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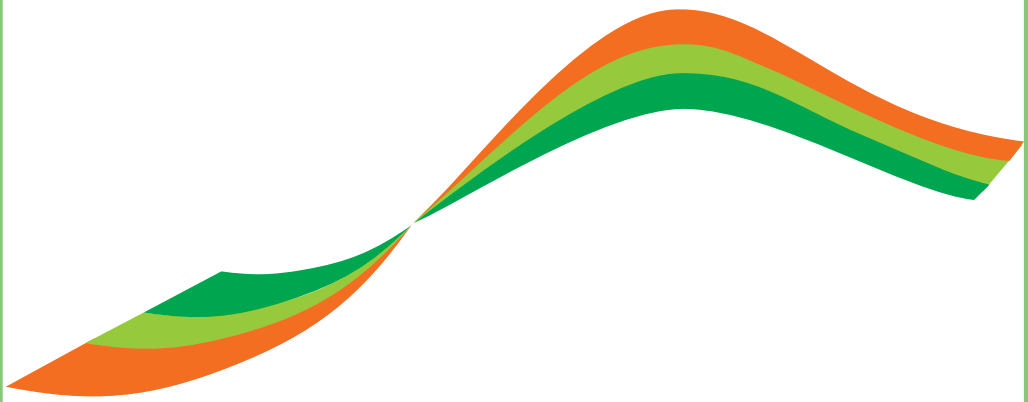

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ECONOMIA AGRO-ALIMENTARE
Food Economy

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Sommario

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Editorial

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We are happy to introduce our journal's final issue of volume 25 of *Economia agro-alimentare/Food Economy* - Open Access. This issue contains five regular articles, all written in English. The articles cover issues related to a variety of topics, namely: the development of the Orchid sector in West Java, rural development in Colombia, the EU agrifood system in light of the recent Ukrainian-Russia conflict, and two articles on consumer preferences: for environmentally-labeled coffee in Taiwan, and for organic dried pasta in Italy.

The scope of the analysis spans from mainly local or national to international, covering geographical areas in Europe (Italy), South America (Colombia), and Asia (Indonesia, Taiwan).

The authors are affiliated with Institutions based in Colombia, Indonesia, Italy, Thailand, and Taiwan.

The article "Strategic foresight: scenario planning for business development of the Indonesian Orchid Association (IOA) West Java, Indonesia" by Tasya Salman, Aos Aos, and Agus Permana discusses the use of strategic foresight and scenario planning for the business development of the IOA West Java in the orchid industry. The study's respondents were selected using purposive sampling, considering business actors who are

members of IOA West Java with at least one year of business experience and stakeholders who are experts and have intervention in the orchid business development in West Java. One of the Scenarios was selected as the vision for the business at IOA West Java in the next 15 years, with a focus on the role of IOA West Java in supporting orchid business development and the application of tissue culture technology. The medium to long-term planning (5-15 years) was chosen to cover overall business opportunities and risks. The backcasting process is used to achieve the vision outlined in the chosen scenario.

The article "Endogenous Rural Development Planning: A Case Study of Vereda El Vergel in Palmor, Ciénaga Magdalena, Colombia", by Arleth Esther Manjarres Tete, Aminta Isabel De La Hoz Suarez, and Hector Urzula Berrio, examines the rural development of Vereda Vergel in Palmor-Ciénaga Magdalena, Colombia, and the productive activities carried out by its inhabitants. The research reveals that there is a lack of planning in the territory to promote rural development, resulting in limited commercialization opportunities for the community's products. The community engages in diverse productive activities, including fruit and bread crops, animal husbandry, and beekeeping, but these products are only commercialized within the locality through ancestral barter systems. The absence of paved roads and basic infrastructure hinders the expansion of rural development and limits the commercialization of agricultural production to other territories. Despite the community's efforts, the lack of commitment from municipal governance prevents the rural development from transcending beyond the village. The research emphasizes the need for state government support, including economic assistance, technological equipment, and the formulation of productive projects led by the community. The authors conclude that governments should implement strategies based on territorial problems and manage strategic territorial projects to generate rural development. However, the qualification of human resources is identified as a problem that slows down development in the territory, as the community lacks knowledge about project formulation.

The paper "Exploring organic consumer preferences for dried pasta", authored by Serena Mandolesi, Emilia Cubero Dudinskaya, Simona Naspetti, Francesco Solfanelli, and Raffaele Zanoli, explores the knowledge, attitudes, and preferences of organic consumers towards dried pasta, with a focus on organic and "ancient" durum wheat varieties. Limited consumer knowledge about dried pasta characteristics and the importance of extrinsic cues, such as taste and local origin, is identified. The findings suggest that companies should invest in innovation, production processes, and packaging design to meet consumer preferences and improve communication strategies for dried

pasta. The study provides insights into the pasta market, which can help organic companies enter this new market and make their products more appealing to consumers. Participants in the study did not associate dried pasta with luxury or exclusiveness, indicating that pasta is perceived as a food for everyone. The focus on organic and "ancient" durum wheat varieties in the study contributes to the existing literature by providing new insights and knowledge about a niche market that has been previously neglected. The results of the study can also assist companies in selecting marketing claims to make this type of pasta more appealing to consumers.

The article "The EU agri-food system in the recent crisis scenarios", authored by Carla Zarbà, Gioacchino Pappalardo, Roberta Selvaggi, and Biagio Pecorino, examines the level of the EU agri-food self-reliance system, in light of the challenges due to the Covid-19 pandemic and the Russian-Ukrainian war, through the development of self-sufficiency calculation and import dependency indices. The Gerard-Lafay Index and the relative comparative advantage proposed by Vollrath are used to assess the EU's comparative advantage. The indices show a good level of self-sufficiency in wheat but poor levels in maize, indicating potential vulnerabilities in the event of a crisis. Recommended actions have been suggested to secure the EU food supply and satisfy future demand in case of adverse events, to react and cope with emergency scenarios.

Finally, the article "Unraveling Psychosocial Drivers of Environmentally-labeled Coffee", authored by Veenarat Ut-tha and Rebecca Chung, investigates the purchase intentions of Taiwanese consumers towards environmentally-labeled coffee using the Theory of Planned Behavior (TPB). Structural equation modelling reveals positive associations between attitude, subjective norms, perceived behavioural control, and purchase intention. Factors influencing attitude include sensory, upscale, and environmental beliefs, while health beliefs do not play a significant role. Probit regression analysis confirms that purchase intention positively influences consumers' willingness to engage in coffee consumption. Consumer characteristics such as past experience, household size, knowledge, and age also impact coffee consumption willingness. The study proposes a model to predict coffee consumption willingness and examines influencing factors such as purchase intention, past experience, knowledge, gender, age, marital status, education, occupation, household size, and household income. The TPB framework suggests that purchase intention can predict an individual's willingness to consume coffee, specifically environmentally-labeled coffee. The study provides valuable insights for stakeholders seeking to promote sustainable consumption and guide environmentally-conscious decision-making strategies.

Since 2011, it has become customary for us to implement a rotation system for certain members of the Scientific Advisory Board (SAB) in order to enhance the scientific progress of our journal's community of practice. We want to express our heartfelt appreciation to the SAB members who concluded their tenure on the Board at the end of 2023, namely Wuyang Hu, Giuseppe Di Vita, Martin Hingley, Anna Irene De Luca, John L. Stanton, Marco Costanigro, Drini Imami and Song Soo Lim, for their invaluable contributions in previous years. We highly value the exceptional scholarly input of all SAB members and are deeply grateful for their assistance in reviewing, suggesting reviewers, and evaluating papers for the "Best Paper Award" in the previous year.

The updated list of 48 Scientific Advisory Board (SAB) members for the year 2024 can be found in the preliminary section of the journal as well as on the journal's website, https://economiaagroalimentare.it. We are delighted to welcome the new members who will assist us in upholding the international character of the journal. Our present SAB is composed of scholars associated with diverse institutions in Italy (13), USA (7), Germany and the UK (4), France and Greece (3), Brazil (2), Albania, Australia, Austria, Belgium, Hungary, the Netherlands, Norway, Poland, the Republic of Korea, and Sweden (1), as well as 2 international institutions. The Editor-in-Chief and the Editorial Board welcome the new members and anticipate fruitful collaboration with all SAB members.

There have been no other changes to the Editorial Board of the journal. We seize this opportunity to thank the Italian Society of Agri-food Economics (SIEA) Presidential Board for renewing their trust in the Editor-in-Chief and Associate Editors. We are thankful for the continued support from the scholarly community represented by SIEA, and we pledge to uphold the highest standards of academic excellence in all our editorial decisions.

We recognize and appreciate the continued support of our community of authors, reviewers, and readers for their contributions to the success of our journal. Particularly, we are thankful for the irreplaceable input of the reviewers, who have a vital role in ensuring the quality and significance of the manuscripts we publish. Their insightful feedback and expertise are highly esteemed. The complete list of reviewers who served during the year 2023 is available at the end of the issue.

Lastly, we would like to sincerely thank FrancoAngeli Edizioni's staff for their exceptional work in editing and publishing the journal. Their unwavering dedication to maintaining the elevated standards of our publication is praiseworthy, and we look forward to continued collaboration with them in the upcoming year.

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Strategic foresight: Scenario planning for business development of the Indonesian Orchid Association (IOA), West Java, Indonesia

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Abstract

Agricultural businesses are often faced with uncertainty about the future, which can be both an opportunity and a threat to business development. This challenge is also faced by the Indonesian Orchid Association (IOA) West Java, Indonesia, which faces volatile, uncertain, complex, and ambiguous environmental conditions that are influenced by various factors such as political, economic, social, technological, legal, and environmental. This study aims to identify factors that influence business and formulate a business development strategy at the IOA West Java, based on strategic foresight. Data collection was carried out using interview techniques and a literature study. Respondents were selected using purposive sampling by considering their working experience and intervention in the development of the orchid business in West Java. It consists of eighteen business actors in IOA West Java, two employees of the Department of Food Crops and Horticulture West Java, and one researcher of the National Research and Innovation Agency. The results showed that the driving factors that most influence businesses are the role of IOA West Java and the application of tissue culture technology because it can support orchid production and increase competitiveness. Strategic foresight for the next 5 years is focused on increasing farmer competence, applying tissue culture technology, and building

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market certainty, for the next 10 years, it is focused on meeting domestic demand for orchids by at least 50%, and for the next 15 years, it is focused on business continuity and increasing competitiveness. In a wider context in Indonesia, as well as in other developing countries, strategic foresight can be applied to anticipate uncertainty and develop agricultural businesses gradually, both in terms of production, marketing, and the sustainability of the business and the commodities it cultivates.

Introduction

The orchid business in West Java, Indonesia, has great potential to be developed. This potential is shown by the high diversity of orchid species in West Java, which is a source of genetic material that can be utilized to develop a superior species (Boroduske *et al*., 2021). According to Comber (1990), there are 642 orchid species in West Java out of a total of 731 orchid species in Java. Not only is it rich in species diversity, but West Java also became the largest orchid production center in Indonesia in 2021, with total production reaching 4.84 million stalks (Statistics Indonesia, 2022). These potentials are also supported by consumer demand, which continues to increase along with developments in the tourism and property sectors, demands for environmental beauty, and increasing consumer income (Nurmaryam, 2011).

In running the orchid business, there is an organization that brings together business actors in West Java, namely the Indonesian Orchid Association (IOA). IOA West Java was officially established in January 2022, consisting of four IOA branches, namely Bandung City, Bandung Regency, West Bandung Regency, and Sumedang. Apart from bringing together orchid business actors, IOA West Java is also a forum for socializing with consumers and orchid enthusiasts, as well as a means to preserve Indonesian orchids. This is in accordance with the general objectives of the IOA, namely to advance the orchid business and increase public awareness of the preservation of Indonesian orchids.

The orchid business is inseparable from various problems. One of the problems faced is related to the threat of future uncertainty (Kononiuk *et al*., 2017). This uncertainty can come from various factors, including political, economic, social, technological, legal, and environmental factors (Rastogi, 2016). According to Sollosy (2013), future uncertainty can come from the availability of information and the actions of competitors who are always moving dynamically. Consequently, this uncertainty can be both an opportunity and a threat to business development because it can affect the

production time, production quantity (Hobday *et al*., 2016), stock inventory, production costs, and market performance (Singhry and Rahman, 2018). Therefore, knowledge and planning about the future are important so that business actors can adapt and deal with uncertain conditions (Rohrbeck and Shwarz, 2013; Rohrbeck *et al*., 2015). To solve this problem, this study aimed to identify factors that influence business and formulate a business development strategy at the IOA West Java, Indonesia, based on strategic foresight.

This study provides two significant contributions. First, this study provides information about the factors that influence the orchid business, especially at IOA West Java. Second, this study provides strategies that can be applied to facing the problems in the orchid business in West Java, both now and in the future. Thus, this study contributes to providing insight into the development of the orchid business in farmer organizations, especially in developing countries. In the next sections, the theoretical bases of strategic foresight and factors that influence business development will be explained more.

1. Background

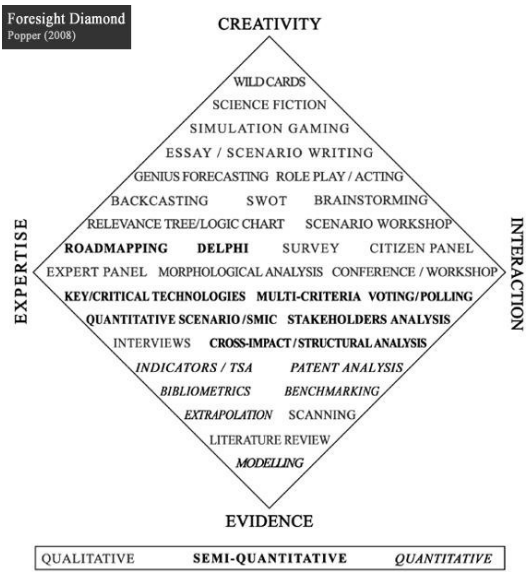
Strategic foresight

Strategic foresight is a method used to assist organizations in dealing with future uncertainties by exploring, interpreting, and responding to the factors that drive change, as well as creating the expected future of the organization (Said and Hellara, 2013; Rohrbeck and Schwarz, 2013; Iden *et al*., 2016; Yoon *et al*., 2018; Bootz, 2019). De Moor *et al*. (2014) and AGRIP (2018) further explain that strategic foresight can describe the future that might occur due to issues and policies currently developing. It makes organizations better prepared to face volatile, uncertain, complex, and ambiguous (VUCA) environmental conditions. Meanwhile, Kononiuk *et al*. (2017) explained that the strategic foresight can be used to strengthen market position, determine the direction of development and innovation, and identify potential threats and opportunities.

Previous studies show that the application of strategic foresight has been widely practiced in various sectors of global organizations. Several sectors that have implemented strategic foresight include technology-based companies (Sarpong and Maclean, 2014; Raford, 2014), government (Inayatullah, 2012), policing (Inayatullah, 2013), environment, agriculture (Inayatullah and Elouafi, 2014), education, and culture (Cook *et al*., 2014). Strategic foresight greatly assists the government and non- governmental organizations in making decisions to anticipate new challenges in the future, reduce risks, and develop the desired future (Cook *et al*., 2014).

Foresight analysis can be structured in several ways and combine a variety of methods. These methods are summarized by Popper (2008) in Foresight Diamond, which is a framework that categorizes various methods based on the type of knowledge source. These types of knowledge sources include creativity, expertise, interaction, and evidence (Figure 1). However, the fact is that no combination of methods is ideal. But the combination of these methods can provide comprehensive insights into various problems.

Figure 1 - Foresight diamond



Source: Popper (2008).

PESTLE analysis

PESTLE analysis is a strategic management tool for identifying and evaluating factors affecting business. It consists of political, economic, social, technological, legal, and environmental factors (Rastogi, 2016). Political factors related to government policies and state intervention that affect the organization environment. Economic factors related to economic conditions such as interest rates, inflation, and economic growth (Rastogi, 2016). Social factors related to the characteristics of a population, such as demography and culture (Hasanov and Mikayilov, 2017; Rastogi, 2016). Technological factors related to the process revolution and the application of technology to increase

competitiveness (Rastogi, 2016; Agyekum, 2020). Legal factors related to laws that regulate various aspects such as employment, export-import, etc. Environmental factors explain environmental conditions, for example, climate change, geographical conditions, and pollution (Rastogi, 2016).

In this study, IOA West Java also faced volatile, uncertain, complex, and ambiguous environmental conditions that were influenced by political, economic, social, technological, legal, and environmental factors. Volatile conditions, for example, occur in changing trends in ornamental plants and also in competitors who are always innovating. Uncertain environmental conditions occur in uncertain demand and production costs. Then, complex has meaning influenced by various factors, for example, world political conditions, changes in policy, and other factors that cannot be controlled. Last, ambiguous conditions can occur due to minimal information that can provide subjective views, for example, whether the application of technology can be carried out.

Each of these factors can drive or inhibit the development of a business. A good understanding of the factors that affect the business environment can reduce risks that may occur in the future through adaptation to various changes and capturing existing opportunities as a strategy to develop a business (Inayatullah, 2013; Rastogi and Trivedi, 2016; Shtal *et al*., 2018).

2. Materials and methods

Data Collection

This research was conducted in West Java, Indonesia, consisting of two cities, namely Bandung and Cimahi City, and six regencies, namely Bandung Regency, West Bandung Regency, Sumedang Regency, Subang Regency, Pangandaran Regency, and Bogor Regency. A qualitative descriptive approach is used to understand a phenomenon (Gehman *et al*., 2017), in this case regarding the factors that influence the development of the orchid business in IOA West Java. Identification includes driving and inhibiting factors using PESTLE analysis, consisting of political, economic, social, technological, legal, and environmental factors.

Data collection was carried out using a literature study and interview method with eighteen business actors in IOA West Java, two employees of the Department of Food Crops and Horticulture, West Java, and one researcher of the National Research and Innovation Agency. In detail, business actors in IOA West Java consist of six breeders, six farmers (two seedling farmers and four juvenile-adult farmers), and six traders.

Interviews with business actors include the characteristics of respondents and business activities ranging from the procurement of raw materials, production, distribution, marketing, and business constraints. Meanwhile, questions posed to stakeholders such as the chairman and board of the IOA, the Department of Food Crops and Horticulture, and researchers from the National Research and Innovation Agency included the characteristics of the respondents and the conditions of the orchid business in West Java, such as programs and policies regarding business development and preservation of orchids, business constraints, and plans or evaluations for further improvements. Interviews generally lasted one to two hours for each respondent. In detail, the characteristics of each respondent are presented in Tables 1 and 2.

The selection of the respondents was carried out using purposive sampling, namely the method of determining the sample subjectively by researchers based on certain considerations (Sharma, 2017). The criteria for business actors included members of IOA West Java and having at least one year's business experience. Business experience of at least one year is considered so that the activities, costs, and cooperative relationships have been clear. Meanwhile, the criteria for stakeholders are an expert and have an intervention in the development of the orchid business in West Java.

Table 1 - Characteristics of business actors in IOA West Java

Characteristics	Breeder	Farmer	Trader
Age (years)			
≤30	4	3	
31-40	2	1	2
41-50		1	2
>50		1	2
Last education			
Bachelor / Master / Doctor	6	6	6
Business experience (years)			
1-5	3	5	4
5-10	2	1	1
>10	1		1
Nature of business			
Primary	4	3	3
Side job	2	3	3

Table 2 - Characteristics of stakeholder respondents

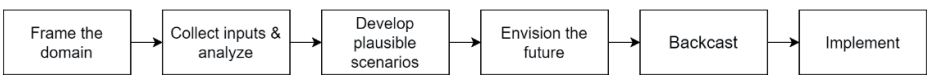
Position	**Working experience (years)**
Quality Supervisor of Agricultural Products, Department of Food Crops and Horticulture, West Java	8
Agricultural and Agribusiness Improvement Analyst, Department of Food Crops and Horticulture, West Java	3
Researchers of National Research and Innovation Agency (former researcher at Ornamental Crops Research Institute)	18

Data Analysis

Data analysis used strategic foresight, which consists of six steps as shown in Figure 2. The approach used to build scenarios is positive disruption, namely factors that have a positive impact on the organization (AGRIP, 2018). The assessment of positive factors, in this case, the business driving factors, using the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) methods. The weight value describes the level of importance of a factor with a value between 0.0 (not important) to 1.0 (very important), and the total weight is worth 1. Meanwhile, the rating describes the level of probability of a factor occurring in the future with a value between 1 (very low) to 4 (very high). Multiplication between weight and rating produces a score (Alamanda *et al*., 2019).

The assessment of weight and rating is subjective, so there is a potential for bias in obtaining results for further analysis. The potential for bias can produce irrelevant results for the orchid business development strategy. To reduce this bias, the researcher confirmed with the stakeholders because they have a big role in the development of the orchid business and are experts in their field.

Figure 2 - Six steps of foresight



Source: AGRIP (2018) - modification.

Two driving factors that have the highest score are combined into a plausible scenario diagram, and strategies are formulated to deal with each of the conditions encountered (Nugroho, 2016). After the plausible scenarios

have been formed, an organizational vision is determined that describes the desired future. Then, the organization carries out backcasting, which is the process of determining achievement targets and the steps needed to achieve these targets backward. Finally, the organization implements the strategies so that the desired business future can be realized (AGRIP, 2018).

3. Results and discussion

3.1. *Business inhibiting factors*

Inhibiting factors are factors that become a challenge for organization to be able to survive or develop in certain situations. Several factors inhibiting business at IOA West Java are:

1. Political: lack of diplomacy of the Indonesian government with the trading partner countries. This is indicated by regulations that require orchids from Indonesia that are exported to USA to be free from planting media, while orchids from Taiwan can enter USA along with the pots and planting media. In fact, orchids originating from Indonesia already have good quality standards (Directorate General of Horticulture, Indonesian Ministry of Agriculture, 2020).
2. Economic: limited capital of business actors in IOA West Java to develop their businesses. The findings of this study are in accordance with the results of Nugroho's research (2016), which found that financial factors inhibit the development of Micro, Small, and Medium Enterprises (MSMEs). In IOA West Java, it makes the business actors difficult to increase their production capacity and quality due to limited area and technology.

