implications. From a managerial perspective, this study is useful for managers which can identify the most relevant attributes able to affect the decision-making process and the wine purchase. The identification of these attributes could address the label design and color in relation to the market destination and culture. The emerged difference among our results and other empirical evidences, suggests that the consumers' attention toward extrinsic and intrinsic quality cues given in the label depend by the market segment studied. However, the premium price for attributes such as the appellation of origin and the information attributable to the terroir from which the wine comes from, highlights the need to strengthen the link between wine and area of origin.

Our findings have also many important policy implications. Governments should engage in activities to enhance the reputation of particular wine growing areas or varieties from a region to increase the competitiveness of wine exports to new world consumer markets. In this regard, the adoption of specific measures both to support the wineries' participation at the wine events, especially in the emerging consumer markets, and to integrate the marketing strategies using the most recent tools, are desirable. Furthermore, taking into consideration the attention of Chinese consumers toward the health aspects, policy maker, as suggested by Annunziata, Pomarici, Vecchio, and Mariani (2016), should consider the introduction in the label of information about the calories and the maximum number of wine glasses not to exceed.

Results of this study should be read with caution taking into account that the hedonic price method does not exclude that the results also result from random and unforeseeable factors such as producers' and sellers' decision and market influence, that they represent an average estimation of Italian wine in the Chinese market, and finally, that the proposed model considers only wines included in the Wine Searcher database in a specific period (March 2017).

Taking into account these limitations, further researches should investigate, through a cross-country study, the existence of a different appreciation degree of Chinese consumers for wines from different Country of Origin. Furthermore, an analysis of the influence of corporate brand or specific appellation of origin broadly recognized in the world wine market is suggested.

References

Agnoli, L., Capitello, R., & Begalli, D. J. (2014). Geographical brand and country-of-origin effects in the Chinese wine import market. *Journal of Brand Management*, *21*(7), 541–558.

Angulo, A. M., Gil, J. M., Gracia, A., & Sánchez, M. (2000). Hedonic prices for Spanish red quality wine. *British Food Journal*, *102*(7), 481–493.

Annunziata, A., Pomarici, E., Vecchio, R., & Mariani, A. (2016). Nutritional information and health warnings on wine labels: Exploring consumer interest and preferences. *Appetite*, *106*(2), 58–69.

Atkin, T., & Gurney, N. (2013). Protecting Quality of Wine Exports to China: Barriers and Bridges. *Journal of International Food & Agribusiness Marketing*, *25*(2), 171–186.

Balestrini, P., & Gamble, P. (2006). Country-of-origin effects on Chinese wine consumers. *British Food Journal*, *108*(5), 396–412.

Barber, N., & Almanza, B. A. (2006). Influence of wine packaging on consumers' decision to purchase. *Journal of Foodservice Business Research*, *9*(4), 83–98.

Boatto, V., Defrancesco, E., & Trestini, S. (2011). The price premium for wine quality signals: Does retailers' information provision matter? *British Food Journal*, *113*(5), 669–679.

Boudreaux, C. A., & Palmer, S. E. (2007). A charming little Cabernet: Effects of wine label design on purchase intent and brand personality. *International Journal of Wine Business Research*, *19*(3), 170–186.

Brentari, E., Levaggi, R., & Zuccolotto, P. (2011). Pricing strategies for Italian red wine. *Food Quality and Preference*, *22*(8), 725–732.

Carew, R., & Florkowski, W. J. (2010). The Importance of Geographic Wine Appellations: Hedonic Pricing of Burgundy Wines in the British Columbia Wine Market. *Canadian Journal of Agricultural Economics*, *58*, 93–108.

Celhay, F., & Passebois, J. (2011). Wine labelling: is it time to break with tradition? A study of the moderating role of perceived risk. *International Journal of Wine Business Research*, *23*(4), 318–337.

Chaney, I. M. (2000). External search effort for wine. *International Journal of Wine Marketing*, *12*(2), 5–21.

Combris, P., Lecocq, S., & Visser, M. (1997). Estimation of a hedonic price equation for Bordeaux wine: Does quality matter? *The Economic Journal*, *107*(441), 390–402.

Convey, M. (2011). The impact of wine packaging on Chinese consumer choice (MBA thesis). Bordeaux School of Business (BEM).

Corsi, A. M., Marinelli, N., & Sottini, A. (2013). Italian wines and Asia: policy scenarios and competitive dynamics. *British Food Journal*, *115*(3), 342–364.

Corsi, A., & Strøm, S. (2013). The premium for organic wines: Estimating a Hedonic Farm-Gate Price Equation. *Journal of Wine Economics*, *8*(1), 29–48.

Crescimanno, M., & Galati, A. (2014). Competitiveness of Italian wines in the international market. *Bulgarian Journal Agricultural Science*, *20*(1), 12–22.

de Luca, P., & Penco, P. (2006, July). The role of packaging in the marketing communication: An explorative study of the Italian wine business. Refereed Paper presented at 3rd International Wine Business Research Conference, Montpellier.

Defrancesco, E., Estrella Orrego, J., & Gennari, A. (2012). Would 'new world' wines benefit from protected geographical indications in international markets? The case of Argentinean malbec. Wine. *Economics and Policy*, *1*(1), 63–72.

Elliot, S., & Barth, J. E. (2012). Wine label design and personality preferences of millennials. *Journal of Product & Brand Management*, *21*(3), 183–191.

Fan, M. (2007). Wine seen social status in China. The Washington Post, 30 January.

Florkowski, W. J., Carew, R., & Senhui, H. (2008, August). British Columbia consumers' preferences for Italian wines: Reputation and vintage effects on wine quality and prices. 12th EAAE Congress 'People, Food and Environments: Global Trends and European Strategies', Gent.

Fogarty, J. J. (2006). The return of Australian fine wine. *European Review of Agricultural Economics*, *33*(4), 542–561.

Fotopoulos, C., & Krystallis, A. (2003). Quality labels as a marketing advantage: The case of the "PDO Zagora" apples in the Greek market. *European Journal of Marketing*, *37*(10), 1350–1374.

Galati, A., Crescimanno, M., Tinervia, S. (2017). Italian red wine in the Japanese market: a hedonic price analysis. *Global Business and Economics Review*, *19*(6), 760–770. doi:10.1504/GBER.2017.10004179

Galati, A., Crescimanno, M., Abbruzzo, A., Chironi, S., & Tinervia, S. (2017). The premium price for Italian red wines in new world wine consuming countries: the case of the Russian market. *Journal of Wine Research*, *28*(3), 181–193.

Goodman, S. (2009). An international comparison of retail consumer wine choice. *International Journal of Wine Business Research*, *21*(1), 41–49.

Henley, C. D., Fowler, D. C., Yuan, J., Stout, B. L., & Goh, B. K. (2011). Label design: impact on millennials' perceptions of wine. *International Journal of Wine Business Research*, *23*(1), 7–20.

Hu, X., Li, L., Xie, C., & Zhou, J. (2008). The effects of country-of-origin on Chinese consumers' wine purchasing behaviour. *Journal of Technology Management in China*, *3*, 292–306.

Jarvis, W., Mueller, S., & Chiong, K. (2010). A latent analysis of images and words in wine choice. *Australasian Marketing Journal*, *18*(3), 138–144.

Jenster, P., & Cheng, Y. (2008). Dragon wine: developments in the Chinese wine industry. *International Journal of Wine Business Research*, *20*(3), 244–259.

Kennedy, P. E. (1981). Estimation with correctly interpreted dummy variables in semilogarithmic equations. *American Economic Association*, *71*(4), 801.

Laeng, B., Suegami, T., & Aminihajibashi, S. (2016). Wine labels: an eye-tracking and pupillometry study. *International Journal of Wine Business Research*, *28*(4), 327–348.

Lancaster, K. (1966). A new approach to consumer's theory. *Journal of Political Economy*, *74*, 132–157.

Levaggi, R., & Brentari, E. (2014). The hedonic price for Italian red wine: Do chemical and sensory characteristics matter? *Agribusiness*, *30*(4), 385–397.

Li, Y., & Bardaji, I. (2017). Adapting the wine industry in China to climate change: challenges and opportunities. *OENO One*, *51*, 2. Available at: http://oeno-one.eu/article/view/1184.

Li, L., Hu, X., & Zhuo, J. (2006). Do Chinese Consumer Prefer to buy Imported Wine? The effect of country of origin. Conference paper, WTO, China, and the Asian Economies, IV: Economic Integration and Economic Development, University of International Business and Economics, Beijing, China.

Lick, E., König, B., Kpossa, M. R., & Buller, V. (2017). Sensory expectations generated by colours of red wine labels. *Journal of Retailing and Consumer Services*, *37*, 146–158.

Liu, F., & Murphy, J. (2007). A qualitative study of Chinese wine consumption and purchasing: Implications for Australian wines. *International Journal of Wine Business Research*, *19*(2), 98–113.

Liu, H. B., McCarthy, B., Chen, T., Guo, S., & Song, X. (2014). The Chinese wine market: a market segmentation study. *Asia Pacific Journal of Marketing and Logistics*, *26*(3), 450–471.

Lockshin, L. S., & Rhodus, W. T. (1993). The effect of price and oak flavor on perceived wine quality. *International Journal of Wine Marketing*, *5*(2), 13–25.

Lockshin, L., Corsi, A. M., Cohen, J., Lee, R., & Williamson, P. (2017). West versus East: Measuring the development of Chinese wine preferences. *Food Quality and Preference*, *56*, 256–265.

Masset, P., Weisskopf, J. P., Faye, B., & Le Fur, E. (2016). Red obsession: The ascent of fine wine in China. *Emerging Markets Review*, *29*, 200–225.

Mitry, D. J., Smith, D. E., & Jenster, P. V. (2009). China's role in global competition in the wine industry: A new contestant and future trends. *International Journal of Wine Research*, *1*, 19–25.

Morilla Critz, J., & Martínez Valderrama, A. (2002). Una función de precios hedónicos para el vino español de calidad en el año 2000. *Estudios Agrosociales y Pesqueros*, *196*, 173–193.

Mueller Loose, S. & Szolnoki, G. (2010). The relative influence of packaging, labelling, branding and sensory attributes on liking and purchase intent: Consumers differ in their responsiveness. *Food Quality and Preference*, *21*(7), 774–783.

Mueller Loose, S. & Szolnoki, G. (2012). Market price differentials for food packaging characteristics. *Food Quality and Preference*, *25*(2), 171–182.

OIV (2016). World Vitiviniculture Situation. OIV Statistical Report on World Vitiviniculture. Retrieved from http://www.oiv.int/public/medias/5029/world-vitiviniculture-situation-2016.pdf.

Olson, J. C., & Jacoby, J. (1972). Cue utilization in the quality perception process. In SV - Proceedings of the Third Annual Conference of the Association for Consumer Research. M. Venkatesan (pp. 167–179). Chicago, IL: Association for Consumer Research.

Quester, P. G., & Smart, J. (1996). Product involvement in consumer wine purchases: Its demographic determinants and influence on choice attributes. *International Journal of Wine Marketing*, *8*(3), 37–56.

Richardson, P. S., Dick, A. S., & Jain, A. K. (1994). Extrinsic and intrinsic cue effects on perceptions of store brand quality. *Journal of Marketing*, *58*, 28–36.

Roma, P., Di Martino, G., & Perrone, G. (2013). What to show on the wine labels: a hedonic analysis of price drivers of Sicilian wines. *Applied Economics*, *45*(19), 2765–2778.

Rosen, S. (1974). Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition. *Journal of Political Economy*, *82*(1), 34–55.

Rundh, B. (2009). Packaging design: creating competitive advantage with product packaging. *British Food Journal*, *111*(9), 988–1002.

Rundh, B. (2013). Linking packaging to marketing: how packaging is influencing the marketing strategy. *British Food Journal*, *115*(11), 1547–1563.

Sherman, S. & Tuten, T. (2011). Message on a bottle: the wine label's influence. *International Journal of Wine Business Research*, *23*, 221–234.

Somogyi, S., Li, E., Johnson, T., Bruwer, J., & Bastian, S. (2011). The underlying motivations of Chinese wine consumer behaviour. *Asia Pacific Journal of Marketing and Logistics*, *23*(4), 473–485.

Steiner, B. (2004a). French wines on the decline? Econometric evidence from Britain. *Journal of Agricultural Economics*, *55*(2), 267–288.

Steiner, B. (2004b). Australian wines in the British wine market: A hedonic price analysis. *Agribusiness*, *20*(3), 287–307.

Tang, C. H. V., Tchetchik, A., & Cohen, E. (2015). Perception of wine labels by Hong Kong Chinese consumers. *Wine Economics and Policy*, *4*(1), 12–21.

Thorpe, M. (2009). The globalisation of the wine industry: new world, old world and China. *China Agricultural Economic Review*, *1*, 301–313.

Troncoso, C. J. L., & Medardo Aguirre, G. (2006). Factores que Influyen en los Precios del Vino Chileno en el Mercado de Estados Unidos: Análisis de Precios Hedonicos [Factors that influence the price of Chilean wines in the USA market: A hedonic price analysis]. *Agricultura Técnica*, *66*(3), 295–305.

UN Comtrade (2017). Un Comtrade Database. Retrieved June 12, 2017, from https://comtrade.un.org/data.

van Trijp, H., Hoyer, W., & Inman, J. (1996). Why Switch? Product Category-Level Explanations for True Variety-Seeking Behavior. *Journal of Marketing Research*, *33*(August), 281–292.

Waugh, F. V. (1928). Quality factors influencing vegetable prices. *Journal of Farm Economics*, *10*(2), 185–196.

Williamson, P. O., Lockshin, L., Francis, I. L., & Mueller Loose, S. (2016). Influencing consumer choice: Short and medium term effect of country of origin information on wine choice. *Food Quality and Preference*, *51*, 89–99.

Xu, P., & Zeng, Y. C. (2014). Factors that Affect Willingness to Pay for Red Wines in China. *Journal of International Consumer Marketing*, *26*(5), 426–439.

5.4. Annex 4

Sustainable Value Creation in the Food Chain: A Consumer Perspective

József Tóth [1,2,*], Giuseppina Migliore [3] , Giorgio Schifani [3] and Giuseppina Rizzo [3,*]

[1] Department of Agricultural Economics and Rural Development, Corvinus University of Budapest, 1093 Budapest, Hungary

[2] Faculty of Economics, Socio-Human Sciences and Engineering, Sapientia Hungarian University of Transylvania, 530104 Miercurea Ciuc, Piaţa Libertăţii nr. 1, Romania

[3] Department of Agricultural, Food and Forest Sciences, University of Palermo, 90128 Palermo, Italy; giuseppina.migliore@unipa.it (G.M.); Giorgio.schifani@unipa.it (G.S.)

[*] Correspondence: jozsef.toth@uni-corvinus.hu (J.T.); giuseppina.rizzo03@unipa.it (G.R.); Tel.: +36-30-555-9755 (J.T.); +39-320-041-5120 (G.R.)

check for updates

Abstract: The growth of diet-related diseases is becoming an important societal concern and a challenge for a more sustainable society. This has developed important trends in food consumption, including the increasing demand for food with a natural attribute and with health claims (e.g., enriched food). Consumers tend to evaluate these two attributes as superior ones and tend to pay a premium price for them. Accordingly, the value added by producers also will upturn if they take into consideration the consumers' preferences. However, to the best of our knowledge, consumer preference over the two types of products (natural and enriched) is not yet completely clear. The present study tries to contribute to reducing this gap by analyzing Hungarian consumer preferences for natural fruit juices over enriched ones and exploring the drivers which guide consumer choices for the two attributes. For this purpose, we analyze young consumers' willingness-to-pay (WTP) for natural and enriched fruit juices using a seemingly unrelated regression (SUR) to derive the two value-added activities. Our results show that the fruit juice with the natural attribute is preferred over the enriched one, and that there is a common feature behind the perception of the two attributes, namely the healthiness. Based on the natural fruit juice characteristic, these results open space for local production in gardens or in small-medium sized farms. This could have beneficial effects, both for sustainable development of rural areas and for the promotion of healthy food systems towards sustainability in food consumption.

Keywords: willingness to pay; enriched attribute; natural attribute; healthy attribute; seemingly unrelated regression (SUR); fruit juice; Hungary

1. Introduction

The growth of diet-related diseases is becoming an important societal concern and a challenge for a more sustainable society [1]. As a result, today, consumers are aware that their diet affects their health and so prefer to choose food that helps them to have a healthy lifestyle. [2,3]. This has contributed to the development of important trends in food consumption, which has seen, amongst others, the growing consumer interest towards foods with natural and health claims attributes [4]. The category of food with health claims includes food enriched with healthy components, such as polyphenols, vitamins, and other healthy components [2], while natural food is food without additives and human interventions, considered by consumers harmful for their health [5].

The Kampffmeyer Food Innovation Study [6] revealed that food naturalness is a decisive buying incentive and that the majority of the consumers perceived a strong connection between "natural" and

"healthy." Furthermore, it has been demonstrated that consumers living in developed countries prefer natural foods over the conventional ones, as they are considered to have positive health effects [7]. Similarly, foods with health claims have registered a growing market success. According to the latest available data [8,9], 27% of global respondents, on average, are very willing to pay a premium price for health claims. This percentage is slightly higher in western countries and particularly in the U.S., where the majority of consumers believe that health claim foods give real benefits in improving and maintaining overall health, and nearly 30% indicate that they buy products with health claims on the labels [10].

The growing consumers' interest towards these product characteristics has pushed the food industry to provide healthier products [11,12]. The use of health as a selection criterion has already been offering new possibilities to the food market and continues to provide new challenges for producers [13]. One of these challenges for the food industry is to give consumers product options with a natural and healthy image.

From a consumers perspective, interest shown towards these two attributes (natural and health claims) is due to the common will of consumers to improve or maintain their health, although the two attributes have different exceptions [14]. Health motivations as factors for purchasing natural and health claim products have already been investigated in several studies [14,15]. However, to the best of our knowledge, consumer preference over the two types of attributes is not yet completely clear.

The present study tries to reduce this gap, by analyzing consumer preferences for the attributes natural and health claim, and exploring the drivers affecting consumer choices for both attributes. Knowing which attribute is more valued by consumers could give important indications to the food industry more oriented to provide products with a health image. Furthermore, understanding the drivers behind consumer preference could be useful for planning successful marketing strategies for those enterprises oriented to satisfying those consumers' needs.

Based on these premises, three objectives have been set in this study: 1. to investigate which attribute, between natural and health claims, is more appreciated by consumers; 2. to explore the drivers behind consumers' choice for both health attributes, and 3. to verify whether the price premium of two types of attributes is explained by common factors.

To answer these research questions, the present study used a laboratory experiment in order to derive the consumer's willingness to pay (WTP) for natural and enriched attributes. The remainder of the paper is organized as follows: after the introduction, Section 2 explains the theoretical framework and consumer choices on healthy products in Hungary; Section 3 shows the data collection and methods; Section 4 presents results and discussion and, finally, in Section 5, we conclude, and the study limitations are provided.

2. Theoretical Framework

Consumers consider the naturalness of foods as a highly valued quality characteristic [16]. They interpret the food naturalness as an indicator of the healthiness and quality of the product, derived from the 'integral integrity of the product' [17]. As a result, natural products are perceived as good for your health as they are free of additives and other synthetic substances, perceived to reduce the healthiness of food [18–21]. Furthermore, the idea of natural eating seems to generate a perception of physical and emotional well-being [22]. This is supported also by Rozin [18], according to whom natural food evokes a positive association in consumers' minds, following the idea that 'natural entities are inherently better than non-natural entities'. According to the literature, higher natural food consumption seems to be associated with the perception that processed food can cause high health risks [20,23].

Similarly, health claim products have registered a faster market growing in the last few years, responding to consumers concerns on health and providing messages about specific benefits of products that potentially increase perceived wellbeing [24]. Indeed, enriched foods communicate their health-related benefits with the help of claims that may contain a bulk of information [25].

The typical elements that health claims may be built from are the components that trigger the function by generating physiological and psychological benefits [1]. Enriched food looks similar to conventional food and is consumed as part of a regular diet and has been shown to have health benefits and/or reduce the risk of chronic diseases beyond the basic nutritional functions of food [26].

However, how consumers respond to enriched food varies from product to product. From a consumer's perspective, enriched foods are not a homogenous category of products, and consumers' attitudes seem to affect the purchasing intention for various enriched products differently [15]. Moreover, some enriched foods are perceived as less natural, since the beneficial components which trigger the function are derived from technology-based enhancement, and they may include foods with chemical additives and preservatives.

Thus, consumer perception is influenced by both the health element that has been added in food and the process by which this addition happened [2]. Acceptance of food products depends on the health image of the product category or the ingredients [27], on the production method [1] and how the product was enriched and 'tampered with' [28]. According to Lähteenmäki [1], the familiarity with the product greatly influences the perception of the consumer. In fact, familiarity is a key factor in acceptance of enriched food [27]. However, although it may be thought that natural and enriched foods are contradictory (for example due to the difference in health-related message), there are several studies that indicate a link between the two concepts, because both are chosen by consumers to improve or maintain their health [29]. For example, Caracciolo and colleagues [30] investigated consumer preferences for the two attributes and their empirical findings revealed that consumers evaluate both attributes, natural and enriched, similarly.

Among the products having a health image, fruit juices are among the most recognizable, thanks to their natural contents of vitamins and minerals [31]. The fruit juice market is one of the most innovative and competitive segments of the food sector [31]. Manufacturers striving to expand sales are focusing on product diversification, developing fruit juices that go beyond the taste of the product and providing general health benefits. Since fruits are the primary source of ascorbic acid in the diet, the enrichment of fruit juices has been concerned mainly with this vitamin [32]. In this context, vitamin enrichments are more accepted by consumers compared to other types of fruit juice enrichment, for example with calcium, since the latter is perceived an unnatural type of enrichment [28,33]. This would position vitamin-enriched fruit juices closer to natural food, creating a more "holistic health image" [28]. Similarly, consumers are increasingly preferring fruit juices with the natural attribute, containing 100% in fruit. These drinks are free from added sugars and artificial colors or flavors, and they represent an opportunity for those companies that want to create a competitive advantage in the fruit juice market. Furthermore, to create a strong sense of community and add value to the product, the local origin of the ingredients is often emphasized and well specified in natural fruit juices. As a result, there is a growing consumer interest in local products that position these fruit juices as healthier and more sustainable than their conventional counterparts [31]. However, to date, it is not clear which type of attribute (enriched or natural) is more preferred by consumers in fruit juices. This information could be very helpful for those companies operating in those market segments where healthy products are becoming of primary importance in consumers' buying behavior. For this reason, we carried out an experimental study in Győr, Hungary, because this country is among those where consumers are starting to pay more attention to their health [34,35]. Indeed, in Hungary, alongside economic growth, the healthy diet and lifestyle are becoming increasingly important for consumers [36]. Literature reveals that health issues represent the main reason for purchasing health food and that health attributes have become as important as sensory ones, during the buying decision-making process [37]. For example, Balázs [38] in his study showed that more than half of the respondents were willing to pay an extra 10% for healthy products. Moreover, Balázs's findings showed that consumers of healthy food generally have higher levels of education and higher incomes, while their age ranged between young and middle-aged. Furthermore, according to the literature young consumers seem to exceed all prior generational expenditure [39], making a large direct contribution to the economy [40] and an even larger indirect

economic impact, by influencing the majority of family purchase decisions [41]. In addition, young consumers have significant current and future impact on the Western economies and are accordingly considered the most powerful consumer group in the marketplace [42]. For this reason, we have focused our attention on the university student generation in Hungary, in order to understand which health attribute, enriched or natural, is preferred in fruit juices. Knowing the theoretical framework is fundamental to developing this research, which may contribute to better marketing design strategies and, successively, contribute to creating a competitive market advantage for food companies.

3. Materials and Methods

3.1. Experimental Auctions

The experiments were conducted over a two-week period, in autumn 2018, at the "Széchenyi István" University (Hungary). The consumers of this study were students, who were recruited randomly and informed they were participating in a consumer preference research study for different types of fruit juice. Using the Vickrey auction methodology [43], an experimental evaluation process was chosen, which is identified in the fifth-price auction. Ten 25-min experimental sessions involving ten people each were organized. The choice of the fifth-price auction allows, at the same time, the number of participants in the auction and their degree of involvement to be increased. Lusk et al. [44] showed that bidders would generally be more involved if at least half of them could potentially win the product at auction. In addition, participants were told that only one round and one product would be binding, to avoid reductions in demand and effects on wealth in subsequent rounds [45]. Each participant in the auction received 2000 Hungarian forints (HUF) (approximately € 5.50) as a reward for his/her participation in the auction. All respondents rated the three fruit juices containing the same amount of information.

In the initial phase, participants were selected from among those who said they had been drinking fruit juice for the past two weeks. In the second phase, every individual received the monetary compensation and signed a consent form and a form committing him/her to buy the product in the case of a victory. In the third phase, the auction mechanism was explained, and in the fourth phase, a researcher described the three fruit juices' characteristics. The three products were (1) conventional fruit juice, used as a control product, compared to the other two types of fruit juices, (2) 100% natural fruit juice made from fruit straight from the garden, with no dilution and no concentrate and (3) fruit juice enriched with sea buckthorn to strengthen the immune system and with a high vitamin C content. The three fruit juices were packaged in three white and unbranded packs, to avoid the effects of the brand and the label. In the fifth phase, the participants wrote their sealed bids on anonymous tickets. Finally, in the last phase, everyone completed a questionnaire and one fruit juice and one price (market price) were randomly extracted. Those participants who bid more for the auctioned fruit juice compared to the market price won the fruit juice, paying the extracted price for it.

3.2. Questionnaire

The questionnaire included two main sections. The first section collected information on consumers' socio-demographic characteristics (age, gender, number of household members and monthly net income), on their consumption frequency of fruit juice and the characteristics that are sought in the product (good taste and smell, vitamin and mineral content, geographical origin, nice appearance, calories content, free from artificial materials, price and brand name). The second section included three psycho-attitudinal scales: natural product interest (NPI), general health interest (GHI), and reward from using functional food (RFF). These scales are widely used in the literature [46,47]. More precisely, GHI and NPI scales were developed by Roininen, Lähteenmäki and Tuorila [48]; the first consists of eight articles that reveal the consumers' attitude towards healthy eating, while the second scale includes six articles aimed at capturing the consumers' attitude towards the consumption of unprocessed food. The RFF scale was proposed by Lähteenmäki [49] and includes seven items that explain the declaration

of gratitude deriving from the use of enriched foods. These validated GHI, NPI and RFF attitude scales were collected by means of 7-point Likert scales, where 1 corresponds to totally disagree and 7 to totally agree.

3.3. Statistical Analysis

The data collected were processed in four distinct phases, using the STATA 15.0 (Budapest, Hungary) integrated statistical software. In the first phase, the socio-demographic characteristics of the sample were defined, through descriptive analyses; in the second phase, the psycho-attitudinal scales were interpreted, checking their internal consistency (alpha-coefficient) and calculating the average of each item. In the third part, a description of the WTPs detected for the three types of fruit juices was made; in addition, by means of parametric (t-test) and non-parametric tests (Wilcoxon tests), it was verified whether the three WTPs were significantly different, and therefore, two deltas (premium prices) were calculated. The two premium prices were obtained, one at a time, by first calculating the difference between the WTP for natural and conventional fruit juices and then the difference between WTP for enriched and conventional fruit juice:

$$\Delta WTP_{NAT} = (WTP_{NAT} - WTP_{CONV})$$
$$\Delta WTP_{ENR} = (WTP_{ENR} - WTP_{CONV})$$

Later, the seemingly unrelated regressions (SUR) [50] were presented, together the Breusch-Pagan test of independence, to measure how the price premium of the two fruit juices can be influenced and, at the same time, to verify whether the price premium of the two types of juices is explained by common attributes.

This stochastic model may be expressed by the following relationship:

$$y = X\beta + u$$

where y and u are vectors with n elements, X is a matrix with n rows and $k + 1$ columns (with k the explanatory variables + 1 for the constant) and β is the vector containing $k + 1$ unknown coefficients.

4. Results and Discussion

4.1. Sample Description

The consumers participating in the experiment were 100 students of the "Széchenyi István" University of Győr (Hungary), including 29 males and 71 females, between 18 and 28 years of age (mean age = 22; S.D. = 2.23). The number of family members the students had ranged from 1 to 5, where 1 indicates that the student lives alone and 5 indicates that he/she lives with more than 4 people. The average number of members per family was 3 people. Finally, the monthly net income was in a range from "below 60 thousand" and "more than 350 thousand", with an average of about 120 thousand HUF (about €360). The socio-demographic characteristics of the participants are shown in Table 1.

Table 1. Socio-demographic characteristics of the sample.

Variables	Mean	Std. dev.	Min	Max
Gender [1]	0.29	0.50	0	1
Age [2]	21.65	2.23	18	28
Family Members [3]	2.77	1.12	1	5
Monthly Income [4]	1.81	0.64	1	3

[1]: dummy variable, 1 = male and 0 = female; [2]: continuous variable; [3]: categorical variable, 1 = single, 2 = two members, 3 = three members, 4 = four members, 5 = family with more than 4 members; [4]: categorical variable, 1 = <60 thousand HUF; 2 = 60–120 thousand HUF; 3 = 121–220 thousand HUF; 4 = 221–350 thousand HUF; 5 = >350,000.

4.2. Psycho-Attitudinal Scales

Attitudes have been shown to have a great effect during the consumers' decision-making process, and for this reason, they were used in the present study to explain consumers' food choices, through appropriate attitudinal scales [51]. In particular, the GHI scale was chosen because it is expected to correlate positively with attitudes towards enriched foods [48]; the NPI scale is hypothesized to have a positive correlation with natural product consumption [48], while the RFF is expected to have a positive correlation with the consumer's willingness to feed himself/herself with enriched foods in order to improve or maintain a state of health [52,53]. Furthermore, for those items with negative meaning, Likert scale scores were reversed to improve the attitude scales' readability.

The Cronbach's alpha value was 0.85 for natural product interest, 0.83 for general health interest and 0.89 for reward from using functional food, indicating a good internal reliability (Table 2).

Table 2. Internal reliability of the scales.

Scale	Cronbach's Alpha
GHI	0.83
NPI	0.85
RFF	0.89

The results show a high awareness of consumers about the health consequences of their food choices. Indeed, the higher GHI item scores were: "The healthiness of food has little impact on my food choices" (reversed mean = 5.00) and "I am very careful about the healthiness of food I eat" (mean = 4.51). Concerning NPI, the items with the highest scores were: "Foods containing artificial flavor enhancers are not harmful to health" (reversed mean = 5.98) and "Organically grown vegetables are no healthier than others" (reversed mean = 6.10). The items with the highest values for RFF were: "I get pleasure from eating functional foods" (mean = 5.77) and "The idea that I can take care of my health by eating functional foods gives me pleasure" (mean = 6.01).

Finally, correlation coefficients were computed and the presence of a positive and statistically significant correlation was found among all the three scales (Table 3).

Table 3. Correlation coefficients of the scales.

	GHI	NPI	RFF
GHI	1.0000		
NPI	0.5890	1.0000	
RFF	0.6601	0.4233	1.0000

The descriptive statistics of individual items composing the three scales are shown in Tables 4–6.

Table 4. Items' statistics of general health interest (GHI) scale.

	General Health Interest (GHI)	Mean	S.D.	Min	Max
GHI_1	The healthiness of food has little impact on my food choices.	5.00	1.6	1	7
GHI_2	I am very particular about the healthiness of food I eat.	4.51	1.39	1	7
GHI_3	I eat what I like, and I do not worry much about the healthiness of food.	4.06	1.67	1	7
GHI_4	It is important for me that my diet is low in fat.	3.53	1.40	1	7
GHI_5	I always follow a healthy and balanced diet.	3.85	1.54	1	7
GHI_6	It is important for me that my daily diet contains a lot of vitamins and minerals.	4.67	1.49	1	7
GHI_7	The healthiness of snacks makes no difference to me.	3.64	1.94	1	7
GHI_8	I do not avoid foods, even if they may raise my cholesterol.	3.78	1.66	1	7

Table 5. Items' statistics of natural product interest (NPI) scale.

Natural Product Interest (NPI)		Mean	S.D.	Min	Max
NPI_1	I try to eat foods that do not contain additives.	3.98	1.70	1	7
NPI_2	I do not care about additives in my daily diet.	4.33	1.72	1	7
NPI_3	I do not eat processed foods, because I do not know what they contain.	3.42	1.83	1	7
NPI_4	I would like to eat only organically grown vegetables.	5.59	1.56	1	7
NPI_5	In my opinion, artificially flavored foods are not harmful for my health.	5.98	1.16	1	7
NPI_6	In my opinion, organically grown foods are no better for my health than those grown conventionally.	6.10	1.37	1	7

Table 6. Items' statistics of reward from using functional food (RFF) scale.

Reward from using Functional Food (RFF)		Mean	S.D.	Min	Max
RFF_1	I get pleasure from eating functional foods.	5.77	1.35	1	7
RFF_2	The idea that I can take care of my health by eating functional foods gives me pleasure.	6.01	1.17	1	7
RFF_3	Functional foods make me feel more energetic.	5.12	1.43	1	7
RFF_4	Functional foods help to improve my mood.	4.69	1.53	1	7
RFF_5	My performance improves when I eat functional foods.	4.81	1.43	1	7
RFF_6	I actively seek out information about functional foods.	4.27	1.57	1	7
RFF_7	I willingly try even unfamiliar products if they are functional.	4.04	1.63	1	7

4.3. Willingness to Pay (WTP)

Consumer bids describe how much participants are willing to pay for conventional, natural and enriched fruit juice. The estimated average WTPs were the following: 646.76 HUF (about €1.93) for the conventional fruit juice, 794.09 HUF (about €2.37) for the enriched fruit juice, and 957.93 (about €2.86) for the natural fruit juice (Table 7).

Table 7. Consumers' willingness to pay.

	Mean	S. D.	Min	Max
WTP_{CON}	646.76	322.32	50	1800
WTP_{ENR}	794.09	369.98	100	2000
WTP_{NAT}	957.93	489.08	200	2500
ΔWTP_{ENR}	147.32	178.91	−500	1050
ΔWTP_{NAT}	311.17	287.97	−270	1400

By means of a t-test and Wilcoxon test, it was possible to verify that there are statistically significant differences between the two attributes and that the natural attribute was preferred to the enriched attribute. Indeed, ΔWTP_{NAT}, that is the differential value between the natural fruit juice and the conventional one, has an average value of 311.17 HUF (about 0.93€), while ΔWTP_{ENR}, which is the

differential value between the enriched fruit juice and the conventional one, has an average value of 147.32 HUF (about €0.44) (Table 7).

4.4. Drivers Behind Consumers' WTP for Both Attribute

It is clear that consumer choice depends on many factors [48]. By performing a SUR between the two WTP for natural and enriched fruit juices and the other variables collected through the questionnaire, such as the consumer characteristics and psycho-attitudinal scales, it was possible to understand which are the drivers affecting consumer WTP for the two attributes. In Table 8 drivers behind consumers' WTP for both enriched and natural attributes, and the estimated coefficients as well as their statistical significance, are shown.

Table 8. Drivers behind consumers' willingness to pay.

Equation	Obs	Parms	"R-sq"	p
ΔWTP_{ENR}	95	4	0.1675	0.0007
ΔWTP_{NAT}	95	4	0.1093	0.0201
ΔWTP_{ENR}	**Coef.**	**Std. Err.**	**z**	**P > |z|**
GHI	−61.76	23.05	−2.68	0.007
NPI	−0.56	21.35	−0.03	0.979
RFF	70.81	19.62	3.61	0.000
INCOME	37.01	15.02	2.46	0.014
ΔWTP_{NAT}	**Coef.**	**Std. Err.**	**z**	**P > |z|**
GHI	−21.24	38.34	−0.55	0.580
NPI	−16.61	35.50	−0.47	0.640
RFF	72.22	32.64	2.21	0.027
INCOME	60.09	24.97	2.41	0.016

Breusch-Pagan test of independence: chi2(1) = 63.129, Pr = 0.0000.

For the section on consumers' WTP for vitamin-enriched fruit juice as a dependent variable, the results showed that the participants' preference is mainly affected by participants' attitude towards healthy eating (through their importance attributed to the items of the general interest scale for health (GHI)), towards the reward from using enriched foods (RFF) and consumers' monthly net income. Looking at this in more detail, RFF attitude and the monthly net income are positively correlated with the dependent variable; therefore, as the value of these independent variables increases, the average of the WTP for the enriched fruit juice tends to increase. On the contrary, the negative coefficient of GHI attitude suggests that as they increase, the dependent variable tends to decrease. This means that the attitude towards healthy eating negatively affects the preference for the enriched fruit juice. This research is in line with other studies that describe the choice for the two attributes to improve or maintain a state of health [14,54,55].

Relatively to the consumers' WTP for the natural fruit juice, the results show that, contrary to what was showed by Caracciolo and colleagues' study, the preference for natural fruit juice is not explained by the NPI attitude. According to the results, the WTP values for natural fruit juice seem to be also affected by RFF attitudes, which in this case is related to the rewards from using natural fruit juice rich in vitamins. This suggests the interest for both attributes (enriched and natural) seems to be affected by common drivers, that is, rewards from using fruit juices richer in vitamins compared to the conventional one. Differences in results, compared to other research findings, may depend on consumers familiarity with the product [1], suggesting, in line with Urala and Lähteenmäki's study [15], that effects on consumer choice have to be studied not as one homogenous group of product, but rather as separate products within the various food categories. Furthermore, monthly net income positively affects consumers' WTP for both products. This is in line with Bruchi and colleagues' study [50]

showing how as the level of monthly net income increases, the WTP for natural and enriched fruit juice increases.

5. Conclusions

The present study had multiple objectives: to investigate the preferences for natural and enriched products and to understand which drivers affect their preference and if there are common drivers between the two WTP. To respond to these research questions, consumers' preferences for enriched and natural attributes were measured via an experimental auction on fruit juices. Outcomes point out that consumers prefer natural fruit juice more than the enriched ones, but the motivations underlying consumers' preferences for both products are the same (the perceived reward from consuming fruit juices richer in vitamins compared to the conventional one).

These results can help us to understand how much and how consumers accept innovations in the food market, and therefore, help companies put their products on the markets.

Our analysis also reveals the primacy of natural fruit juice against the enriched fruit juices at WTP level. Regarding the participants' cohort and the way the juice was produced (fresh apples direct from the garden/local farms, without burdening the environment) we can also conclude that producers along the food chain may create additional value if they consider the consumer preferences of the younger generation.

Furthermore, the preference for natural fruit juice opens space for local production in gardens or in small-medium sized farms. This could have beneficial effects, on one hand for sustainable development of the rural area due to the resulting lower CO_2 emissions from short-distance transportation and the recirculation of financial capital in rural areas. On the other hand, the preference for the natural attribute could be a leverage for the promotion of healthy and sustainable food systems more oriented towards sustainability in food consumption. This direction is very much in line with the sustainability requirements of the globe. The study carries significant implications for consumer research on the preference of sustainable fruit juices, as well as practical management implications. Regarding the former, our study is one of the first to analyze consumer behavior towards fruit juices with health attributes, thus enriching extant literature on the willingness to pay a premium price for health attributes, and reinforcing business literature, which supports that consumers have a positive attitude towards sustainable products. In addition, our results corroborate the importance of consumer attitudinal characteristics in explaining the purchasing decision process for products with sustainable characteristics. As for the managerial perspective, our results offer entrepreneurs suggestions to differentiate their product offerings. In fact, considering the growing awareness, among consumers, of the importance of healthy food consumption, the Hungarian fruit juices industry is called upon to develop effective marketing strategies that will help consumers identify and distinguish fruit juices on the market. From this point of view, the ability of industries to develop innovations in this direction, which could boost the competitive performance of companies, is particularly important.

Although the study offers much food for thought, it has some limitations, such as having used a non-representative sample; thus, the generalizability of the results is limited. Furthermore, the RFF attitude in explaining the preference for both attributes in fruit juices opens space for further analysis in order to validate the results of the present study or overcome its limitations. Therefore, further studies have to take into account statistically representative samples in order to capture a full picture of consumers' preferences for healthy fruit juices. Moreover, further research could be repeated in different markets also for comparison. This would offer cross-cultural insights and help adapt marketing strategies to the individual and/or global perspectives.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

References

1. Lähteenmäki, L. Claiming health in food products: Ninth Pangborn Sensory Science Symposium. *Food Qual. Prefer.* **2013**, *27*, 196–201. [CrossRef]

2. Grunert, K.G. *Consumer Trends and New Product Opportunities in the Food Sector*; Academic Publishers: Wageningen, The Netherlands, 2017.

3. Goetzke, B.; Nitzko, S.; Spiller, A. Consumption of organic and functional food. A matter of well-being and health? *Appetite* **2014**, *77*, 96–105. [CrossRef] [PubMed]

4. Willer, H.; Schaack, D.; Lernoud, J. Organic farming and market development in Europe and the European Union. In *The World of Organic Agriculture. Statistics and Emerging Trends*; Research Institute of Organic Agriculture FiBL and IFOAM-Organics International: Bonn, Germany, 2019; pp. 217–254. Available online: https://shop.fibl.org/chde/2020-organic-world-2019.html (accessed on 10 November 2019).

5. Asioli, D.; Aschemann-Witzel, J.; Caputo, V.; Vecchio, R.; Annunziata, A.; Næs, T.; Varela, P. Making sense of the "clean label" trends: A review of consumer food choice behavior and discussion of industry implications. *Food Res. Int.* **2017**, *99*, 58–71. [CrossRef] [PubMed]

6. GoodMills Innovation. Available online: http://goodmillsinnovation.com/sites/kfi.kampffmeyer.faktor3server.de/files/attachments/1_pi_kfi_cleanlabelstudy_english_final.pdf/ (accessed on 15 October 2016).

7. Roman, S.; Sánchez-Siles, L.M.; Siegrist, M. The importance of food naturalness for consumers: Results of a systematic review. *Trends Food Sci. Technol.* **2017**, *67*, 44–57. [CrossRef]

8. Nielsen Company. Available online: https://www.nielsen.com/wp-content/uploads/sites/3/2019/04/health-wellness-report-feb-2017.pdf (accessed on 7 December 2019).

9. Nielsen Company. Available online: https://www.nielsen.com/wpcontent/uploads/sites/3/2019/04/Nielsen20Global20Health20and20Wellness20Report20-20January202015-1.pdf (accessed on 12 October 2018).

10. Sloan, E.; Adams Hutt, C. Beverage trends in 2012 and beyond. *Agro. FOOD Ind. Hi Tech.* **2012**, *23*, 8–12.

11. Nguyen, H.V.; Nguyen, N.; Nguyen, B.K.; Lobo, A.; Vu, P.A. Organic Food Purchases in an Emerging Market.: The Influence of Consumers' Personal Factors and Green Marketing Practices of Food Stores. *Int. J. Environ. Res. Public Health* **2019**, *16*, 1037. [CrossRef]

12. Seiders, K.; Ross, D.P. Obesity and the Role of Food Marketing: A Policy Analysis of Issues and Remedies. *J. Public Policy Mark.* **2004**, *23*, 153–169. [CrossRef]

13. Casey, D.K. *Three Puzzles of Private Governance: Global GAP and the Regulation of Food Safety and Quality*. UCD Working Papers in Law, Criminology & Socio-Legal Studies. United Kingdom. 2009. Available online: http://dx.doi.org/10.2139/ssrn.1515702 (accessed on 1 November 2019).

14. Aschemann-Witzel, J.; Maroscheck, N.; Hamm, U. Are organic consumers preferring or avoiding foods with nutrition and health claims? *Food Qual. Prefer.* **2013**, *30*, 68–76. [CrossRef]

15. Urala, N.; Lähteenmäki, L. Reasons behind consumers' functional food choices. *Nutr. Food Sci.* **2003**, *33*, 148–158. [CrossRef]

16. Rozin, P.; Spranca, M.; Krieger, Z.; Neuhaus, R.; Surillo, D.; Swerdlin, A.; Wood, K. Preference for natural: Instrumental and ideational/moral motivations, and the contrast between foods and medicines. *Appetite* **2004**, *43*, 147–154. [CrossRef]

17. Kahl, J.; Załęcka, A.; Ploeger, A.; Bügel, S.; Huber, M. Functional food and organic food are competing rather than supporting concepts in Europe. *Agriculture* **2012**, *2*, 316–324. [CrossRef]

18. Rozin, P. The meaning of "natural" process more important than content. *Psychol. Sci.* **2005**, *16*, 652–658. [CrossRef]

19. Migliore, G.; Borrello, M.; Lombardi, A.; Schifani, G. Consumers' willingness to pay for natural food: Evidence from an artefactual field experiment. *Agric. Food Econ.* **2018**, *6*, 21. [CrossRef]

20. Dickson-Spillmann, M.; Siegrist, M.; Keller, C. Attitudes toward chemicals are associated with preference for natural food. *Food Qual. Prefer.* **2011**, *22*, 149–156. [CrossRef]

21. Evans, G.; de Challemaison, B.; Cox, D.N. Consumers' ratings of the natural and unnatural qualities of foods. *Appetite* **2010**, *54*, 557–563. [CrossRef] [PubMed]

22. Moscato, E.M.; Machin, J.E. Mother natural: Motivations and associations for consuming natural foods. *Appetite* **2018**, *121*, 18–28. [CrossRef] [PubMed]

23. Lockie, S.; Lyons, K.; Lawrence, G.; Grice, J. Choosing organics: A path analysis of factors underlying the selection of organic food among Australian consumers. *Appetite* **2004**, *43*, 135–146. [CrossRef]

24. Nocella, G.; Kennedy, O. Food health claims–What consumers understand. *Food Policy* **2012**, *37*, 571–580. [CrossRef]

25. Annunziata, A.; Vecchio, R. Functional foods development in the European market: A consumer perspective. *J. Funct. Foods* **2011**, *3*, 223–228. [CrossRef]

26. Falguera, V.; Aliguer, N.; Falguera, M. An integrated approach to current trends in food consumption: Moving toward functional and organic products? *Food Control* **2012**, *26*, 274–281. [CrossRef]

27. Lähteenmäki, L.; Lampila, P.; Grunert, K.; Boztug, Y.; Ueland, Ø.; Åström, A.; Martinsdóttir, E. Impact of health-related claims on the perception of other product attributes. *Food Policy* **2010**, *35*, 230–239. [CrossRef]

28. Siro, I.; Kápolna, E.; Kápolna, B.; Lugasi, A. Functional food. Product development, marketing and consumer acceptance—A review. *Appetite* **2008**, *55*, 456–467. [CrossRef] [PubMed]

29. Verbeke, W. Consumer acceptance of functional foods: Socio-demographic, cognitive and attitudinal determinants. *Food Qual. Prefer.* **2005**, *16*, 45–57. [CrossRef]

30. Caracciolo, F.; Vecchio, R.; Lerro, M.; Migliore, G.; Schifani, G.; Cembalo, L. Natural versus enriched food: Evidence from a laboratory experiment with chewing gum. *Food Res. Int.* **2019**, *122*, 87–95. [CrossRef]

31. Priyadarshini, A.; Priyadarshini, A. Market dimensions of the fruit juice industry. In *Fruit Juices Fruit Juices, Extraction, Composition, Quality and Analysis*; Rajauria, G., Tiwari, B., Eds.; Academic Press; Elsevier: Dublin, Ireland, 2018; Volume 19, pp. 15–32.