   From a global perspective, the war between Russia and Ukraine caused economic instability and inflation (Lim *et al*., 2022). Conflicts that occur can also cause the rupiah exchange rate to weaken and encourage investors to move their assets to safer investments (Iqbal *et al*., 2020). Indirectly, people are becoming more selective and prioritizing primary and secondary needs compared to tertiary needs such as buying ornamental plants.
3. Social: lack of knowledge and skills of IOA business actors in applying certain technologies, for example, tissue culture technology. This is due to limited capital, which makes it difficult for businesses to access technology and participate in training programs.
4. Technological: the application of tissue culture technology cannot be applied by business actors in IOA West Java. This is in accordance with Wisdya (2009), which states that tissue culture technology using meristem

parts, known as mericlone can only be applied in large industries such as Wilis Agro Lestari and Ekakarya Graha Flora Company. Meanwhile, breeders in IOA West Java generally still use in vitro culture using seeds from crossbreeding. The use of crossbreeding techniques causes a low level of plant uniformity, so that it does not meet industrial or export quality standards. As a result, most industries in Indonesia still buy seeds from imports, especially from Taiwan and Thailand. This is in accordance with data from the Center for Agricultural Data and Information Systems, Ministry of Agriculture Indonesia (2020), that the volume of orchid imports in Indonesia in 2015-2019 tends to increase at an average rate of 138.71% per year, or an average import volume of 102.84 thousand kg.

5. Legal: some business actors in IOA West Java do not have business legality yet. This is in accordance with Anggraeni's research (2021), which states that still many MSMEs that do not have business legality due to limited funds, difficulty in correspondence, and a lack of knowledge.
   Another legal inhibiting factor is the difficulty in obtaining export permits, especially from the Department of Natural Resources Conservation, because orchids are a protected commodity in Indonesia. Orchid protection is necessary because various rare orchid varieties are often unsustainably harvested, thus threatening the sustainability of the orchids (Hinsley, 2018). Orchids are also a horticultural commodity that is often smuggled or traded illegally in various countries (Hinsley *et al*., 2017).
6. Environmental: unpredictable weather will affect the time of cultivation. It has an impact on additional operational costs. Weather conditions also affect the increased risk of pests and diseases, so the quality of orchids decreases. This is in accordance with Kirillova and Kirillov's research (2020), which shows that weather conditions affect plant growth and development, such as plant size, flowering, seed production, and the number of young plants. Meanwhile, De and Medhi (2014) and Harvey *et al*. (2018) explain that weather conditions have an impact on increasing pests and diseases and the income earned by farmers. In addition, climate change can also accelerate plant extinctions in Indonesia. This problem is exacerbated by habitat destruction and illegal hunting, where currently, around 437 plant species in Indonesia are categorized as endangered (Restanto et al., 2016; Widiatmoko, 2017). The risk of extinction of orchids tends to be greater because they depend on other organisms such as mycorrhizal fungi, pollinators, and host trees, which are also influenced by habitat and climatic conditions (Fay, 2018). This is a big problem in the orchid business because it can reduce the diversity of orchid species, which are a source of germplasm to obtain superior species.

3.2. *Business driving factors*

Driving factors are factors that support the company to change in a better direction. Some of the factors that drive business at IOA West Java are:

1. Political: the Indonesian Ministry of Agriculture encourage exports of agricultural products, increases added value, and increases competitiveness through the Threefold Export Movement in 2020-2024 (Directorate General of Horticulture, 2019 in the Center for Agricultural Data and Information Systems, Indonesian Ministry of Agriculture, 2020).
2. Economic: in 2022, economic growth in West Java reached 5.45%. This value is greater than the economic growth in Indonesia of 5.31%. West Java's economic growth in 2023 will be supported by increased domestic demand, high investment potential, and maintained industrial sector performance (Tribunnews Jabar, 2023). Good economic growth is an indicator of people's welfare in West Java, thus supporting the orchid business to continue to grow.

   In starting or developing a business, the government also offers People's Business Credit as a source of capital for business actors (Nurmaryam, 2011). This can be utilized by business actors in the IOA West Java to overcome capital limitations.

   From a global perspective, orchids are one of the best-selling horticultural crops in international trade. This is because orchids have many uses, such as ornamental plants, medicines, and rituals (Hinsley *et al.*, 2018). This makes the orchid a promising business because it has high economic value.
3. Social: increasing consumer demand due to the change in public perception. According to Nurmaryam (2011), an increase in consumer demand for ornamental plants is driven by an increase in average education and changes in lifestyle that are increasingly concerned about health, beauty, and environmental sustainability, as well as their increasingly diverse uses, for example, weddings, ceremonies, religious activities, and congratulations. Likewise, orchids are currently becoming increasingly popular, both as potted plants and as collections of rare plant varieties (Williams *et al*., 2018).

   In addition, the existence of IOA West Java also plays an important role in business actors developing their businesses. Business actors can socialize, learn, and expand marketing access. Thus, IOA have contributed to the progress of the orchid business in West Java.
4. Technological: the use of communication technologies such as WhatsApp, Facebook, and Instagram to support the promotion and marketing of orchids. In terms of production, the existence of in vitro culture technology in Indonesia greatly supports the process of propagating orchid plants while maintaining genetic variability (Utami and Hariyanto, 2019). In

addition, the Indonesian Ornamental Plants Research Institute has also developed bioreactor technology. According to one of the National Research and Innovation Agency researchers who previously researched at the Ornamental Plants Research Institute, the application of bioreactor technology can increase the production of *Dendrobium* sp. This is due to the better absorption of nutrients, oxygen availability, and cell division, so that a greater number of orchids can be obtained in a shorter time.

5. Legal: ease of business licensing with the One Stop Service, which simplifies business licensing procedures, waives of licensing fees for micro enterprises, and relieves licensing fees for small enterprises (Marlinah, 2020).
6. Environmental: environmental conditions in West Java are suitable for orchid cultivation. West Java has a tropical climate with an average temperature of 25-30^{o}C (Geografi.org, 2022). Areas with an average temperature that tends to be high, such as in Ciranjang, Cianjur Regency, are suitable for growing *Phalaenopsis* sp. Meanwhile, areas with relatively cool temperatures are suitable for the flowering of *Phalaenopsis* sp., for example, in Ciwidey and Lembang.
   West Java also has a high diversity of orchid species. According to Comber (1990), West Java has 642 species of orchids out of the 731 species of orchids in Java. High species diversity can be used as a source of germplasm to assemble superior varieties.

3.3. *Business driving factor evaluation*

Based on business driving factor analysis, the two driving factors with the highest scores are the role of IOA West Java and the application of tissue culture technology, with each score of 0.35 (Table 3). The higher score indicates that the factor is considered more important and the possibility of its occurrence in the future is stronger.

The existence of IOA West Java is considered important because IOA has become a means for business actors and orchid enthusiast to connect with each other. The relationships that are formed are not only a means for socializing but also create the flow of information, products, and finances through transaction processes, training, and other activities. This provides benefits for both parties. Businesses can sell their products directly to consumers, while consumers can easily obtain products and information about orchids. On the other hand, programs held by IOA, such as exhibitions, are an opportunity for business actors to expand their marketing networks and increase their business existence. This is in accordance with Ansharullah's research (2021), which explained that IOA has an important

Table 3 - Business driving factor evaluation of IOA West Java

No	Driving factor	Weight	Rating	Score
1	Threefold Export Movement	0.10	2	0.20
2	Economic growth in West Java	0.10	3	0.29
3	People's Business Credit	0.08	3	0.24
4	Public perception	0.10	3	0.29
5	Role of IOA West Java	0.12	3	0.35
6	Communication technologies	0.10	3	0.29
7	Tissue culture technology	0.12	3	0.35
8	One stop service	0.10	3	0.29
9	Suitable climate	0.10	3	0.29
10	High diversity of orchid species	0.10	3	0.29
	Total	**1.00**		**2.90**

role for orchid business actors, starting from procuring production materials such as seeds, fertilizers, pesticides, and planting media, increasing production and competitiveness through training programs, and improving marketing performance through information on prices, markets, and holding exhibitions.

The technology driving factor, namely the application of tissue culture, is also considered important because it is able to support the production of orchids in large quantities, in a shorter time, and with a high level of uniformity. This is in accordance with the research of Khatun *et al*. (2020), who found that the application of tissue culture is able to produce plants with a high level of uniformity with a maximum variation of 10%. Through the application of this technology, it is hoped that orchid business actors at IOA West Java will be able to produce a certain number of orchids continuously with quality that meets industry and export standards.

These two factors have a mutually supportive relationship. The existence of IOA West Java can act as a facilitator for connecting with certain parties in order to access tissue culture technology. Meanwhile, tissue culture technology is a way to increase orchid production, both in quantity and quality. This provides an opportunity for business actors in IOA to become competitive producers.

Although these two factors are considered very important and most likely to occur, to achieve them, there are several challenges that must be faced. In maximizing the function of IOA, the challenges faced are

how the organization can manage its resources as well as possible and how its members participate. Meanwhile, to be able to apply tissue culture technology, sufficient capital is required and collaboration with related parties for the procurement of tools and materials as well as attending training. This is a challenge for IOA West Java, considering that limited capital is one of the inhibiting factors, and optimizing the organization is also important because this organization is relatively new and still developing.

3.4. *Plausible scenarios*

The two business driving factors with the highest scores are combined into a plausible scenario diagram as presented in Table 4.

Table 4 - Plausible Scenarios of IOA West Java Business Development

	Application of tissue culture	**Tissue culture has not been applied**
Big role of IOA West Java	Scenario I Application of tissue culture and big role of IOA West Java	Scenario II Tissue culture has not been applied and big role of IOA West Java
Low role of IOA West Java	Scenario IV Application of tissue culture and low role of IOA West Java	Scenario III Tissue culture has not been applied and low role of IOA West Java

Scenario I describe a future with a positive business climate with the support of IOA West Java and the application of tissue culture technology. In this scenario, IOA has a role as a forum for socializing and advancing the orchid business through various programs such as training, exhibitions, partner expansion, etc. Meanwhile, the application of tissue culture has a positive influence on orchid production. Gradually, it is hoped that local orchid production can replace imported supplies and increase exports to various countries. Directions for scenario I are focused on cooperation and collaboration with various parties, such as research institutions, academics, the government, and industry, to support innovation and expand marketing networks. In addition, IOA must be able to manage its funds and human resources as well as possible so that it can reduce the risk of loss, especially at the beginning of the application of tissue culture technology, which may still encounter various obstacles with a high failure rate. Last, IOA can

segment the business according to the potential of each region so it can run effectively.

Scenario II describes the future of the business with orchid production, which is not yet optimal because the application of tissue culture technology cannot be implemented. Until now, the production of orchids in IOA West Java generally still uses crossbreeding techniques and in vitro culture using seeds, which produce orchids with a low level of uniformity. The main factor that becomes an obstacle in the application of tissue culture technology is the limited funds for the procurement of technology and training. On the other hand, IOA has a positive influence on improving the quality of its members and expanding its marketing network. Directions for scenario II are focused on increasing collaboration with the government and other parties in obtaining capital assistance, facilities and infrastructure, and other facilities. Furthermore, IOA must be able to move independently by focusing on programs to obtain funds used to finance organization needs, one of them is to apply tissue culture technology.

Scenario III describes a difficult business future due to the low role of IOA West Java and the tissue culture technology has not been applied. Basically, the role of organization is very important, especially for small-scale business actors. Various problems such as lack of knowledge and skills, limited funds, low application of technology, and a lack of marketing networks make it more difficult for business actors to develop their businesses and can even cause business setbacks because they cannot compete with other business actors, especially imports. The directions for scenario III are focused on strengthening IOA by unifying the visions of orchid business actors in West Java. With the same vision, it is hoped that business actors can unite to advance the orchid business in West Java. In addition, the commitment and cohesiveness of members are also required, which can be realized by increasing member participation in various programs and in decision-making.

Scenario IV describes the future of business where the organization role of IOA West Java is low but tissue culture technology can already be applied. The vision to move forward and an attitude that is open to change, including responding to the existence of technology, are driving forces for business actors to increase knowledge and skills, one of which is through the application of tissue culture technology. However, the low role of IOA can cause various problems, for example, the application of tissue culture is not optimal because the quality of human resources is still low and the risk of production failure is high. In addition, the marketing reach is also limited, so the products produced are not optimally absorbed by the market. This situation can cause business setbacks and even business death due to slow capital turnover and large losses. The directions for scenario IV are focused on strengthening the role of IOA West Java so that they can

minimize the risk of loss and strengthen business positions through training programs, cooperation, and collaboration with other parties. On the other hand, the application of tissue culture technology that has been carried out should continue to be developed to obtain optimal results. Through the IOA, knowledge and skills in the application of tissue culture are distributed so that farmers can unite to produce orchids in order to meet market demand.

3.5. *Strategic foresight*

Based on the formulation of the scenarios that have been carried out, one scenario has been selected for the vision of the business at IOA West Java in the next 15 years, namely scenario I. In this scenario, the role of IOA West Java is very large to support the development of the orchid business, and tissue culture technology has been applied. Medium to long-term planning (5-15 years) was chosen because it can cover overall business opportunities and risks with relatively long use (Ruff, 2014). In order to achieve this vision, a backcasting process is carried out.

For the next 15 years, the goal to be achieved is business continuity and becoming a competitive business actor. To achieve this goal, the strategies undertaken include (1) encouraging new members to join and maintain cohesiveness, (2) network expansion, (3) research and innovation, and (4) maintaining product quality. For the next 10 years, the main goal to be achieved is to produce orchids to meet 50% of domestic demand. The strategies undertaken include (1) research and innovation, (2) maintaining product quality, and (3) optimizing human resources and technology applications. For the next 5 years, the goals to be achieved are implementing tissue culture technology, increasing the competence of business actors, building market certainty, meeting the needs of members, and preserving orchids. Some of the strategies undertaken are (1) collaboration with industry, research institutions, and other agencies to promote training and marketing, (2) training and applying peer-to-peer learning, (3) administering business legality, (4) establishing a cooperative unit, and (5) collaboration with the Department of Forestry to build an arboretum.

Based on the type, these strategies can be divided into two categories namely technical strategies and managerial strategies. Technical strategy relates to the company's main activities, such as production processes, product development, and the use of technology, while managerial strategy relates to functional matters such as human resource management and sales (Lech, 2014; Gomes *et al*., 2018).

Some of the technical strategies implemented to support orchid production include encouraging training programs, applying peer-to-peer learning,

developing research, and innovation. The concept of peer-to-peer learning was chosen because it can minimize costs and is effective in increasing and leveling out the competence of members. In this case, it is enough for the IOA to involve some of its members in training. Then members who have acquired the knowledge and skills can disseminate them to other members so that the use of costs and dissemination of information can run efficiently. This is in accordance with the research of Hilsdon (2014) and Nelwati *et al*. (2018), which found that the application of peer learning is able to advance members together through increased active participation and motivation.

Meanwhile, the managerial strategy for institutional strengthening and development is carried out by maintaining the cohesiveness of members, encouraging new members to join, establishing good relations with various parties, and forming a cooperative unit. Fischer and Qaim (2014) explained that several factors that affect membership interest and the intensity of member participation are institutional characteristics such as objectives, structure, and applicable rules; membership fees; benefits obtained by members; and individual characteristics such as social, economic, and attitude factors. In Ofuoku (2013), it is further explained regarding the individual characteristics that influence the interest of farmers to join as members of a farmer group, namely marital status, level of education, household size, farming scale, farming experience, extension contact, and relationships with other farmers. Based on this explanation, it is necessary to periodically evaluate and communicate effectively so that the IOA can continue to develop and properly accommodate the various needs of its members. This effectiveness can be reviewed based on the quality of information, amount of information, and member satisfaction (Gandasari *et al*., 2015). In addition, the formation of a cooperative unit is important to support the development of the organization and meet the needs of its members. This is in accordance with the research of Arifandy *et al*. (2020), which shows that cooperative units have an important role as providers of capital in the form of savings and loan activities, providers of facilities, facilitators in establishing relationships and collaboration with external parties, and assist in increasing the income of their members.

To protect the diversity of orchid species, a managerial strategy is applied, namely to conserve and protect ecosystems and use them in a sustainable manner (Safe'i *et al*., 2021). One of the strategies undertaken by IOA West Java is to create an arboretum in collaboration with the Department of Forestry. According to Harum and Moestrup (2014), an arboretum is an area that is overgrown with plants for the purpose of preservation, education, research, or recreation. In the future, the arboretum will not only be a means of preserving orchids in Indonesia but also a source of germplasm for the development of the orchid industry in Indonesia, especially in West Java.

Orchid preservation can run more optimally with the participation of the government to minimize activities related to habitat destruction as well as illegal harvesting and trading. To address this issue, Hinsley *et al*. (2018) summarizes several things that need to be done, namely regulating and documenting the harvest and trade of orchids, supporting the legal trade, preventing illegal trade, and elevating the significance of the orchid trade among policy makers, conservationists, and the public.

Conclusions

Based on the research findings, it can be concluded that the driving factor that is considered the most important and likely to occur, as well as the vision for the next 15 years, is the big role of IOA West Java and the application of tissue culture technology. Strategic foresight for the next 5 years is focused on increasing farmer competence, applying tissue culture technology, and building market certainty, for the next 10 years, it is focused on meeting domestic demand for orchids by at least 50%, and for the next 15 years, it is focused on business continuity and increasing competitiveness.

Research on strategic foresight is still very limited, so it needs to be further developed by combining various methods in order to provide a more valid and relevant strategy to be applied in the future. Various information in this research also need to be deepened to provide more comprehensive information. Suggestions for further research should be able to study the application of tissue culture technology in more detail, starting from costs, input requirements, processes, parties providing training programs, etc. Other issues, such as consumer preferences and the difficulty of obtaining export permits, can also be further investigated, thus opening up opportunities for orchid business actors in Indonesia to increase and expand their marketing network to export.

A practical recommendation for orchid business actors and IOA West Java is to collaborate with research institutions in developing an effective production technology, for example, by comparing tissue culture technology with bioreactors that have been developed by the Ornamental Plant Research Institute. This can be an alternative solution to increasing the quantity and quality of orchid as well as reducing production costs.

For the government, the recommendations given are to monitor and document the production and trade of orchids, as well as facilitate export permits to support legal trade and suppress illegal trade. The government should also establish good diplomatic relations with trading partner countries and assist in expanding marketing networks. If possible, the government can create a training program and help procure facilities and infrastructure for the development of the orchid business.

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Endogenous rural development planning. Case: Vereda El Vergel in Palmor - Ciénaga Magdalena, Colombia

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Abstract

In Colombia, the agricultural sector is a strategic point to generate development in the territories; but few governmental actions are implemented to achieve it, therefore, the objective of this research is to explain how the rural development of Vereda Vergel in Palmor-Ciénaga Magdalena, Colombia, has taken place based on the productive activities developed by its inhabitants under the criterion of governance of the community itself focused on its welfare. Methodologically, it is classified as a descriptive-explanatory field study with a qualitative approach, following the theoretical postulates of Alburquerque (2007) and Martínez de Anguita (2006). As a data collection technique, an interview script was applied to a focus group formed by farmers of the village. The main finding shows that there is no planning in the territory to promote the rural development generated within the community; however, the community diversifies its productive activity in fruit and bread crops such as lemon, mango, strawberry, coffee, yucca, yams; on the other hand, animal husbandry: chickens, ducks, pigs and cows, as well as beekeeping activities. In this sense, all the primary production and handcrafted processed products

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are only commercialized within the locality through ancestral barter systems, without giving space to commercialize to other territories of the department, because the mobility to the outskirts of the village is difficult to access due to the lack of paved roads, limiting or making null other forms of commercialization that would generate development in the territory. In this sense, it is concluded that there is leadership on the part of the communities to generate endogenous rural development, however, this does not transcend for lack of real commitment materialized by the municipal governance, but in spite of this, the community is food sovereign because they do not apply agro-extractivism, they only focus on the common food welfare of the community.

Introduction

The productive activities that are led within communities far from urban areas become, in the long term, the starting point for governments to propose territorial development strategies; this is because in the non-urban (rural) area, the population with the highest degree of vulnerability is generally located, as it has limitations in the territory in relation to access to public services, health, education, road infrastructure, among others. In this sense, it is important to generate a system of state governance that allows these localities to achieve a degree of development in conjunction with the entire territory, taking into account the sectors of the economy that produce and contribute most to society. Regarding the latter, the Sustainable Development Goal (SDG) No. 2 called Zero Hunger has been contemplated in the 2030 Agenda, which establishes as one of its goals to double agricultural activity and sustain food production worldwide (United Nations, 2018), being a challenge for each of the territorial governors, to incorporate strategies within their development plans related to the fulfillment of this.

However, food security has been a concern for a long time and Latin American countries such as Mexico have been working on programs to produce food and guarantee food security; the Special Program for Food Security (SPFS) was implemented with the help of FAO (Food and Agriculture Organization of the United Nations) and SAGARPA (Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food) in 2002. This program allowed Mexico to transform its economic and social reality based on territorial intervention where the productive sectors that generated food production were taken into account to generate this transformation, thus benefiting around 2013, two hundred and ten thousand families distributed in different states of that country, with financing projects in resources and

technology that allowed them to develop productivity (FAO, 2013). Mexico is currently the second largest economy in Latin America (World Bank, 2023) and depends 70% on agriculture, whose growth has remained stable at an estimated 3% (Tecnológico de Monterey, 2022).

As a generality, it should be noted that most of the world's food production is generated in zones that are identified as rural areas; characterized as wooded and riverine places where people live and work in agriculture and fishing, activities that constitute a source of income and food sustenance for them. Therefore, when talking about rurality, the term is associated with a territory where its inhabitants develop economic activities typical of the countryside, because agriculture as stated by Dirven (2019) continues to be one of the defining activities of rural areas. Similarly, agriculture is considered one of the main sources generating food security worldwide and as it is a necessity, it also becomes a lucrative and income-generating activity to boost the economy of a country. Therefore, state governments are motivated to generate development in rural areas by prioritizing the agricultural sector, for which it is necessary to support farmers with goods, resources and technology in order to improve processes to encourage productivity and implement social investment projects that create the conditions for these areas to develop economically.