32. Bunnell, R.H. Enrichment of fruit products and fruit juices. *J. Agric. Food Chem.* **1968**, *16*, 177–183. [CrossRef]

33. Verbeke, W.; Scholderer, J.; Lähteenmäki, L. Consumer appeal of nutrition and health claims in three existing product concepts. *Appetite* **2009**, *52*, 684–692. [CrossRef]

34. Oláh, J.; Virglerova, Z.; Popp, J.; Kliestikova, J.; Kovács, S. The Assessment of Non-Financial Risk Sources of SMES in the V4 Countries and Serbia. *Sustainability* **2019**, *11*, 4806. [CrossRef]

35. Lakner, Z.; Kiss, A.; Merlet, I.; Oláh, J.; Máté, D.; Grabara, J.; Popp, J. Building Coalitions for a Diversified and Sustainable Tourism: Two Case Studies from Hungary. *Sustainability* **2018**, *10*, 1090. [CrossRef]

36. Nagy-Pércsi, K.; Fogarassy, C. Important Influencing and Decision Factors in Organic Food Purchasing in Hungary. *Sustainability* **2019**, *11*, 6075. [CrossRef]

37. Lee, H.J.; Yun, Z.S. Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food. *Food Qual. Prefer.* **2015**, *39*, 259–267. [CrossRef]

38. Balázs, B. Local Food System Development in Hungary. *Int. J. Sociol. Agric. Food* **2012**, *19*, 403–421.

39. O'Donnell, J. Gen Y sits on top of consumer food chain; they're savvy shoppers with money and influence. *USA Today* **2006**, *11*, 322–358.

40. Yang, Z.; Lu, W.; Long, Y.; Bao, X.; Yang, Q. Assessment of heavy metals contamination in urban topsoil from Changchun City, China. *J. Geochem. Explor.* **2011**, *108*, 27–38. [CrossRef]

41. Bucic, T.; Harris, J.; Arli, D. Ethical consumers among the millennials: A cross-national study. *J. Bus. Ethics* **2012**, *110*, 113–131. [CrossRef]

42. Ferris, G.R.; Berkson, H.M.; Harris, M.M. The recruitment interview process: Persuasion and organization reputation promotion in competitive labor markets. *Hum. Resour. Manag. Rev.* **2002**, *12*, 359–375. [CrossRef]

43. Vickrey, W. Counter speculation, auctions, and competitive sealed tenders. *J. Financ.* **1961**, *16*, 8–37. [CrossRef]

44. Lusk, J.L.; Alexander, C.; Rousu, M.C. Designing experimental auctions for marketing research: The effect of values, distributions, and mechanisms on incentives for truthful bidding. *Rev. Mark. Sci.* **2007**, *5*. [CrossRef]

45. Shogren, J.F.; Shin, S.Y.; Hayes, D.J.; Kliebenstein, J.B. Resolving differences in willingness to pay and willingness to accept. *Am. Econ. Rev.* **1994**, *30*, 255–270.

46. Onwezen, M.C.; Reinders, M.J.; van der Lans, I.A.; Sijtsema, S.J.; Jasiulewicz, A.; Guardia, M.D.; Guerrero, L. A cross-national consumer segmentation based on food benefits: The link with consumption situations and food perceptions. *Food Qual. Prefer.* **2012**, *24*, 276–286. [CrossRef]

47. Zandstra, E.H.; De Graaf, C.; Van Staveren, W.A. Influence of health and taste attitudes on consumption of low- and high-fat foods. *Food Qual. Prefer.* **2001**, *12*, 75–82. [CrossRef]

48. Roininen, K.; Lähteenmäki, L.; Tuorila, H. Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite* **1999**, *33*, 71–88. [CrossRef] [PubMed]

49. Lähteenmäki, L.; Lyly, M.; Urala, N. Consumer attitudes towards functional foods. *Underst. Consum. Food Prod.* **2004**, 412–427. [CrossRef]

50. Cameron, A.C.; Trivedi, P.K. *Microeconometrics, Methods and Applications*; Cambridge University Press: New York, NY, USA, 2005; ISBN 13 978-0-521-84805-3.

51. Tuorila, H. Attitudes as determinants of food consumption. In *Encyclopedia of Human Biology*, 2nd ed.; Academic Press: San Diego, CA, USA, 1997; Volume 1.

52. Bruschi, V.; Teuber, R.; Dolgopolova, I. Acceptance and willingness to pay for health-enhancing bakery products–Empirical evidence for young urban Russian consumers. *Food Qual. Prefer.* **2015**, *46*, 79–91. [CrossRef]

53. Rizzo, G.; Borrello, M.; Dara Guccione, G.; Schifani, G.; Cembalo, L. Organic Food Consumption: The Relevance of the Health Attribute. *Sustainability* **2020**, *12*, 595. [CrossRef]

54. Apaolaza, V.; Hartmann, P.; D'Souza, C.; López, C.M. Eat organic–Feel good? The relationship between organic food consumption, health concern and subjective wellbeing. *Food Qual. Prefer.* **2018**, *63*, 51–62. [CrossRef]

55. Barauskaite, D.; Gineikiene, J.; Fennis, B.M.; Auruskeviciene, V.; Yamaguchi, M.; Kondo, N. Eating healthy to impress: How conspicuous consumption, perceived self-control motivation, and descriptive normative influence determine functional food choices. *Appetite* **2018**, *131*, 59–67. [CrossRef]

5.5. Annex 5

Article

Organic Food Consumption: The Relevance of the Health Attribute

Giuseppina Rizzo [1],*, Massimiliano Borrello [2], Giovanni Dara Guccione [3], Giorgio Schifani [1] and Luigi Cembalo [2]

[1] Department of Agricultural, Food and Forest Sciences, University of Palermo, 90128 Palermo, Italy; Giorgio.schifani@unipa.it

[2] Department of Agricultural Sciences, Agricultural Economics and Policy Group, University of Naples Federico II, 80055 Portici (Naples), Italy; massimiliano.borrello@unina.it (M.B.); cembalo@unina.it (L.C.)

[3] CREA Research Centre for Agricultural Policies and Bioeconomy, 90143 Palermo, Italy; giovanni.daraguccione@crea.gov.it

* Correspondence: giuseppina.rizzo03@unipa.it; Tel.: +39-3200415120

Abstract: During the last decades, organic food products have become the main sustainable alternative to conventional food consumption. Among the several organic food attributes that consumers recognize in organic food, healthiness has been reported as the primary motivation to buy products certified as organic. The objective of the current study is to assess the relative weight of the health attribute among other recognized organic food attributes. To achieve this aim, a multiple price list (MPL) methodology is adopted to elicit consumers' Willingness to Pay (WTP) for organic extra virgin olive oil (EVOO). Findings show that the contribution of the health attribute to determine the average premium price for organic EVOO is 78.9% of its total premium price. The study generates managerial implications to promote further expansion of the organic food market.

Keywords: health concern; sustainable food; organic food; extra virgin olive oil; organic attributes; health attribute; consumer behavior

1. Introduction

Sustainability in global food systems is one of the most relevant goals in this century [1]. If one considers agri-food production, this may be achieved by reducing trade-offs between productivity and sustainability, by choosing appropriate production methods [2,3]. On the other hand, fostering sustainable food consumption addresses the sustainability goal emphasizing the relevance of consumers' choices. In this regard, over the years, changes in consumer behavior have been observed, with increasing number of individuals choosing more sustainable products in their daily dietary choice [4]. This is due to the spreading awareness of environmental impacts of the agri-food sector [5], as well as the growing interest for the health dimension of food related to nutrients intake [6] and food safety [7].

Within this scenario, consuming organic foods has become one of the most popular sustainable consumption options among the several alternatives to conventional food [7,8]. According to the latest available data, organic food consumption in the world continues to grow with a consolidated trend in every country [9]. Organic produce counts on a market of 90 billion euros in the world, with the United States as the top market with 40 billion euros, followed by Germany (10 billion euros), France (7.9 billion euros), China (7.6 billion euros), and Italy (3.1 billion euros).

Studies undertaken in different countries, using different empirical strategies, identify common attributes associated with organic products [10–12]. These attributes are, in order of relevance to consumers: healthiness [13], food safety [14], environmental protection [15], animal welfare [16], and

the support of the local economy [17–19]. Literature informing consumers' choice for organic food states that, although the attitude of consumers for animal welfare and environmental consequences is a determining factor, the attitude and the awareness of health represent the main factor that influences willingness to pay (WTP) [20]. Among others, Li and colleagues [21] found that the higher is consumers' concern about health, the greater is their willingness to pay for organic food. Furthermore, consumers who believe that organic food is healthier are less likely to purchase a conventional product, even if the organic product is more expensive than they expected [22,23]. According to Massey et al. [24] and Krystallis and colleagues [25], the most important arguments used to justify consumers' price premium for organic foods is the health attribute recognized to organic food, followed by the nature conservation attribute and the perception that it has a good taste. Despite the extensive literature providing a list of the main reasons to buy organic food (e.g., [10,12]), to the best of our knowledge, the relative importance of organic food attributes to determine consumers' preferences and WTP has received scant attention. Based on the studies reporting healthiness as the primary consumers' motivation for purchasing organic foods (e.g., [21–26]), the current study seeks to assess the relative weight of this attribute among other recognized organic food attributes. More specifically, the following research objectives are addressed: 1) to find the contribution of the health attribute in determining consumers' WTP a premium price for organic food products, and 2) to explore the drivers behind consumers' WTP for the health attribute. Discovering the contribution of each attribute to consumers' preferences would provide a better understanding of consumers' valuation of organic food products, generating, as a consequence, managerial implications to support the further expansion of this sustainable market, thus contributing to the goal of more sustainable food systems.

The remainder of this paper unfolds as follows. Following this introduction, Section 2 describes the empirical strategy adopted in the study. In Section 3, findings are shown and discussed. Section 4 concludes the work by providing implications and suggestions for future research.

2. Empirical Strategy

The empirical strategy adopted assumes to derive consumers' preferences for the health attribute of the organic extra virgin olive oil (EVOO) by comparing this product with a counterpart conveying to consumers food healthiness as unique attribute, i.e., functional EVOO. Food products can be considered functional if, together with the basic nutritional impact, they have beneficial effects on one or more functions of the human organism, thus either improving the general and physical conditions or/and decreasing the risk of the evolution of diseases [27]. In this regard, with the Reg. (UE) 432/2012, the EFSA (European Food Safety Authority, Parma, Italy) has authorized some functional health claims (hc) to apply to EVOO. The rationale to compare organic EVOO with its functional counterpart lies in the assumption that a functional product brings, somehow clearly isolated, the health attribute [28,29]. Therefore, by comparing the two products, it is possible to isolate consumers' preference for the health attribute in the organic version. This empirical strategy was, to the best of our knowledge, never applied before in other studies.

A structured and closed online questionnaire on the consumption of EVOO was submitted. Data were collected between Spring and Winter 2018. Consumers were invited, via social networks and e-mail, to participate in the online survey. There were no restrictions except for being older than 18 years old (adult age in Italy) and a regular EVOO consumer (at least once per month). Though not statistically representative, a convenient sampling strategy allows to target a wide number of consumers.

The questionnaire was structured in four sections, lasting about 20 min. In the first section, information was collected regarding: frequency of EVOO consumption; whether respondents were responsible for the family's olive oil purchases; the prevailing EVOO purchase channel (i.e., supermarket, specialty shop, direct selling by farmers, etc.); the most frequent consumption circumstance; the annual quantity consumed.

In the second section, WTP for EVOO was elicited by using an elicitation mechanism named Multiple Price List (MPL) [30,31]. Prices were presented as an array of ordered prices in a table (ranging from €7.50 to €12.00 at €0.50 intervals), one per row, and respondents asked to indicate

whether they were willing to buy the specific product at each price level (i.e., yes/no). Respondents were informed of the average market price of conventional EVOO (€7 per liter).

It is known that food is not only a mean to satisfy basic needs, but plays a key role in preventing food-related diseases and improving physical and mental well-being [32]. Therefore, in the third section, different measures have been used to understand whether the preference for the two versions of EVOO is influenced by extra-mercantile factors such as, attitudinal or psychological ones. To analyze constructs related to these factors, measurement scales developed in the field of generic foods can be used also in the domain of organic and functional products. First, Roininen et al. [33] developed an attitude scale to measure general health interest (GHI) in food choices. As functional foods differ from conventionally healthy foods, this scale is expected to correlate positively, but only moderately, with attitudes towards functional foods. Second, the same authors developed a scale for measuring natural product interest (NPI) [33]. Under the hypothesis that functional foods are considered by consumers as less natural than conventional ones [34], this scale is expected to have a negative correlation with functional food attitudes. Third, in order to assess the interviewees' specific attitudes towards functional products, a short version of the scale defined by Urala and Lähteenmäki [34] was used. The dimension taken into consideration is defined "perceived reward for the use of functional foods" (FF REW) which includes statements expressing personal fulfillment derived from the use of such foods, intended as a tool to improve health and to take care of oneself. Fourth, NEP scale [35] was used to predict environmental activism, environmentally significant behaviors, people's real environmental behavior, awareness for environmental problems, and emotional connectedness to nature [36]. These validated GHI, NPI, FF REW, and NEP attitude scales were collected by means of seven-point Likert scales. The different items taken into consideration were formulated in such a way that respondents with opposing attitudes provided different answers by positioning on the various anchors: 1 = totally disagree; 2 = disagree; 3 = partially disagree; 4 = uncertain; 5 = partially agree; 6 = agree; 7 = totally agree, so as to be able to detect and quantify the variables.

In the fourth and last section, socio-demographic information of participants is requested, namely: region of origin, age, gender, number of members and presence of minors in the family, educational qualifications, profession, and income of the interviewee.

Statistical Analysis

In order to find the relative contribution of the health attribute in an organic product, and then, to explore the drivers behind consumers' willingness to pay for the health attribute, the data collected through the online platform questionnaire were processed in three distinct phases, using the Stata integrated statistical software.

In the first phase descriptive analysis of the data were conducted in order to define the socio-demographic characteristics of the sample and the consumer purchasing behavior; in the second phase the psycho-attitudinal scales were decoded; in the final part, after a description of the WTPs detected for the two types of EVOO, a Tobit Regression was performed to measure how the individual variables examined in the analysis can influence the price premium.

This stochastic model may be expressed by the following relationship:

$$y_t = X_t\beta + u_t \qquad if\ X_t\beta + u_t > 0$$
$$y_t = 0 \qquad if\ X_t\beta + u_t \leq 0$$
$$t = 1, 2, \dots, N$$

where N is the number of observations, y_t is the dependent variable, X_t is a vector of independent variables, β is a vector of unknown coefficients, and u_t is an independently distributed error term assumed to be normal, with zero mean and constant variance ϑ^2. Thus, the model assumes that there is an underlying, stochastic index equal to $(X_t\beta + u_t)$ which is observed only when it is positive, and hence qualifies as an unobserved, latent variable.

3. Results and Discussion

3.1. Socio-Demographic Characteristics

The questionnaire was correctly filled in by 867 consumers, who are equally distributed in gender, with 441 females (51%) and 426 males (49%). The questionnaire was administered to adult consumers, and this resulted in a respondents' age distribution ranging from 18 to 73 years, with an average age of 42 years.

Except for 11% of respondents who declared themselves single, the average number of members of the households was 3. Specifically, there were families of four components (34%), three components (23%), two components (20%), five components (11%), and more than five components (1%). Minors were present in 33% of the sampled households.

The highest percentage of the participants had a high education degree, while 32% of the sample had a high school degree, 47% had a bachelor's degree, 18% had master or a doctorate and the remaining 3% had secondary school education. Further, 77% of the sample declared that their monthly income falls in the class between 1080 and 4320 euros, 10% ranked between less than 540 and up to 1080 euros, and the remaining 13% had income of between 4320 and over 8100 euros.

As for profession, 43.6% of respondents claimed to be public or private employees, in second place were the unemployed (18%) and freelancers (18%), followed by teachers with 8.5%, entrepreneurs with 7.3%, executives and pensioners with a percentage just over 4.6%.

Furthermore, 79% of the sample were concentrated in the South and Islands, compared to 21%, which includes the remaining regions, so the data are not representative of the Italian population. This distribution is part of the sample selection process, as we wanted to detect the largest number of respondents in the regions with the highest oil production and daily use in the normal daily diet. In fact, presented with the question "With what frequency do you consume EVOO?", 90% of the interviewees declared "every day".

For the evaluation of purchasing habits, the survey showed that 39% of consumers purchase EVOO personally, 35% together with another family member, and the remaining 26% said that EVOO's purchasing manager was another family member. The descriptive analyzes of the sample are summarized in Table 1.

Table 1. Descriptive statistics of the sample (n = 867).

	Mean	Std. Dev.	Min	Max
Gender [1]	0.51	0.50	0	1
Age [2]	41.98	13.27	18	73
Family members [3]	3.17	1.23	1	6
Minors [4]	0.33	0.47	0	1
Level of education [5]	3.80	0.77	1	5
Monthly income [6]	1.81	0.64	1	3

[1]: Dummy variable, 1 = Female and 0 = Male; [2]: Continuous variable; [3]: Categorical variable, 1 = Single, 2 = Two members, 3 = Three members, 4 = Four members, 5 = Five members and 6 = family with more than 5 members; [4]: Dummy variable, 1 = minors are present in the family and 0 = minors are not present in the family; [5]: Categorical variable, 1 = elementary school, 2 = junior high school, 3 = diploma, 4 = degree, 5 = Master/PhD; [6]: Categorical variable, 1 = low income, 2 = middle-income, 3 = high income.

3.2. Psycho-Attitudinal Scales

Attitude can be defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" [37]. Because attitudes strongly affect food choice behavior, they can be used to explain consumers' food choices by means of appropriate attitudinal scales [38].

The used attitudinal scales concerning the general interest for health (GHI), for natural products (NPI), the perceived reward for the use of functional foods (FF REW), and the attitude towards the

environment (NEP) have already been presented in the second section. Each interviewee expressed his or her degree of agreement or disagreement, positioning himself on the seven-point Likert scale for each individual statement reported (item). The average and standard deviation of each item were calculated and are shown in Tables 2–5.

Table 2. Descriptive statistics of GHI scale.

	General Health Interest (GHI)	Mean	Std. Dev	Min	Max
GHI_1	The healthiness of food has little impact on my food choices	3.07	2.39	1	7
GHI_2	I am very particular about the healthiness of food I eat	5.9	1.3	1	7
GHI_3	I eat what I like and I do not worry much about the healthiness of food	2.67	1.73	1	7
GHI_4	It is important for me that my diet is slow in fat	4.35	1.63	1	7
GHI_5	I always follow a healthy and balanced diet	4.78	1.53	1	7
GHI_6	It is important for me that my daily diet contains a lot of vitamins and minerals	5.23	1.48	1	7
GHI_7	The healthiness of snacks makes no difference to me	1.96	1.63	1	7
GHI_8	I do not avoid foods, even if they may raise my cholesterol	3.35	1.71	1	7

Table 3. Descriptive statistics of NPI scale.

	Natural Product Interest (NPI)	Mean	Std. Dev	Min	Max
NPI_1	I try to eat foods that do not contain additives	5.33	1.59	1	7
NPI_2	I do not care about additives in my daily diet	2.61	1.67	1	7
NPI_3	I do not eat processed foods, because I do not know what they contain	3.96	1.8	1	7
NPI_4	I would like to eat only organically grown vegetables	5.43	1.81	1	7
NPI_5	In my opinion, artificially flavored foods are not harmful for my health	2.95	1.83	1	7
NPI_6	In my opinion, organically grown foods are no better for my health than those grown conventionally	2.91	1.96	1	7

Table 4. Descriptive statistics of FF REW scale.

	Reward From Using Functional Food (FF REW)	Mean	Std. Dev	Min	Max
REW_1	I get pleasure from eating functional foods	5.92	1.31	1	7
REW_2	The idea that I can take care of my health by eating functional foods gives me pleasure	5.93	1.31	1	7
REW_3	Functional foods make me feel more energetic	5.19	1.57	1	7
REW_4	Functional foods help to improve my mood	4.9	1.7	1	7
REW_5	My performance improves when I eat functional foods	4.93	1.66	1	7
REW_6	I actively seek out information about functional foods	4.61	1.79	1	7
REW_7	I willingly try even unfamiliar products if they are functional	4.76	1.74	1	7

Table 5. Descriptive statistics of NEP scale.

	New Ecological Paradigm (NEP)	Mean	Std. Dev	Min	Max
NEP_1	If things continue on their present course, we will soon experience a major ecological catastrophe	5.16	1.66	1	7
NEP_2	The earth is like a spaceship with very limited room and resource	5.59	1.54	1	7

NEP_3	When humans interfere with nature it often produces disastrous consequences	5.72	1.51	1	7
NEP_4	Humans are severely abusing the environment	6.19	1.27	1	7
NEP_5	The idea that we will experience a major ecological disaster if things continue in their current course is a wrong nonsense	2.54	1.88	1	7
NEP_6	I can't see any other real environmental problems created by rapid economic growth. Create only benefits	2.02	1.48	1	7
NEP_7	The idea that the balance of nature is terribly delicate and easily susceptible is too pessimistic	2.4	1.66	1	7
NEP_8	I don't think the environment is badly exploited by humans	1.94	1.5	1	7
NEP_9	People who claim that the inexorable exploitation of nature has brought us to the brink of ecological collapse are wrong	2.21	1.69	1	7
NEP_10	The balance of nature is very delicate and easily upset	5.79	1.51	1	7

In order to verify the internal validity of the four used scales, the Cronbach's alpha was computed. This coefficient is a statistical indicator used to measure the consistency or reliability of a score in psychological tests for a sample of subjects examined. It is calculated as follows:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\Sigma_{i=1}^{k}\sigma_{yi}^2}{\sigma_x^2}\right) \tag{1}$$

where k is the number of items; σ_X^2 is the variance of the total score and σ_{Yi}^2 is the variance of the items, for the sample of individuals under examination.

In general, high reliability values are to be considered as those greater than or equal to 0.65; therefore, from the results reported in Table 6 relating to the 4 scales, we can confirm a good internal consistency for the different items.

Table 6. Cronbach's Alpha for the four psycho-attitudinal scales used.

Item	Cronbach's Alpha
GHI	0.71
NEP	0.68
NPI	0.91
FF REW	0.86

From the correlation analysis, it turned out that the four scales are interrelated (especially GHI and NPI, with 57% correlation). Except for the NEP scale, which turns out to be inversely related to the others since it presents reverse items, all the scales show direct proportionality, that is, as one increases, the other considered increases (Table 7).

Table 7. Correlation analysis.

	Mean_GHI	Mean_NPI	Mean_RWE	Mean_NEP
Mean_GHI	1.0000			
Mean_NPI	0.5665	1.0000		
Mean_REW	0.4600	0.4854	1.0000	
Mean_NEP	0.2952	0.4138	0.2787	1.0000

3.3. Willingness to Pay

The growing awareness of the link between food and health has led consumers to perceive and associate an additional value to those products that lead back to health attributes. The questionnaire included, after providing information on the health value of the organic and functional EVOO, a question through which it was asked to express the willingness to pay a price premium for the two types of EVOO.

As mentioned in Section 2, the elicitation method adopted in the study is the Multiple Price List (MPL). In the context of eliciting willingness to pay for some good, MPL confronts the interviewee with an array of ordered prices in a table, one per row, and asks him/her to indicate "yes" or "no" for

each price. WTP values were based on the average calculated on the highest price for which the respondent indicated "yes" and the first price for which he/she responded "no". It was also allowed an opt-out. In the event, a price premium of zero was associated.

Findings reveal that 76.7% of sampled consumers are willing to pay a premium price for the organic EVOO, against the remaining 23.3% who do not believe that the health attribute of organic EVOO justifies a premium price. For the functional EVOO, 67.6% of respondents declared to be willing to pay a premium price for its health claim, against the remaining 32.4%.

The averages of the price premium for the two types of EVOO were calculated. The willingness to pay a price premium for organic EVOO (WTPbio) is €1.405, while that for functional EVOO (WTPhc) is €1.109 (Table 8). Figures 1 and 2 show WTPbio and WTPhc Kdensity and box-plot.

Table 8. Descriptive statistics for WTPbio and WTPhc variables.

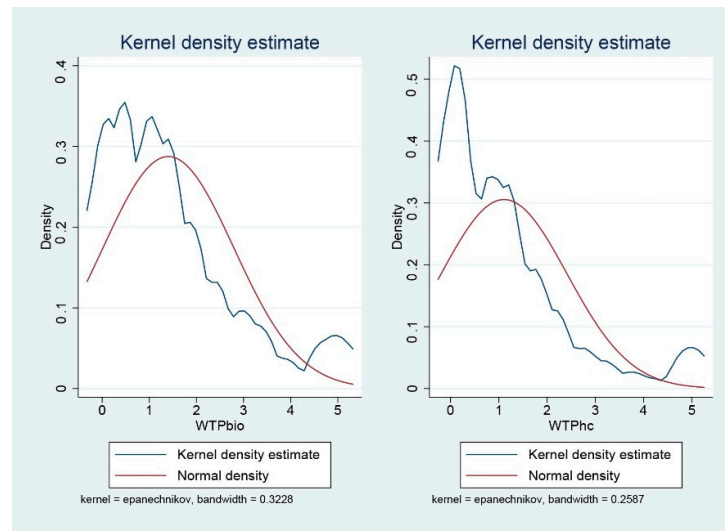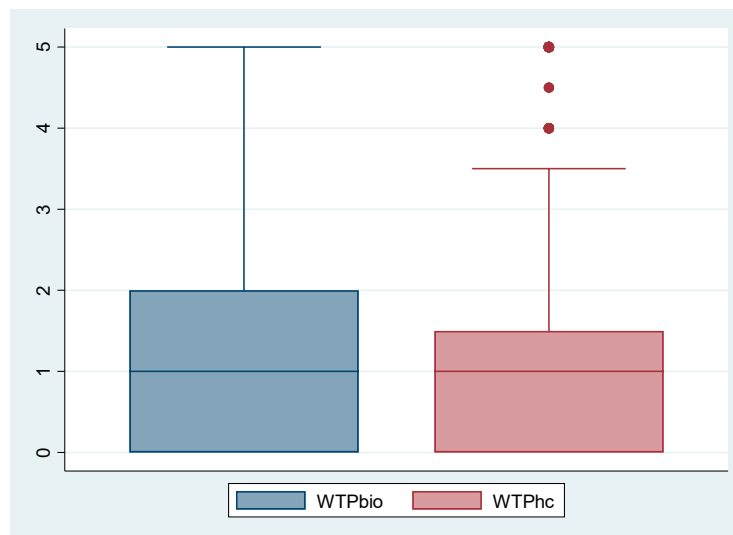|	Obs	Mean	Std. Dev.	Min	Max
WTPbio	867	1.405	1.387	0	5
WTPhc	867	1.109	1.306	0	5

Figure 1. WTPbio and WTPhc Kdensity.

Figure 2. WTPbio and WTPhc Box-plot.

Parametric (*t*-test) [39] and non-parametric tests (Wilcoxon tests) [40] demonstrate that the value of WTPbio is significantly different and greater than that of WTPhc, with an average delta of about €0.30. This delta represents the value of all attributes associated to organic food, once that the health attribute is isolated by difference between the WTP of the two EVOO versions. Therefore, and answering to the first research question of the current paper, the contribution of the health attribute to determine the average premium price for organic EVOO is €1.109 (78.9% of its total premium price), corresponding to the respondents' average premium price for the health claim of functional EVOO (WTPhc).

3.4. Drivers behind Consumers' WTP for the Health Attribute

It has been previously emphasized that consumers' choice depends on a multitude of factors. A Tobit regression model having as dependent variable the relative contribution of the EVOO health attribute (euro amount of WTP for the health attribute) and as regressors the other variables collected in the questionnaire—i.e., the socio-demographic characteristics and psycho-attitudinal scales—was implemented to find the main drivers of consumer' willingness to pay for the EVOO health attribute. Table 9 shows the estimated coefficients, with relative statistical significance, for the model. Only statistically significant variables are reported.

Table 9. Results of Tobit Regression Model.

Variable	Coef.	Std. Err.	*t*	*p* > |*t*|
GHI	0.175474	0.084640	2.07	0.038
FF REW	0.391949	0.064188	6.09	0.000
Monthly income	0.077366	0.040657	1.90	0.057
Gender	−0.30616	0.140974	−2.17	0.030

Dependent variable: Organic Health Attribute; Limits: Lower = 0 and Upper = 5; Number Obs = 867 (516 Uncensored; LR chi2 (9) = 82.80, Prob > chi2 = 0.0000; Pseudo R2 = 0.0294.

As the Tobit regression model shows, the expected value of y in the model is:

$$E_y = X\beta F(z) + \sigma f(z) \tag{2}$$

where X is a vector of independent variables, β is a vector of unknown coefficients, z is the unit normal density, $F(z)$ is the cumulative normal distribution function and $f(z)$ is the normal probability density function. A Tobit model is a regression in which the observed range of the dependent variable is censored/truncated in some way. In the presence of a censored dependent variable, usual ordinary least squares regression does not yield consistent parameter estimates, while Tobit estimates are consistent [41].

In Table 10, marginal effects are shown. They are the variation of the dependent variable y when one explanatory variable x varies of one unit, considering all the other x variables to the average; if the independent variable x is a dummy, the marginal effect indicates the variation in the dependent variable y, in the passage of the x variable from 0 to 1.

Table 10. Marginal effects calculation.

Variable	Dy/Dx	Std. Err.	Z	*p* > |Z|
GHI	0.110991	0.0535	2.07	0.038
FF REW	0.247347	0.04048	6.11	0.000
Monthly income	0.048936	0.0257	1.90	0.057
Gender *	−0.193775	0.8924	−2.17	0.030

(*) dy/dx is for discrete change of dummy variable from 0 to 1.

What emerges from the analysis is the relevance of the general interest scale for health (GHI), the reward scale perceived by the consumption of functional products (FF REW), monthly income, presence of minors, age, and gender. In particular, it is possible to notice that the two scales and the

monthly income are positively correlated (+0.11, +0.24 and +0.04, respectively) with the dependent variable and therefore as the value of these regressors increases, the average of the dependent variable tends to increase. On the contrary, the negative coefficients of the presence of minors, gender, and age variables suggest that as they increase, the dependent variable tends to decrease. The data elaboration shows that being a female reduces WTP for healthy attribute of organic EVOO by 0.19 euro/L relative to male. The presence of children in households decreases WTP for the same attribute by 0.15 euro/L, and as age increases the WTP decreases by 0.004 euro/L.

These results are only partially in line with previously published literature. For example, Gunduz and colleagues [42] found that monthly income is positively correlated with the WTP for organic chicken, while Krystallis and colleagues [25] argue that income affects mainly the quantity of organic products bought by households and not their willingness to buy them.

The negative effect of being a woman in determining WTP for the health attribute of organic EVOO contradicts existing literature; this is probably due by the fact that, even if women are more careful and aware of the health dimension of their food choices, men are generally inclined to pay a higher price premium than women [43].

Finally, in agreement with Charatsari and Tzimitra-Kalogianni [44,45] and Magnusson et al. [46], the age factor does not seem to play an important role, with younger consumers showing only a slightly higher WTP (as in our results where age is not significant).

4. Conclusions

Organic food is peculiar since it is associated by consumers with an array of attributes, among which the perceived positive impact on human health has been shown as the main one to drive consumer preferences [47]. Informed by these evidences and adopting extra-virgin olive oil (EVOO) as contextual example, the current research was aimed to evaluate the relative contribution of the health attribute to determine consumers' preference and WTP for organic products and to explore the factors behind consumers' WTP for the health attribute. To achieve this goal, an online survey of 867 consumers of Italian EVOO was conducted, in which a multiple price list (MPL) mechanism was adopted to elicit consumers' WTP. WTP was elicited for organic EVOO and for a functional counterpart in order to isolate the health attribute of the organic product.

Results show the fundamental role of the health attribute to generate consumers' preferences for organic EVOO. Particularly, our findings show that the relative contribution of the health attribute amounts to about four fifths of the total value attributed by consumers to the organic EVOO. It was also found that the willingness to pay for the health attribute under study is positively influenced by the consumers' interest in health, the perceived personal fulfillment generated by the consumption of functional products and monthly income, while gender negatively affected the consumer's willingness to pay.

It is recognized that food is one of the three consumption domains responsible for the largest share of environmental impact [48] and that, at the same time, environmental sustainability is a fundamental determinant of human health [49,50]. In this regard, global calls for sustainable food systems solicit market strategies to foster the consumption of food products coming from sustainable alternatives to conventional agriculture [51–53]. Among the several sustainable alternatives to conventional food production, certified organic foods undoubtedly represent those that have gained greatest momentum.

The new EU regulation on organic production recognizes that "Organic production is an overall system of farm management and food production that combines the best environmental and climate action practices, a high level of biodiversity, and the preservation of natural resources" [54]. Thus, fostering organic food consumption by studying the drivers that guide consumer preferences for this category of products is a crucial strategy to preserve environmental sustainability [55]. Based on this assumption, this study was designed with the aim to gain more insights on consumers' perception of organic food characteristics, as well as on the main drivers of organic food purchase.

Further research is expected to follow the lead of our study to make findings generalizable to the reference population. The current study did not seek statistical representativeness of the sample. Such a strategy implies that the data generating process does not allow to infer the unknown population. If known, that population would be made of adult Italian regular consumers of EVOO. Based on this, we had no chance for a comparison with the whole population, even though we believe it would make results more robust with a wider external validity. Moreover, consumers with different demographic profiles, such as age, education background, occupation, and income should be considered. As follow up of this research, another organic food product should be considered to validate our findings, as it would also be relevant to evaluate the relative weight of other attributes of organic products.

Author Contributions: This paper is the result of teamwork. G.R., G.S. and G.D.G. conceived the research question. G.R. and L.C. conceived the research design. G.R. analyzed the data. M.B., G.R. and L.C. discussed the results. G.R., M.B. and L.C. wrote the paper while the other two authors supported in writing the paper. All authors have read and agreed to the published version of the manuscript.

References

1. Aschemann-Witzel, J.; Maroscheck, N.; Hamm, U. Are organic consumers preferring or avoiding foods with nutrition and health claims? *Food Qual. Prefer.* **2013**, *30*, 68–76.
2. Freda, R.; Borrello, M.; Cembalo, L. Innovation in floriculture when environmental and economics criteria are conflicting. *Calitatea* **2015**, *16*, 110.
3. Niggli, U. Sustainability of organic food production: Challenges and innovations. *Proc. Nutr. Soc.* **2015**, *74*, 83–88.
4. Holloway, L.; Kneafsey, M.; Venn, L.; Cox, R.; Dowler, E.; Tuomainen, H. Possible food economies: A methodological framework for exploring food production-consumption relationships. *J. Rural. Stud.* **2007**, *47*, 1–19.
5. Moisander, J. Motivational complexity of green consumerism. *Int. J. Consum. Stud.* **2007**, *31*, 404–409.
6. Migliore, G.; Borrello, M.; Lombardi, A.; Schifani, G. Consumers' willingness to pay for natural food: Evidence from an artefactual field experiment. *Agric. Food Econ.* **2018**, *6*, 21.
7. Gan, C.; Chang, Z.; Tran, M.C.; Cohen, D.A. Consumer attitudes toward the purchase of organic products in China. *Int. J. Econ. Bus.* **2016**, *15*, 117–144.
8. Asian, S.; Hafezalkotob, A.; John, J.J. Sharing economy in organic food supply chains: A pathway to sustainable development. *Int. J. Prod. Econ.* **2019**, *7*, 36–38.
9. FiBL & IFOAM–Organics International. *The World of Organic Agriculture*; FiBL & IFOAM–Organics International: Bonn, Germany, 2019.
10. Stolz, H.; Stolze, M.; Hamm, U.; Janssen, M.; Ruto, E. Consumer attitudes towards organic versus conventional food with specific quality attributes. *NJAS Wagening. J. Life Sci.* **2011**, *58*, 67–72.
11. Zander, K.; Hamm, U. Consumer preferences for additional ethical attributes of organic food. *Food Qual. Prefer.* **2010**, *21*, 495–503.
12. Schleenbecker, R.; Hamm, U. Consumers' perception of organic product characteristics. *Rev. Appet.* **2013**, *71*, 420–429.
13. Hamilton, K.; Hekmat, S. Organic food and university students: A pilot study. *Nutr. Food Sci. J.* **2018**, *15*, 133–134.
14. Curl, C.L.; Beresford, S.A.; Hajat, A.; Kaufman, J.D.; Moore, K.; Nettleton, J.A.; Diez-Roux, A.V. Associations of organic produce consumption with socioeconomic status and the local food environment: Multi-Ethnic Study of Atherosclerosis (MESA). *PLoS ONE* **2013**, *8*, 769–778.
15. Schäufele, I.; Hamm, U. Organic wine purchase behaviour in Germany: Exploring the attitude-behaviour-gap with data from a household panel. *Food Qual. Prefer.* **2018**, *63*, 1–11.

16. Akaichi, F.; Glenk, K.; Revoredo-Giha, C. Could animal welfare claims and nutritional information boost the demand for organic meat? Evidence from non-hypothetical experimental auctions. *J. Clean. Prod.* **2019**, *207*, 961–970.

17. Wägeli, S.; Hamm, U. Consumers' perception and expectations of local organic food supply chains. *Org. Agric.* **2016**, *6*, 215–224.

18. Feldmann, C.; Hamm, U. Consumers' perceptions and preferences for local food: A review. *Food Qual. Prefer.* **2015**, *40*, 152–164.

19. Radic, I.; Canavari, M. Viennese consumers' preferences and willingness to pay for raspberries from Arilje, Serbia. *Econ. Agro Aliment.* **2014**, *22*, 70–75.

20. Nuttavuthisit, K.; Thøgersen, J. The importance of consumer trust for the emergence of a market for green products: The case of organic food. *J. Bus. Ethics* **2017**, *140*, 323–337.

21. Li, R.; Lee, H.Y.; Lin, Y.T.; Liu, C.W.; Tsai, P.F. Consumers' Willingness to Pay for Organic Foods in China: Bibliometric Review for an Emerging Literature. *Int. J. Environ. Res. Public Health* **2019**, *16*, 1713.

22. Rödiger, M.S. The Role of Price in Consumers' Purchase Decisions on Organic Food. Ph.D. Dissertation, Universität Kassel, Kassel, Germany, 2018.

23. Honkanen, P.; Verplanken, B.; Olsen, S.O. Ethical values and motives driving organic food choice. *J. Consum. Behav.* **2006**, *5*, 420–430.

24. Massey, M.; O'Cass, A.; Otahal, P. A meta-analytic study of the factors driving the purchase of organic food. *Appetite* **2018**, *125*, 418–427.

25. Krystallis, A.; Fotopoulos, C.; Zotos, Y. Organic consumers' profile and their willingness to pay (WTP) for selected organic food products in Greece. *J. Int. Consum. Mark.* **2006**, *19*, 81–106.

26. Yadav, R.; Pathak, G.S. Intention to purchase organic food among young consumers: Evidences from a developing nation. *Appetite* **2016**, *96*, 122–128.

27. Martirosyan, D.M.; Singh, J. A new definition of functional food by FFC: What makes a new definition unique? *Funct. Foods Health Dis.* **2015**, *5*, 209–223.

28. Hughner, R.S.; McDonagh, P.; Prothero, A.; Shultz, C.J.; Stanton, J. Who are organic food consumers? A compilation and review of why people purchase organic food. *J. Consum. Behav. Int. Res. Rev.* **2007**, *6*, 94–110.

29. Verbeke, W. Consumer acceptance of functional foods: Socio-demographic, cognitive and attitudinal determinants. *Food Qual. Prefer.* **2005**, *16*, 45–57.

30. Andersen, S.; Harrison, G.; Lau, M.; Rutstrom, E. Elicitation using multiple price list formats. *Exp. Econ.* **2006**, *9*, 383–405.

31. Lerro, M.; Vecchio, R.; Caracciolo, F.; Pascucci, S.; Cembalo, L. Consumers' heterogeneous preferences towards corporate social responsibility in the food industry. *Corp. Soc. Responsib. Environ. Manag.* **2018**, *25*, 1050–1061.

32. Roberfroid, M.B. Concepts and strategy of functional food science: The European perspective. *Am. J. Clin. Nutr.* **2000**, *71*, 1660–1664.

33. Roininen, K., Lähteenmäki, L.; Tuorila, H. Quantification of the consumer's attitude towards health and the hedonic characteristics of foods. *Appetite* **1999**, *33*, 7188.

34. Urala, N.; Lähteenmäki, L. Attitudes behind consumers' willingness to use functional foods. *Food Qual. Prefer.* **2004**, *15*, 793–803.

35. Clark, C.F.; Kotchen, M.J.; Moore, M.R. Internal and external influences on pro-environmental behavior: Participation in a green electricity program. *J. Environ. Psychol.* **2003**, *23*, 237–246.

36. Peterson, A.T.; Papeş, M.; Soberón, J. Rethinking receiver operating characteristic analysis applications in ecological niche modeling. *Ecol. Model.* **2008**, *213*, 63–72.

37. Eagly, A.H.; Chaiken, S. *The Psychology of Attitudes*; Hartcourt Brace Jovanovich College Publisher: San Diego, CA, USA, 1993.

38. Tuorila, H. Attitudes as determinants of food consumption. *Encycl. Hum. Biol.* **1997**, *1*, 559–606.

39. Kim, T.K. T-test as a parametric statistic. *Korean J. Anesthesiol.* **2015**, *68*, 540.

40. Gibbons, J.D. *Location Tests for Single and Paired Samples (Sign Test and Wilcoxon Signed Rank Test)*; SAGE Publications: Thousand Oaks, CA, USA, 1993.

41. Cameron, C.C.; Trivedi, P.K. *Microeconometrics, Methods and Applications*; Cambridge University Press: New York, NY, USA, 2005; ISBN-13 978-0-521-84805-3.

42. Gunduz, O., Bayramoglu, Z. Consumer's willingness to pay for organic chicken meat in Samsun province of Turkey. *J. Anim. Vet. Adv.* **2011**, *10*, 334–340.

43. Ureña, F.; Bernabéu, R.; Olmeda, M. Women, men and organic food: Differences in their attitudes and willingness to pay. A Spanish case study. *Int. J. Consum. Stud.* **2008**, *32*, 18–26.

44. Essoussi, L.H.; Zahaf, M. Profiling organic food consumers: Motivations, trust orientations and purchasing behaviour. *J. Int. Bus. Econ.* **2008**, *8*, 25–39.

45. Charatsari, C.; Tzimitra-Kalogianni, I. Insight into Consumers' Willingness to expend extra Time and Money to purchase Organic Vegetables. *New Medit* **2007**, *6*, 22.

46. Magnusson, M.K.; Arvola, A.; Hursti, U.K.K.; Åberg, L.; Sjödén, P.O. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite* **2003**, *40*, 109–117.

47. Molinillo, S.; Vidal-Branco, M.; Japutra, A. Understanding the drivers of organic foods purchasing of millennials: Evidence from Brazil and Spain. *J. Retail. Consum. Serv.* **2020**, *52*, 101926.

48. Reisch, L.; Eberle, U.; Lorek, S. Sustainable food consumption: An overview of contemporary issues and policies. *Sustainability* **2013**, *9*, 7–25.

49. Myers, S.S.; Gaffikin, L.; Golden, C.D.; Ostfeld, R.S.; Redford, K.H.; Ricketts, T.H.; Osofsky, S.A. Human health impacts of ecosystem alteration. *Proc. Natl. Acad. Sci. USA* **2013**, *110*, 18753–18760.

50. Li, A.M. Ecological determinants of health: Food and environment on human health. *Environ. Sci. Pollut. Res.* **2017**, *24*, 9002–9015.

51. Lombardi, A.; Vecchio, R.; Borrello, M.; Caracciolo, F.; Cembalo, L. Willingness to pay for insect-based food: The role of information and carrier. *Food Qual. Prefer.* **2019**, *72*, 177–187.

52. Pascucci, S.; Lombardi, A.; Cembalo, L.; Dentoni, D. Governance mechanisms in Food Community Networks. *Ital. J. Food Sci.* **2013**, *25*, 98–104.