In view of the above, governments must implement strategies based on territorial problems that will enable them to plan rural development in terms of the different sectors that contribute to its scope; in other words, with a territorial approach, which implies that the projects defined for the generation of rural development must necessarily be linked to the characteristics and conditions of the territory. Therefore, in accordance with CEPAL (2010), in order to generate rural development, it is necessary to manage strategic territorial projects, consolidate productive infrastructure, train the community and strengthen the entrepreneurial capacities of small producers.

Considering the findings of institutions such as CEPAL on rural development, it is important to point out that in order to generate rural development, the inhabitants value the territory where they live, identify with it and work together to generate the structural changes required within the communities to generate development. However, it is not enough to generate productive processes in rural areas that emerge from the inhabitants of the area; it is also necessary for the state to intervene as a guiding agent and promoter of rural development with a territorial approach. There are many strategies that can be implemented at the government level to promote this type of development. Ramos, E. *et al.* (2014) identified that in Spain a governmental strategy called Marca Territorial was implemented, allowing rural development to be expanded by articulating it with public good services such as environmental conservation, cultural tradition, demographic

balance, etc., and not only focusing it on agricultural production. From this approach, citizens become more committed to the rural development of the territory and the economy becomes more dynamic because, due to their cultural identity, the products produced there tend to be in greater demand by them.

In Colombia, agriculture is the main source of employment; in fact, according to the OECD (2022), 62% of the rural labor force is hired in the agricultural sector, and the National Development Plan 2022-2026 "Colombia, a world power for life", the countryside is prioritized with progress based on rural development strategies and non-agricultural projects that generate income and employment based on the potential of each territory, working together to ensure the national production of inputs (Congress of the Republic, 2023), which must be carried out by the management of each territorial government, through the implementation of development plans.

However, although state efforts at the national level are focused on strengthening the agricultural sector to increase food production in the countryside and contribute to food security in the country, little is done in each of the rural areas in the territory. This situation arises because local governments have had a vision of development that is not very holistic, where their imaginary defines the concept as the improvement of the living conditions of the inhabitants in terms of access to public services, education, health and decent housing; ignoring in part the potential of the operative human resources existing in rural areas, who lead productive processes in their desire for subsistence, taking advantage of all the resources found in the ecosystem. In addition to this, the socioeconomic conditions of these rural communities allow them to cultivate the land and animals in an ancestral way, which becomes an advantage in relation to the objectives of sustainable development in terms of preservation of life and care of the environment. Consequently, the trend in rural areas is to generate endogenous agroecological rural development, as stated by Boza (2011), when referring to endogenous rural development as that where production initiatives emerge within the communities and at the same time being agroecological because they do not involve technology in their production processes, but are guided by ancestral techniques.

In view of the above, planning local development becomes a complex matter, because it is not about acting in response to the basic needs of citizens to solve them; but to take advantage of the productive potential that communities have, especially those located in rural areas, to articulate them to the national and international development commitments in terms of environmental sustainability and food security, taking into account that one

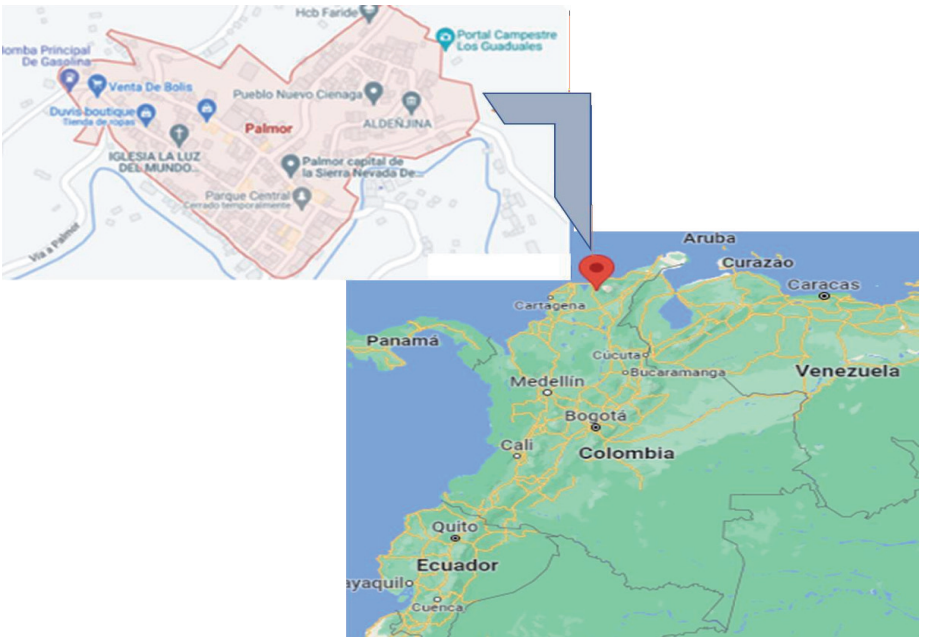
of the objectives sought with the SDGs contemplated in the 2030 Agenda is to preserve life, minimize poverty and eliminate hunger in the world.

In this particular, the urgent need to minimize poverty is in general terms, however, from the rural point of view, poverty prevails in this area at 45.7% according to data from worldwide studies (ECLAC, 2020). On the other hand, landing the situation in Colombia, poverty at rural level is located at 37.1% for the year 2020, being the department of Magdalena in its rural area who presents an indicator of 47% in relation to the total rural poverty in the country (DANE, 2020). This indicates that the department of Magdalena is one of the poorest territories in Colombia and the population that suffers most from poverty is located in the rural area of the department. The department is made up of 32 municipalities, of which Ciénaga stands out for its agricultural and fishing production, being representative rural areas of this municipality: Sevillano, Cordobita, Palmor, San Javier, San Pedro and Siberia, which in turn are made up of hamlets.

Specifically, we take as a reference for the research, the village of El Vergel located in Palmor, Ciénaga-Magdalena, which is characterized for being an agricultural territory far from urbanity, conformed by a population of 32 families with an average of 5 inhabitants per household, owners of 5 hectares of land where they cultivate coffee, with ancestry of population from the interior of the country, predominantly rooted in the coffee culture, activity that has allowed them to maintain their economy for many years. But, beyond this economic coffee activity developed within the community, given the different problems presented around it, it would be important to examine other alternatives of production that have allowed them to subsist in a territory so far away from urbanity and to inquire about the support of the municipal government to promote rural development in this locality.

The targeted rural area is a district of the municipality of Ciénaga in the department of Magdalena and is considered the capital of the Sierra Nevada de Santa Marta because it is geographically located there; this territory was founded by families from the interior who settled there fleeing the violence generated in their cities of origin. This territory is considered a rural area and has an area of 581.75 km^2, i.e. it occupies 45.88% of the total area of the municipality of Ciénaga which is 1.267.97 km^2 and is made up of the villages of Mocoita, Mocoa, Makencal, Nueva América, Pausedonia Alto, Pausedonia Bajo, La Paz, Palestina, San Fernando, Tucurinca, Uranio Alto, Uranio Bajo, Uranio Tres, El Vergel, El Pozón, Aguas Vivas, Cuatro Caminos, California, La Libertad and Cherua. Illustration 1 shows the geographical map of Palmor in Ciénaga-Magdalena-Colombia.

Illustration 1 - Map of Palmor



Source: Google Maps (2023).

1. Generalities for Rural Development Planning

The planning of rural development is a topic that has interested many authors in ancient times and has acquired importance worldwide due to the multiple problems that society is experiencing in terms of poverty indices. Sáenz (1999) states that in Latin America some governments plan the development of their territories in terms of state economic growth based on the involvement of external industrialized companies that exploit natural resources and do not prioritize productivity in the hands of the peasantry. In relation to this, it is evident in Latin America that governance for the development of countries applies a top-down planning, where the participation of communities that lead productive processes in the countryside is null. This somehow slows down development in rural areas of the territory and therefore the economic growth of the countries, by denying the opportunity to the communities located in rural areas to show their productive processes and to support them from the governments with projects to boost the territorial economy at the national level through the commercialization of products and, at the international

level by submitting to the fulfillment of certain requirements for the export of foodstuffs.

Similarly, the International Labor Organization (ILO), 2016, refers that in Latin America and the Caribbean, the rural areas of the different territories receive little governmental support and that the communities settled there lack public services, basic sanitation, transportation, health and education; generating differences between rural and urban areas, in terms of productivity. In this sense, urban areas, because they are populated, have the road infrastructure, basic sanitation, public services, among others, necessary to easily develop productive and commercialization activities. On the contrary, for communities located in rural areas, the limitations in road infrastructure and access to public services, health and education become a problem for expanding endogenous development generated within the locality. This indicates that the intervention of the State is necessary as a collaborating agent for the transformation of the territories and improvement of the living conditions of the inhabitants, based on binding development strategies of the oppressed sectors located in rural areas, through participatory planning, which could be articulated with the development of the entire territory to achieve the goals of the State.

However, it is recognized that rural development emerged in the 1970s as a strategy to promote economic growth and contribute to the improvement of the lives of the rural population, but it has not had the expected scope, because there are limitations to the involvement of these localities in development planning; Such is the case of Vereda el Vergel in Palmor Ciénaga Magdalena, where there is a community of active peasants dedicated to the cultivation of agricultural products and animals for consumption and sale in the town, who have slowed down the commercialization of their production, because in the territory there are problems related to road infrastructure and public services that have not been addressed by the state governments. In this sense, Márquez (2002) refers to the concept of rural development as a process of economic growth and structural change that improves the living conditions of a local population living in a given territory and that can be classified taking into account the different facets of development: endogenous rural, integrated rural and local development.

Now, from the point of view of endogenous rural development, the objective is to increase the well-being of rural inhabitants through the implementation of economic, social and cultural activities based on their own human and material resources; but endogenous development can also mean, according to Ochoa (2006), the emergence of new spaces for discourse and the social construction of realities that are experienced within the territories, seeking to promote alternative ways of understanding the performance of society from a more inclusive perspective. In this sense, endogenous rural

development is a starting point for transforming society, since it is based on a construction of structural change materialized in the leadership of economic, social and cultural activities that are generated within the communities, making use of their potential. What is currently being experienced in Vereda el Vergel (Palmor, Ciénaga-Magdalena) is an example of endogenous rural development, which could contribute to the fulfillment of state objectives in terms of food security, elimination of hunger and minimization of poverty.

Thus, endogenous rural development expands when all the characteristics of the territory are taken advantage of and new actors are involved, thus materializing endogenous local development. Vásquez (2000) states that endogenous local development occurs when the community is capable of leading a process of structural change at the level of its productive processes, making use of existing resources, thus clarifying that rurality extends beyond the territory to diversify productive activities. Based on the ideas put forward by the author, the community settled in El Vergel is contextualized, which makes use of the natural resources by cultivating the land and keeping animals; but within it there are those who think that together with other villages they could develop tourist activities taking advantage of the beauty of the vegetation, the climate and the bird watching that is experienced in the area, if the conditions for the access of people to the territory are improved. This indicates that in the community there are people with an imaginary of holistic development, but it does not materialize because there is a lack of commitment on the part of governmental actors.

This holistic development proposes the concept of territorial progress based on the use of natural resources, the cultural identity of the communities, care for the environment, the historical and social values of the inhabitants, and the synergy that should exist among all the members of a locality to carry out productive projects with an impact on the rural area. In this regard, Márquez (2002) indicates that integrated rural development is possible in the territories when there is a territorial and ecological balance based on the different factors involved in development: cultural, environmental, historical and patrimonial. However, when analyzing the situation in the Vereda El Vergel in Palmor Ciénaga Magdalena Colombia, the development of this locality is limited to endogenous rural development.

On the other hand, local development is conceived by Casanova (2004) as a process in which the inhabitants of a society maintain their own identity, generating and strengthening economic, social and cultural dynamics with the participation of governmental actors acting within the territory in favor of a common project that integrates economic growth, equity, ecological sustainability and innovation; the latter being an important aspect for the generation of development, as commented by De La Hoz *et al*. (2018) when indicating that innovation is a social activity that generates excellent results

in the concert of transformative social action oriented to the objectives and goals set for the endogenous development of the nation. Based on this, it is not possible to speak of local development in a state, when the actions of the different territorial governments do not take into account the processes led by the communities within their development imaginaries. This is the importance of planning the local development of the territories with a broad vision towards the urban and rural areas, where aspects such as innovation, ecological sustainability, among others, are taken into account, designing strategies that can be materialized through common projects that allow economic growth and social development in the territory.

According to the above, the natural conception of rural regions in Colombia is an advantage for achieving territorial development due to the great variety of flora and fauna and the potential for cultural and historical riches (OECD, 2022); In addition, recent reports show that the economy of the agricultural sector has been growing through exports, driven by products such as coffee, flowers, bananas, cocoa, trout, tilapia, mango, among others, which are grown in different regions of the country; 29 countries in the world are receptive to agricultural products (Zea, 2022), which allows the expansion of borders for farmers to sell their crops abroad. However, not all farmers have access to marketing their products abroad or at the national level, due to limitations in transporting them because they are located in rural areas that are difficult to access. Products such as coffee and bananas, which are considered export products, are produced in the Department of Magdalena by farmers located in rural areas of the territory, with coffee grown in areas close to the Sierra Nevada de Santa Marta being the most important; however, farmers located in rural areas of the department sell their products without any guarantees to a third party, which is the one that makes the most profit by exporting the products through their organizations.

The case of the farmers of Vereda el Vergel in Palmor, Ciénaga-Magdalena, is not very different from what happens with other producers in the rural area of the department; despite the fact that the communities have generated endogenous rural development with their activities, this does not transcend, it is not known because their production remains within the population, it is used for consumption, sometimes it is lost and other times it can hardly be sold outside the locality. It is disconcerting to know that those in power plan development behind the backs of what happens inside the communities, especially those working in the countryside, by continuing with top-down planning approaches, which do not allow for the participation of the rural community in the construction of development plans; being of vital importance in these processes when talking nowadays about food security, where the main actors are the farmers, who take the products to the urban areas.

The foregoing makes it necessary to reflect on the true planning of rural development, understood as a prospective process that makes it possible to articulate the productive potential of rural areas towards urbanity, in order to encourage economic growth in the territory, while it is necessary to specify the actions to be implemented to achieve the desired development objectives, reducing the uncertainties that may arise in the future. Thus, it is a methodology derived from strategic planning in which the objectives are emphasized and the means to achieve them are identified, reflecting on the future of rurality (Martínez de Anguita, 2006). However, it should be borne in mind that the strategies implemented in rural areas should be based on processes of consultation with the community to improve its quality of life (Villacorta, 1998).

In accordance with the above, rural development planning suggests the implementation of certain strategies, such as: development based on community resources, reordering of natural resources toward production with possibilities for industrialization, unification of agriculture with industry, forging an agro-industrial scheme, creation of basic infrastructure for development, promotion of investment by public or private third parties, and environmental conservation. According to Martínez de Anguita (2006), these strategies should be framed within normative lines that configure a model of new rurality, understanding the concept as the need to construct rural development in a participatory manner as a product that emerges from the community.

Consequently, there is a political line in which rural society should participate democratically to achieve a better quality of life based on the integral development of the individual and the resources available to it, with the participation of the rural community being important in the construction of territorial development plans that affect them. Similarly, an institutional line where the rule of law of the people must prevail for territorial management; an economic line that suggests social responsibilities to the market; a cultural line that recognizes the diversity of ethnicities and cultures; an environmental line focused on the principles of sustainable human development and the addition of environmental wealth to improve the quality of life of the people; and a territorial line where rural society should be the sum of regional and local projects with total autonomy for their execution (Martínez de Anguita, 2006); in order to speak of an articulated rural development planning.

For example, in the department of Magdalena, the Comprehensive Plan for Agricultural and Rural Development with a territorial approach was formulated, with a vision of agricultural and rural development 2018-2038, proposing strategic axes aimed at the competitiveness of the agricultural sector; the productive and social inclusion of agriculture; the social,

productive and sustainable development of the territory; and institutional strengthening for the agricultural and rural development of the territory. Likewise, the departmental government adopted certain goals set forth therein, through the document Departmental Agricultural Extension Plan 2020-2023, emphasizing the promotion of rural entrepreneurship through agribusiness to maximize the department's natural resources, which will be achieved through the fulfillment of strategic axis III of the Departmental Development Plan Magdalena Renace, which talks about the revolution of employment, productivity, mobilization, agriculture and production (Caicedo, 2020) and which connects directly with the commitment to the competitiveness of the agricultural sector.

In relation to the above, the rural development of the department is proposed from a focus on the competitiveness of rural communities in the agricultural sector, aimed at generating structural processes within the communities based on agro-industrial activities; The modernization of the productive structure is important and has been proposed specifically for Palmor, the territory where Vereda el Vergel is located and which is the object of study in this research, towards the construction of small-scale irrigation districts and land adaptation; however, other important factors that influence the achievement of development are not considered, such as physical infrastructure, the qualification of human resources, the quality of collective services, and the processes of cooperation and relationship with other territories, considering the proposals of (Alburquerque, 1997).

At the level of the municipality of Ciénaga Tette (2020) focuses the rural development of the municipality of Ciénaga towards the improvement of the agro-campesino economy, aiming at an integral cycle of planting, production, harvesting and marketing of agricultural products. It proposes as a strategy a pilot project of crop diversification, with small producers of the villages of La Mira, La Ninfa, La María, La Aguja and some villages of Corregimiento de Sevillano, contemplated in this way within the municipal development plan. It is evident here that Palmor is not included in the territorial planning despite being a district of the municipality of Ciénaga where the greatest agricultural potential of the territory is located and which is made up of villages inhabited by vulnerable communities, including Vereda el Vergel, which is the object of study of this research.

2. Materials and methods

This research is classified as a descriptive study in which the endogenous rural development variable is observed directly in the territory where the reality is presented, Vereda el Vergel in the municipality of Ciénaga

(Magdalena), in order to collect the pertinent and necessary information to obtain the results of the research and subsequently build the conclusions.

The research is field research because it is developed within the community that makes up the Vereda el Vergel; it is transectional because the information is obtained at a single moment in the place of the facts and has a qualitative approach. Focus groups are used as a research technique and semi- structured interviews and participant observation are used as support instruments for the collection of information. In addition to the above, a review of the National Development Plan 2018-2022 Pact for Colombia, Pact for Equity; Departmental Development Plan Magdalena Renace 2020-2023; Comprehensive Plan for Agricultural and Rural Development with a Territorial Approach. Departmental vision of agricultural and rural development 2018-2038 in the Department of Magdalena; Municipal Development Plan 2020-2023 Ciénaga moves forward hand in hand with the people and; OECD, ILO, ECLAC, ADR, ONU reports related to rural development in Colombia and the Latin American and Caribbean region, as well as news reports related to state intervention in the villages located in Palmor, specifically in the Vereda el Vergel.

This research is qualitative in nature and involves a triangulation of data based on information obtained from primary sources (Community of El Vergel, Palmor, Ciénaga-Magdalena, Colombia) and the application of research techniques, analyzing the context in which the situations that generate rural development occur, which is the object of study in this research. Okuda, B. *et al.* (2005) affirm that triangulation comprises the use of several strategies that allow studying the same phenomenon from various angles to increase the validity and consistency of the findings. In this sense, by applying a triangulation method in this research, the topic of rural development can be approached from the perspective of the population located in the territory; the positions of various authors are analyzed in relation to the concept of rural development vs. what the researchers contribute in relation to the analysis of the observed experience; and the different governmental actions are analyzed in terms of the variable studied.

Illustration 2 shows the evidence of the focus groups conducted with the community of coffee growers in the village under investigation. The population of the present study was constituted taking into account the information to be obtained from the informants and the documentary population required for the analysis; the informants were identified and characterized taking into account the productive activity they carry out in the locality, establishing as the target group the 32 families that make up the village of El Vergel in Palmor, Ciénaga-Magdalena and, with this, the dynamics of rural development in that territory could be identified.

Illustration 2 - Focus groups with the community of coffee growers in Vereda El Vergel

Source: Photographs Manjarres, A. (2021).

Table 1 shows the characterization of the informants located in the village of El Vergel in Ciénaga Magdalena, in terms of number and main characteristics. The population was characterized as follows: a) President of Vereda el Vergel, to whom a semi-structured interview was applied with the objective of knowing if they had a relationship with the governmental entity for support in the rural development of the locality; b) Leaders of each farm located within the Vereda el Vergel, with whom a focus group was developed in order to learn about the way they develop their productive activity and; c) People with enterprises within the Vereda el Vergel, with whom a focus group was also developed in order to learn about the bets on endogenous development that they project as members of the community.

The documentary population was obtained through the extraction of public documents published on governmental platforms in Colombia and worldwide, such as the website of the Governor's Office of Magdalena-Colombia, the website of the municipality of Ciénaga-Magdalena, the OECD website, the ILO website, the ECLAC website, the ADR website, and the ONU website. With this population, an analysis was made about rural development at the global and country level, reviewing what is being done in the territory, focusing on the Vereda el Vergel to demonstrate actions aimed at generating

Table 1 - Characterization of the informant Subjects who participated in the focus groups

Village/Municipality/Department	Reporting Subjects	Quantity
Vereda el Vergel/Ciénaga/Magdalena/ Colombia	President of the Vereda	1
	Leader of each farm located in the Vereda el Vergel	32
	People with enterprises within the Vereda el Vergel	3

Source: Own construction (2022).

rural development from governance. Table 2 shows the characterization of the documentary population, where an inventory of the most important documents at the country and world government level is listed, reviewed to address the issue of rural development from a macro aspect to focus it at the territory level in its micro aspect.