53. Caracciolo, F.; Vecchio, R.; Lerro, M.; Migliore, G.; Schifani, G.; Cembalo, L. Natural versus enriched food: Evidence from a laboratory experiment with chewing gum. *Food Res. Int.* **2019**, *122*, 87–95.

54. European Union. *Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on Organic Production and Labelling of Organic Products*; European Union: Brussels, Belgium, 2018.

55. Tanner, C.; Wölfing Kast, S. Promoting sustainable consumption: Determinants of green purchases by Swiss consumers. *Psychol. Mark.* **2003**, *20*, 883–902.

5.6. Annex 6

Would organic consumers want more ethics in organic food sector? The effects of the organic plus on the consumers' willingness to pay

Giuseppina Rizzo[1], Giorgio Schifani[1], József Tóth[2] and Giuseppina Migliore[1]

[1] Department of Agricultural, Food and Forest Sciences, University of Palermo, 90128 Palermo, Italy

[2] Department of Agricultural Economics and Rural Development, Corvinus University of Budapest, 1093 Budapest, Hungary

1) Introduction

According to the latest FiBL survey on global organic agriculture (2017), organic sales have reached an all-time high, which sees a market of 90 billion euros in the world, with the United States with 40 billion euros, followed by Germany (10 billion euros), France (7.9 billion euros), China (7.6 billion euros), and Italy (3.1 billion euros). This growth can be considered a success for multiple ecological and economic reasons. From an ecological point of view, organic agriculture represents a more sustainable alternative to conventional agricultural production, where the use of chemical products has led to pollution of the subsoil and, in some cases, the loss of biodiversity (Tiraieyari et al., 2017).

From an economic point of view, over the years, the growth of organic production has led to the expansion of this category of products up to conventional supermarkets and therefore has opened the market to new customers, thus reducing the obstacles to the adoption of organic agriculture, which has become more known for both producers and consumers (Best, 2008).

However, as early as the 1990s, it began to be argued that the growth of the organic sector would also lead to negative consequences, dictated by a process called the "conventionalization of organic agriculture" (Tovey, 1997). Conventionalization refers to the process by which organic agriculture increasingly takes on the characteristics of mainstream industrial agriculture. In fact, growing and expanding, organic agriculture has in fact taken on various aspects of industrial agriculture and, at the same time, has diminished its sustainability, thus leading to a partial loss of the ethical values that have always characterized the organic sector (Buck et al., 1997).

Indeed, this process of conventionalization requires greater mechanization of agriculture, a decrease in direct marketing, and, in the long term, even a relaxation of the organic standards proclaimed by IFOAM in 2005 (De Wit and Verhoog, 2007).

Conventionalization is in contrast with the IFOAM principles that characterize organic production and, in particular, with the principles of ecology and health (Van Huik and Bock, 2006).

These principles are fundamental for the choice of organic products by the consumer, in which the values mentioned in the explanation accompanying them seem to be firmly rooted in their ethics (Luttikholt, 2007).

In correspondence with this change in the sector, the meaning of "organic" has also begun to indicate the use of natural methods on a small scale to a standardized industrial agricultural reality on a large scale (Harrison, 2008). For this reason, the same producers who started the organic movement in the 70s have slightly deviated from the organic label, acting according to their personal management values (Harrison, 2008). These farmers believe that current organic standards do not do enough to protect the environment or to support a truly sustainable distribution system. They have thus differentiated, going beyond organic, up to "Organic Plus" (Schleenbecker and Hamm, 2013; Boggia et al., 2010; Zander and Hamm, 2010; Yue and Tong, 2009).

In literature, few studies have dealt with organic plus products. For example, Howard and Allen (2006) found that the most important additional attributes for organic consumers are the local origin of the products and the social aspect that can affect the sector. This category of products has also been examined in Zander and Hamm (2010) and by Howard and Allen (2006), discovering that the sustainable aspect of production has been

identified as an important criterion for choosing organic food. Bickel, Mühlrath, and Zander (2009) said that the most important criterion was fair producer prices.

It is clear that the organic sector has evolved over time, with all the consequences of chance, and this has led to the evolution of a product that, otherwise, required to be standardized.

However, it must also be considered that the ethical attributes of organic agriculture entail an increase in production costs, thus negatively affecting competitiveness with other types of agriculture. It is crucial to understand if, and to what extent, consumers are willing to compensate organic food producers for additional production costs resulting from higher ethical production standards, which give organic food added value. It is also important to understand what types of organic plus consumer prefers, as we have noticed that in the literature there is still no ranking.

In order to steer the market in the right direction, the following study has three objectives: 1) To understand if the organic plus attributes really have an added value; 2) To see which plus is more important for organic consumers and, 3) To study the drivers that guide organic consumers in their food chooses.

Discovering consumer preferences for organic plus would provide a better understanding of reasons that push consumers to buy organic food and would help expand this sustainable market.

The rest of this document is carried out as follows. Following this introduction, Section 2 deals with Theoretical Framework, Section 3 shows the Empirical Strategy, Section 4 explains Results and Discussion and, finally, Section 5 outlines our Conclusions.

1) Theoretical Framework

Consumer interest in the social, environmental and economic implications of food production is increasingly evident (Basha and Lal, 2019). This phenomenon can be identified in the concept of "ethical consumerism" and concerns the interest of consumers, not only for their own health but also for human rights and for animal and environmental protection (Mathews and Nair, 2020).

In this context, organic agriculture has become one of the most important food production systems, born as an alternative to the conventional agricultural system (Kröger and Schäfer, 2014), as it aims to create a more sustainable agro-food system (Raynolds 2000).

It follows that the organic market in the last two decades has expanded considerably (FiBL, 2017), also seeing the involvement of new market partners. However, this led to a "conventionalization" of the sector (De Wit and Verhoog 2007) and to a decrease in organic standards (Padel, 2008). Indeed, the new companies entering the organic sector operate on a large scale, have larger farm sizes (Padel 2008) and use intensive and industrialized methods that have led to the reduction of the differences between organic and conventional farms (Darnhofer et al. 2010).

In response to this, the market for organic products suffered a bifurcation, spontaneously dividing into two distinct sections. The first sees the involvement of small and medium companies, oriented towards a healthy and sustainable lifestyle, producing high-quality products that follow the standards of associations of organic farmers; the second is typical of large, industrial-scale producers characterized by the sale of organic food in accordance with the basic rules of the EU Regulation (CE) 834/2007 (Constance et al., 2008).

Organic agriculture is typically considered to be better for rural communities, as smaller-scale operations, price premiums, and use of direct markets would support the development of local food systems, as an alternative to the negative impacts of the industrial food system. However, as agribusiness entered the organic market, a bipolar production system has formed, made up of more operations that mix input substitution strategies with monoculture production of high-value crops targeted to indirect markets, while smaller farms employ artisanal practices to grow a variety of crops using more sustainable agronomic practices targeted to direct markets (Guthman, 2004).

The growth of the basic organic standards section has put pressure on the first section, committed to maintaining higher biological standards and ensuring compliance with specific social standards (Zander et al.2011).

These initiatives, which represent the will to maintain the origins and values of the movement, led to the birth of the "organic plus" (Zander and Hamm 2008). The term 'organic plus' was introduced to describe the use of additional criteria that go beyond European organic standards, as a tool to stand out from the increasingly conventionalized organic market, and to satisfy consumers who have approached this market thanks to its distinctive values since its inception.

There are many studies on determinants explaining consumer choices for organic products. About it, in 2007, among main organic purchase motives, Hughner and colleagues detected environmental concerns, health concerns, support of the local economy and animal welfare concerns. These four reasons can be grouped under the sphere of sustainability, as they all contribute to better environmental and social sustainability (Baldi et al., 2013). Indeed, the main attributes that characterize the organic market are the sustainability represented by the innovative and eco-friendly production method (which also leads to a product perceived by the consumer as healthier and safer) and the direct contact between producer and consumer (Reisch et al., 2013). Organic food systems help local businesses gaining market access (Carpio and Isengildina-Massa, 2009), and consumers may therefore believe that they support the local community when purchasing locally produced organic food (Toler et al., 2009). In addition, local food may also imply environmental benefits due to reduced 'food miles' (Denver and Jeansen, 2014) and have important social components (Rana and Paul, 2017).

In this context, the "organic plus" aims to start from these traditional bases to reach higher levels and obtain more benefits.

For example, in the field of organic products, packaging has become an added value element for customers and it is an important factor for this market business success (Olsson et al., 2011). If organic farming represents a sustainable practice, it is important to extend sustainability to the packaging of its products, in order to reduce waste and reuse products, recycling them (Williams et al., 2008). In this way, package becomes a way to reduce the environmental impact in itself (Gray and Guthrie, 2007), and , in this regard, Satimanon and Weatherspoon (2010) suggested that ecological packaging should be added in order to attract more purchases by consumers of organic products.

Another particularly important added value is given by the place of origin of the products. In particular, it has been shown that organically minded consumers not only consider organic food production important but also evaluate local food production (Hempel and Hamm, 2016). Local food, by definition, entails greater proximity in the relationship between producer and consumer (Zander and Hamm, 2010). This gives greater value to organic food products, which in the meantime have become part of the globalization process (Wirth et al., 2011).

Finally, organic agriculture plus also is its social function. This term indicates the agricultural activities that influence society, contributing to the cultural growth and civil promotion of its members (Torquati et al., 2019). It is practiced in social farms, characterized by both a productive and social component (Foti et al., 2014). The first involves the production of agricultural products to be placed on the market, the second has the aim of assisting, training, and employing people with different types and levels of disadvantage, through the principles of horticultural therapy, a discipline that uses plants for rehabilitation (Davis, 1995). In this context, organic agriculture can prove to be of particular importance, as the use of chemical products can limit the activity of the people involved. On the contrary, the possibility of using organic farming techniques preserves from contact with toxic substances and guarantees an improvement in the interaction between man and plant, and simplified management of agronomic practices compared to conventional methods (Muganu et al., 2009). However, the listed advantages entail an increase in production costs, thus negatively affecting competitiveness in the market for agri-food products. In this regard, it is important to investigate the willingness of the consumer to pay a surplus for these products, and at the same time, to study which are the main drivers that guide him in his agri-food choices.

Although the organic plus represents a qualitative leap for the consumption of organic products, in literature, the innovation of this category of products remains little addressed to date. This study, therefore, aims to fill, at least partially, the existing gap, by experimental auctions on organic eggs. We chose them because based on the current consumer sustainable concerns; also production methods and origin of eggs became important

factors in purchase behavior (Mesias et al., 2011; Von Borell and Sorensen, 2004). The introduction of new products such as organic, local, and free-range eggs (for example in social farms) into the market has affected consumers' egg choice (Mesias et al., 2011). Consumers perceive organic eggs to be healthy, natural, and environmentally and animal friendly, quality products (Biemans and Tekien, 2017; Van Loo et al., 2010).

2) Empirical Strategy

In order to answer formulated queries, experimental auctions were carried out (Fox et al., 1995; Lusk and Shogren, 2007). The experiment was conducted at the University of Palermo (Italy), in September 2019, involving only consumers of organic foods, who were randomly recruited, through open invitations, by university website and online social platforms. Eleven experimental sessions of 30 minutes were organized, involving ten people at a time.

The mechanism used was the "random nth-price auction" (Shogren et al., 2001), which combines two classic experimental auction mechanisms: the Vickrey auction and the BDM mechanism (Grether and Plott, 1979). In it, randomness allows to involve all bidders and to reduce any incentive to fix a stable market compensation price. In this way, each participant is invited to bid sincerely because he/she cannot use a random market compensation price as an indicator and all the participants should be involved because everyone has the opportunity to buy a unit of the proposed good (Shogren et al., 2001).

The experiment was carried out as follows: first of all, participants who declared to eat both eggs and organic products were selected. Subsequently, each participant received the monetary compensation (€5) as a reward for his/her participation in the auction and signed the two consent forms for his/her participation and for the commitment to purchase in case of auction victory. In the third phase, the auction mechanism was explained and a researcher described egg characteristics.

The auction involved the use of four products: (1) standard organic egg carton, used as a control product, (2) organic egg carton in environmentally friendly packaging, (3) organic egg carton from local agriculture, and (4) organic eggs carton from social farms.

All the products were packaged, four at a time, anonymously, to avoid the effects of brand and label (Rousu er al., 2017). Participants wrote their bids on anonymous tickets and completed the provided questionnaire. Finally, a carton type and a price (market price) were randomly drawn to determine the winners, who paid for the selected product.

After ending the auction, respondents completed a questionnaire that included some socio-demographic information (for example age, gender, and education), food consumption habits, and attitudes towards the environment and prosocialness.

In particular, to investigate organic food consumption habits we included the question: "How often do you consume organic products?", whose answers ranged from "rarely" to "very often"; while attitudes were measured by means of two psycho-attitudinal scales, existing in the literature. Specifically, we used a modified version of the New Ecological Paradigm (NEP) scale to evaluate environmental activism and people's real environmental behavior (Dunlap et al., 2000) and the Prosocialness Scale for Adults (PSA) to measure the availability of consumers to prefer and thus help small and medium-sized businesses in the local area (Caprara et al., 2005).

The validated two scales were collected by means of seven-point Likert scales: 1 = totally disagree; 2 = disagree; 3 = partially disagree; 4 = uncertain; 5 = partially agree; 6 = agree; 7 = totally agree, so as to be able to detect and quantify the variables.

Finally, in order to find answers to our research questions, data collected were processed, using Stata 15.0.

First of all, descriptive analysis of the data was conducted, to define sample characteristics; then, the four egg WTPs were decoded and, after a description of two psycho-attitudinal scales, Breusch-Pagan Test and Ordered Logit Regression was performed to verify the independence of the processed WTPs and measure how the individual variables examined in the analysis can influence the price premium.

3) Results and discussion

4.1. Sample characteristics

Concerning consumer socio-demographic profile (Table 1) it is possible to note a preponderance of men (55%), an average age of 40 years, with individuals aged between 20 and 76 years, and a high level of education (about 59%). 84% of the sample is responsible for food purchases in its family and 56% of participants regularly buy organic food.

Table 1. Consumer socio-demographic profile

Variable	Description	Category	Frequencies
Gender	partecipant's gender	male	55 %
		female	45%
Age	partecipant's age	20-34 yeras	43.64 %
		35-48 years	22.75 %
		49-62 years	21.84 %
		63-76 years	11.77 %
Education	highest education level	low education	40.91 %
		high education	59.09 %
Purchasing manager	primary shopper of food in the family	yes	84 %
		not	16 %
Regular shopper organic food	consumer is a regular buyer of organic food	yes	56.34 %
		not	43.66 %

4.2. Willingness to pay for the four types of organic eggs

Participants were willing to pay significantly different premium prices for the four products. More precisely, the willingness to pay for eggs was: €1.64 for organic eggs, €1.98 for organic eggs with sustainable packaging, €1.85 for organic eggs from social farms and €1.91 for organic eggs from local farms (Table 2).

T-test and Wilcoxon signed-ranked tests confirmed that the four mean WTPs were all significantly different from each other. Specifically, organic eggs with sustainable packaging had a significantly higher WTP value as compared to the other egg types.

By comparing the WTP for organic eggs with the other types of eggs, three price premiums can be estimated: consumers are willing to pay €0.34 more for sustainable organic eggs, €0.21 more for social organic eggs, and €0.27 more for local organic eggs (Table 2).

Table 2. WTP and price premium for eggs.

Egg type	WTP (mean)	Price premium for organic plus (mean)
Organic eggs	€1.64	
Sustainable organic eggs	€1.98	+ €0.34
Social organic eggs	€1.85	+ €0.21
Local organic eggs	€1.91	+ €0.27

4.3. Psycho-Attitudinal Scales

Attitudes can be used to explain consumers' food choices, by means of appropriate attitudinal scales (Tourila, 1997). Notably, in this study, the used attitudinal scales concern attitude towards the environment (NEP) and attitude towards prosocialness (PSA), which we have already presented in the third section.
The average and standard deviation of their items were calculated and are shown in Tables 3 and 4.

Table 3. Descriptive statistics of NEP scale.

	New Ecological Paradigm (NEP)	Mean	Std. Dev	Min	Max
NEP_1	We are approaching the limit of the number of people the earth can support	3.70	1.01	1	7
NEP_2	Humans have the right to modify the natural environment to suit their needs	2.02	1.01	1	7
NEP_3	When humans interfere with nature it often produces disastrous consequences	4.34	0.91	1	7
NEP_4	Human ingenuity will insure that we do NOT make the earth unlivable	2.70	1.14	1	7
NEP_5	Humans are severely abusing the environment	4.70	0.69	1	7
NEP_6	The earth has plenty of natural resources if we just learn how to develop them	4.47	0.82	1	7
NEP_7	Plants and animals have as much right as humans to exist	4.50	0.80	1	7
NEP_8	The balance of nature is strong enough to cope with the impacts of modern industrial nations	2.11	1.04	1	7
NEP_9	Despite our special abilities humans are still subject to the laws of nature	4.35	0.81	1	7
NEP_10	The so-called "ecological crisis" facing humankind has been greatly exaggerated	2.25	1.12	1	7
NEP_11	The earth is like a spaceship with very limited room and resources	3.99	0.97	1	7
NEP_12	Humans were meant to rule over the rest of nature	1.97	1.01	1	7
NEP_13	The balance of nature is very delicate and easily upset	4.30	0.77	1	7
NEP_14	Humans will eventually learn enough about how nature works to be able to control it	2.61	0.99	1	7
NEP_15	If things continue on their present course, we will soon experience a major ecological catastrophe	4.29	0.73	1	7

Table 4. Descriptive statistics of PSA scale.

	Prosocialness Scale for Adults (PSA)	Mean	Std. Dev	Min	Max
PSA_1	I try to be close to and take care of those who are in need	5.66	1.21	1	7
PSA_2	I am available for volunteer activities to help those who are in need	5.28	1.53	1	7
PSA_3	I help immediately those who are in need	5.59	1.20	1	7
PSA_4	I am emphatic with those who are in need	5.48	1.41	1	7
PSA_5	I easily lend money or other things	4.80	1.56	1	7
PSA_6	I am willing to make my knowledge and abilities available to others	6.26	0.87	1	7
PSA_7	I easily put myself in the shoes of those who are in discomfort	5.86	1.13	1	7

PSA_8	I am pleased to help my friends/colleagues in their activities	6.40	0.66	1	7

To verify the internal validity of the two scales, Cronbach's alpha was estimated. This coefficient measures the internal consistency of a score in psychological tests. High reliability values are to be considered as those greater than or equal to 0.65; therefore, from the results reported in Table 5, it is possible to confirm a good internal consistency for the different items.

Table 5. Cronbach's Alpha for psycho-attitudinal scales used.

	Cronbach's Alpha
NEP	0.73
PSA	0.81

From the correlation analysis, we can say that the two scales have a low correlation (Table 6)

Table 6. Correlation analysis.

	NEP	PSA
NEP	1.0000	
PSA	0.2695	1.0000

4.4. Determinants of WTP for the egg types

To understand what consumer characteristics and attitudes affects their WTP for sustainable, social and local eggs, an Ordered Logistic Regression model was implemented (Cameron and Trivedi, 2005). This model is a generalization of the Logit Regression and lets ordered categories of the dependent variable to be modelled, through increasing threshold levels (Migliore et al., 2015). So, the dependent variables, which at the beginning were a continuous variable, were been divided into 3 categories: low, moderate, high (Table 7). Only observations with a positive price premium were considered. Therefore, from 110 initial observations, the model on organic eggs with sustainable packaging has reduced to 107 observations, that on organic eggs from social farms has become 105 observations, while that on local organic eggs has remained unchanged.

Table 7. Categories distributions of the three dependent variables.

Price premium values for sustainable organic eggs			
Category (€)	Freq.	Perc.	Cum.
Low: 0.10 - 0.25	48	44.86	44.86
Mod.: 0.26 - 0.40	19	17.75	62.61
High: 0.41 - 2.00	40	37.39	100.00
Price premium values for social organic eggs			
Category (€)	Freq.	Perc.	Cum.
Low: 0.09 - 0.15	28	26.66	26.66
Mod.: 0.16 - 0.50	56	53.33	79.99
High: 0.51 - 1.70	21	20.01	100.00
Price premium values for local organic eggs			
Category (€)	Freq.	Perc.	Cum.
Low: 0.10 - 0.20	29	26.36	26.36
Mod.: 0.21 - 0.35	41	37.27	63.63
High: 0.36 - 1.60	40	36.37	100.00

Before launching the model, a correlation among explanatory variables was verified (a low correlation has been found among all variables), and the Breusch-Pagan Test among the four price premiums was performed

to explain that the underlying processes are not independent from each-other (Table 8). Ordered Logit results are shown in Table 9.

Table 8. Correlation matrix of price premium residuals

	Organic eggs	Sustainable organic eggs	Social organic eggs	Local organic eggs
Organic Eggs	1.0000			
Sustainable organic eggs	0.1702	1.0000		
Social organic eggs	0.2484	0.4008	1.0000	
Local organic eggs	0.3829	0.0152	0.4029	1.000

Breusch-Pagan test of independence: chi2(6) = 61.657, Pr = 0.0000

Table 9. Ordered logit regression results

Price premium Sustainable organic eggs	Price premium Social organic eggs	Price premium Local organic eggs
Log likelihood = -101.73222	Log likelihood = -80.262388	Log likelihood = -111.97912
Number of obs = 107	Number of obs = 105	Number of obs = 110
LR chi2(6) = 10.79	LR chi2(6) = 19.30	LR chi2(6) = 16.27
Prob > chi2 = 0.0950	Prob > chi2 = 0.0037	Prob > chi2 = 0.0124
Pseudo R2 = 0.0504	Pseudo R2 = 0.1003	Pseudo R2 = 0.0677

Explicative variables	Price premium Sustainable organic eggs		Price premium Social organic eggs		Price premium Local organic eggs	
	Coef.	Sign.	Coef.	Sign.	Coef.	Sign.
Age	-.0007535		1.656607	***	-.0055654	
Gender	-.7661087	*	.0886241		-.6329549	*
Organic consumption freq.	.4296337		.9047106	**	.4915286	*
Education	.6810843		.2125379		.0722243	
NEP Scale	.2823426	***	.6946409	**	2.462402	***
PROSOCIALNESS Scale	.0787591	*	1.003005	***	.3970153	***
Cut1	1.18736		3.957514		9.995334	
Cut2	1.90487		7.277423		11.76084	

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

Finally, the odds ratios were determined by measuring the changes in the probability of the dependent variable following a unit change in the explanatory variable (Table 10).

Table 10. Odds ratio of the Ordered Logistic regression

Explicative variables	Price premium Sustainable organic eggs		Price premium Social organic eggs		Price premium Local organic eggs	
	Odds Ratio	Sign.	Odds Ratio	Sign.	Odds Ratio	Sign.
Age	.9992468		5.241495	***	.99445	
Gender	.4648183	*	1.09267		.5310204	*
Organic consumption freq.	1.536695		2.471217	**	1.634813	*
Education	1.976019		1.236813		1.074896	
NEP Scale	1.326233	***	2.00299	**	11.73295	***
PROSOCIALNESS Scale	1.081944	*	2.726464	***	1.487379	***
Cut1	1.18736		3.957514		9.995334	
Cut2	1.90487		7.277423		11.76084	

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

The price premium for organic eggs in environmentally friendly packaging increases with the growth of education years and natural concern (NEP scale), while it appears to decrease with the growth of age.

As regards the price premium for organic eggs from social agriculture, we can see four positive significant variables: age, organic consumption frequency, NEP mean and PROSOCIALNESS mean. Therefore, the probability of having a higher price premium for local organic eggs increases with the growth of the latter.

Finally, regarding the price premium for organic eggs from local farms, we can state that it is negatively influenced by gender and positively influenced by organic consumption frequency, NEP scale and PROSOCIALNESS scale.

In addition, it is important to note that the NEP scale has a positive influence on all three price premiums, reflecting how sustainability is an important criterion for organic consumers, regardless of the 'plus' preferred by consumers during the experiment.

The ORs calculated indicate that holding the values of the other explanatory variables constant, the attitude variable with the greatest effect on the first price premium is the NEP scale (+1.35); on the second price premium is the PROSOCIALNESS scale (+2.72), and on the third price premium is the NEP scale (+11.73).

Our study supports some results already present in the literature.

In particular, first Howard and Allen (2006) and then Zander and Hamm (2010) have claimed that the sustainable aspect of organic production has been identified as an important criterion for choosing this category of food. In their study, Bickel, Mühlrath and Zander (2009) said that an important selection criterion was the social aspect of organic production. Tóth and colleagues (2020) argued that the local attribute gives added value to production. In 2016, Hempel and Hamm said local attribute complements organic attribute in purchase decisions of organic-minded consumers.

In line with Monier-Dilhan and Bergès's study (2016), our research suggests that organic consumers appear to be very motivated by community interest attributes, as the environmental and social impacts of their food choices. This emphasizes the central role of environmental and social concerns of everyone in determining the propensity to consume organic products (Kottala and Singh, 2015; Bravo et al., 2013).

4) Conclusion

Given the strong consumer interest in the social, environmental and economic implications of food production, organic farming has become one of the most important food production systems. This phenomenon, identified as "ethical consumerism", concerns the interest of consumers, not only for their own health but also for human rights and for the protection of animals and the environment.

On the basis of these arguments, the following study sought to investigate the consumer's willingness to pay a surplus for three types of innovation on organic products that attributed additional sustainable environmental, social and economic qualities to the basic organic product, making the organic product an "organic plus" product.

Organic foods have basic values that are well identifiable. However, the characteristics of the organic pluses go far beyond the basic value alone. In fact, recyclable packaging, local production, and the involvement of social farms all turned out to be attributes that increased the basic value of the product.

However, ethical attributes that go beyond organic farming standards increase production costs and will therefore have negative impacts on competitiveness. The crucial point is therefore to understand whether consumers are willing to compensate organic food producers for the additional production costs caused by higher ethical production standards by paying higher prices.

More specifically, it was found that consumers have appreciated more sustainable product innovation and this highlights the environmental attention that market demand has matured in recent times.

This paper shows that consumers under study are ready to make a greater effort in favor of sustainability, so we believe it is appropriate to sensitize companies to move in this direction. As these aspects are well communicated, producing organic food with higher ethical standards is a promising strategy to differentiate your products in the organic market and gain and secure market share.

References

1. Willer, H., Lernoud, J., & Kemper, L. (2018). The world of organic agriculture 2018: Summary. In *The World of Organic Agriculture. Statistics and Emerging Trends 2018* (pp. 22-31). Research Institute of Organic Agriculture FiBL and IFOAM-Organics International.

2. Tiraieyari, N., Hamzah, A., & Samah, B. A. (2017). Organic farming and sustainable agriculture in Malaysia: organic farmers' challenges towards adoption. *Sustainable Development of Organic Agriculture: Historical Perspectives*, 135.

3. Best, H. (2008). Organic agriculture and the conventionalization hypothesis: A case study from West Germany. *Agriculture and human values*, *25*(1), 95-106.

4. Buck, D., C. Getz, and J. Guthman (1997). ''From farm to table: The organic vegetable commodity chain of Northern California.'' Sociologia Ruralis 37(1): 3–20.

5. Tovey, H. (1997). ''Food, environmentalism and rural sociology: On the organic farming movement in Ireland.'' Sociologia Ruralis 37: 21–37.

6. De Wit, J., & Verhoog, H. (2007). Organic values and the conventionalization of organic agriculture. *NJAS-wageningen journal of life sciences*, *54*(4), 449-462.

7. Van Huik, M. & B. Bock, 2006. Attitudes of organic pig farmers towards animal welfare. In: M. Kaiser & M. Lien (Eds), Ethics and the Politics of Food. Preprints of 6th Eursafe Congress, 22-24 June 2006, Oslo. Academic Publishers, Wageningen, pp. 550-554.

8. Luttikholt, L, 2007. Principles of organic agriculture as formulated by the International Federation of Organic Agriculture Movements. NJAS - Wageningen Journal ofLife Sciences 54: 347-360.

9. Harrison, K. L. (2008). Organic Plus: Regulating Beyond the Current Organic Standards. *Pace Envtl. L. Rev.*, *25*, 211.

10. Schleenbecker, R., & Hamm, U. (2013). Consumers' perception of organic product characteristics. A review. *Appetite*, *71*, 420-429.

11. Boggia, A., Paolotti, L., & Castellini, C. (2010). Environmental impact evaluation of conventional, organic and organic-plus poultry production systems using life cycle assessment. *World's Poultry Science Journal*, *66*(1), 95-114.

12. Yue, C., & Tong, C. (2009). Organic or local? Investigating consumer preference for fresh produce using a choice experiment with real economic incentives. *HortScience*, *44*(2), 366-371.

13. Zander, K., & Hamm, U. (2010). Consumer preferences for additional ethical attributes of organic food. *Food quality and preference*, *21*(5), 495-503.

14. Howard, P. H., & Allen, P. (2006). Beyond organic: consumer interest in new labelling schemes in the Central Coast of California. *International Journal of Consumer Studies*, *30*(5), 439-451

15. Bickel, M., Mühlrath, D., & Zander, K. (2009). Kaufmotive und Zahlungsbereitschaften für Erzeuger-Fair-Milch-Produkte der Upländer Bauernmolkerei.

16. Basha, M. B., & Lal, D. (2019). Indian consumers' attitudes towards purchasing organically produced foods: An empirical study. *Journal of cleaner production*, *215*, 99-111.

17. Mathews, S., & Nair, S. R. (2020). Ethical Consumerism and Effectiveness From a Cause-Related Marketing (CRM) Perspective. In *Handbook of Research on Contemporary Consumerism* (pp. 134-153). IGI Global.

18. Kröger, M., Schäfer, M. Between Ideals and Reality: Development and Implementation of Fairness Standards in the Organic Food Sector. J Agric Environ Ethics 27, 43–63 (2014). https://doi.org/10.1007/s10806-013-9444-0

19. Raynolds, L. (2000). Re-embedding global agriculture: The international organic and fair trade movements. Agriculture and Human Values, 17, 297–309

20. De Wit, J., & Verhoog, H. (2007). Organic values and the conventionalization of organic agriculture. NJAS, 54(4), 449–462.

21. Padel, S. (2008). Values of organic producers converting at different times: results of a focus group study in five European countries. International Journal of Agricultural Resources, Governance and Ecology, 7(1/2), 63–77.

22. Darnhofer, I., Lindenthal, T., Bartel-Kratochvil, R., & Zollitsch, W. (2010). Conventionalisation of organic farming practices: from structural criteria towards an assessment based on organic principles. A review. Agronomy for Sustainable Development, 30 67–81 (Accepted April 8, 2009).

23. Zander, K., & Hamm, U. (2008). Communication of ethical values in organic farming. 16th IFOAM Organic World Congress. Modena, Italy, June 16–20, 2008. http://orgprints.org/view/projects/ conference.html.

24. Zander, K., Hamm, U., Freyer, B., Go¨ssinger, K., Naspetti, S., Padel, S., Stolz, H., Stolze, M., Zanoli, R.(2011). Consumer concerns regarding additional ethical attributes of organic food. In Neuhoff, D., Halberg, N., Rasmussen, I. A., Hermansen, J.E., Ssekyewa, C., Sohn, S. M. (Hrsg.). Organic is Life: Knowledge for tomorrow. ISOFAR, Bonn, (pp. 22-25.).

25. Williams H., Wikstrom F., Lofgren M. A life cycle perspective on environmental effect of customer focused packaging development. Journal of cleaner production 2008, 16, 853-859.

26. Gray V. and Guthrie J. Ethical issues of environmentally friendly packaging. In Packaging a major influence on competitive advantage in the 1990s, 2007 (Emerald Backfiles)

27. Olsson, A., Lindh, H., & Bertoluci, G. (2011). Packaging design in organic food supply chains–a case study in Sweden. In DS 68-3: Proceedings of the 18th International Conference on Engineering Design (ICED 11), Impacting Society through Engineering Design, Vol. 3: Design Organisation and Management, Lyngby/Copenhagen, Denmark, 15.-19.08. 2011 (pp. 264-273).

28. Satimanon, T., & Weatherspoon, D. D. (2010). Hedonic analysis of sustainable food products. International Food and Agribusiness Management Review, 13(1030-2016-82887), 57-74.

29. Wirth, F. F., Stanton, J. L., & Wiley, J. B. (2011). The relative importance of search versus credence product attributes: organic and locally grown. Agricultural and Resource Economics Review, 40(1), 48-62.

30. Zander, K., & Hamm, U. (2010). Consumer preferences for additional ethical attributes of organic food. Food quality and preference, 21(5), 495-503.

31. Hempel, C., & Hamm, U. (2016). How important is local food to organic-minded consumers?. Appetite, 96, 309-318.

32. Muganu, M., Balestra, G. M., & Senni, S. (2009, June). The importance of organic method in social horticulture. In II International Conference on Landscape and Urban Horticulture 881 (pp. 847-849).

33. Foti, V. T., Giudice, V. L., & Rizzo, M. (2014). RELATIONSHIP SYSTEM ANALYSIS IN SOCIAL FARMING: THE ROLE OF" SICILIAN SOCIAL FARM NETWORK" 3. Calitatea, 15(S1), 62.

34. Torquati, B., Paffarini, C., Tempesta, T., & Vecchiato, D. (2019). Evaluating consumer perceptions of social farming through choice modelling. Sustainable Production and Consumption, 19, 238-246.

35. Davis, S.H. 1995. American Horticultural Therapy Association: its purpose and potential. Hort Technology 5(2):121-126.

36. Ellis, K. A., Innocent, G., Grove-White, D., Cripps, P., McLean, W. G., Howard, C. V., & Mihm, M. (2006). Comparing the fatty acid composition of organic and conventional milk. Journal of dairy science, 89(6), 1938-1950.

37. Grether, D. M., & Plott, C. R. (1979). Economic theory of choice and the preference reversal phenomenon. The American Economic Review, 69(4), 623-638.

38. Shogren, J. F., Margolis, M., Koo, C., & List, J. A. (2001). A random nth-price auction. Journal of economic behavior & organization, 46(4), 409-421.

39. Fox, J. A., Shogren, J. F., Hayes, D. J., & Kliebenstein, J. B. (1995). Experimental auctions to measure willingness to pay for food safety. Valuing food safety and nutrition, 115-128.

40. Lusk, J. L., & Shogren, J. F. (2007). Experimental auctions: Methods and applications in economic and marketing research. Cambridge University Press.

41. Rousu, M. C., O'Connor, R., & Corrigan, J. (2017). Effect of brand and advertising medium on demand for e-cigarettes: Evidence from an experimental auction. Preventive medicine reports, 7, 11-15.

42. Caprara, G. V., Steca, P., Zelli, A., & Capanna, C. (2005). A new scale for measuring adults' prosocialness. European Journal of psychological assessment, 21(2), 77-89.

43. Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. Journal of social issues, 56(3), 425-442.

44. Tuorila, H. Attitudes as determinants of food consumption. *Encycl. Hum. Biol*. **1997**, *1*, 559–606.

45. Cameron, A. C., & Trivedi, P. K. (2005). Microeconometrics: methods and applications. Cambridge university press.

46. Migliore, G., Galati, A., Romeo, P., Crescimanno, M., & Schifani, G. (2015). Quality attributes of cactus pear fruit and their role in consumer choice. British Food Journal.

47. Tóth, J., Migliore, G., Schifani, G., & Rizzo, G. (2020). Sustainable Value Creation in the Food Chain: A Consumer Perspective. Sustainability, 12(4), 1438.

48. Hempel, C., & Hamm, U. (2016). How important is local food to organic-minded consumers?. Appetite, 96, 309-318.

49. Constance, D. H., Choi, J. Y., & Lyke-Ho-Gland, H. (2008). Conventionalization, bifurcation, and quality of life: Certified and non-certified organic farmers in Texas. Journal of Rural Social Sciences, 23(1), 9.

50. Guthman, J. 2004. "The Trouble with 'Organic Lite': A Rejoinder to the 'Conventionalization' Debate." Sociologia Ruralis 44(3):301-16.

51. Rana, J., & Paul, J. (2017). Consumer behavior and purchase intention for organic food: A review and research agenda. *Journal of Retailing and Consumer Services*, *38*, 157-165.

52. Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of consumer behaviour, 6(2Ǧ3), 94-110

53. Baldi, L., Banterle, A., & Stranieri, S., 2012. Alimentazione, salute e ambiente: consumatori e imprese" sostenibili". RIVISTA DI STUDI SULLA SOSTENIBILITA'.

54. Reisch, L., Eberle, U., & Lorek, S., 2013. Sustainable food consumption: an overview of contemporary issues and policies. Sustainability: Science, Practice, & Policy, 9(2), 7-25.

55. Carpio CE, Isengildina-Massa O, 2009. Consumers' willingness to pay for locally grown products: the case of South Carolina. Agribusiness 25(3): 412-426.

56. Toler, S., Briggeman, B. C., Lusk, J. L., & Adams, D. C., 2009. Fairness, farmers markets and local production. American Journal of Agricultural Economics, 91(5), 1273–1278.

57. Denver, S., & Jensen, J. D., 2014. Consumer preferences for organically and locally produced apples. Food Quality and Preference, 31, 129-134.

58. Mesias, F., Carrasco, F.M., Martinez, M.J. and Gaspara, P. (2011), "Functional and organic eggs as an alternative to conventional production: a conjoint analysis of consumers' preferences", Journal of the Science of Food and Agriculture, Vol. 91 No. 3, pp. 532-538.

59. Von Borell, E. and Sorensen, J.T. (2004), "Organic livestock production in Europe: aims, rules and trends with special emphasis on animal health and welfare", Livestock Production Science, Vol. 90 No. 1, pp. 3-9.

60. Van Loo, E., Caputo, V., Nayga, R.M., Meullenet, J.F., Crandall, P.G. and Ricke, S.C. (2010), "Effect of organic poultry purchase frequency on consumer attitudes toward organic poultry meat", Journal of Food Science, Vol. 75 No. 7, pp. 384-397.

61. Biemans, S.Z. and Tekien, A. (2017), "Free range, organic? Polish consumers preferences regarding information on farming system and nutritional enhancement of eggs: a discrete choice based experiment", Sustainability, Vol. 9 No. 11, pp. 1-16.

62. Monier-Dilhan, S., & Bergès, F. (2016). Consumers' motivations driving organic demand: Between self-interest and sustainability. Agricultural and Resource Economics Review, 45(3), 522-538.

63. Kottala, S. Y., & Singh, R. (2015). A review of sustainability, deterrents, personal values, attitudes and purchase intentions in the organic food supply chain. Pacific Science Review B: Humanities and Social Sciences, 1(3), 114-123.

64. Bravo, C. P., Cordts, A., Schulze, B., & Spiller, A. (2013). Assessing determinants of organic food consumption using data from the German National Nutrition Survey II. Food quality and Preference, 28(1), 60-70.

Section 6

References

---

1. Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented innovation: A systematic review. International Journal of Management Reviews, 18(2), 180-205.

2. Adcroft, A., Lasch, F., Le Roy, F., & Yami, S. (2007). Critical growth factors of ICT start-ups. Management decision.

3. Adi, B., & Indriani, F. (2017). ANALISIS FAKTOR-FAKTOR YANG MEMPENGARUHI MINAT BELI PRODUK PRIVATE LABEL. Diponegoro Journal of Management, 6(4), 231-242.

4. Agriculture Organization of the United Nations. Fisheries Department. (2000). The State of World Fisheries and Aquaculture, 2000 (Vol. 3). Food & Agriculture Org..

5. Ahn, J. M., Minshall, T., & Mortara, L. (2015). Open innovation: a new classification and its impact on firm performance in innovative SMEs. Journal of Innovation Management, 3(2), 33–54.

6. Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice Hall.

7. Aksoy, H. 2017. How do innovation culture, marketing innovation and product innovation affect the market performance of small and medium-sized enterprises (SMEs). Technology in Society, 51 (1): 133-141

8. Alba, M. F., Álvarez-Coque, J. M. G., & Mas-Verdú, F. (2013). New firm creation and innovation: industrial patterns and inter-sectoral linkages. International Entrepreneurship and Management Journal, 9(4), 501-519.

9. Almli, V.L., Næsa, T., Enderli, G., Sulmont-Rossé, C., Issanchou, S. and Hersleth, M. (2011), "Consumers' acceptance of innovations in traditional cheese: a comparative study in France and Norway", Appetite, Vol. 57 No. 1, pp. 110-120.

10. Ariza, C., Rugeles, L., Saavedra, D., & Guaitero, B. (2020). Measuring innovation in agricultural firms: A methodological approach.

11. Arthur, W. B. (2013). Complexity economics. Complexity and the Economy.

12. Arvola, A., Lähteenmäki, L. and Tuorila, H. (1999), "Predicting the intent to purchase unfamiliar and familiar cheeses: the effects of attitudes, expected liking and food neophobia", Appetite, Vol. 32 No. 1, pp. 113-126

13. Aschemann-Witzel, J. (2015). Consumer perception and trends about health and sustainability: Trade-offs and synergies of two pivotal issues. Current Opinion in Food Science, 3, 6-10.

14. Avermaete, T., & Viaene, J. (2002, June). On innovation and meeting regulation-the case of the Belgian food industry. In DRUID Summer Conference on" Industrial Dynamics of the New and Old Economy-who is embracing whom (pp. 6-8).

15. Avermaete, T., Viaene, J., Morgan, E. J., Pitts, E., Crawford, N., and Mahon, D. 2004. Determinants of product and process innovation in small food manufacturing firms. Trends in food science & technology, 15(10), 474-483.

16. Awazu, Y., Baloh, P., Desouza, K. C., Wecht, C. H., Kim, J., & Jha, S. (2009). Information–communication technologies open up innovation. Research-Technology Management, 52(1), 51-58.

17. Babalola, S. S. (2009). Women entrepreneurial innovative behaviour: The role of psychological capital. International Journal of Business and management, 4(11), 184-192.

18. Bäckström, A., Pirttilä-Backman, A.M. and Tuorila, H. (2004), "Willingness to try new foods as predicted by social representations and attitude and trait scales", Appetite, Vol. 43 No. 1, pp. 75-83.

19. Baldi, L., Banterle, A., & Stranieri, S., 2012. Alimentazione, salute e ambiente: consumatori e imprese" sostenibili". RIVISTA DI STUDI SULLA SOSTENIBILITA'.

20. Banovic, M., Reinders, M. J., Claret, A., Guerrero, L., & Krystallis, A. (2019). A cross-cultural perspective on impact of health and nutrition claims, country-of-origin and eco-label on consumer choice of new aquaculture products. Food Research International, 123, 36-47.

21. Barbieri, J. C., Gouveia de Vasconcelos, I. F., Andreassi, T., & de Vasconcelos, F. C. (2010). Innovation and sustainability: new models and propositions. Rae-Revista de Administracao de Empresas, 50(2), 146-154.

22. Basha, M. B., & Lal, D. (2019). Indian consumers' attitudes towards purchasing organically produced foods: An empirical study. Journal of cleaner production, 215, 99-111.

23. Bearth, A. and Siegrist, M. (2016), "Are risk or benefit perceptions more important for public acceptance of innovative food technologies: a meta-analysis", Trends in Food Science & Technology, Vol. 49, pp. 14-23.

24. Beise, M., & Rennings, K. (2005). Lead markets and regulation: a framework for analyzing the international diffusion of environmental innovations. Ecological economics, 52(1), 5-17.

25. Belenzon, S. and Schankerman, M. (2015), "Motivation and sorting of human capital in open innovation", Strategic Management Journal, Vol. 36 No. 6, pp. 795-820.

26. Beltagui, A., Kunz, N., & Gold, S. (2020). The role of 3D printing and open design on adoption of socially sustainable supply chain innovation. International Journal of Production Economics, 221, 107462.

27. Belussi, F.; Sammarra, A.; Sedita, S.R. Learning at the boundaries in an "Open Regional Innovation System": A focus on firms' innovation strategies in the Emilia Romagna life science industry. Res. Policy 2010, 39, 710–721

28. Bender, M. M., & Derby, B. M. (1992). Prevalence of reading nutrition and ingredient information on food labels among adult Americans: 1982–1988. Journal of Nutrition Education, 24(6), 292-297.

29. Bercovitz, J. E., & Feldman, M. P. (2007). Fishing upstream: Firm innovation strategy and university research alliances. Research policy, 36(7), 930-948.

30. Beschorner T, Mueller M (2007) Social standards: toward an active ethical involvement of businesses in developing countries. J Bus Ethics 73(1):11–20

31. Bigliardi, B., Galati, F., & Petroni, G. (2011). Collaborative modes of R&D: the new challenges for personnel management. International Journal of Business, Management and Social Sciences, 2(3), 66-74.

32. Birch, D., Lawley, M., & Hamblin, D. (2012). Drivers and barriers to seafood consumption in Australia. Journal of Consumer Marketing.

33. Blaylock J, Smallwood D, Kassel K, Variyam J, Aldrich L. Economics, food choices, and nutrition. Food Policy. 1999;24:269–86

34. Block, J. H., Fisch, C. O., & Van Praag, M. (2017). The Schumpeterian entrepreneur: A review of the empirical evidence on the antecedents, behaviour and consequences of innovative entrepreneurship. Industry and Innovation, 24(1), 61-95.

35. Bogers, M., Chesbrough, H., & Strand, R. (2020). Sustainable open innovation to address a grand challenge. British Food Journal.

36. Boland, M. (2008). Innovation in the food industry: Personalised nutrition and mass customisation. Innovation, 10(1), 53-60.

37. Bonney, L., Clark, R., Collins, R., & Fearne, A. (2007). From serendipity to sustainable competitive advantage: insights from Houston's Farm and their journey of co-innovation. Supply Chain Management: An International Journal.

38. Borgen, S. O., & Aarset, B. (2016). Participatory innovation: lessons from breeding cooperatives. Agricultural Systems, 145, 99-105.