Table 2 - Characterization of the Documentary Population

Documentary Population	Quantity
National Development Plan 2018-2022 Pact for Colombia, a pact for equity	1
Comprehensive Plan for Agricultural and Rural Development with a Territorial Approach. Departmental vision of agricultural and rural development 2018-2038 in the Department of Magdalena	1
Municipal Development Plan 2020-2023 Ciénaga moves forward hand in hand with the people	1
(OECD, 2022). Preliminary executive summary. OECD Rural Policy Review. Colombia	1
(ECLAC, 2020). Social Panorama of Latin America	1
(DANE, 2020). Poverty and Inequality	1
(ILO, 2016). Thematic labor outlook 3. Working in the countryside in the 21st century. Reality and prospects for rural employment in Latin America and the Caribbean	1

Source: Own construction (2022).

2. Results

In reference to the characteristics of the population living in Vereda el Vergel in Palmor, Ciénaga-Magdalena, through participant observation, it was identified that the community is made up of a mixture of people from different cities in Colombia; some originating from Santander, Antioquia, Tolima, Caldas, Cundinamarca, among others, who settled in the territory as a result of forced displacement due to violence in their place of origin, and others settled there because of their marked interest in coffee growing. Likewise, it is obtained as information that the families settled in the Vereda el Vergel, in its totality are integrated by leaders of coffee farms located in that territory, so it is inferred that the main productive activity of this community revolves around the production of coffee and the varieties of seeds such as Caturra, Colombia and Castillo stand out.

In relation to the way in which the productive activity is developed by the inhabitants of Vereda El Vergel, questions were constructed and addressed in focus groups with the participation of thirty-two (32) leaders of farms located in that locality, based on the lines of development of which the new rurality speaks to us and on the concepts of endogenous rural development.

Table 3 below shows the results obtained from the focus group conducted with the community. The table presents an analysis of the conceptual location related to the productive behavior of the community located in Vereda El Vergel, Palmor-Ciénaga Magdalena, Colombia. For this purpose, the concepts Endogenous Rural Development (Boza, 2011) and New Rurality (Martínez de Anguita, 2006) are analyzed, based on compliance with the characteristics that typify each of the concepts in a development environment; grounding it in the experiences of the community located in the territory.

Table 3 - Conceptual location of the productive behavior of the community of El Vergel-Palmor, Ciénaga Magdalena

Community characteristics in the development process	**Endogenous rural development Boza (2011)**			**New rurality Martínez de anguita (2006)**		
	Is fulfilled	**Is met to a lesser degree**	**Not complied**	**Is fulfilled**	**Is met to a lesser degree**	**Not complied**
Exploitation of the resources provided by nature through land use	x					
Trend towards food security based on land cultivation	x					

Community characteristics in the development process	**Endogenous rural development Boza (2011)**			**New rurality Martínez de anguita (2006)**		
	Is fulfilled	**Is met to a lesser degree**	**Not complied**	**Is fulfilled**	**Is met to a lesser degree**	**Not complied**
Trend towards food security from animal husbandry	x					
Generation of economic income from the commercialization of foodstuffs		x				
Commercialization of the product in higher value markets			x			
Use of exchange techniques (barter) for the commercialization of their products	x					
Organization of each production process	x					
Cooperative work among the members of the village development of their processes	x					
Leveraging cultural, environmental, and historical factors as a source of revenue generation			x			
Holistic view of development	x					
Use of technological means in the development of its production processes						x
Artisanal development of production processes	x					
Personnel trained in agribusiness who apply their knowledge within their production processes						x
Acquisition of technological equipment for working the land						x
Existence of technologically elaborated land irrigation systems						x

Source: Own construction (2022).

The results of the analysis in Table 3 show that the characteristics that identify the productive processes led by this community are typified under the concept of endogenous rural development, in line with what Boza (2011) states, when referring that this type of development materializes when productive initiatives are generated within the communities, which do not involve technology because their activities are developed by ancestral methods. This theory is evidenced when, through the conversation with members of the community, they stated that they lead their own productive processes by being responsible for the coffee farms, by developing alternative fruit and bread crops, and by cultivating livestock, making use of extensions of land that allow them to develop this type of activities without reaching agro-extractivism, which in the end are reflected in the achievement of their own individual and collective wellbeing; This is part of a construction of structural change materialized in the leadership of economic, social and cultural activities that are generated within the communities, making use of their potential.

Similarly, by involving the 3 entrepreneurs in the focus group, it is evident that there are initiatives to generate dynamism in the economy within the village from hiking, tourism and bird watching activities, with a view to generating contributions to the economic growth of the municipality and the department. The community is betting on a community store where they can sell their own food products and their imaginary development of the territory is focused on agrotourism where they can sell the experiences of the countryside and the legacies of their culture. However, in spite of having ideas that, when materialized, could contribute to the development of the territory and therefore to the economic growth, these are people who do not have the necessary knowledge for the formulation of projects.

In view of the above, there is a problem that slows down development in the territory: the qualification of human resources (Alburquerque, 1997), because if the community had knowledge about project formulation, it would be easy for them to materialize their ideas and present them to governmental entities as rural development initiatives. This makes it clear, then, that despite the fact that productive activities led by the community itself are being developed within the Vergel village and that they are part of an endogenous rural development, there is a rupture with governmental entities that does not allow this development to transcend to other parts of the territory, thus slowing its economic growth.

In addition to this, they stated that in the processes they plow the land manually and use techniques to conserve the soil, opening the field to ecological diversity, while increasing the sustainability of the local ecosystem; in addition to this, they expressed that as a community they work collaboratively to move production to the outskirts of the village using their

own means of transportation, although with difficulty due to the difficult access of the roads that communicate the locality to the outskirts of the territory. As a negative aspect, the community emphasizes that the production is moved with difficulty to the outskirts of the village and is delivered to a third party that commercializes it in the coffee market, obtaining higher profits for the intermediary; a situation that occurs when there is no direct relationship with buyers in higher value markets.

As a positive aspect, the result of the research also showed that although the main economic activity in the village is the cultivation of coffee, the community also diversifies its productive activity in other fruit and bread crops such as lemon, mango, strawberry, coffee, cassava and yam, as well as animal husbandry of chickens, ducks, pigs and cows and beekeeping activities, as a strategy for food security of the same community. This production is processed in an artisanal way by the community itself and is commercialized only within the community, using ancestral barter systems, without giving space to be sold to other territories of the department, because mobility to the outskirts of the village is difficult to access due to the lack of paved roads. This shows the urgent need for state governments to create conditions in this rural area to boost the economy and generate support for these communities in terms of formalization of their production processes and relationships with external markets for marketing their products, which in the future could be considered a basis for ensuring food security at local, national and international levels, taking into account that this is what is aimed at globally with the implementation of the ODS within government development plans.

However, this endogenous rural development does not transcend and does not contribute significantly to the economic growth of the territory because the road infrastructure conditions are not in place to allow large-scale commercialization of the agricultural production generated in that locality, nor are technified productive processes carried out that would allow large-scale production, limiting the emergence of what some authors have called new rurality. In this regard, Martínez de Anguita (2006) points out that in the territories it is not only necessary for the community to take advantage of the resources it has, but also to create the basic infrastructures for development.

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Table 4 shows the conditions required to expand rural development in the territory. For this purpose, the aspects considered in rural development are analyzed in order to classify it as New Rurality, under the approach given by Martínez de Anguita (2006). In this sense, the strategies carried out within the territory by the community and governmental entities, which could give rise to this new development approach, are investigated.

Table 4 - Conditions required for the expansion of rural development in the territory

Aspects to consider in the new rurality, Martinez de Anguita (2006)	**Yes**	**No**
Execution of a road infrastructure project by the state government for the improvement of access roads		x
Agribusiness training for local residents, led by the state government		x
Agribusiness training for local residents, led by the state government		x
Promotion of the territory through productive, ethnic and cultural potential		x
Formulation of productive projects based on community-led processes		x
Articulation of the productive processes generated in the village with the urban sector		x
Economic support from the state government to farmers in the village, to finance productive processes		x
Community participation in the construction of territorial development plans		x
Delivery by the state government of technological equipment for the development of their production processes		x

Source: Own construction (2022).

When analyzing Table 4, it is evident that there is a fracture between the state government and the community of El Vergel to promote rural development; this is based on the absence of government management to improve access roads to the community, lack of training programs for the population of the village, which motivates them to formalize their enterprises and focus their activities on agro-industry or agribusiness and a lack of promotion of the territory through its productive potential to attract the attention of external public and private investors. In addition to this, it was found that the community located in this village does not participate in the processes of construction of development plans for the territory and, therefore, their imaginary about rural development is not taken into account,

nor their ethnic and cultural characteristics; formulating projects in the rural sector that are unfocused on the real needs of the population. As Villacorta (1998) points out, the strategies implemented in rural territories to generate and expand development should be based on processes of consultation with the community, allowing community participation in the construction of development plans and the formulation of productive projects.

Conclusions and recommendations

The village of El Vergel in Palmor, Ciénaga Magdalena, Colombia, is a community of coffee growers that has generated endogenous rural development in its locality, based on the leadership of productive activities consisting of coffee harvesting, fruit and bread crops such as lemon, mango, strawberry, yucca and yams, as well as animal husbandry of chickens, ducks, pigs and cows and beekeeping activities, without carrying out agro-extractivism, but bringing as a consequence the scope of food security to the community itself. However, this endogenous rural development does not transcend to other parts of the territory, due to the existence of a rupture between governmental actors and the community to support rural initiative processes that could contribute to territorial economic development. The latter is a consequence of the lack of concerted actions between the municipal and departmental governments and the community, which would allow them to know their development imaginary and the projections that they have as members of a rural community towards the achievement of the improvement of their life situation, in order to materialize them in projects related to their development plans.

In this sense, it evidences the absence of local development planning for this territory, which articulates and complements the rural area with the urban area and where the community has spaces for participation to make known its development imaginary; because local development (Casanova, 2004) strengthens the dynamics at the economic, social and cultural levels based on the participation of different actors.

Based on the above conclusions, it is recommended that governmental entities intervene in the village of El Vergel in Palmor, Ciénaga-Magdalena-Colombia, in order to promote the endogenous rural development generated within this community to other territories, taking into account the following aspects:

Provide spaces that allow the growth in knowledge of agribusiness and agribusiness, applicable to their daily activities, to improve their economic income and give visibility to the village.

Improvement of road infrastructure to facilitate mobility and encourage the commercialization of agricultural and other products to places outside the locality.

Generate spaces for consultation with the community in order to learn about their ideas about rural development and productive activities as a strategy for obtaining income and improving the life situations experienced by each of the inhabitants.

Plan the rural development of the territories, involving the members of the community in the processes of construction of the same and in a concerted way formulate projects that integrate the rural area with the urban area in order to promote an integral local development, in its macro form.

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Exploring organic consumer preferences for dried pasta

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Abstract

Dried pasta is depicted as the most traditional and popular Italian food culture. Italy has the highest per capita pasta consumption worldwide, but lifestyle changes define new habits and trends in consuming this traditional Italian food. The present study aims to explore organic consumers' knowledge, attitudes and preferences for dried pasta and, specifically, the relevance of organic and "ancient" durum wheat varieties. Results show limited knowledge of consumers about dried pasta characteristics and the relevance of extrinsic cues, especially those related to expected taste and local origin. Therefore, the most relevant claims for improving the communication strategy of dried pasta are identified. Companies should meet consumers' preferences by increasing investments in the innovation of this staple food with a focus on improving production processes and packaging design with more effective front-of-pack communication. The findings provide insights into the pasta market, which may help organic companies to enter this new market and make their products more appealing to consumers.

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Introduction

The Mediterranean diet, with all its diversity, is the result of shared experiences that strictly belonged to "*a particular environment*" and to "*a geographical region of multiple facets and rich history*" (Altomare *et al.*, 2013; Renna *et al.*, 2015). This traditional diet is widely appreciated for the intake of several healthy nutrients such as fibres, antioxidants and high-quality fats (Renna *et al.*, 2015). Several health benefits are attributed to the Mediterranean diet, such as its ability to prevent specific pathologies like coronary heart disease (Keys, 1980; Renna *et al.*, 2015). For this reason, this diet is associated not only with a healthy eating pattern but also with a way of living that helped to shape the cultural basis of eating of the Mediterranean people.

Many foods play a relevant role in the Mediterranean diet; however, pasta is one of the most popular and appreciated, especially in Italy (Altamore *et al.*, 2017, 2018; Cacchiarelli & Sorrentino, 2016). Pasta plays a vital role in the Italian culinary tradition (Cacchiarelli & Sorrentino, 2016). Italy is the world's leading pasta producer (Altamore *et al.*, 2020) and the first exporter, with global exports reaching 30% in 2020 (+18.2% compared to 2019) (ISMEA, 2021; World's Top Exports, 2020). Also, pasta consumption in Italy is the highest, with 23.1 kg per capita per year (IPO International Pasta Organization, 2020). The recent Covid-19 pandemic has contributed to increased home cooking, especially during lockdowns, boosting pasta consumption in 2020 with a growth of +8,9% compared to 2019 (ISMEA, 2021). Specifically, Italian consumers increased the purchase of durum wheat pasta of Italian origin (e.g. pasta products with "100% Italiana" label) (ISMEA, 2020).

Despite this recent temporary boom, mostly related to the pandemic restrictions that have forced Italian consumers to eat at home, consumption in Italy has decreased annually since 2016 (Altamore *et al.*, 2018). New trends and other emerging drivers have transformed consumer behaviour, preferences and habits (Altamore *et al.*, 2020; Rabadán *et al.*, 2021; Ringquist *et al.*, 2016). The reduced pasta consumption may be associated with changes in Italians' habits toward other diets perceived as "healthier" and based on a lower intake of carbohydrates (Altamore *et al.*, 2018). Also, mass media blackened dietary carbohydrates over the last decade, spreading consumers' negative perceptions (Marinangeli *et al.*, 2019). Other factors, such as the globalisation of food production and consumption, the use of novel ingredients from different culinary cultures and the lack of time to eat and cook at home, have oriented consumers to reduce the quantity of pasta they consume every day (Foster *et al.*, 2020; Seidelmann *et al.*, 2018).

At the same time, the reduced pasta consumption was partially balanced by a growing demand for high-quality foods that consumers recognise to

have a higher economic value (Altamore *et al.*, 2017, 2020; Contò *et al.*, 2016). Recently, food experts' guidelines and health policies contributed to the spread of food products with a higher intake of fibre and nutrients grains (e.g., whole grain pasta) (Škrobot *et al.*, 2022). Besides, the broader availability of high-quality foods and effective advertising messages has made pasta with "ancient" and local wheat varieties fashionable (e.g., Saragolla, Timilia, Graziella Ra and other turanicum types). In spite of this increase, wholemeal consumption, spelt, turanicum pasta and alike are still a niche (Altamore *et al.*, 2020; Defrancesco *et al.*, 2017).

Very few studies investigated consumers' preferences and attitudes towards the consumption of pasta (Aghaei & Bonyadi Naeini, 2018; Altamore *et al.*, 2017, 2020; Dean *et al.*, 2007; Defrancesco *et al.*, 2017; Di Monaco *et al.*, 2004; Foster *et al.*, 2020; Sajdakowska *et al.*, 2021; Shepherd *et al.*, 2012; Sogari *et al.*, 2019) as well as sensory liking (Altamore *et al.*, 2017, 2018; Di Monaco *et al.*, 2004; Magalis *et al.*, 2016).

Arvola *et al.* (2007) found that Italian consumers did not perceive whole grains differently from refined grains. According to the literature, sensory attributes drive consumers' hedonic appreciation and food choices, and pasta is no exception (De Pelsmaeker *et al.*, 2017; Grunert, 2003; Mascarello *et al.*, 2015). Sensory characteristics are highly related to Italian consumers' familiarity with this staple food (Altamore *et al.*, 2020). However, in some cases, the relevance of sensory liking in the food choice is reinforced by the fact that consumers are unaware of any specific knowledge about health benefits, contents and production methods of pasta, bread and others (Altamore *et al.*, 2017; Magalis *et al.*, 2016; Shepherd *et al.*, 2012; Sogari *et al.*, 2019). Shepherd *et al.* (2012) found that compared to Italian consumers, Finnish consumers were more conscious of the differences between the benefits of consuming refined grain and whole grain products. Nevertheless, the awareness of health benefits is insufficient for a radical behaviour change.

Previous studies showed that providing more precise information and claims centred on health benefits will increase the willingness to adopt and pay a price premium for high-quality products (Altamore *et al.*, 2017; Dolgopolova & Teuber, 2018; Mialon *et al.*, 2002). Sogari *et al.* (2019) who investigated the effect of different claims, found that promoting whole grain pasta with healthy messages increased the choice probability for this kind of good. Notably, the type of information to be used should specifically target the different types of consumers. For example, communicating health benefits "*in an effective and easy-to-read way*" is better in terms of efficacy compared to the more "*scientific*" forms (Sogari *et al.*, 2019).

Consumers' behaviour is also affected by packaging innovations because pasta, like other cereals, is a stable and mature product that consumers usually purchase using their favourite brands as a reference (Garber *et al.*,

2000). Contò *et al.* (2016) consistently found that brand name is considered the most relevant attribute. Also, Di Monaco *et al.* (2004) showed that, when tasting different pasta samples, providing information like the brand name affects the linking score of the pasta. Analysis of variance applied to blind conditions showed that consumers tend to assign similar sensory characteristics to each pasta sample. In contrast, during the informed liking, with the brand name, consumers were able to discern among the samples increasing differences among them. However, key elements such as colour and packaging can add value to this traditional product (Contò *et al.*, 2016). Previous studies stated consumers prefer ecological, recyclable and smart packaging (Altamore *et al.*, 2020; Contò *et al.*, 2016). Garber *et al.* (2020) found that, in the case of spaghetti, new packaging whose colour is perceived as dissimilar to the original package may attract the consumer's attention. However, only when the new package is consistent with the brand's equity and original positioning. Finally, consumers preferred transparent packages to assess the pasta's characteristics and colour (Di Monaco *et al.*, 2004).

While only a few studies have investigated consumers' preferences towards pasta consumption (Aghaei & Bonyadi Naeini, 2018; Altamore *et al.*, 2017, 2020; Dean *et al.*, 2007; Defrancesco *et al.*, 2017; Di Monaco *et al.*, 2004; Foster *et al.*, 2020; Sajdakowska *et al.*, 2021; Shepherd *et al.*, 2012; Sogari *et al.*, 2019), even fewer studies have focused on consumers' preferences towards pasta made of "ancient" durum wheat varieties (Contò *et al.*, 2016; Teuber *et al.*, 2016; Wendin *et al.*, 2020). Contò *et al.* (2016) revealed that consumers appeared interested in pasta made with "ancient" varieties. Another study on heritage cereals confirmed that the "ancient" claim would likely positively impact consumers' food choices (Wendin *et al.*, 2020). The positive perception towards "ancient" wheat varieties can be associated with consumers' belief that those varieties, similar to organic food products, are healthier and more environmentally sustainable than other conventional varieties (Teuber *et al.*, 2016). Despite clear positive attitudes towards "ancient" wheat varieties, which emerged from those studies (Contò *et al.*, 2016; Teuber *et al.*, 2016; Wendin *et al.*, 2020), none focussed on organic consumers. Therefore, this study will address the research gap regarding organic consumers' knowledge of pasta attributes and "ancient" grains and determine the most influential attributes to pasta purchases.

The aim of the present study is to investigate organic consumers' knowledge, attitudes and preferences for dried pasta. In order to answer the aim, four research questions were formulated:

RQ1. What are organic consumers' knowledge, attitudes and preferences towards dried pasta?

RQ2. What product attributes do organic consumers associate with "luxury" or "exclusive" dried pasta?

RQ3. Which are the most relevant pasta attributes for organic consumers' choice?

RQ4. How relevant is the attribute "ancient grains" for organic consumers' when choosing among different dried pasta products?

The focus on pasta made with organic and "ancient" durum wheat varieties will contribute to the current literature by adding new insights and knowledge of a niche market that has been so far neglected in the previous research at national and international levels. Moreover, the results of the study may help companies to enter this new market and how to select marketing claims to make this pasta type more appealing to consumers.

1. Materials and methods

The present study comprises two methodologies: focus groups (FGs) and a quantitative survey. The purpose of a focus group is to explore in depth the phenomenon of a research topic (Krueger, 1994; McQuarrie, 1989). FGs allow for revealing experiences and opinions of participants that would not be accessible without group interaction (Morgan, 1997). As with other qualitative research methods, focus groups are useful for exploratory research to gather in-depth insight into any research topic from a small group of participants (Krueger, 1998). A small number of participants is sufficient to analyse the research topic deeply. The literature shows that a good FG is between eight to twelve participants (Robson, 2002). Also, Krugeger (1994) states that five to seven participants could be enough to explore the range of opinions on a topic. In this case, consumers' knowledge, attitudes, preferences (RQ1) and perception of organic dried pasta as a "luxury" or "exclusive" food product (RQ2) were explored by focus groups (McQuarrie, 1989).

The importance of conducting a preliminary qualitative study is that assessing a general understanding of the topic is necessary to set a more quantitative analysis. While FGs provide an in-depth view of a topic, their results are not quantifiable and can not be generalisable to wider groups of the population (Bryman, 2012). For this reason, the FGs were integrated with a quantitative study. Based on the results of the FGs and previous literature, a survey including a pairwise ranking task was developed. The aim was to identify the most relevant attributes in the consumer choice of organic dried pasta (RQ3). Both FGs and a survey were used to acknowledge if the attribute "ancient grains" can influence the purchase of dried pasta (RQ4).

Qualitative research: Focus Groups

Two FGs were conducted: the first focus group was led in January 2020 (FG1), while the second was in November 2020 (FG2). Each focus group was recorded. The first focus group (FG1) was conducted to identify relevant drivers influencing pasta consumption and to explore consumers' knowledge and perceptions of pasta made from "ancient grains" (RQ1). The moderator started presenting herself and introducing the purpose of the discussion and the principal customary rules. Then, the discussion continued exploring general purchasing and consumption habits and participants' experiences with the pasta product, e.g., frequency and circumstances of consumption, home cooking, and out-of-home consumption. Next, the moderator asked participants to describe which quality attributes define "high-quality" pasta. In the second part, the discussion shifted to the type of cereal used to produce pasta. Both preferences and experiences towards different types of pasta were explored. Several probing questions were also used to identify perceived differences between traditional pasta and pasta made from "ancient" grains like the "Senatore Cappelli" wheat variety, one of the most known. Then, the discussion continued exploring the other relevant attributes that may influence pasta purchase, like the brand name, type of production process, price, and packaging. FG1 ended by asking participants to imagine their "ideal" pasta to grasp their broad vision.

The second focus group (FG2) was conducted online due to the pandemic situation in 2020. The aim was to understand consumers' attitudes toward the idea of "luxury" and "exclusiveness" applied to the characteristics of dried pasta (RQ2). Like the first FG, FG2 started with an introductory section designed to create a pleasant and workable atmosphere among the participants. The discussion began by asking participants to make examples of luxury and exclusive foods. Then, the discussion continued exploring distinctive elements that can give foodstuffs the dimension of luxury and exclusiveness. The second part moved the attention to the pasta product. The moderator stimulated the discussion to understand whether participants can associate the idea of "luxury" with the pasta product, identifying the more critical distinguishing attributes. Then, participants' knowledge and preferences about cereals used to make pasta were explored to address whether the characteristics of the cereal (e.g., variety, origin, production, certification) are used as a proxy for quality and how they may influence consumer choices. Finally, packaging characteristics were discussed to determine which elements attract their attention most and define which packaging attribute can be associated with the idea of "exclusiveness".

Both FGs were conducted by trained moderators and lasted 60-90 minutes each. A total of 17 consumers participated in the focus group discussions. All

selected participants were responsible for food purchases in their household. Consumers were recruited in similar proportions according to organic food purchasing habits (regular and occasional). Consumers whose organic food shopping represents more than 50% of their household groceries were considered regular organic consumers (Mandolesi *et al*., 2022). Occasional organic consumers were all the others, excluding those who never buy organic and neither are interested in it. For each focus group, both women and men were recruited. All of the participants were between 18 and 70 years old. Participants were recruited during grocery shopping at an organic food shop and via snowballing. The description of the participant sample of both FGs is reported in Table 1.

Table 1 - Focus group sample characteristics

	Date	N. of Participants	Gender		Age		Type of consumer	
			M	F	18-45	46-70	Occ.	Reg.
FG1	10.01.2020	11	3	8	1	10	5	6
FG2	12.11.2020	6	3	3	2	4	4	2

Quantitative research: Incomplete Ordinal Information Choice Model (PAPRIKA)

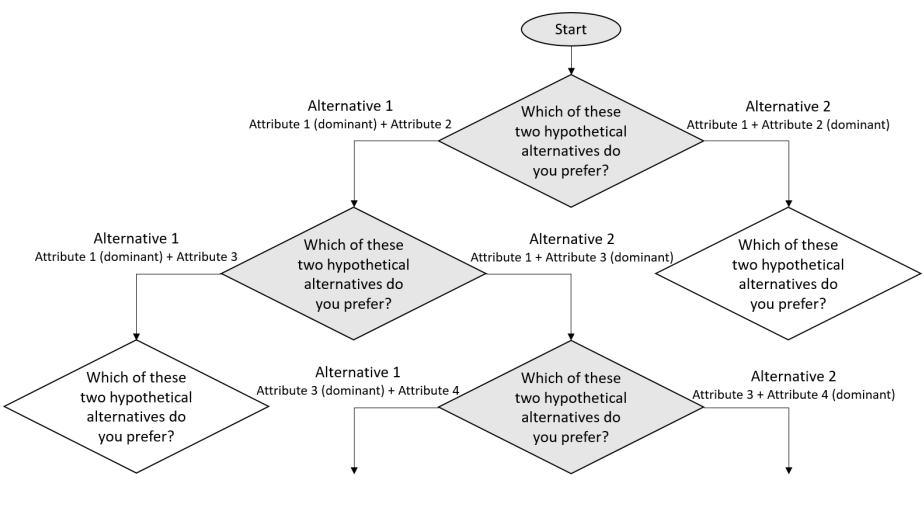
Conjoint analysis was used to identify the most relevant attributes in the consumer choice of organic dried pasta (RQ3). The theoretical foundations of the conjoint analysis, based on Lancaster's (1966) consumer theory and the theory of random utility (Mcfadden, 1974), suggest that the utilities of goods can be broken down into separate utilities by their attributes. Hence, as people are rational, they will choose the alternative that maximises their utility according to their point of view.

In Italy, pasta products and their packaging incorporate many aspects which affect consumers' decisions (Altamore *et al*., 2020; Defrancesco *et al*., 2017). However, consumers at the time of purchase, given cognitive and time limitations, can only evaluate some of these characteristics (Ares *et al*., 2013; Milosavljevic & Cerf, 2008). For this reason, methods based on incomplete ordinal information, such as Pairwise Trade-off Analysis (Johnson, 1976) or Adaptive Conjoint Analysis (Green *et al*., 2001), can be instrumental in determining the relative importance of the factors involved in the consumers'

complex decisions. Identifying such factors is critical for more detailed future studies.

The present study used the Potentially All Pairwise RanKings of all possible Alternatives (PAPRIKA) method (Hansen & Ombler, 2008) to construct the incomplete ordinal information choice model through the 1000Minds online software platform (www.1000minds.com). For this method, respondents' preferences are defined by asking questions involving a series of trade-offs between undominated pairs of alternatives. During the survey, each participant was presented with pairs of hypothetical alternatives characterised by two of the attributes usually displayed on pasta packages. Each pair of the undominated alternatives showed the same attributes but different levels (Figure 1). One attribute is said to be dominant (higher level) on one alternative, while the second is said to be dominant on the second alternative. For example, the following two attributes were shown in one of the pairs: the "Bronze drawn" and the "Short supply chain: from the producer to the consumer". Each of these attributes has two levels: present (yes) or absent (no). In the first alternative, the "Short supply chain: from the producer to the consumer " was dominant (present), while the "Bronze drawn" attribute was dominant (present) only in the second alternative. Participants were asked to select from each pair their preferred alternative or express indifference between the two options.

Figure 1 - Process flow chart for the Potentially All Pairwise RanKings of all possible Alternatives (PAPRIKA) method



This process was repeated several times, presenting different combinations of attributes each time (Hansen & Ombler, 2008). The principle was that by repeatedly asking participants to select an alternative from each pair of options, enough information about their pasta preferences would be produced to accurately rank all the attributes (Liberman *et al*., 2019). By this "adaptive" ranking method, each time a choice is made, the algorithm "adapts" or "learns" by formulating a new question based on all the previous choices. Constraints were imposed a priori to exclude impossible combinations of attributes (for example, the local origin only appeared with local brands).

Whenever the participant made a choice, the PAPRIKA algorithm instantaneously identified all other hypothetical aspects that could be coupled based on the principles of transitivity among the available choices. For this reason, the number of questions presented to each subject varied according to previous choices. In this study, an average of sixty-three questions were presented to the participants.

As respondents' rankings became consistent, a complete overall ranking of alternatives was defined through data obtained via linear programming (Hansen & Ombler, 2008). In other words, the PAPRIKA method simplified the decision-making process while giving each attribute a relative importance weight.

The attributes and respective levels were established based on existing literature (Altamore *et al*., 2020; Contò *et al*., 2016), experts' judgement, an analysis of the labels available in the pasta products in the supermarket and the results of the focus groups. The selected attributes and their levels are presented in Table 2.

Respondents were informed that the pasta was always organic, so this attribute does not appear in the list. Those attributes related to product claims had two levels, in which the reference category was set as the absence of the specific attribute. For the attributes with more than two levels, the reference category was set to the attribute's best-known or most familiar level. However, for the "Tagline" attribute, the reference category was the absence of any tagline.

Survey design

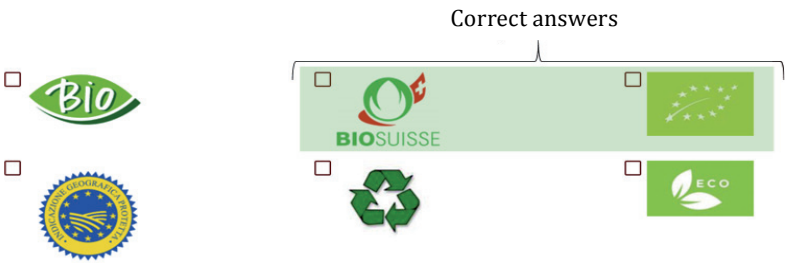
The survey was led in Italy between January and February 2021 using the Qualtrics and 1000minds platforms. The first part of the survey was designed in Qualtrics and included sociodemographic questions, organic products' usage and organic certification recognition. The second part had the PAPRIKA rankings task developed on the 1000minds platform.

Table 2 - PAPRIKA attributes and levels

Attributes	**Levels**
Origin	"100% Italian grain" (reference) "100% grain from Le Marche region" "100% grain from the hills of Urbino"
Grain	"Durum Wheat" (reference) "Ancient Grains" "Senatore Cappelli" "Turanicum Graziella Ra"
Brand	"Alce Nero" (reference) "Girolomoni" "Montebello"
Tagline	– (reference) "Dignity for the Earth" "Rural Bio"
"Produced with Montebello spring water"	No (reference) Yes
Always "al dente"	No (reference) Yes
"From the field to the table: 100% from our supply chain"	No (reference) Yes
"Bronze drawn"	No (reference) Yes
"Excellent and unique flavour"	No (reference) Yes
"Fat-free"	No (reference) Yes
"Short supply chain: from the producer to the consumer"	No (reference) Yes
"Limited edition"	No (reference) Yes
"Slow Food"	No (reference) Yes
"Source of fibre"	No (reference) Yes
"Slow drying"	No (reference) Yes
"Low glutenin content"	No (reference) Yes

The sociodemographic questions included age, gender, occupation and province of residence. Uses of organic products, purchase frequency and place of purchase data were also collected. The recognition of organic certification was evaluated, simultaneously showing six logos (only two organic) in randomised order. The subjects were asked to select the logo or logos legally accepted in the EU for organic food products (Figure 2).

Figure 2 - Logos presented to participants



Survey sample

302 respondents (diverse from the participants in the FGs) were recruited through the Amazon "M-Turk" platform among those over 18 years old and registered in Italy. Eligible respondents, as for the FGs, were partially or fully responsible for the household's food purchasing, regular or occasional organic consumers and bought certified organic pasta at least once a week. Respondents who worked or had a close family member working in agriculture, catering, market research or any other food-related industry were excluded as they might have more knowledge than an average consumer. In the end, after screening out uneligible respondents and those who did not recognise the organic logo, the data consisted of 73 responses.

2. Results

FG results

To preserve anonymity and privacy, FG participants will be identified by a code "FGNumber, ParticipantNumber, Gender, Type", where "Type" assumes the value "Reg" when referring to regular organic pasta consumers and "Occ" when referring to occasional.

Consumer preferences and trends for dried pasta

Results suggest that consumption habits of pasta have changed recently. FG participants declared that frequencies of consumption and portions had increasingly declined over the last years. The majority confirmed remaining loyal to their favourite brand and consuming pasta for special occasions with family and friends during the weekend. They mainly addressed this choice to the reduced time for lunch, preferring "smart" alternatives during the week. For this reason, pasta is not the first choice for out-of-home consumption during the lunch break. One participant affirmed: "*with my schedule at work, it is not possible (to cook or eat pasta)… however at the weekend, (pasta) is the main ingredient for lunch at least*" (FG1, P5, F, Reg). However, pasta remains the first choice in the case of families with a high number of members and children. One stated: "*I do not usually eat pasta… but when I am at home with my son, I cook pasta*" (FG1, P11, M, Reg).

Participants also declared consuming less pasta for health motivations. For example, a few participants affirmed not to consume pasta every day "*to control the glycaemic issue*" (FG1, P11, M, Reg) and "*to control weight*" (FG1, P9, F, Occ). Participants generally perceived that non-conventional pasta typologies (e.g., whole grain pasta) are healthier than the traditional durum wheat pasta. For this reason, they declared to consume less traditional pasta (e.g., durum wheat pasta), preferring other typologies like fresh pasta, legume pasta, spelt pasta and whole grain pasta.

Quality indicators for a "good" pasta

Participants indicated taste, origin, production methods (e.g., type of drying, quality of water) and health aspects as quality indicators. Most participants declared to prefer tasty, healthy and locally-produced pasta. Taste and sensory appeal are essential for many participants, representing the main drivers for pasta selection. The taste was also related to high-quality pasta that, after cooking, always remains "*al dente*" (FG1, P2, F, Reg; FG1, P7, M, Occ; FG1, P8, F, Reg).

Most participants declared to look to the origin of the grain and the processing place, preferring the "Italian" and "local" origin. They also preferred small local producers, as they perceived them to use local and Italian wheat compared to big conventional companies. They also believe that high nutritional quality and health benefits characterise local pasta. Despite some participants highlighting the importance of the organic certification as an indicator of a high-quality product, others believe that the origin of the grain and production methods are more relevant than the presence of the organic

certification: "*… maybe for pasta, being organic is not so relevant. It is more the manufacturing industry, the origin of raw material*" (FG1, P7, M, Occ).

Attitudes towards "ancient grains"

All participants showed a positive attitude towards "ancient" wheat varieties, which evoke the idea of a "*non-artificial*" and sometimes "*healthier*" option to standard durum wheat varieties.

Generally, most respondents showed limited knowledge of the term "ancient grains" ("grani antichi", in Italian). However, some of them declared they had already consumed and tasted pasta made with "ancient" varieties like the "Senatore Cappelli" durum wheat (FG1, P3, F, Reg; FG1, P10, F, Occ; FG1, P11, M, Reg).

For all participants, a tasty experience is important, and they declared to be unwilling to sacrifice the pleasantness of taste. However, those who have tried alternative pasta used the term "*different*" to describe "ancient" wheat pasta taste, which was not necessarily associated with a tastier experience than traditional durum wheat pasta.

For participants, the main motive to consume pasta using "ancient grains" is linked to the perception of eating healthy food (FG1, P4, F, Reg; FG1, P10, F, Occ). However, the frequency of purchase and consumption is not high, mainly related to the curiosity to try something different.

Regarding price, for participants, "ancient" grain pasta is perceived as too expensive for the family budget (FG1, P1, F, Occ; FG1, P10, F, Occ).

Attitudes towards labels and packaging features

On the shelves, participants confirmed looking first at specific information reported on the pasta pack: origin, production methods (e.g., drying process) and organic certification. Only some participants claimed more precise indications about the supply chain for traceability and controls.

Regarding the packaging, participants agreed to prefer recyclable and compostable materials, generally those packs with less plastic (FG1, P4, F, Reg; FG1, P5, F Reg). Results confirmed that being more sustainable has an impact even on the food choice of participants.

Consumer perceptions of "exclusiveness" of a food product

Participants did not associate dried pasta with "luxury" and "exclusiveness". Some of them affirmed: "*I do not associate pasta with a luxury concept*" (FG2, P1, M, Occ) and "*I think that pasta is for everyone*" (FG2, P4, M, Reg).

According to the participants' experience, very few food products can be considered "exclusive", like white truffles, certain wines (e.g., Sassicaia), and champagnes and oysters. For participants, "exclusive" foods are rarely consumed because they are scarce, costly, and sometimes unaffordable for many. Only the "*artisanal*" and "*handmade*" pasta could be associated with the concept of "exclusiveness". However, it is essential to note that for many, handmade pasta is linked with personal experiences and homemade fresh egg pasta (e.g., "tagliatelle", a handmade egg pasta typical of Italian cuisine), which is different from the dried type. Participants believed grain type is important when referring to "high-quality" pasta. For this reason, participants underlined that high-quality pasta must be "*organic*", "*local*", and produced with a "*special type of grain*".

Price also is another crucial factor. A high price reminds them of high quality. For example, most participants recognised the high value of the Kamut grain type in terms of nutritional content, and one participant stated: "*the Kamut is excellent but also very expensive*" (FG2, P5, M, Reg). Some participants also confirmed to be more willing to pay a price premium for purchasing pasta made locally by artisanal and trusted producers because they address a higher economic value to those products.

Generally, most participants related the idea of "luxury" mostly with objective features such as high price and scarcity of the product. However, for other participants, this concept can also be related to a personal dimension of pleasure: "*(something) that you give to yourself for pleasure*" (FG2, P3, F, Occ), "*to be kind with yourself*" (FG2, P1, M, Occ). Another participant highlighted the independence of food satisfaction from the product's price or uniqueness. She explained: "*(the consumption of a product) must always be related to satisfaction… otherwise, it is not a luxury, it is just expensive… if I do not like red wines, I don't care drinking the Amarone (wine)*" (FG2, P3, F, Occ).

Participants suggested using unique and more visible labels to communicate the idea of high-quality pasta, to provide information about quality, healthiness, sustainability and controls of raw materials and production processes. Good communication needs to be combined with "*pleasant*" and "*special*" packaging that could attract more consumers' eyes (FG2, P1, M, Occ).

Survey results

The average respondents were 34 years old, with a standard deviation of 11.2 years. Details are presented in Table 3.

Table 3 - Sociodemographic characteristics of the survey sample

	%		%
Gender		**Regions (areas)**	
Male	66%	Nord	50%
Female	34%	Center	20%
Age		South	17%
18-24	22%	Islands	13%
25-34	41%		
35-44	19%		
45-54	12%		
Over 55	5%		
Employment			
Employed	67%		
Unemployed	7%		
Student	25%		
Retired	1%		

Although most respondents declared themselves occasional organic consumers (89%), their frequency of consumption of organic foods varied according to the product type. Fruit and vegetables were almost always bought organic, while dairy products and bread were sometimes non-organic. Respondents purchase organic products mainly in supermarkets, specialised stores and online. Moreover, 82% of the participants recognised Europe's legally accepted organic logo for packaged food products.

Of the 73 participants, only 58 could correctly finalise the PAPRIKA ranking task. The remaining 15 subjects were excluded as their inconsistent responses indicated possible random choices and not taking the task seriously.

On average, each participant faced 63 (SD = 11.4) trade-offs in a range of 37 to 76 trade-offs. The most important attribute was the tagline (Table 4). Within the "Tagline" attribute, respondents preferred "Dignity of the Earth", to "Rural Bio", or no tagline at all. "Dignity of the Earth" contributed 57% of the tagline's 8.2% (i.e. 4.7%), and "Rural Bio" accounted for only 43% (i.e. 3.5% of the total for the "Tagline" attribute). Both taglines were preferred over the alternative of having no tagline at all.

The "Tagline" attribute was followed in importance by these five claims: "Short supply chain: from the producer to the consumer", "Bronze-drawn", "From the field to the table: 100% from our supply chain", "Excellent and unique flavour" and "Source of fibre". Although the claims provide different

Table 4 - Average part-worth utilities estimates and standard deviation

Attributes	Part-worth utilities	SD
Origin*	5.19	3.65
"100% wheat from Le Marche region"	2.36	2.30
"100% wheat from the hills of Urbino"	2.83	2.31
Grain**	6.30	4.18
"Ancient Grains"	3.29	2.78
"Senatore Cappelli"	1.69	2.15
"Turanicum Graziella Ra"	1.33	1.30
Brand***	4.24	2.93
"Girolomoni"	1.82	1.86
"Montebello"	2.41	1.95
Tagline****	8.21	3.04
"Dignity of the Earth"	4.64	2.24
"Rural Bio"	3.57	2.24
"Produced with Montebello spring water"	5.30	2.80
Always "*al dente*"	6.16	3.67
"From the field to the table: 100% from our supply chain"	7.50	2.23
"Bronze drawn"	7.59	2.99
"Excellent and unique flavour"	7.17	3.08
"Fat-free"	6.19	3.71
"Short supply chain: from the producer to the consumer"	7.86	2.91
"Limited edition"	3.56	2.54
"Slow Food"	6.55	3.40
"Source of fibre"	7.16	3.19
"Slow drying"	5.74	2.88
"Low glutenin content"	5.26	3.35

The reference categories are * 100% Italian wheat, ** Durum wheat, *** Alce Nero, **** No tagline.

information, it is worth noting that most of them are related to the production process. This result highlights organic consumers' interest in the production processes and short supply chains directly managed by the producer company.

Looking at the variability (st. dev) of the claims, "Excellent and unique flavour" and "Source of fibre" are considered likewise relevant. Together with the "Bronze drawn" claim, all of these claims are associated with healthiness and good sensory experiences during pasta consumption. In general, results show that consumers' preferences for organic pasta in Italy are highly diverse. Significant differences were found between genders. Males, more than females ($t(56) = 2.070$, $p = 0.043$), prefer the claim "Bronze drawn". A 100% controlled supply chain is also significantly valued by consumers who correctly identified the EU organic certification logo than respondents who did not recognise the certification scheme ($t(56) = -2.252$, $p = 0.028$).

The grain type attribute, ranking eighth in importance, weighs 6.3%. Within this attribute, the "Ancient Grains" is favoured over other types of wheat (the "Senatore Cappelli" and the "Turanicum Graziella Ra"). Moreover, "Ancient Grains" ($F(3,54) = 3.0$, $p = 0.038$) were also significantly more preferred by the southern regions than by the northern ones ($p = 0.035$). All three grains were preferred over the generic "Durum wheat".

The "Fat-free" claim also showed significant differences in terms of age ($F(3,54) = 3.9$, $p = 0.014$). Respondents under 25 perceive more utility from this attribute than respondents between 25 and 34 ($p = 0.016$) or over 45 ($p = 0.41$). Significant differences exist among regions concerning using the Montebello spring water ($F(3,54) = 6.2$, $p = 0.001$). The centre ($p = 0.001$) and the islands ($p = 0.017$) regions significantly appreciate more this water source than the southern regions. Nevertheless, this was among the less important attributes.