39. Boschma, R. A., & Frenken, K. (2006). Why is economic geography not an evolutionary science? Towards an evolutionary economic geography. Journal of economic geography, 6(3), 273-302.

40. Bresciani, S., & Ferraris, A. (2012). Imprese multinazionali: innovazione e scelte localizzative. Milano: Maggioli.

41. Brinkmann J, Peattie K (2008) Consumer ethics research: reframing the debate about consumption for good. Electron J Bus Ethics Organ Stud 13(1):27–31

42. Brondoni, S., M. (2014). Global Capitalism and Sustainable Growth. From Global Products to Network Globalisation. Symphonya. Emerging Issues in Management (symphonya.unimib.it), n. 1, 10 – 31.

43. Bruhn, C.M. (2008), "Consumer acceptance of food innovations", Innovation: Management, Policy & Practice, Vol. 10 No. 1, pp. 91-95.

44. Brunswicker, S., & Vanhaverbeke, W. (2011). Beyond open innovation in large enterprises: How do small and medium-sized enterprises (SMEs) open up to external innovation sources? doi:10.2139/ssrn.1925185.

45. Brunswicker, S., & Vanhaverbeke, W. (2015). Open Innovation in Small and Medium-Sized Enterprises (SMEs): External Knowledge Sourcing Strategies and Internal Organizational Facilitators. Journal of Small Business Management, 53(4), 1241–1263.

46. Buerke, A., Straatmann, T., Lin-Hi, N., & Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior. Review of Managerial Science, 11(4), 959-991.

47. Buerke, A., Straatmann, T., Lin-Hi, N., & Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior. Review of Managerial Science, 11(4), 959-991.

48. BURTON-JONES, A. 1999, Knowledge Capitalism – Business, Work, and Learning in the New Economy, Oxford University Press, Oxford.

49. Byrd-Bredbenner, C. (1994). Designing a consumer friendly nutrition label. Journal of Nutrition Education, 26(4), 180-190.

50. Cainelli, G., Mazzanti, M., & Montresor, S. (2012). Environmental innovations, local networks and internationalization. Industry and Innovation, 19(8), 697-734.

51. Capitanio, F., A. Coppola, and S. Pascucci. "Product and Process Innovation in the Italian Food Industry." Agribusiness 26,4(2010):503-18.

52. Carayannis, E. G., Dubina, I. N., & Ilinova, A. A. (2015). Licensing in the context of entrepreneurial university activity: an empirical evidence and a theoretical model. Journal of the Knowledge Economy, 6(1), 1–12.

53. Cardello, A.V. (2003), "Consumer concerns and expectations about novel food processing technologies: effects on product liking", Appetite, Vol. 40 No. 3, pp. 217-233

54. Carpio CE, Isengildina-Massa O, 2009. Consumers' willingness to pay for locally grown products: the case of South Carolina. Agribusiness 25(3): 412-426.

55. Carrigan, M., Szmigin, I., & Wright, J. (2004). Shopping for a better world? An interpretive study of the potential for ethical consumption within the older market. Journal of Consumer Marketing.

56. Caruana R, Crane A (2008) Constructing consumer responsibility: exploring the role of corporate communications. Organ Stud 29(12):1495–1519

57. Casti, J. 2001. 'Introduction to Complex Systems', Exystence Working Paper, www. complexityscience.org

58. Chandy, R. K., & Tellis, G. J. (1998). Organizing for radical product innovation: The overlooked role of willingness to cannibalize. Journal of marketing research, 35(4), 474-487.

59. Chesbrough, H. (2012). Open innovation: Where we've been and where we're going. Research-Technology Management, 55(4), 20-27.

60. Chesbrough, H. "The Era of Open Innovation." MIT Sloan Management Review, vol. 44, no. 3, pp. 35-41, 2003.

61. Chesbrough, H. W. (2003). Open innovation: The new imperative for creating and profiting from technology. Harvard Business Press.

62. Chesbrough, H. W. (2007). Why companies should have open business models", MIT Sloan Management Review, Vol. 48 No. 2, pp. 22-28

63. Chesbrough, H., Crowther, A. K. (2006). Beyond high tech: Early adopters of open innovation in other industries. R&D Management, 36(3), 229–236.

64. Chesbrough, H., Vanhaverbeke, W. West, J. (eds), (2006). Open Innovation. Researching a New Paradigm. Oxford University Press.

65. Chiaroni, D., V. Chiesa, and F. Frattini. 2011. The open innovation journey: How firms dynamically implement the emerging innovation manage- ment paradigm. Technovation 31 (1): 34–43.

66. Christensen, C.M. 1997. The innovator's dilemma: when new technologies cause great firms to fail. Boston: Harvard Business Press.

67. Ciliberti, S., L. Carraresi, and S. Bröring. "Drivers of Innovation in Italy: Food versus Pharmaceutical Industry." British Food Journal 118,6(2016):1292-316.

68. Cillo, V., Rialti, R., Bertoldi, B., & Ciampi, F. (2019). Knowledge management and open innovation in agri-food crowdfunding. British Food Journal.

69. Cohen, W. M. (2010). Fifty years of empirical studies of innovative activity and performance. In Handbook of the Economics of Innovation (Vol. 1, pp. 129-213). North-Holland.

70. Cole, G. (2018). Beyond labelling: Rethinking the role and value of the refugee 'label'through semiotics. Journal of Refugee Studies, 31(1), 1-21.

71. Connolly J, Prothero A (1998) Sustainable consumption: consumption, consumers and the commodity discourse. Consum Mark Cult 6(4):275–291

72. Coras, E. L. and Tantau, A. D. (2014). Open Innovation – The Good, The Bad, The Uncertainties. The USV Annals of Economics and Public Administration, 14(1), 38–47.

73. Costa, A. I. A., Schoolmeester, D., Dekker, M., & Jongen, W. M. F. (2007). To cook or not to cook: a means-end study of the motivations behind meal choice. Food Quality and Preference, 18(2/3), 77-88.

74. Costa, A. I., & Jongen, W. M. F. (2006). New insights into consumer-led food product development. Trends in Food Science & Technology, 17(8), 457-465.

75. D'Angelo, A., & Baroncelli, A. (2020). An investigation over inbound open innovation in SMEs: insights from an Italian manufacturing sample. Technology Analysis & Strategic Management, 32(5), 542-560.

76. Dahlander, L., & Gann, D. M. (2010). How open is innovation?. Research policy, 39(6), 699-709.

77. Dahlander, L.,& Gann, D.M. (2010). How open is innovation?. Research Policy, 39(6), 699-709.

78. Dalla Corte, V. F., Dabdab Waquil, P., & Stiegert, K. (2015). Wheat industry: which factors influence innovation?. Journal of technology management & innovation, 10(3), 11-17.

79. Davenport, T. H., & Prusak, L. (1998). Working knowledge: How organizations manage what they know. Harvard Business Press.

80. de Boer J, Hoogland CT, Boersema JJ. Towards more sustainable food choices: value priorities and motivational orientations. Food Qual Prefer. 2007;18:985–96

81. De Jong, J. P., & Vermeulen, P. A. (2006). Determinants of product innovation in small firms: A comparison across industries. International small business journal, 24(6), 587-609.

82. De Jonge, J., Van Kleef, E., Frewer, L. J., & Renn, O. (2007). Perceptions of risk, benefit and trust associated with consumer food choice. In Understanding consumers of food products (pp. 125-152). Woodhead.

83. De Medeiros, J. F., Ribeiro, J. L. D., & Cortimiglia, M. N. (2014). Success factors for environmentally sustainable product innovation: a systematic literature review. Journal of Cleaner Production, 65, 76-86.

84. Denver, S., & Jensen, J. D., 2014. Consumer preferences for organically and locally produced apples. Food Quality and Preference, 31, 129-134.

85. Denver, S., & Jensen, J. D., 2014. Consumer preferences for organically and locally produced apples. Food Quality and Preference, 31, 129-134.

86. Dewar, R.D. and Dutton, J.E. 1986. The adoption of radical and incremental innovations: an empirical analysis. Management Science, 32(11), pp.1422-1433.

87. Dittmar H (2005) Compulsive buying—a growing concern? An examination of gender, age, and endorsement of materialistic values as predictors. Br J Psychol 96(4):467–491

88. Dolgopolova, I., Teuber, R. and Bruschi, V. (2015), "Consumers' perceptions of functional foods: trust and foodneophobia in a cross-cultural context", International Journal of Consumer Studies, Vol. 39 No. 6, pp. 708-715.

89. Dominici, G.; Levanti, G. The Complex System Theory for the Analysis of Inter-Firm Networks: A Literature Overview and Theoretic Framework. Int. Bus. Res. 2011, 4, 31–37.

90. Earle, M.D. (1997), "Innovation in the food industry", Trends in Food Science & Technology, Vol. 8 No. 5, pp. 166-175

91. Edwards, T., Delbridge, R., & Munday, M. (2005). Understanding innovation in small and medium-sized enterprises: a process manifest. Technovation, 25(10), 1119-1127.

92. Eertmans A, Victoir A, Vansant G, Van Den Bergh O. Food-related personality traits, food choice motives and food intake : mediator and moderator relationships. Food Qual Prefer. 2005;16:714–26.

93. FAO. Definition of sustainable diets. International scientific symposium. Biodiversity and sustainable diets united against hunger. Rome, Italy: FAO Headquarters.; 2010

94. Felin, T., and Zenger, T. R. (2014), "Closed or open innovation? Problem solving and the governance choice", Research Policy, Vol. 43 No. 5, pp. 914-925.

95. Feller, J., Finnegan, P., and Nilsson, O. "Open innovation and public administration: transformational typologies and business model impacts." European Journal of Information Systems, vol. 20, pp. 358–374, 2011.

96. Feller, J., Finnegan, P., Hayes, J. and O'Reilly, V. "Institutionalising information asymmetry: governance structures for open innovation." Information Technology & People, vol. 22, no. 4, pp. 297-316, 2009.

97. Ferraris, A., Vrontis, D., Belyaeva, Z., De Bernardi, P., & Ozek, H. (2020). Innovation within the food companies: how creative partnerships may conduct to better performances?. British Food Journal.

98. Flor, M., Cooper, S. Y., & Oltraa, M. J. (2018). External knowledge search, absorptive capacity and radical innovation in high-technology firms. European Management Journal, 36(2), 183–194. doi:10.1016/j. emj.2017.08.003

99. Franke, N.; Lüthje, C. User Innovation Oxford Research Encyclopedia, Business And Management: Oxford University Press USA. In Oxford Research Encyclopedia of Business and Management; 2020.

100. Frewer, L., Scholderer, J. and Lambert, N. (2003), "Consumer acceptance of functional foods: issues for the future", British Food Journal, Vol. 105 No. 10, pp. 714-731

101. Friel, S., Barosh, L. J., & Lawrence, M. (2014). Towards healthy and sustainable food consumption: an Australian case study. Public health nutrition, 17(5), 1156-1166.

102. Gambardella, A., Giuri, P. and Luzzi, A. 2007. The market for patents in Europe. Research Policy, 36(8), pp.1163-1183.

103. Garcia Alvarez-Coque, J. M., López-García Usach, T., & Sánchez García, M. (2013). Territory and innovation behaviour in agri-food firms: does rurality matter?. New Medit: A Mediterranean Journal of Economics, Agriculture and Environment, 12(3), 2-10.

104. García-Cortijo, M. C., Castillo-Valero, J. S., & Carrasco, I. (2019). Innovation in rural Spain. What drives innovation in the rural-peripheral areas of southern Europe?. Journal of Rural Studies, 71, 114-124.

105. GASSMANN, O. & ENKEL, E. (2005) „Open Innovation Forschung. Forschungsfragen und erste Erkenntnisse", In Weissenberger-Eibl, M. A. (eds): Gestaltung von Innovationssystemen. Kassel: Cactus Group Verlag

106. Gassmann, O. and Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. In R&D management conference.

107. Gassmann, O., Enkel, E. and Chesbrough, H. (2010), "The future of open innovation", R&D Management, Vol. 40 No. 3, pp. 213-221.

108. Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. R&d Management, 40(3), 213-221.

109. Gava, O., Favilli, E., Bartolini, F., & Brunori, G. (2017). Knowledge networks and their role in shaping the relations within the Agricultural Knowledge and Innovation System in the agroenergy sector. The case of biogas in Tuscany (Italy). Journal of rural studies, 56, 100-113.

110. Ghassim, B., & Bogers, M. (2019). Linking stakeholder engagement to profitability through sustainability-oriented innovation: A quantitative study of the minerals industry. Journal of Cleaner Production, 224, 905-919.

111. Giannopoulou, E., Yström, A. Ollila, S., Fredberg, T., and Elmquist, M. (2010), "Implications of openness: a study into (all) the growing literature on open innovation", Journal of Technology Management & Innovation, Vol. 5 No. 3, pp. 162-180.

112. Gok, I., & Ulu, E. K. (2019). Functional foods in Turkey: marketing, consumer awareness and regulatory aspects. Nutrition & Food Science.

113. Gonçalves, E., Lemos, M. B., & de Negri, J. (2008). Determinants of technological innovation in Argentina and Brazil. Cepal Review, (94).

114. Goode, S., & Stevens, K. (2000). An analysis of the business characteristics of adopters and non-adopters of World Wide Web technology. Information technology and Management, 1(1-2), 129-154.

115. Gort, M. and Klepper, S. 1982. Time paths in the diffusion of product innovations, Economic Journal, vol. 92, 630–53

116. Grunert, K. G., Harmsen, H., Meulenberg, M., and Traill, B. 1997. Innovation in the food sector: a revised framework. In Products and Process Innovation in the Food Industry (pp. 213-226). Springer, Boston, MA.

117. Grunert, K., Hermsen H., Meulenberg M., Kuiper E., Ottowitz T., Declerck F., Traill B. and Göransson G., (1997), "A framework for analysing innovation in the food sector", in Traill, B. and Grunert K. (Eds), Product and Process Innovation in the Food Industry, Blackie Academic. & Professional, London, pp 1-37

118. Grunert, K.G. (2005), "Consumer behaviour with regard to food innovations: quality perception and decision-making", in Jongen, W.M.F. and Meulenberg, M.T.G. (Eds), Innovations in Agri-Food Systems – Product Quality and Consumer Acceptance, Wageningen Academic Publishers, Wageningen, pp. 57-82.

119. Guerrero, L., Guàrdia, M.D., Xicola, J., Verbeke, W., Vanhonacker, F., Zakowska-Biemans, S., Sajdakowska, M., Sulmont-Rossé, C., Issanchou, S., Contel, M., Scalvedi, M.L., Granli, B.S. and Hersleth, M. (2009), "Consumer-driven definition of traditional food products and innovation in traditional foods: a qualitative cross-cultural study", Appetite, Vol. 52 No. 2, pp. 345-354.

120. Hall, J., & Vredenburg, H. (2003). The challenge of innovating for sustainable development. MIT Sloan Management Review, 45(1), 61.

121. HANUSH, H. and PYKA, A. 2007, Introduction, [in:] HANUSH, H. and PYKA, A., Elgar Companion to Neo-Schumpeterian Economics, Edward Elgar, Cheltenham.

122. Henson, S. (1995), "Demand-side constraints on the introduction of new food technologies: the case of food irradiation", Food Policy, Vol. 20 No. 2, pp. 111-127.

123. Herbig, P.A. 1994. The innovation matrix: culture and structure prerequisites to innovation. Westport, CT: Quorum Books.

124. Hersleth, M., Lengard, V., Verbeke, W., Guerrero, L. and Næs, T. (2011), "Consumers' acceptance of innovations in dry-cured ham: impact of reduced salt content, prolonged aging time and new origin", Food Quality and Preference, Vol. 22 No. 1, pp. 31-41.

125. Hieke, S., Kuljanic, N., Wills, J. M., Pravst, I., Kaur, A., Raats, M. M., ... & Grunert, K. G. (2015). The role of health-related claims and health-related symbols in consumer behaviour: Design and conceptual framework of the CLYMBOL project and initial results. Nutrition Bulletin, 40(1), 66-72.

126. Hjalmarsson, A., Juell-Skielse, G. and Johannesson, P. (2017). Open Digital Innovation: a Contest Driven Approach, Springer.

127. Hoek, A. C., Pearson, D., James, S. W., Lawrence, M. A., & Friel, S. (2017). Healthy and environmentally sustainable food choices: Consumer responses to point-of-purchase actions. Food Quality and Preference, 58, 94-106.

128. Hoffman, K., Parejo, M., Bessant, J., & Perren, L. (1998). Small firms, R&D, technology and innovation in the UK: a literature review. Technovation, 18(1), 39-55.

129. Holmlund, M., Kowalkowski, C., & Biggemann, S. (2016). Organizational behavior in innovation, marketing, and purchasing in business service contexts—An agenda for academic inquiry. Journal of Business Research, 69(7), 2457-2462.

130. Hossain, M. (2013). Open innovation: so far and a way forward. World Journal of Science, Technology and Sustainable Development.

131. Huang, M. H., & Rust, R. T. (2011). Sustainability and consumption. Journal of the Academy of Marketing Science, 39(1), 40-54.

132. Huber, J. (2008). Technological environmental innovations (TEIs) in a chain-analytical and life-cycle-analytical perspective. Journal of Cleaner Production, 16(18), 1980-1986.

133.   Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of consumer behaviour, 6(2Ğ3), 94-110

134.   Huizingh, E. K. (2011). Open innovation: State of the art and future perspectives. Technovation, 31(1), 2-9.

135.   Januszewska R, Pieniak Z, Verbeke W. Food choice questionnaire revisited in four countries. Does it still measure the same? Appetite. 2011;57:94–8.

136.   Jung, D. I., Chow, C., & Wu, A. (2003). The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. The leadership quarterly, 14(4-5), 525-544.

137.   Kang, J. H., Solomon, G. T., & Choi, D. Y. (2015). CEOs' leadership styles and managers' innovative behaviour: Investigation of intervening effects in an entrepreneurial context. Journal of Management Studies, 52(4), 531-554.

138.   Keijl, S., Gilsing, V. A., Knoben, J., & Duysters, G. (2016). The two faces of inventions: The relationship between recombination and impact in pharmaceutical biotechnology. Research Policy, 45(5), 1061-1074.

139.   Kesidou, E., & Demirel, P. (2012). On the drivers of eco-innovations: Empirical evidence from the UK. Research Policy, 41(5), 862-870.

140.   Keupp, M.M. and Gassmann, O. (2009). Determinants and archetype users of open innovation. R&D Management, 39 (4), 331-341.

141.   Klepper, S. 1997. Industry life cycles, Industrial and Corporate Change, vol. 6, no. 1, 145–81

142.   Knudsen, M. P. (2007). The relative importance of interfirm relationships and knowledge transfer for new product development success. journal of Product innovation Management, 24(2), 117-138.

143.   Kokanuch, A. and Tuntrabundit, K. (2010). Knowledge sharing capability and organizational performance: a theoretical perspective. The Proceedings of 10th International Academic Conference, the IISES, Vienna, Austria.

144.   Konttinen H, Sarlio-Lähteenkorva S, Silventoinen K, Männistö S, Haukkala A. Socio-economic disparities in the consumption of vegetables, fruit and energy-dense foods: the role of motive priorities. Public Health Nutr. 2013;16:873–82.

145.   Kotler P (2011) Reinventing marketing to manage the environmental imperative. J Mark 75(4):132–135

146.   Krueger, N. F. Jr., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. Journal of Business Venturing, 15, 411-432

147.   Kushwah, S., Dhir, A., & Sagar, M. (2019). Ethical consumption intentions and choice behavior towards organic food. Moderation role of buying and environmental concerns. Journal of Cleaner Production, 236, 117519.

148.   Lähteenmäki, L.; Lyly, M.; Urala, N. Consumer attitudes towards functional foods. Underst. Consum. Food Prod. 2004, 412–427. doi:10.1016/j.foodqual.2019.103827.

149.   Läpple, D., Renwick, A., Cullinan, J., & Thorne, F. (2016). What drives innovation in the agricultural sector? A spatial analysis of knowledge spillovers. Land use policy, 56, 238-250.

150.   Lassen, A. H., & Laugen, B. T. (2017). Open innovation: On the influence of internal and external collaboration on degree of newness. Business Process Management Journal, 23(620), 1129–1143. doi:10.1108/BPMJ-10- 2016- 0212

151.   Lazarenko, Y. (2019). Open innovation practice: exploring opportunities and potential risks. Baltic Journal of Economic Studies, 5(2), 90-95.

152.   Lazaretti, K., Giotto, O. T., Sehnem, S., & Bencke, F. F. (2019). Building sustainability and innovation in organizations. Benchmarking: An International Journal.

153. Lazzarotti, V., and Pellegrini, L. (2015), "An explorative study on family firms and open innovation breadth: do non–family managers make the difference?", European Journal of International Management, Vol. 9 No. 2, pp. 179-200.

154. Leach, M., Rockström, J., Raskin, P., Scoones, I., Stirling, A. C., Smith, A., ... & Folke, C. (2012). Transforming innovation for sustainability. Ecology and Society, 17(2).

155. Lee SY, Carroll CE (2011) the emergence, variation, and evolution of corporate social responsibility in the public sphere, 1980–2004: the exposure of firms to public debate. J Bus Ethics 104(1):115–131

156. Lee, K. H., & Kim, J. W. (2011). Integrating suppliers into green product innovation development: an empirical case study in the semiconductor industry. Business Strategy and the Environment, 20(8), 527-538.

157. Lee, S., Park, G., Yoon, B., & Park, J. (2010). Open innovation in SMEs—an intermediated network model. Research Policy, 39(2), 290–300.

158. Lepkowska-White, E., & Parsons, A. L. (2001). Comprehension of warnings and resulting attitudes. Journal of Consumer Affairs, 35(2), 278-294.

159. Lichtenthaler U,, M. Hoegl and M. Muethel. "Is your company ready for open innovation?" MIT Sloan Management Review, vol. 53, no. 1, pp. 45-48, 2011.

160. Lichtenthaler, U. (2010). Open innovation: potential risks and managerial countermeasures. Proceedings of the R&D Management Conference.

161. Lichtenthaler, U. (2011), "Open innovation: past research, current debates, and future directions", The Academy of Management Perspectives, Vol. 25 No. 1, pp. 75-93.

162. Lichtenthaler, U. 2013. The Collaboration of Innovation Intermediaries and Manufacturing Firms in the Markets for Technology. Journal of Product Innovation Management, 30(S1), pp.142-158.

163. Liñán, F.; Urbano, D.; Guerrero, M. Regional Variations in Entrepreneurial Cognitions: Start-up Intentions of University Students in Spain. Entrep. Reg. Dev. 2011, 23, 187–215.

164. Lombardi, R., Trequattrini, R., & Battista, M. (2014). Systematic errors in decision making processes: the case of the Italian Serie A football championship. International Journal of Applied Decision Sciences, 7(3), 239–254.

165. López-Mielgo, N., Montes-Peón, J. M., & Vázquez-Ordás, C. (2012). ¿ Qué necesita una empresa para innovar? Investigación, experiencia y persistencia. Revista Europea de Dirección y Economía de la Empresa, 21(3), 266-281.