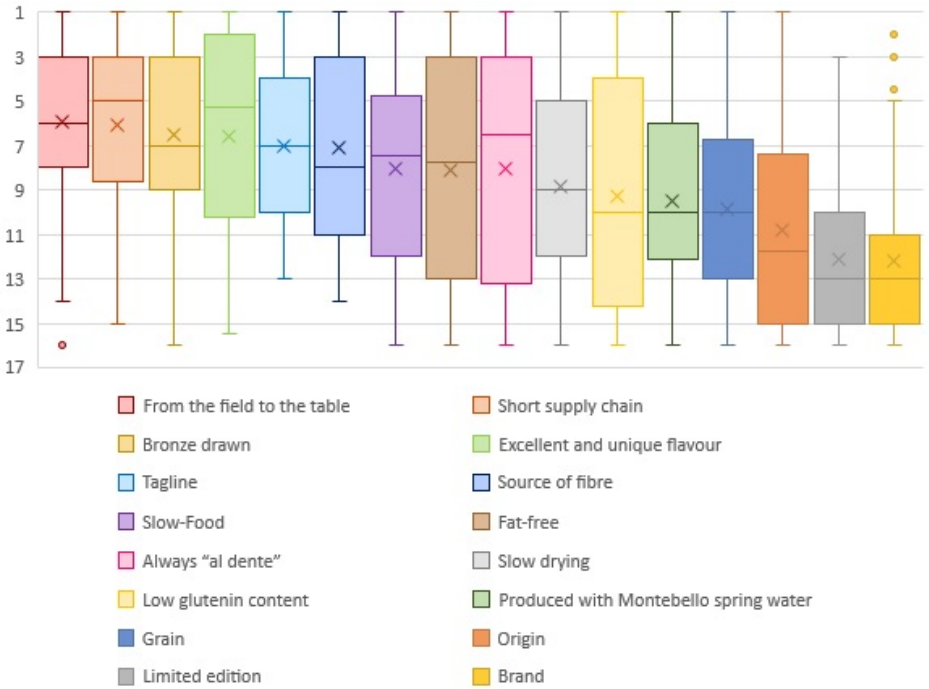
The "100% grain from hills of Urbino", within the origin attributes, is the preferred wheat type, followed by "100% grain from Marche region". Thus, wheat sourced from the Urbino hills is preferred over grain from the Marche region or Italy.

The "Montebello" brand is preferred, followed by the "Girolomoni" brand. Both brands are preferred over the "Alce Nero" brand, considered the reference category. Nevertheless, the high variability of preferences for the "Girolomoni" brand makes the difference from the "Alce Nero" brand not significant.

A mean of the individual rankings for each attribute – from the preferred attribute (ranking = 1) to the least preferred (ranking = 16) – was computed (as we did for the utilities). Detailed results are presented in the box plot in Figure 3. The attribute with the smallest average range has the largest range of average utilities. Consequently, the highest ranking corresponds to 5.9 ("From the field to the table: 100% from our supply chain", closely followed by "Short supply chain: from the producer to the consumer"). Being the mean rank so far from 1 (most preferred attribute) means a wide variability among the most preferred attributes among consumers. These

findings match the previous results as these attributes are among the top five parts-worth utilities.

Figure 3 - Box-plot for the ranking of each attribute



The "x" indicates the mean of the ranking of each attribute.

Furthermore, the brand name and the "Limited edition" claim are the less important attributes in ranking and part-worth utilities. Such results indicate that if a product is of quality, it is rewarded with a purchase beyond the brand's fame. Moreover, the concept of "Limited edition" was less chosen, implying that it is difficult for consumers to associate the idea of exclusivity with the pasta product.

3. Discussion

The FG results provide evidence that there is still limited knowledge about dried pasta ingredients and types of cereals. Although FG participants show a positive attitude towards "ancient grains", similar to the previous study,

the majority have a vague idea of what the term "ancient" refers to (Contò *et al.*, 2016; Teuber *et al.*, 2016; Wendin *et al.*, 2020). The FG findings show that pasta, no longer considered the primary option for an Italian lunch, is consumed less than in the past and even less if made with "ancient" wheat varieties. Pasta is a meal for special occasions, during the weekend, with family and friends (Altamore *et al.*, 2018, 2020).

Both FGs and PAPRIKA results indicate that taste significantly weighs on the final decision to buy a pasta product, which aligns with a previous study (Altamore *et al.*, 2020a). More specifically, the survey results show that among the most relevant attributes are those connected with the sensory experience ("Bronze drawn", "Excellent and unique flavour"). Given that the sensory dimension is essential and is the determining driver for repurchase (Grunert, 2003), a small taste change in staple food like pasta could hurdle the increase in consumption (Altamore *et al.*, 2020; De Pelsmaeker *et al.*, 2017; Defrancesco *et al.*, 2017; Grunert, 2003). Therefore, wholemeal pasta or pasta made with "ancient grains" may not be for all.

Therefore, the results indicate that to incentivise the purchase, choosing the most relevant pre-consumption attributes would be essential. The survey results show that the marketing attributes of a pasta product that have the largest relevance are: the "Tagline", the "Short supply chain: from the producer to the consumer" and "From the field to the table: 100% from our supply chain" claims).

The survey confirms that information about the origin of ingredients (water and wheat) is relevant for the purchase (Altamore *et al.*, 2018; Cappelli & Cini, 2021). The origin should be Italian, and better if it is local. In line with the results of previous studies, the local provenance of the grain should refer to a specific and circumscribed area of origin (e.g., grain from the hills of Urbino), not just to the term "local products" generically proposed (Hu *et al.*, 2012; Meyerding *et al.*, 2019). Consumers associate craftsmanship and the "local" production with high quality, essential characteristics for an "exclusive" pasta.

Although consumers prefer to buy "high-quality" pasta brands (among the most mentioned: i.e., Mancini, Gragnano, la Cooperativa Terra e il Cielo, Ecor di Natura Sì, Girolomoni), they do not link dried pasta with the idea of "luxury" and "exclusiveness". According to the FG results, for participants, a "luxury" food product should be "artisanal" and "handmade" but also very expensive and difficult to find, which is far from how pasta is usually perceived. Consequently, the "Limited edition" claim, tested with the survey, also has a low weight in the PAPRIKA analysis.

Purchase local food products is relevant (Contò *et al.*, 2016). The results show how consumers would like to purchase and consume local, traditionally produced and high-quality pasta made from "ancient" grain varieties, either

spelt or "ancient" wheat varieties. Although consumers perceive the price of "ancient" grain pasta as too high (Arvola *et al.*, 2007), most of them declare to be willing to pay a price premium for high-quality products with the required attributes (Altamore *et al.*, 2017; Dolgopolova & Teuber, 2018; Hartmann *et al.*, 2018; Mialon *et al.*, 2002). However, the fact that respondents assign a "*different*" taste to pasta made with "ancient" grains may explain why there is resistance to buying it, making "ancient" grain pasta a niche segment (Altamore *et al.*, 2020). As discussed during the FGs, pasta made with "ancient" varieties is consumed for curiosity, to try something new, or as an unusual alternative (Altamore *et al.*, 2020; Contò *et al.*, 2016; Defrancesco *et al.*, 2017).

Generally, FG participants perceive "ancient" grains as healthier than traditional ones (Teuber *et al.*, 2016). The control of "*the glycaemic issue*" and "*weight*" are among the crucial aspects that emerge from FGs results, confirming the close attention that consumers pay to diets with a low intake of carbohydrates (Altamore *et al.*, 2018; Foster *et al.*, 2020). Indeed, the PAPRIKA analysis highlights that consumers under 25 value the "Fat-free" claim in pasta more than those between 35 and 45 years old. Similar to previous studies, the "ancient" adjective is perceived as something tied to tradition, "*artisanal*", "*non-artificial*", and "*less industrialised*" than conventional pasta (Contò *et al.*, 2016; Wendin *et al.*, 2020). The PAPRIKA analysis also confirms consumers' preferences for alternative pasta typologies, showing that consumers prefer the "Ancient Grains" attribute over the generic "Durum Wheat" attribute. However, the part-worth and rank of this attribute are not very high. For these reasons, we can conclude that the attribute "ancient grain" may significantly influence the purchase of dried pasta.

Despite environmental aspects being less mentioned and less important than taste, origin and health aspects, the results indicate that organic pasta packs should be more sustainable, avoiding plastic use while being "recyclable" and "compostable" (Altamore *et al.*, 2020; Contò *et al.*, 2016). Organic consumers would prefer more information regarding the production process and short supply chain (Scalvedi & Saba, 2018; Wägeli & Hamm, 2016).

Although the brand name is still relevant in consumers' food choices (Di Monaco *et al.*, 2004), the propensity is to choose organic pasta considering intrinsic and extrinsic characteristics (e.g., tagline, taste, origin and price). Among the credence attributes, the brand name is not very relevant for organic consumers and is surpassed by the tagline. In general, such results highlight the low brand equity of organic pasta producers.

Conclusions

The agri-food sector represents a strategic industry of the Italian economy, and dried pasta is of the most exported and appreciated products worldwide. Recently, the increased awareness of high-quality foods and health-consciousness significantly impacted consumers' preferences towards pasta. This aspect changed the pasta market, favouring the comparison of broader availability of organically grown wheat and grains. Despite the positive perception of organic pasta types, obtained with limited use of pesticides or chemicals compared to conventional ones, the study highlighted the general decrease in pasta consumption.

For organic consumers, pasta is no longer an everyday meal and is increasingly considered a weekend or special occasion food. This most likely depends on the change in work habits and health issues, mainly associated with the need to limit calorie intake for controlling weight or glycemic. Although pasta can be considered a medium-low glycemic index food compared to other cereal-based products (Bresciani *et al.*, 2022; Di Pede *et al.*, 2021). Such changes in health issues and the development of preferences for diets with a lower intake of carbohydrates are trends not only in the Italian market but also worldwide (Rabadán *et al.*, 2021; Ringquist *et al.*, 2016). The high amount of carbohydrates and sugar represents a global consumption barrier, which specific advancement of technological processes may limit to influence glycemic content.

Despite culinary traditions, innovation in pasta products is an important driver since if consumers cannot find the characteristics they want; they will shift their purchase to other foods or brands. This is true for consumers all around the world. As a result, pasta producers and manufacturing companies should meet changes in consumer preferences over time by increasing investments in the innovation of this staple food. Specifically, the pasta industry should focus on improving packaging design and online, in-store and front-of-pack communication for organic dried pasta. Aspects such as the naturalness of simple ingredients, sustainable packaging, origin and production processes of the product should be highlighted with transparent labels that can help consumers to respond to their current preferences (Astill *et al.*, 2019; Bresciani *et al.*, 2022).

Implementing claims in the pack that evoke good taste, good quality and, potentially, the healthiness of organic dried pasta could benefit the producer. For example, "Bronze drawn" evokes sensorial expectations related to the rough aspect of the pasta surface. The rough drawing results in a porous, opaque pasta, reminiscent of homemade pasta. The porosity and roughness of the surface make it the perfect pasta for retaining sauces, such as classic

tomato sauce. All claims related to taste authenticity appear relevant for marketing organic pasta and should be exploited to differentiate it from other quality pasta products. In this study, the focus was only on organic pasta. While it is well known that the consumer highly values the "organic" claim, the role of other attributes and claims is often underrated.

Overall, the results show that organic consumers have limited knowledge of their pasta purchases. They tend to give more importance to extrinsic cues (tagline, origin, and other label or pack information, especially those linked with expected taste) than ingredients and wheat varieties. Organic pasta brands are still relatively unknown and do not weigh much in driving organic consumer choice. This is a key opportunity for new and current organic pasta producers, who can differentiate their products through the abovementioned claims. Companies interested in entering this niche market might want to propose pasta produced through short supply chains to the consumer, with processes highlighting sensorial aspects and in sustainable packages.

On the other hand, policymakers have a two-fold role. First, from the consumer point of view, informative campaigns could be implemented to provide additional knowledge to consumers about the role of the diverse characteristics of pasta and their link to specific health and sustainability benefits. An informed consumer is more willing to accept a higher price for pasta products with desired characteristics, creating new opportunities for all organic companies along the supply chain and possibly increasing profits. Second, from the industry point of view, policymakers could potentially provide incentives (e.g., tax releases, simplified business procedures) to pasta companies (not only) that produce sustainably and transparently, while providing consumers with healthy and nutritious food products.

Further research is necessary to understand consumers' preferences in the organic pasta market regarding price, promotion strategies and hedonic attributes through sensorial analysis and experiments, possibly developed in supermarkets or the purchasing place of the consumer.

Among the study's limitations, the small participant sample for qualitative and quantitative analysis should be mentioned. However, the study's exploratory nature did not aim to generalise the findings to a broader sample. Due to financial limitations, the study used MTurk to recruit Italian organic customers, which eventually are not so common on that platform. We conclude that MTurk is not a relevant platform to run extensive surveys when European, and specifically Italian, respondents are requested.

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The EU agri-food system in the recent crisis scenarios

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Abstract

The European Union agri-food system has faced major challenges in the last years due to the Covid-19 pandemic and the Russian-Ukrainian war. In a scenario where millions of people all over the world suffer from hunger, the uncertainty of food availability and commodity price surge have made it difficult to find and afford food on a large scale even in countries, which apparently are not exposed to those risks. Within the European Union (EU), this has depended upon the vulnerabilities and dependencies inherent in the agri-food system. In order to react and cope with emergency scenarios, the European Institution has adopted some temporary measures. The present paper verifies the level of the EU agri-food Self-Reliance system through the development of Self-sufficiency calculation and the Import Dependency Indices as well as the EU comparative advantage through the Gerard-Lafay Index and the relative comparative advantage proposed by Vollrath. Focusing on wheat and maize, these indices show a good level in the former case, but it may no longer be considered as such in the event of a crisis, and poor levels in the second case already at present time. Based on the achieved results, recommendable actions have been suggested in order to secure the EU food supply and to satisfy the EU demand even in case future adverse events might occur. In addition, further recommended actions to be taken by the European institutions, have been described.

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Introduction

The European Union agri-food system and not only (Bin-Nashwan *et al.*, 2022), have faced major challenges over the last years. First, the Covid-19 pandemic, and second, the current war between Russia and Ukraine have resulted in commodity price spikes (European Commission, 2022a) and in concerns about the availability of resources, thus posing the global food security at risk (Zarbà *et al.*, 2021; Howard, 2022; Kemmerling *et al.*, 2022).

While addressing the food security issue, three aspects may be worth considering here: the physical availability (Amin *et al.*, 2022; Polukhin *et al.*, 2022) relating to the physiological needs of the population, the economic availability of food and food adequacy, which entails health and safety implications (Jerzak and Smiglak-Krajewska, 2020).

FAO *et al.* (2021) estimated that 720 to 811 million people across the world faced hunger, next to an increased level of undernourishment, varying from 1.5 percent to 9.9 percent.

Russia and Ukraine have historically played a leading role in global trade. According to FAO (2022), Russia (14%) and Ukraine (4%), used to export a combined total of 18% of the world's cereal production between 2016/17 and 2020/21. However, the Russian-Ukrainian war has changed this scenario, undermining their (Yazbeck *et al.*, 2022) capacity to supply global markets with foodstuffs. Due to the war, Ukraine has stopped its exports, while the labour shortages have made the harvests uncertain. This has affected global food security and impacted the global food market (Ben Hassen and El Bilali, 2022).

The purposes of this paper is to investigate the way the estimated decrease in Ukrainian wheat and maize production during 2022-2023 found out by (Lang *et al.*, 2022; Nasir *et al.*, 2022), and the changes in political relations between Russia and the European Union, as underlined by (Chen *et al.*, 2023), have affected the European Union's agri-food system. Moreover, this paper it explores also as to whether the decreased grain trade volume found out by (Feng *et al.*, 2023; Oteh *et al.*, 2022) and the global wheat average price forecasted by (Lin *et al.*, 2023) could lead to a food insecurity of these products in EU.

According to Jerzak and Smiglak-Krajewska (2020), the European Union production volume of protein raw materials does not seem sufficient to satisfy the internal demand. Therefore, the agri-food system of the internal market has to rely on imported goods (Romanelli and Giovanardi, 2023). That consideration, which regarded the EU agri-food system dependency, preceded even the covid-19 pandemic and so, it could be only reasonable to think that the situation may indeed have worsened. On the contrary, however,

other authors (Nasir *et al.*, 2022) affirmed that the European Union covers domestic needs for most agricultural products through its production.

Faced with these different points of view, the present paper aims to verify the agri-food system Self-Reliance index (SRI) in the EU, and the resilience capacity of that system.

Considering the fact that cereals are one of the staple foods of the Mediterranean diet (Serrano *et al.*, 2021; Martinez-Lacoba *et al.*, 2018; Tosti *et al.*, 2018), and that in comparison with other commodities mainly the trade in cereals has been affected by the war (OECD & FAO, 2022), the present investigation focuses on this agri-food category.

Therefore, the Self-Sufficiency and Import Dependency indices (SSI and IDI) were determined first. Second, the Gerard Lafay Index (LFI) was computed to assess the EU's competitiveness. The result allows one to determine whether the EU is relatively specialized in the agri-food sector, as well as its comparative advantage. Third, through the Relative Trade Advantage (RTA) index (Vollrath, 1991) the present analysis verified the influence of the relative export-import competitive performance of the EU versus the Russian Federation and Ukraine, given their marked participation in international markets (OECD & FAO, 2022).

The Covid-19 crisis has shown that severe supply challenges, even in the EU, were possible (Pappalardo *et al.*, 2022) and recently the Russian-Ukrainian war has presented new challenges. This uncertainty is in sharp contrast to Article 39.5 of the Treaty on the Functioning of the European Union regarding the importance of ensuring food supplies and food security.

The adverse events that occurred forced drastic and sudden changes that severely put a strain on the resilience of European agri-food systems. It required the need to implement policy and institutional changes in order to enhance its ability to deal with future emergencies (Saboori *et al.*, 2022).

To ensure the future food supply and food security, the European Commission proposed a Contingency Plan (European Commission, 2021) (European Commission, 2022b) to set up and coordinate a food crisis response mechanism to discuss several topics with a transversal approach involving Member States (Matthews, 2021). The goal was to identify the different phases of the crisis management cycle with a view to pointing out which could be the risks in the future landscape for the EU food supply and food security.

The preparedness phase of the contingency planning tends to identify the potential hazards and impacts of the agri-food systems. This results in a prodromal work for the planning of specific emergency measures to mitigate the impact of any actual occurrence of damaging events.

Therefore, the European Commission pointed out some threats through that mechanism. Among the main risks identified were climate change and

environmental degradation, which lead to increasing adverse weather events (Indriawati & Prasetyani, 2021; Pengue, 2022).

The European institution's concern is that, apart from the Covid-19 crisis, climate and environmental issues may have a strong impact on the EU food supply. This is probably the case because, recently, severe climate events have appeared to be not sporadic and capable of endangering agricultural productivity, as well as hitting the agri-food system (Brassesco *et al.*, 2022; Khojasteh *et al.*, 2022). In fact, the extreme weather events, which occur due to climate change, together with the increased probability of occurring, have the potential to affect agricultural and seafood production within the EU (Lassa *et al.*, 2019; Ionescu *et al.*, 2022). The failure of fodder crops due to droughts are concrete examples (Muralikrishnan *et al.*, 2022; Mazwi *et al.*, 2022). Climate change in particular, is leading to potential dangerous meteorological disasters and water scarcity (Ercin *et al.*, 2019), thus affecting the food supply chain (Møller *et al.*, 2022; Zupančič *et al.*, 2022). Disasters can destroy healthy crops (Brás *et al.*, 2019), make infrastructural damage to the agricultural production system, and create food products supply difficulties due to transport impossibilities. In case of water scarcity, the production capacity results limited and may lead to inability to produce healthy crops. Among other things, such events may generate price volatility and food stocks insecurity (Götz *et al.*, 2015; Haile *et al.*, 2014; Santeramo *et al.*, 2018; Howard, 2022). These aspects show the vulnerability of the agri-food system, which may be regarded as one of the outputs of the disaster cycle mechanism and therefore, a weakness to be addressed through new EU acts.

Another dependence of the agri-food sector is related to imports. In today's globalized world, food variety availability in a specific country depends on the production capacity of other regions and states (Jerzak and Smiglak-Krajewska, 2020).

Numerous are the imported crop categories, as the EU relies on a limited internal number of sources (No Authors listed, 2022; Brás *et al.*, 2019). EU oilseed meals for feeding are an example of the fact that 76% of the whole amount is imported together with the 14% for the top five species of fish consumed (European Commission, 2021c.).

Considering that cereals are one of the main staple foods of the Mediterranean diet (Roberto *et al.*, 2018; Martinez-Lacoba *et al.*, 2018; Tosti *et al.*, 2018) and that in comparison with other commodities mainly cereals trade has been affected by the war (OECD and FAO 2022), it becomes even more relevant to check as to whether the EU's agri-food system is dependent on this category of products. There mainly two reasons for focusing the attention of this paper on cereals and in particular on wheat and maize.

First, cereals are, in general, one of the main staple foods of the Mediterranean diet (Martinez-Lacoba *et al.*, 2018; Tosti *et al.*, 2018; Serrano *et al.*, 2021).

Second, wheat and maize, specifically, had a pronounced participation in international markets in the current Russian-Ukrainian war context as they constituted the predominant share of cereal production in the agri-food sector in the three-year period 2018-2020, accounting for 46% and 24% respectively of the main cereals produced in the EU (FAOSTAT). Indeed, in comparison with other commodities, mainly cereals trade has been affected by the war (OECD & FAO, 2022) and this is the second reason.

1. Materials and methods (Self-Reliance, Gerard Lafay and Vollrath Indexes calculations)

The present paper aims at identifying the EU Self-Reliance level with respect to wheat and maize, the EU Self-Sufficiency Index (Kaufmann *et al*., 2022) and the Import Dependency Index (Pavlović, 2018). Furthermore, Gerard Lafay's index (LFI) (Platania *et al*., 2015) provided the possibility to find out the comparative EU advantage in the agri-food sector.

The analysis is based on FAO statistical data. The imports and exports that EU flows were selected for the whole agri-food system and singularly for wheat and maize for the period 2018-2020. The product codes of the products under investigation within the FAO international nomenclature were wheat [0111] and maize [0112].

In order to determine the degree of importance when it comes to the production of those cereals, in relation to the internal consumption within the EU, the Food Self-Sufficiency Index (SSI) was determined with reference to the years defined above. Specifically, the food Self-Sufficiency refers to the ability a specific territory to meet its own food requirements from domestic production without taking into account the shares of exports of the same product (Brás *et al*., 2019; Clapp, 2015).

Given that the domestic availability (total supply) is the total of foodstuff produced together with the related imports in the relative territory excluding the exported shares, SSI equals the total domestic food production as a ratio of total supply. SSI formula consists in dividing the total domestic food output and total supply in a certain country for a certain year (Brankov, 2022) as follows below:

$$SSI = \frac{P_j^i}{P_j^i + I_j^i - E_j^i}$$

Where:
P_j^i = pruduction of region i of a product in economic sector j to the rest of the world;

I_j^i = imports of a product in economic sector *j* from the rest of the world to region *i*;
E_j^i = export of a region i of a product in economic sector *j* to the rest of the world.

When the ratio is less than 100 percent, it expresses low levels of domestic production; the results equal to 100 percent show that the sector's food production capacity is on the edge in supporting the food needs of the population; when the results are greater than 100 percent, it shows that domestic production is efficiently able to support the domestic requirements. The higher the ratio, the greater the Self-Sufficiency (Clapp, 2015).

On the other hand, through food Import Dependency Index (IDI), it is possible to assess the extent to which the EU relies on external resources from its own territory for food needs. It indicates what the weight of imports is on the amounts of Domestic supply and, thus, the degree of linkage from imports, as well as how much comes from the country's own production. IDI is given by the ratio of the amountof imports to total domestic supply. The formula is the following (Smutka *et al.*, 2019):

$$IDI = \frac{I_j^i}{P_j^i + I_j^i - E_j^i}$$

Where:
I_j^i = imports of a product in economic sector *j* from the rest of the world to region *i*;
P_j^i = production of region *i* of a product in economic sector *j* to the rest of the world;
E_j^i = exports of region *i* of a product in economic sector *j* to the rest of the world.

The higher is the resulting value, the higher will be the extent of dependency on imports. As regards the LFI, this is an indicator that determines the specialization of a territory in a given sector both in relative "internal" terms, i.e., with respect to the other sectors that make up the economic system of that territory, and in relative "external" terms with respect to a set of countries taken as reference (Zarbà *et al.*, 2020). In the present paper, the aim is to express the degree of specialization (Brasili and Barone, 2011) of wheat and maize in the EU context, in relative terms i.e., compared to the rest of the EU agri-food system. The EU may consider itself to be relatively specialized in a given sector, compared to all other sectors, if the normalized ratio in that sector is higher than the measured average of the normalized ratios of all other sectors in the EU economy itself.

For the calculation of LFI trade flow analysis is used, i.e. imports and exports data, being LFI highly reliable when considering import and export

two-way flows (Allegra *et al.*, 2019). In this way, the resulting normalized ratio is a function of the percentage difference between exports and imports. The sum indicates the totality of imports and exports of agri-food with respect to the degree of specialization of wheat and maize products. Therefore, normalization is achieved by 'weighing' the contribution of the cereal sector in the agri-food trade balance.

The LFI algorithm is expressed, in particular, by the following formula (Boffa *et al.*, 2009) where subscript *J* indicates the wheat sector or the maize sector, whereas index *i* identifies the EU; symbol Σ_j indicates the whole of the EU agri-food chains.

Export and import volumes are indicated by the variables x and y respectively.

$$\boldsymbol{LFI_j^i = 100 \left[\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^{N}(x_j^i - m_j^i)}{\sum_{j=1}^{N}(x_j^i + m_j^i)}\right] \frac{x_j^i + m_j^i}{\sum_{j=1}^{N}(x_j^i + m_j^i)}}$$

Where:
x_j^i = exports of region *i* of a product in economic sector *j* to the rest of the world;
m_j^i = imports of a product in economic sector *j* from the rest of the world to region *i*;
N = is the number of traded goods.

The Gerard Lafay Index can take negative value, 0 and positive values. 0 value indicates that in the territory of reference exports and imports are equal; positive values denote the specialization of that territory while negative results indicate the contrary. The higher the values of the LFI are the higher is the degrees of specialization. In case the values turn out to be negative, it shows a state of *despecialisation* in the sector, i.e. a situation of reliance on imports.

The Relative comparative advantage guides towards a better identification of the consequences of policy and/or factual changes (Zarbà *et al.*, 2011; Zarbà *et al.*, 2013) and it derived from Balassa index eliminating the criticizes double-counting of Country and product (Crescimano and Galati, 2014; Pappalardo *et al.*, 2013).

The relative comparative advantage (RTA) index introduced by Vollrath (1991) is defined as the difference between the relative advantage index of exports (RXA) and the relative advantage index of imports (RMA). Specifically, RXA refers to the share of exports of a product (a) for the country under consideration (i) at the EU level compared to the share held for other products, while, likewise, RMA refers to the share of imports. The RTA of Vollrath shows a commercial advantage when it assumes positive

values and vice versa a comparative disadvantage when they are negative (Bernini Carri & Sassi, 2008). Moreover, compared with Lafay's index, Vollrath eliminates the effect of "double counted" by subtracting the product and the country in question respectively by total exports and by all the countries concerned (Zarbà *et al*., 2011; Zarbà *et al*., 2013).

The Vollrath index is expressed as follows:

$$RTA_a^i = RXA_a^i - RMA_a^i = \left[\frac{\frac{X_a^i}{X_n^i}}{\frac{X_a^r}{A_n^r}} - \frac{\frac{M_a^i}{M_n^i}}{\frac{M_a^r}{M_n^r}}\right]$$

Where:
X = exports of region;
M = imports;
i = region/country;
a = traded good;
r = European Union;
n = all products exchange except product (a).

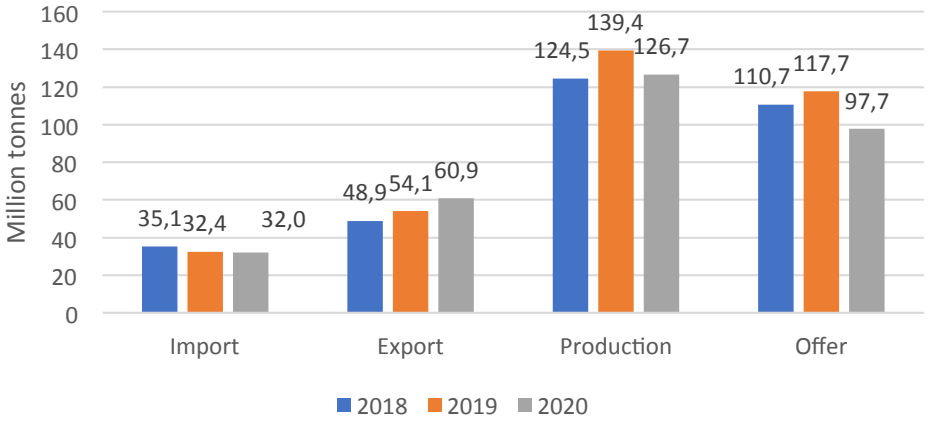
The Vollrath analysis is based on UN COMTRADE statistical data in order to take information relatively to singular Countries, namely the EU, the Russian Federation and Ukraine. The import and export flows were selected for the whole agri-food system and particularly for wheat and maize for the period 2018-2020. The product codes of the items under investigation within the FAO international nomenclature were wheat [1001] and maize [1005].

3. Results and Discussions (Self-Reliance, Gerard Lafay and Vollrath Indexes)

Food Self-Sufficiency related to EU cereal production showed, for the period under examination, different results depending on the types considered: wheat (Figure 1) and maize (Figure 2).

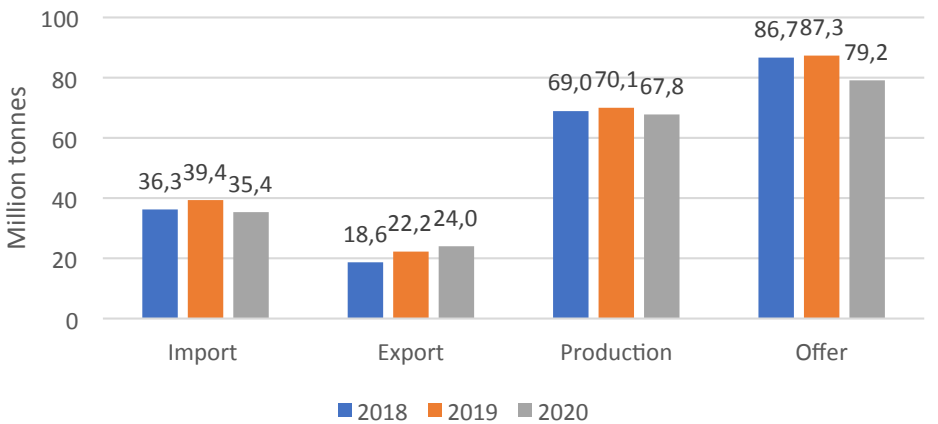
With regards to wheat the calculation of the Self-Sufficiency Index for the three-year period 2018-2020 shows a consistent progressivity moving from one year to the next; in fact, from just over 12% the index rises to just over 18%, and finally to 30% (Table 1). This indicates that the majority of wheat utilization in the EU derived from the internal domestic production. Therefore, SSI's trend displays a consistent progressiveness, which goes from 6% between 2018 and 2019 and doubles between 2018 and 2020 (Table 1).

Figure 1 - Evolution of Wheat supply in the European Union



* Our elaboration.
Source: Faostat.

Figure 2 - Evolution in Maize supply in the European Union



* Our elaboration.
Source: Faostat.

Table 1 - Self Sufficiency Index (SSI) and Import Dependency Index (IDI). % Wheat

Index	2018	2019	2020
SSI	113	118	130
IDI	32	28	33

* Our elaboration.
Source: Faostat (www.fao.org/faostat/en/#home).

This demonstrates that EU wheat production supports the level of food self-sufficiency for this product category as Nasir *et al*., 2022 stated. However, the wheat self-sufficiency condition could prove to be insufficient and unable to meet the needs of the EU's domestic demand in the event of any crises, which could bring to the surface the vulnerabilities and dependencies already mentioned in paragraph 2.1 above.

In addition, imports from third countries play an important role in wheat availability in the EU. Indeed, the dependency ratio indicates that the external contribution to the overall wheat availability would be 1/3; imports in particular contributed to about 32%, more than 27% and almost 33% in the years 2018, 2019 and 2020 respectively.

As for maize, the food contribution to the EU appears rather unsatisfactory, although it tends to improve slightly when taking into account the fact that the self-sufficiency index indicates deficient values, which from -20% in both 2018 and 2019, rises to -14% in 2020 (Table 2). Thus, this trend reveals the inadequacy of the EU's food production level to meet domestic cereal demand, especially in the consideration of the abovementioned vulnerabilities to which cereals production and the agri-food system in general, might be subjected.

Table 2 - Self Sufficiency Index (SSI) and Import Dependency Index (IDI). % Maize

Index	**2018**	**2019**	**2020**
SSI	80	80	86
IDI	42	45	45

* Our elaboration.
Source: Faostat (www.fao.org/faostat/en/#home).

With regard to the role of maize imports in the EU's food needs, Import Dependency Index notes the relative importance of the corresponding traffic flows over the three years under consideration. Specifically, the IDI confirms SSI results; in fact, in 2018 it was over 41%, in 2019 about 45% and in 2020 almost 45% (Table 2).

Therefore, in the light of these findings, it appears advisable to boost the production of these two products, thus, raising the extent of domestic grain supply by increasing its production capacity.

With regard to the Gerard Lafay Index, over the period 2018-2020, the trend of the specialisation level for wheat showed increasingly satisfactory trends, as Table 3 shows. Specifically, it was 2.06 %, in the year 2018, 2.73%, in the year 2019 and 3.35% in the year 2020 (Table 3).

Table 3 - Gerard-Lafay Index (GLI)

Cereals	2018	2019	2020
Wheat	2,06	2,74	3,35
Maize	–1,91	–1,93	–1,36

* Our elaboration.
Source: Faostat (www.fao.org/faostat/en/#home).

In addition, when it comes to maize, no specialization conditions prove to be as evident as the results of the Gerard Lafay Index. In fact, they are negative. The figures in Table 3 (–1.91, –1.93 and –1.36 referring to the years 2018, 2019 and 2020) show the weight of the EU's dependence on third countries.

Therefore, the affirmation of Nasir *et al.*, 2022 stating that the European Union covers domestic needs for most agricultural products through its production does not seem to apply to maize.

Given that, the level of specialization of both types of the cereals in question is not sufficient to establish satisfactory conditions for the needs of the EU internal market. Thus, it seems grounded the statement of Romanelli and Giovanardi, 2023 about the dependency of EU market on imported goods. These results are not reassuring in a context where the recent crisis events that have led to the decrease and, in some cases, to the halting of trade flows of the products under consideration from the Russian Federation and Ukraine (Yazbeck *et al.*, 2022). Therefore, it is recommendable to adopt strategies to raise the EU's level of productivity for both agricultural products. This should be done in order to increase both the level of EU Self-Reliance and comparative advantage, since the higher the degree of specialization of wheat and maize is, the higher their contribution to the cereal trade balance becomes.

The results about maize are in line with Jerzak and Smiglak-Krajewska (2020) who found out a EU dependence in respect to protein raw materials.

Vollrath's index (RTA) allowed for a step forward; in fact, it was calculated in order to propose a more circumstantial analysis on the two products, wheat and corn, considered in the present survey and addressed specifically to the trade relations between the European Union and Russian Federation, and separately between the European Union and Ukraine.

The results, for both products, show a relative comparative advantage for both Eastern European countries (Table 4).

Table 4 - Vollrath Index (RTD)

Indications	Maize			Wheat		
	2018	2019	2020	2018	2019	2020
Russian Federation						
RXA	1,45	0,98	0,59	11,20	7,68	7,32
RMA	0,02	0,02	0,03	0,18	0,11	0,12
RTA	1,42	0,96	0,56	11,02	7,57	7,21
Ukraine						
RXA	10,63	11,82	10,36	2,53	2,2	1,97
RMA	0,14	0,10	0,07	0,02	0,01	0,04
RTA	10,49	11,72	10,29	2,51	2,19	1,93

* Our elaboration.
Source: Faostat (www.fao.org/faostat/en/#home).

Specifically, with regard to maize, the Russian Federation's RTA is 1.42 percent in 2018, 0.96 in 2019, and 0.55 in 2020. Therefore, although there is a relative comparative advantage, the values have been decreasing in the period under review.

In relation to Ukraine, the relative comparative advantage is very high, in fact it stands at 10.49 % % in 2018, 11.71 in 2019 and 10.29 in 2020, and unlike the situation in Russian Federation shows constant levels.

With reference to wheat, Russian Federation shows high levels of relative comparative advantage.

In fact, those are 11.02% in 2018, 7.56 in 2019 and 7.20 in 2020 characterized by a slight inflection between the year 2018 and subsequent years remain constant with each other.

In contrast, the levels of relative comparative advantage of Ukraine are 2.51% in 2018, 2.18 in 2019 and 1.93 in 2020 and show a slight inflection regarding the latter year.

A look at the volumes (Table 5) of the European Union's wheat and maize imports from Russian Federation and Ukraine arise some considerations.

It allow to quantify in detail the extent to which the EU relies on the flows from these two countries (the extent to which the EU relies on these two countries' exports) and thus how much the halt in trade of those two products, due to the Russia-Ukrainian war, may impact the European Union's Agribusiness System.

Table 5 - Maize and Wheat Imports Evolution in the EU from Russian Federation, Ukraine, and World

Indications	2018		2019		2020	
	Thousand Tonnes	%	Thousand Tonnes	%	Thousand Tonnes	%
Maize						
EU - Russian Federation	497.859,1	2,3	202.744,0	0,9	213.113,6	1,0
EU - Ukraine	11.367.457,7	52,4	15.244.997,0	64,1	8.763.052,7	55,8
EU - World	21.678.304,5	100,0	23.771.621,4	100,0	15.716.498,3	100,0
Wheat						
EU - Russian Federation	1.296.672,0	22,0	411.315,2	9,2	318.737,6	6,7
EU - Ukraine	1.342.906,6	22,7	1.068.032,0	23,9	734.259,3	15,4
EU - World	5.906.355,1	100,0	4.460.637,5	100,0	4.757.465,6	100,0

* Our elaboration.
Source: Un comtrade (https://comtradeplus.un.org).

As a matter of fact, the EU's wheat imports from Russian federation and Ukraine together stand at about 45% in 2018 and specifically 22.0 % and 22.7 % respectively, in 2019 at 33% i.e. 9.2% and 23.9% and finally in 2020 at 22% i.e. 6.7% and 15.4%.

The European Union's maize imports from the Russian Federation and Ukraine together stand at about 58% in 2018 and specifically 2.3% and 52.4% respectively, in 2019 at 65% i.e. 0.9% and 64.1% and finally in 2020 at just over 57% i.e. 1.4% and 55.8%.

From the above, it appears that a large part of EU imports come from the aforementioned Eastern European Countries and so a situation of scarcity in the availability of raw materials for the agri-food system for the years 2021, 2022 and onwards is foreseeable. These results support the suggestion to strengthen the agri-food sector, not only in terms of increasing productivity levels, but also as a system. In fact, increasing productivity alone may not be enough, but also not feasible, as it requires a greater exploitation of resources in a context of them scarcity in nature. To address this issue the attempting to develop environmentally and economically sustainable production systems could represent a feasible solution. However, after the crises derived from the war in Ukraine and the covid 19 pandemic that challenged the idea of a globalised world open to continuous exchange, the agri-food system must set itself resilience objectives to strengthen its capacity to be self-sufficient in the event other potential adverse events trigger new crises.

Conclusions

The Covid-19 pandemic and the war in Ukraine have presented the EU agri-food system with challenges.

The decrease and, in some cases, the halting of trade flows of agri-food commodity across the world allows one to foresee a situation of scarcity in the availability of raw materials for the EU agri-food system, which was expected for the years 2021, 2022, and as of now, onwards.

The present analysis showed that even if wheat EU production seems to maintain the level of food self-sufficiency, imports from third countries play an important role in wheat and maize availability in the EU.

As for maize, the self-sufficiency index indicates deficient values. This trend reveals the inadequacy of the EU's food production level in meeting domestic demands for this product category.

Similarly, the level of EU agri-food system' specialisation and the relative comparative advantage of both cereal types in question did not appear sufficient enough to establish satisfactory conditions for the needs of the EU internal market.

In view of the above-mentioned, next to the consideration of the discussed vulnerabilities to which cereals production and the EU agri-food system in general might be subjected, the agri-food sector does not seem prepared to additional potential adverse events. In fact, the one already occurred have forcefully revealed the cracks that have long existed in the EU agri-food system. However, the next challenge could be turning weaknesses into opportunities, which could activate a transformative change that would lead to the implementation of resilience strategies that would include a higher level of productivity in the EU's regrading both agricultural products.

Providing a resilient response means organising a system that would combine at its core the achievement of food security and sustainability objectives (set by European policy and legislation) with the ability to cope with any known (such as resource scarcity, vulnerabilities and dependencies in the agri-food sector) and unknown (such as the various emergencies that may occur) criticalities.

This entails the re-design of the current systems in order to make agricultural production and processing processes sustainable and circular, for instance, by extending the life cycle of products, developing renewable energy sources, which can replace the current fossil-fuel based ones; the purpose of all this is to overcome system dependence and transform vulnerabilities into strength. A potential strategy may be implementing the ecological transition in accordance with the objectives designed by Horizon Europe, while ensuring, at the same time, the flexibility and adaptability of systems towards potential new crises.

Accelerating the global transition of the agri-food system towards sustainability and resilience is the European institutions' preferred way to mitigate climate change and contain the threat of resource scarcity (European Commission, 2021). The reorganisation of systems should include the adoption of key approaches to achieve an ecological transition, such as sustainability and circularity (Zarbà *et al.*, 2023). This implies less pollution footprint, the reuse of resources and waste reduction next to the reduction of food loss, which could feed around 1.26 billion people per year (FAO, 2022).

In light of the above considerations, in order to prepare a better response to future crises and make the EU agri-food system more stable, the EU institutions should orientate the general and overall re-design of the agri-food systems by dealing in the long-term with its dependence issue, because especially in case of potential crises, triggered by climate disasters or other adverse events, the agri-food vulnerabilities may disrupt the entire system itself.

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Unraveling Psychosocial Drivers of Environmentally-labeled Coffee

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Abstract

In Taiwan's niche coffee market, there is a clear demand for sustainability, yet there remains a gap in understanding certification preferences. This study addresses this gap by employing the Theory of Planned Behavior (TPB) to investigate the purchase intentions of 348 Taiwanese consumers towards environmentally-labeled coffee. Structural equation modeling reveals positive associations between attitude, subjective norms, perceived behavioral control individually, and purchase intention. Among the factors influencing attitude, sensory, upscale, and environmental beliefs significantly play significant roles, while health beliefs do not. Probit regression analysis confirms that purchase intention positively influences consumers' willingness to engage in coffee consumption. In additon, consumer characteristics including past experience, household size, knowledge, and age also impact coffee consumption willingness. These findings provide valuable insights for stakeholders seeking to promote sustainable consumption and guiding environmentally-conscious decision-making strategies.

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Introduction

The global coffee trade, the largest among tropical beverages, has experienced rapid growth since 2000, holding the potential to support Sustainable Development Goals (SDGs) through income generation and poverty reduction. Rising consumer demand for traceability, transparency, quality, and origin resonates with the prevailing global coffee culture (FAO, 2023). Projections for the 2023/24 season anticipate production at 174.3 million bags, propelled primarily by Brazil and Vietnam, while consumption is expected to reach an unprecedented 170.2 million bags. The increased importation of coffee by the European Union and the United States may lead to constrained ending inventories of 31.8 million bags (Foreign Agricultural Service USDA, 2023).