166. Lukeš, M. (2013). Entrepreneurs as Innovators: A Multi-Country Study on Entrepreneurs' Innovative Behaviour. Prague Economic Papers, 22(1), 72-84.

167. Lundvall, B. Å. (2007). National innovation systems—analytical concept and development tool. Industry and innovation, 14(1), 95-119.

168. Luo, J., Guo, H., & Jia, F. (2017). Technological innovation in agricultural co-operatives in China: Implications for agro-food innovation policies. Food Policy, 73, 19-33.

169. Lusk, J.L.; Alexander, C.; Rousu, M.C. Designing experimental auctions for marketing research: The e
ect of values, distributions, and mechanisms on incentives for truthful bidding. Rev. Mark. Sci. 2007, 5.

170. Luttikholt, L. W. (2007). Principles of organic agriculture as formulated by the International Federation of Organic Agriculture Movements. NJAS-Wageningen Journal of Life Sciences, 54(4), 347-360.

171. Magnusson, L. (Ed.). (1994). Evolutionary and neo-Schumpeterian approaches to economics (Vol. 36). Springer Science & Business Media.

172. Malerba, F. (2002) Sectoral systems of innovation and production, Research Policy, vol. 31, no. 2, 247–64

173.   Malerba, F. 2005. Sectoral systems of innovation: a framework for linking innovation to the knowledge base, structure and dynamics of sectors, Economics of Innovation and New Technology, vol. 14, no. 1–2, 63–82

174.   Mancini, P., Marotta, G., Nazzaro, C. and Simonetti, B. (2015), "Consumer behaviour, obesity and social costs: the case of Italy", International Journal of Business and Society, Vol. 16 No. 2, pp. 295-324

175.   Markman, G. D., Balkin, D. B., & Schjoedt, L. 2001. Governing the innovation process in entrepreneurial firms. The Journal of High Technology Management Research, 12(2), 273-293.

176.   Marotta, G., Simeone, M. and Nazzaro, C. (2014), "Product reformulation in the food system to improve food safety: evaluation of policy interventions", Appetite, Vol. 74, pp. 107-115.

177.   Martinez, M. G., & Briz, J. (2000). Innovation in the Spanish food & drink industry. The International Food and Agribusiness Management Review, 3(2), 155-176.

178.   Martínez-Ferrero J, García-Sánchez I (2015) Is corporate social responsibility an entrenchment strategy? Evidence in stakeholder protection environments. RMS Rev Manag Sci 9(1):89–114

179.   Matlay, H., Rae, D., Bjornali, E. S., & Støren, L. A. (2012). Examining competence factors that encourage innovative behaviour by European higher education graduate professionals. Journal of Small Business and Enterprise Development.

180.   Maula, M., Keil, T., & Salmenkaita, J. P. (2006). Open Innovation in Systemic Innovation Contexts [w:] Open Innovation: Researching a New Paradigm, red. HW Chesbrough, W. Vanhaverbeke. J. West, Oxford University Press, Oxford.

181.   Mauracher, C., Procidano, I., & Sacchi, G. (2016). Wine tourism quality perception and customer satisfaction reliability: the Italian Prosecco District. Journal of wine research, 27(4), 284-299.

182.   McLaughlin, S. "Identifying the barriers to collaborative innovation in a research and development organization: A case study," paper presented at the 7th International Forum on Knowledge Asset Dynamics (IFKAD) and Knowledge Cities World Summit (KCWS), 13-15 June, Matera, Italy, 2012.

183.   Meadows DH, Meadows DL, Randers J, Behrens WW III (1972) The limits to growth: a report for the club of Rome's project on the predicament of Mankind. Universe Books, New York

184.   Metcalfe, J. S. (1998). Evolutionary economics and creative destruction (Vol. 1). Psychology Press.

185.   Michelacci, C. (2003). Low returns in R&D due to the lack of entrepreneurial skills. The Economic Journal, 113(484), 207-225.

186.   Michelino, F., Cammarano, A., Celone, A., & Caputo, M. (2019). The linkage between sustainability and innovation performance in IT hardware sector. Sustainability, 11(16), 4275.

187.   Miles, S. and Frewer, L.J. (2001), "Investigating specific concerns about different food hazards", Food Quality and Preference, Vol. 12 No. 1, pp. 47-61.

188.   Mortara, L., & Minshall, T. (2014). Patterns of Implementation of OI in MNCs. In H. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), New frontiers in open innovation. Oxford: Oxford University Press.

189.   Mustonen, S. and Tuorila, H. (2010), "Sensory education decreases food neophobia score and encourages trying unfamiliar foods in 8–12-year-old children", Food Quality and Preference, Vol. 21 No. 4, pp. 353-360.

190.   Nguyen, H.V.; Nguyen, N.; Nguyen, B.K.; Lobo, A.; Vu, P.A. Organic Food Purchases in an Emerging Market.: The Influence of Consumers' Personal Factors and Green Marketing Practices of Food Stores. Int. J. Environ. Res. Public Health 2019, 16, 1037

191.   Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. Journal of cleaner production, 19(16), 1876-1883.

192.   Nord, W.R. and Tucker, S. 1987. Implementing routine and radical innovations. Lexington: Lexington Books.

193.   Nossal, K., & Lim, K. (2011). Innovation and productivity in the Australian grains industry. ABARES.

194.   Oecd (2016), Farm Management Practices to Foster Green Growth, Oecd Green Growth Studies, Oecd Publishing, Paris. Doi: [link]

195.   Oecd, E. (2005). Oslo manual: Guidelines for collecting and interpreting innovation data. Paris 2005, Sp, 46.

196.   Olakitan, O. O. (2011). An examination of the impact of selected personality traits on the innovative behaviour of entrepreneurs in Nigeria. International Business and management, 3(2), 112-121.

197.   Onwezen, M.C. and Bartels, J. (2011), "Which perceived characteristics make product innovations appealing to the consumer? A study on the acceptance of fruit innovations using cross-cultural consumer segmentation", Appetite, Vol. 57 No. 1, pp. 50-58.

198.   Orji, I. J., & Liu, S. (2020). A dynamic perspective on the key drivers of innovation-led lean approaches to achieve sustainability in manufacturing supply chain. International Journal of Production Economics, 219, 480-496.

199.   Padel, S., & Gössinger, K. (2008). Farmer consumer partnerships communicating ethical values: A conceptual framework.

200.   Parida, V., Westerberg, M., & Frishammar, J. (2012). Inbound open innovation activities in high-tech SMEs: the impact on innovation performance. Journal of Small Business Management, 50(2), 283–309.

201.   PAVITT, K. (2005): "Innovation Process", In Fagerberg, J., Mowery, D.C. & Nelson, R.R. (eds) The Oxford Handbook of Innovation. Oxford: Oxford University Press.

202.   Pearson, D., Friel, S., & Lawrence, M. (2014). Building environmentally sustainable food systems on informed citizen choices: evidence from Australia. Biological agriculture & horticulture, 30(3), 183-197.

203.   Pejic Bach, M., Aleksic, A., & Merkac-Skok, M. (2018). Examining determinants of entrepreneurial intentions in Slovenia: Applying the theory of planned behaviour and an innovative cognitive style. Economic research-Ekonomska istraživanja, 31(1), 1453-1471.

204.   Perkmann, M. and Walsh, K. (2007), "University–industry relationships and open innovation: towards a research agenda", International Journal of Management Reviews, Vol. 9 No. 4, pp. 259-280.

205.   Pernía, J. L. G., & Legazkue, I. P. (2007). Determinantes de la capacidad de innovación de los negocios emprendedores en España. Economía industrial, (363), 129-147.

206.   Peterson, A.T.; Papeş, M.; Soberón, J. Rethinking receiver operating characteristic analysis applications in ecological niche modeling. Ecol. Model. 2008, 213, 63–72.

207.   Pieniak Z, Verbeke W, Vanhonacker F, Guerrero L, Hersleth M. Association between traditional food consumption and motives for food choice in six European countries. Appetite. 2009;53:101–8

208.   Pitt, M. and Clarke, K. 1999. Competing on competence: a knowledge perspective on the management of strategic innovation. Technology Analysis & Strategic Management, 11 (3): 301-16

209.   PORTER, M.E. and STERN, S. 1999, The New Challenge to America's Prosperity: Findings from the Innovation Index, Council on Competitiveness, Washington, DC.

210.   Presenza, A., Abbate, T., Meleddu, M., & Cesaroni, F. (2016). Small- and medium-scale Italian winemaking companies facing the open innovation challenge. International Small Business Journal, 35(3), 327–348. doi:10.1177/0266242616664798

211. Pula K, Parks CD, Ross CF. Regulatory focus and food choice motives. Prevention orientation associated with mood, convenience, and familiarity. Appetite. 2014;78:15–22. 2

212. Pustovrh, A., Rangus, K., & Drnovšek, M. (2020). The role of open innovation in developing an entrepreneurial support ecosystem. Technological Forecasting and Social Change, 152, 119892.

213. Rametsteiner, E., Pülzl, H., Alkan-Olsson, J., & Frederiksen, P. (2011). Sustainability indicator development—Science or political negotiation?. Ecological Indicators, 11(1), 61-70.

214. Rana, J., & Paul, J. (2017). Consumer behavior and purchase intention for organic food: A review and research agenda. Journal of Retailing and Consumer Services, 38, 157-165.

215. Rana, J., & Paul, J. (2020). Health motive and the purchase of organic food: A meta-analytic review. International Journal of Consumer Studies, 44(2), 162-171.

216. Rangus, K., & Slavec, A. (2017). The interplay of decentralization, employee involvement and absorptive capacity on firms' innovation and business performance. Technological Forecasting and Social Change, 120, 195–203. doi:10.1016/j.techfore.2016.12.017

217. Reisch, L., Eberle, U., & Lorek, S., 2013. Sustainable food consumption: an overview of contemporary issues and policies. Sustainability: Science, Practice, & Policy, 9(2), 7-25.

218. Ritala, P., & Hurmelinna-Laukkanen, P. (2012). Incremental and radical innovation in coopetitionThe role of absorptive capacity and appropriability. Journal of Product Innovation Management, 30(1), 154–169. doi:10.1111/j.1540-5885.2012.00956.x

219. Robertson, P. L., Casali, G. L., & Jacobson, D. (2012). Managing open incremental process innovation: absorptive capacity and distributed learning. Research Policy, 41(5), 822–832.

220. Roininen, K.; Lähteenmäki, L.; Tuorila, H. Quantification of consumer attitudes to health and hedonic characteristics of foods. Appetite 1999, 33, 71–88. doi:10.1006/appe.1999.0232.

221. Rollin, F., Kennedy, J. and Wills, J. (2011), "Consumers and new food technologies", Trends in Food Science & Technology, Vol. 22 Nos 2-3, pp. 99-111.

222. Rosenbusch, N., Brinckmann, J. and Bausch, A. 2011. Is innovation always beneficial? A meta-analysis of the relationship between innovation and performance in SMEs. Journal of Business Venturing, 26 (4): 441-57

223. Ross Jr, W. T., & Creyer, E. H. (1992). Making inferences about missing information: The effects of existing information. Journal of Consumer Research, 19(1), 14-25.

224. Roucan-Kane, M., Gray, A.W. and Boehlje, M.D. (2011), "Approaches for selecting product innovation projects in US Food and agribusiness companies", International Food and Agribusiness Management Review, Vol. 14 No. 4, pp. 51-68.

225. Rozin P. The socio-cultural context of eating and food choice. In: Meiselman HL, editor. MacFie HJH, editors. Food Choice: Acceptance and Consumption. Springer US; 1996. p. 83–104.

226. Rundh, B. (2009). Packaging design: creating competitive advantage with product packaging. British Food Journal, 111(9), 988–1002.

227. Rundh, B. (2013). Linking packaging to marketing: how packaging is influencing the marketing strategy. British Food Journal, 115(11), 1547–1563.

228. Salladarré, F., Brécard, D., Lucas, S., & Ollivier, P. (2016). Are French consumers ready to pay a premium for eco-labeled seafood products? A contingent valuation estimation with heterogeneous anchoring. Agricultural Economics, 47(2), 247-258.

229. Samadi, S. (2014). Open innovation business model in the food industry: Exploring the link with academia and SMEs. Journal of Economics, Business and Management, 2(3), 209-213.

230. Santeramo, F. G., Carlucci, D., De Devitiis, B., Seccia, A., Stasi, A., Viscecchia, R., & Nardone, G. (2018). Emerging trends in European food, diets and food industry. Food Research International, 104, 39-47.

231. Santoro, G., Ferraris, A., & Winteler, D. J. (2019). Open innovation practices and related internal dynamics: case studies of Italian ICT SMEs. EuroMed Journal of Business.

232. Santoro, G., Ferraris, A., Giacosa, E. et al. How SMEs Engage in Open Innovation: a Survey. J Knowl Econ 9, 561–574 (2018). https://doi.org/10.1007/s13132-015-0350-8

233. Schaafsma, G., & Kok, F. J. (2005). Nutritional aspects of food innovations: a focus on functional foods (pp. 207-220). Wageningen Academic Publishers, Wageningen, The Netherlands.

234. Schaltegger S, Wagner M (2011) Sustainable entrepreneurship and sustainability innovation: categories and interactions. Bus Strategy Environ 20(4):222–237

235. Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: categories and interactions. Business strategy and the environment, 20(4), 222-237.

236. Schroll, A. and Mild, A. (2012), "A critical review of empirical research on open innovation adoption", Journal für Betriebswirtschaft, Vol. 62 No. 2, pp. 85-118.

237. SCHUMPETER, J.A. 1912. The Theory of Economic Development, tenth printing 2004, Transaction Publishers, New Brunswick, New Jersey.

238. SCHUMPETER, J.A. 1934, The theory of economic development: an inquiry into profits, capital, credit, interest and the business cycle, Harvard Economic Studies, Vol. 46, Harvard College, Cambridge, MA.

239. SCHUMPETER, J.A. 1939, Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process, 2 vol, New York: McGraw-Hill.

240. SCHUMPETER, J.A. 1942. Capitalism, Socialism and Democracy, 3rd edition, London: George Allen and Unwin, 1976.

241. SCHUMPETER, J.A. 1943, 'Capitalism in the postwar world', in S.E. HARRIS (ed.), Postwar Economic Problems, in Essays (Schumpeter, 1951).

242. Schutz, H.G. and Martens, M. (2001), "Appropriateness as a cognitive-contextual measure of food attitudes", in Frewer, L., Risvik, E. and Schifferstein, H. (Eds), Food, People and Society: A European Perspective of Consumers' Food Choices, Springer-Verlag, Berlin, pp. 281-296.

243. Sen, F. K., and Egelhoff, W. G. 2000. Innovative capabilities of a firm and the use of technical alliances. IEEE Transactions on Engineering Management, 47(2): 174-183

244. Shaw, E. (1998). Social networks: their impact on the innovative behaviour of small service firms. International Journal of Innovation Management, 2(02), 201-222.

245. Sheng, Y., Zhao, S., Nossal, K., & Zhang, D. (2015). Productivity and farm size in A ustralian agriculture: reinvestigating the returns to scale. Australian Journal of Agricultural and Resource Economics, 59(1), 16-38.

246. Sheth JN, Sethia NK, Srinivas S (2011) Mindful consumption: a customer-centric approach to sustainability. J Acad Mark Sci 39(1):21–39

247. Sibbel, A. (2007). The sustainability of functional foods. Social Science & Medicine, 64(3), 554-561.

248. Sieg, J. H., Wallin, M. W., and von Krogh, G. "Managerial challenges in open innovation: a study of innovation intermediation in the chemical industry." R&D Management, vol. 40, no. 3, pp. 281-291, 2010.

249. Siegrist, M. (2008), "Factors influencing public acceptance of innovative food technologies and products", Trends in Food Science & Technology, Vol. 19 No. 11, pp. 603-608.

250. Siegrist, M., Cousin, M.E., Kastenholz, H. and Wiek, A. (2007), "Public acceptance of nanotechnology foods and food packaging: the influence of affect and trust", Appetite, Vol. 49 No. 2, pp. 459-466.

251. Siegrist, M., Hartmann, C. and Keller, C. (2013), "Antecedents of food neophobia and its association with eating behavior and food choices", Food Quality and Preference, Vol. 30 No. 2, pp. 293-298.

252. Simard C. and West. J. "Knowledge Networks and the Locus of Innovation," in Open innovation: Researching a new paradigm. H. Chesbrough, W. Vanhaverbeke and J. West, Eds. Open innovation: Researching a new paradigm, Oxford: Oxford University Press, 2006, pp. 220-240.

253. Sood, A., & Tellis, G. J. (2005). Technological evolution and radical innovation. Journal of Marketing, 69(3), 152-168.

254. Sørensen, J. B., & Stuart, T. E. (2000). Aging, obsolescence, and organizational innovation. Administrative science quarterly, 45(1), 81-112.

255. Stefan, I., & Bengtsson, L. (2017). Unravelling appropriability mechanisms and openness depth effects on firm performance across stages in the innovation process. Technological Forecasting and Social Change, 120, 252-260.

256. Steptoe A, Pollard TM, Wardle J. Development of a measure of the motives underlying the selection of food: the food choice questionnaire. Appetite. 1995;25:267–84

257. Stolzenbach, S., Bredie, W.L.P. and Byrne, D. (2013), "Consumer concepts in new product development of local foods: traditional versus novel honeys", Food Research International, Vol. 52 No. 1, pp. 144-152.

258. Struik P.C. and Kuyper T.W. (2017), Sustainable intensification in agriculture: the richer shade of green. A review. Agronomy for Sustainable Development, 37(5), p.39

259. Tani, M., Papaluca, O., & Sasso, P. (2018). The system thinking perspective in the open-innovation research: A systematic review. Journal of Open Innovation: Technology, Market, and Complexity, 4(3), 38.

260. ter Braak, A., & Deleersnyder, B. (2018). Innovation cloning: the introduction and performance of private label innovation copycats. Journal of Retailing, 94(3), 312-327.

261. Tether, B. S. (2002). The Sources and Aims of Innovation in Services: Variety Between and Within Sectors,(CRIC) CRIC Discussion Paper 12.

262. Thies, C., Kieckhäfer, K., Spengler, T. S., & Sodhi, M. S. (2019). Operations research for sustainability assessment of products: A review. European Journal of Operational Research, 274(1), 1-21.

263. Thøgersen J (2005) How may consumer policy empower consumers for sustainable lifestyles? J Consum Policy 28(2):143–177

264. Thomke, S., & Von Hippel, E. (2002). Customers as innovators: a new way to create value. Harvard business review, 80(4), 74-85.

265. Toler, S., Briggeman, B. C., Lusk, J. L., & Adams, D. C., 2009. Fairness, farmers markets and local production. American Journal of Agricultural Economics, 91(5), 1273–1278.

266. Triguero, A., Moreno-Mondéjar, L., & Davia, M. A. (2013). Drivers of different types of eco-innovation in European SMEs. Ecological economics, 92, 25-33.

267. Truffer, B., & Coenen, L. (2012). Environmental innovation and sustainability transitions in regional studies. Regional studies, 46(1), 1-21.

268. Ullrich, A. and Vladova, G. (2016). Weighing the Pros and Cons of Engaging in Open Innovation. Technology Innovation Management Review, 6(4), 34–40.

269. Ussman, A. M., Almeida, A., Ferreira, J., Franco, M., & Mendes, L. (2001). SMEs and innovation: perceived barriers and behavioural patterns'. The International Journal of Entrepreneurship and Innovation, 2(2), 111–118.

270. Utterback, J.M. 1994. Mastering the dynamics of innovation: how companies can seize opportunities in the face of technological change. Cambrideg: HBS Press

271. Valor C, Carrero I (2014) Viewing responsible consumption as a personal project. Psychol Mark 31(12):1110–1121

272. Van de Vrande, V., De Jong, J., Vanhaverbeke, W., & De Rochemont, M. (2009), "Open innovation in SMEs: trends, motives and management challenges", Technovation, 29(6), 423–437.

273. van Trijp, H., Hoyer, W., & Inman, J. (1996). Why Switch? Product Category-Level Explanations for True Variety-Seeking Behavior. Journal of Marketing Research, 33(August), 281–292.

274. Van Trijp, J.C.M., Steenkamp, J.E.B.M., (2005): Consumer-oriented new product development: principles and practice, in Jongen W.M.F, Meulenberg, M., (eds.), Innovation in agri-food systems. Product quality and consumer acceptance, Wageningen Academic Publishers, Wageningen, NL.

275. Vanhaverbeke, W., & Cloodt, M. (2006). Open innovation in value networks. Open innovation: Researching a new paradigm, 258-281.

276. Vargas, M., Barrera, L. M., Arosa, C., Martínez, N., Betancur, I., Ariza, C. and Castillo, O. (2013). Medición de la innovación agropecuaria en Colombia. Universidad Jorge Tadeo Lozano.

277. Venkataraman, S. (1997). The distinctive domain of entrepreneurship research. In J. Katz (Ed.), Advances in entrepreneurship, firm emergence, and growth (Vol. 3, pp. 119-138). Greenwich, CT: JAI.

278. Verre, V., Petelski, N., & Milesi, D. (2014). Cooperation and appropriation strategies in the high technology sector: the case of an argentinian biopharmaceutical company. Innovar, 24(SPE), 41-53.

279. Vezina, M., MALO, M. C., & Ben Selma, M. (2017). Mature social economy enterprise and social innovation: The case of the Desjardins Environmental Fund. Annals of Public and Cooperative Economics, 88(2), 257-278.

280. Vickrey, W. "Counterspeculation, Auctions and Competitive Sealed Tenders." J. Finan. 16(March 1961):8-37.

281. Wansink, B. (1994). Advertising's impact on category substitution. Journal of marketing research, 31(4), 505-515.

282. West, J. and Gallagher, S. (2006), "Challenges of open innovation: the paradox of firm investment in open-source software", R&D Management, Vol. 36 No. 3, pp. 319-331.

283. Westerlund, M. and Leminen, S. (2011). Managing the Challenges of Becoming an Open Innovation Company: Experiences from Living Labs. Technology Innovation Management Review, October, 19–25.

284. Wheelen, T. L., Hunger, J. D., Hoffman, A. N., & Bamford, C. E. (2017). Strategic management and business policy (p. 55). Boston, MA: pearson.

285. Willer, H., & Lernoud, J. (2019). The world of organic agriculture. Statistics and emerging trends 2019 (pp. 1-336). Research Institute of Organic Agriculture FiBL and IFOAM Organics International.

286. Wossen, T., Abdoulaye, T., Alene, A., Haile, M. G., Feleke, S., Olanrewaju, A., & Manyong, V. (2017). Impacts of extension access and cooperative membership on technology adoption and household welfare. Journal of rural studies, 54, 223-233.

287.	Yamakawa, Y., Yang, H., & Lin, Z. J. (2011). Exploration versus exploitation in alliance portfolio: Performance implications of organizational, strategic, and environmental fit. Research Policy, 40(2), 287-296.