In the coffee segment, specialty and certified coffees are gaining popularity in niche markets. Certified coffee, exemplified by Fair Trade, addresses issues like child labor, livelihoods, and environmental concerns (Fairtrade International, 2023). Rainforest coffee supports small-scale farmers, sustainability, and biodiversity (Rainforest Alliance, 2021). UTZ certification, now part of the Rainforest Alliance, promotes sustainable farming and environmental protection (Rainforest Alliance, 2023). These certifications ensure eco-friendly production (Barreto Peixoto *et al.*, 2023; Liu *et al.*, 2019a). Specialty coffee, known for unique flavors, often highlights specific origins (Wann *et al.*, 2018). Specialty coffee can be certified to validate its commitment to both sustainability and quality, thereby affirming its exceptional standards (Barreto Peixoto *et al.*, 2023; Ho *et al.*, 2018; Sepúlveda *et al.*, 2016). Embracing these trends empowers Taiwanese consumers to actively support sustainable food systems, in accordance with the Taiwanese Food and Agricultural Education Law (TFAEL) (Huang *et al.*, 2023).

Taiwan's thriving coffee market, which serves an impressive 2.85 billion annual cups annually, experienced a remarkable 20% surge, reaching a total worth of $2.76 billion in 2020 (United States Department of Agriculture, 2021). The government actively promotes specialty coffee through various events and competitions, showcasing its significance with a community of approximately 4,000 coffee roasters. Anticipated growth in imports, primarily from the US, Colombia, and Ethiopia, is attributed to limited local production (United States Department of Agriculture, 2021).

Research on sustainable coffee in Taiwan's specialized market indicates a demand, albeit with limited existing studies. Wann *et al.* (2018) examined local preference for specialty coffee in Taichung, highlighting a preference for café-style experience and distinctive packaging, while highlighting the importance of addressing local demand and environmental concerns. In a study by Liu *et al.* (2019a) involving 568 Taiwanese respondents, traceability and organic certifications emerged as top priorities, with fair-trade ranking lower in

importance. This suggests a need to promote awareness of eco-friendly and fair-trade certifications. This underscores a research gap in understanding certification preferences, particularly in the context of sustainability.

Within the global context, Barreto Peixoto *et al.* (2023) conducted a comprehensive review of sustainability in the coffee industry. They highlighted the challenges arising from the dominance of roasters and major companies, emphasizing the need for coordinated governmental initiatives to tackle transparency and sustainability issues. Gaining insight into the motivation and barriers encountered by consumers of sustainable coffee is pivotal, especially since environmentally-labeled coffee continue to hold significance for eco-conscious consumers.

In light of the above evidences, the present study aims to predict the purchase intention and willingness of Taiwanese consumers to consume environmentally-labeled coffee. To achieve this, the Theory of Planned Behavior (TPB) is employed to gain a comprehensive understanding of consumer attitude, specifically examining how attitude, subjective norm, and perceived behavioral control influence purchase intention. Building on the insights from TPB, the study then integrates purchase intention with demographic factors, coffee knowledge, and past experience. This comprehensive approach aims to more accurately predict the willingness of Taiwanese consumers to consume environmentally-labeled coffee in the final stage. These findings can provide valuable insights for policymakers, guiding potential strategies for the expansion of the environmentally-labeled coffee market in Taiwan. This involves aligning policies with consumer preferences and industry trends, thereby cultivating an environment conducive to producers and retailers, and further enhancing sustainability in this specialized market.

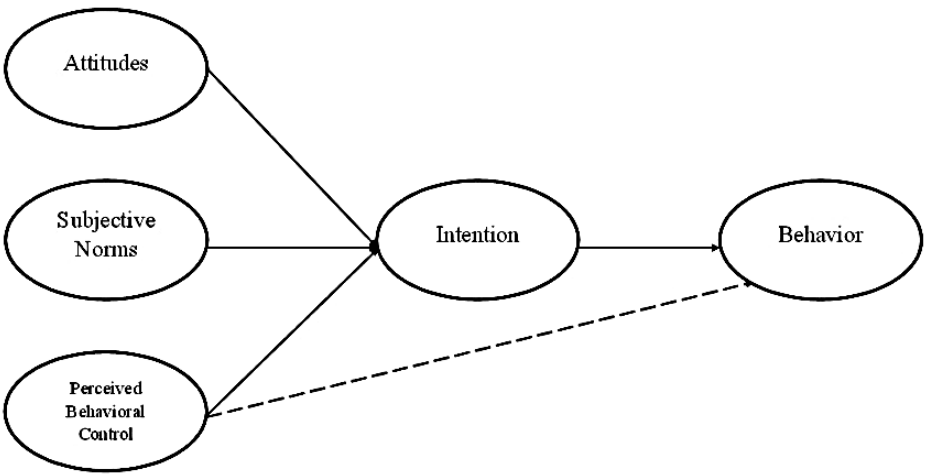
1. Theoretical Framework and Hypotheses

1.1. *Theory of planned behavior*

The Theory of Planned Behavior (TPB) posits that attitude toward behavior (ATT), subjective norm (SN), and perceived behavioral control (PBC) influence behavioral intention, a key determinant of behavior (Ajzen, 1991; Ajzen & Fishbein, 2000). TPB expands on the Theory of Reasoned Action (TRA) by including PBC, which relates to resource availability for behavior execution (Figure 1) (Ajzen, 1991; Madden *et al.*, 1992). Studies on green consumption have utilized TPB effectively (Chen & Tung, 2014; Halder *et al.*, 2016; Han *et al.*, 2010; Liobikienė *et al.*, 2016). However, TPB has faced criticism for its limited focus and predictive limitations (Ajzen, 1991; Terry *et al.*, 1999). To enhance explanatory power, researchers have integrated

perceived moral obligation and sustainability self-identity into the TPB model (Chen, 2020), while other studies have shown superior explanatory capabilities (Han & Kim, 2010; Han *et al.*, 2011; Heidari *et al.*, 2018; Hoeksma *et al.*, 2017; Paul *et al.*, 2016). This study examines beliefs related to sensory, health, upscale, and environment within a TPB model to predict attitude and purchase intention for environmentally-labeled coffee in Taiwan.

Figure 1 - Theory of planned behavior



Source: Adapted from Fishbein & Ajzen (1975).

1.2. *Hypotheses development*

1.2.1. Sensory belief

Previous research highlights the importance of sensory factors, particularly taste and aroma, in shaping the overall coffee experience (Labbe *et al.*, 2015). Taste, smell, and fragrance are identified as primary motives for coffee consumption (Ave *et al.*, 2015; Sousa *et al.*, 2016; Utama *et al.*, 2021), exerting a substantial influencing individuals' attitude and purchase intentions towards coffee (Ave *et al.*, 2015; Utama *et al.*, 2021). Further studies confirm the pivotal role of sensory appeals, encompassing sight, sound, taste, and touch, in driving purchase intentions at coffee establishments (Jang & Lee, 2019). Similarly, Bannor *et al.* (2022) emphasize sensory aspects, particularly taste, in shaping consumer preferences for specialty indigenous chicken products in Ghana. Nevertheless, sensory barriers, such as dissatisfaction

with smell and taste, can impede coffee consumption (Sousa *et al.*, 2016). This study proposes hypotheses regarding the impacts of sensory beliefs, specifically taste and aroma, on attitude and purchase intentions towards environmentally-labeled coffee.

Hypothesis (H1): Sensory belief affects consumers' attitude towards environmentally-labeled coffee.

Hypothesis (H2): Sensory belief affects consumers' purchase intention towards environmentally-labeled coffee.

1.2.2. Health belief

The health benefits of coffee have been extensively studied, with findings indicating positive effects such as migraine reduction (Aguirre, 2016), lowered risks of Parkinson's, Alzheimer's, improved liver function, and weight loss (de Mejia & Ramirez-Mares, 2014). In addition, Singh and Pandey (2018) and Nicolau *et al.* (2020) show that health-conscious individuals tend to favor green packaging and eco-friendly restaurants. Zhang *et al.* (2018) and Bannor *et al.* (2022) establish a link between health concerns to increased purchase intentions and willingness to pay. In the context of environmentally-labeled coffee, the perception of it as "healthy" due to eco-friendly production and chemical-free beans has been shown to cultivate positive attitudes and bolster purchase intentions (Lee *et al.*, 2015). This health-centric effect has been observed in Costa Rica (Aguirre, 2016) and corroborated in Indonesia (Utama *et al.*, 2021). Based on this comprehensive body of evidence, the following hypotheses are put forth:

Hypothesis (H3): Health belief affects consumers' attitude towards environmentally-labeled coffee.

Hypothesis (H4): Health belief affects consumers' purchase intention towards environmentally-labeled coffee.

1.2.3. Upscale belief

"Upscale products" refer to prestigious, high-quality branded items associated with high prices, esteemed reputation, and global recognition (Achabou & Dekhili, 2013; Boulding & Kirmani, 1993; Huang *et al.*, 2014; Ryan & Casidy, 2018; Vraneševic & Stančec, 2003). In this vein, organic

products are closely linked to a luxurious consumer lifestyle in China (Bai *et al.*, 2019). In the context of sustainable coffee, backed by international certifications such as the Voluntary Sustainability Standard Program, environmentally-labeled coffee is perceived as high-quality (Sepúlveda *et al.*, 2016; Ut-tha *et al.*, 2021a) and upscale (Ut-tha *et al.*, 2021b). Ut-tha *et al.* (2021b) also discovered that the upscale image of certified coffee positively influence consumers' attitudes towards purchasing certified coffee in Thailand. Moreover, coffee quality play a significant role in shaping attitudes toward organic coffee purchases (Puspitasari & Balqiah, 2020), while brand reputation exerts influence over product evaluation and purchasing behavior (Ryan & Casidy, 2018). These findings lead to the formation of the following two hypotheses:

Hypothesis (H5): Upscale belief affects consumers' attitude towards environmentally-labeled coffee.

Hypothesis (H6): Upscale belief affects consumers' purchase intention towards environmentally-labeled coffee.

1.2.4. Environmental belief

Environmentally conscious consumers prioritize sustainable products as a means of contributing to environmental protection (My *et al.*, 2018; Petrescu & Petrescu-Mag, 2015; Roitner-Schobesberger *et al.*, 2008). In South Korea, environmental concerns influence attitudes toward purchasing organic coffee (Lee *et al.*, 2015). Existing research on organic products underscores the significant role of the environment in shaping consumer attitudes (Bai *et al.*, 2019; Oroian *et al.*, 2017; Zagata, 2012). Environmental beliefs positively impact purchase decisions and attitudes toward green packaging, as well as willingness to pay a premium (Singh & Pandey, 2018). Higher environmental responsibility correlates with a positive attitude toward green products (Hameed *et al.*, 2019; Shukla, 2019). Key factors in green consumption behavior include environmental concern and knowledge, which significantly influence attitudes, intentions, and green purchasing behavior (Emekci, 2019). Building upon these findings, the following hypotheses are proposed:
Hypothesis (H7): Environmental belief affects consumers' attitude towards environmentally-labeled coffee.

Hypothesis (H8): Environmental belief affects consumers' purchase intention towards environmentally-labeled coffee.

1.2.5. Attitude

Attitude (ATT) comprises beliefs that exert a significant impact on behavioral intention. Extensive research demonstrates that ATT is a robust predictor of pro-environmental behavioral intention (Paul *et al*., 2016; Shi *et al*., 2017; Yadav & Pathak, 2016) as well as purchase intention for sustainably-produced coffee (Ramírez-Correa *et al*., 2020; Van der Merwe & Maree, 2016). Notably, environmentally-labeled coffee, symbolizing green production and consumption, aligns harmoniously with previous literature showing the importance of ATT in green consumerism. Studies by Ruangkanjanases *et al.* (2020), Shukla (2019), Hameed *et al.* (2019), Zhang *et al*. (2018), and Emekci (2019) further underscore the signifcant role of ATT in forming purchase intentions and willingness to pay a premium for eco-friendly products. Thus, a hypothesis is proposed:

Hypothesis (H9): Attitude towards environmentally-labeled coffee affects consumers' purchase intention towards environmentally-labeled coffee.

1.2.6. Subjective norm

Subjective norms (SN) represent social influences exerted by significant individuals, such as family and friends, on decision-making (Aguirre, 2016). Normative beliefs, which align with SN in TPB, affect behavior (Ajzen, 1991). Shukla (2019) and Hameed *et al.* (2019) demonstrated that SN significantly influenced the intention toward purchase green products and engage in eco-conscious behavior. This implies that perceiving social pressure to buy green products positively affects one's intention. SN reflects cognizance of moral and social norms within social groups, thereby playing a significant role in shaping individuals' intentions to engage in green purchasing behavior. Extensive research conducted in various regions, including Thailand (Ut-tha *et al*., 2021b) and South Africa (Van der Merwe & Maree, 2016), as well as the studies by Emekci (2019) and Liobikienė *et al*. (2016) further validate the crucial role played by SN in pro-environmental actions. This study thus proposes that:

Hypothesis (H10): Subjective norm affects consumer's purchase intention towards environmentally-labeled coffee.

1.2.7. Perceived behavioral control

Perceived behavioral control (PBC) reflects an individual's belief in their ability to perform a behavior and overcome obstacles (Ajzen, 1991), including

self-control, resource access, and confidence (Kidwell & Jewell, 2003). When individuals perceive control over relevant factors, their likelihood of engaging in behavior increases. In niche markets such as green consumerism, PBC significantly impacts consumer behavior, particularly in specialty coffee consumption (Van der Merwe & Maree, 2016). It consistently associates with purchase intention for green and organic products (O'Connor *et al.*, 2017; Paul *et al.*, 2016). Lee *et al.* (2015) confirmed PBC's impacts, particularly in the case of organic coffee. Ruangkanjanases *et al.* (2020) found that a strong belief in behavioral control leads to increased green consumption. In addition, Shukla (2019) and Hameed *et al.* (2019) emphasize the significant role of PBC in shaping purchase intention of eco-conscious behavior. The proposed hypothesis is that:

Hypothesis (H11): Perceived behavioral control affects consumer's purchase intention towards environmentally-labeled coffee.

1.2.8. Purchase intention

TPB denoted a significant correlation between intentions and behavior, where stronger intentions lead to a greater likelihood of engaging in that behavior (Ajzen & Driver, 1991). ATT, SN, and PBC collectively shape intentions, ultimately influencing behavior. Hence, intention is a crucial predictor and influencer of actual behavior (Ajzen, 1991). Research on health and consumer behavior demonstrates a significant correlation between willingness to pay premium and intentions (Setyawan *et al.*, 2018). Prior research on price premium intention and willingness to pay more, without affecting decision-making, further support this notion (Salem & Salem, 2018). Emekci (2019) found that intention has a direct effect on green buying behavior, implying that individuals with higher intentions to engage in green buying behavior are more likely to exhibit such behavior. Therefore, intention acts as a mediator between ATT, SN, and PBC, and actual behavior.

1.2.9. Coffee consumption willingness

In this study, researchers explore the concept of "coffee consumption willingness" as a behavior construct rooted in the Theory of Planned Behavior (TPB). This construct involves the transition from intention to actual behavior, as proposed by Ajzen (1991). It involves examining the relationship between "purchase intention of environmentally-labeled coffee" and "coffee consumption willingness." While these two concepts are related,

there is a subtle distinction between them. Purchase intention resides within an individual's mind and represents their intention to buy a specific product, serving as a precursor to actual purchasing behavior.

On the other hand, coffee consumption willingness encompasses a state of readiness for various coffee-related activities, including purchasing, brewing, and savoring environmentally-labeled coffee in its various forms. Researchers apply the theoretical framework of the TPB, which posits that human behavior can be predicted by intention. Therefore, in this study, researchers assume that purchase intention can predict an individual's willingness to consume coffee, which we regard as a future behavior. This behavior pertains specifically to coffee consumption.

The term 'willingness' in this context implies a predisposition or inclination to engage in a certain behavior, which, in this case, is the consumption of coffee. Thus, coffee consumption willingness in this study encompasses more than just purchasing; it also includes the state of preparation for various coffee-related activities, such as buying, brewing, and enjoying different forms of eco-labeled coffee.

The primary focus is on "environmentally-labeled coffee," which researchers define as a 250-gram package of roasted coffee beans adorned with eco-friendly labels (e.g., Fair Trade, Rainforest Alliance, UTZ) on its packaging. Researchers presented participants with an image of this coffee and asked them to express their willingness to consume it in the market, with response options of "yes" or "no". Subsequently, researchers subjected the gathered data to further analysis using a probit model. In this model, the dependent variable represents a binary response, with "yes" indicating willingness and "no" denoting the opposite. Based on these findings, researchers propose the following hypothesis:

Hypothesis (H12): Purchase intention influences coffee consumption willingness regarding environmentally-labeled coffee.

1.2.10. Consumer characteristics

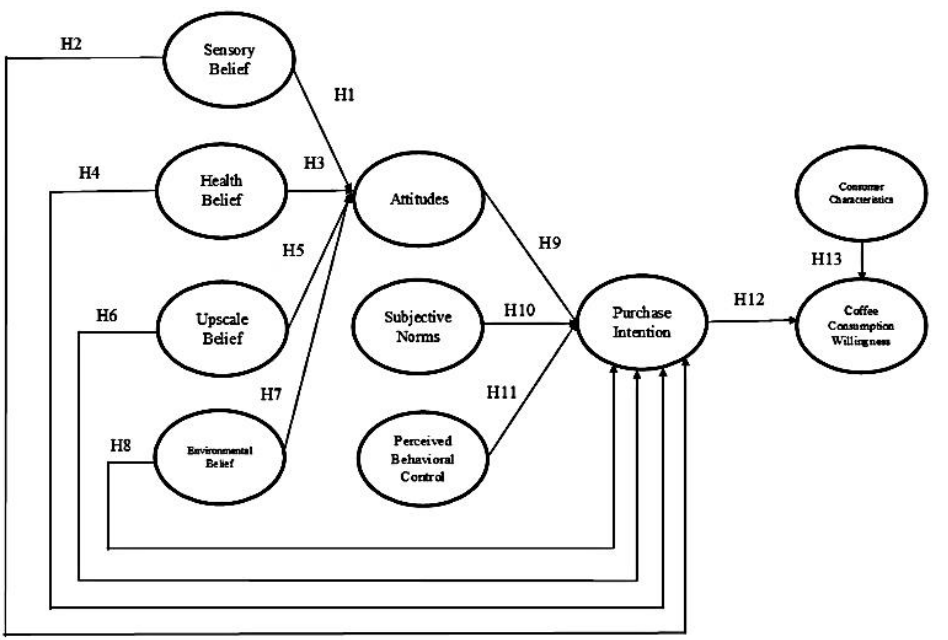
This study extends the TPB model by incorporating additional factors that influence the willingness to consume environmentally-labeled coffee, including sociodemographic characteristics, product knowledge, and past experience. Existing literature indicates that consumer attributes such as knowledge, experience, and demographic variables play a significant role in product purchase decisions (Cerjak *et al.*, 2015; Mohamed *et al.*, 2014). Zhang *et al.* (2018) noted that a deeper understanding of safe vegetables leads to a more positive attitude, and prior experience with online purchases

influences attitude. Ut-tha *et al.* (2021a) discovered that past experience with sustainable coffee positively affects the willingness to pay a premium. Age has been identified as a determinant in preferences for sustainable foods such as indigenous chicken (Bannor *et al.*, 2022), while income has been shown to affect intentions to patronize green restaurants (Nicolau *et al.*, 2020). Extensive literature consistently supports the relationship between demographic variables (e.g., age, gender, income, marital status, job, and education level) and green consumption behavior (Bannor *et al.*, 2022; Iqbal *et al.*, 2022; Nicolau *et al.*, 2020; Ut-tha *et al.*, 2021a; Zhang *et al.*, 2018). This leads to the following hypothesis:

Hypothesis (H13): Consumer characteristics, including past experience, coffee knowledge, gender, age, marital status, education, job, household size, and household income, influence coffee consumption willingness regarding environmentally-labeled coffee.

Based upon the theoretical framework and hypotheses outlined above, Figure 2 depicts the research model in this study.

Figure 2 - Proposed research framework



2. Methodology

2.1. *Sample and data collection*

The present study focuses on roasted coffee beans, packaged in 250 g quantities, produced under the guidelines of third-party certification organizations for Voluntary Sustainability Standards (VSS). These programs, such as Fair Trade, organic (e.g., USDA organic, EU organic), Rainforest Alliance, and UTZ certified, have distinct objectives. For example, Fair Trade aims to promote international trade fairness and sustainable development by offering better trading conditions to smallholder farmers (Pedini *et al.*, 2017), while organic prohibits the use of artificially produced substances to maintain ecosystem balance. Rainforest Alliance seeks to promote harmonious coexistence between people and nature, and UTZ certified is based on principles of fairness and transparency (Lentijo & Hostetler, 2011). These diverse certifications share the goal of improving the livelihood of small farmers in developing countries by promoting sustainability in the coffee value chain and commanding premium prices. In short, these environmentally-friendly coffee labels align with the United Nations' Sustainable Development Goal 12. Consumers place a high value on environmentally-labeled coffee production due to their sustainable consumption practices that provide benefits to the local environment and economy (Bray & Neilson, 2017; Grabs *et al.*, 2016; Lentijo & Hostetler, 2011; Pedini *et al.*, 2017).

To achieve its research objectives, this study employs two methodologies: structural equation modeling (SEM) to predict purchase intention (PI) and probit regression to analyze factors influencing coffee consumption willingness, categorized as either "yes" or "no". Hair *et al.* (2018, p. 633) proposed that the minimum sample sizes should take model complexity and essential measurement model attributes into account. Therefore, a minimum sample size of 150 is suggested for models with seven constructs or fewer, communalities of at least .5, with no underidentified constructs. Given that this current study encompasses eight latent constructs, with communalities exceeding 0.5 and devoid of underidentified constructs, researchers consequently chose a sample size of 400 – equally distributed across four counties – to enhance both precision and reliability. Similarly, in the context of probit regression, a type of binary regression, an alternative model form exists that is nearly equivalent. The probit model closely mirrors the logistic model in most cases involving a binary outcome variable, and its advantages becoming more evident when extending the model to a multi-category outcome measure. To achieve optimal results with maximum likelihood estimation, an overall sample size of 400 is recommended (Hair *et al.*, 2018,

p. 557). To this end, researchers employed a stratified sampling method for allocating a total of 400 samples and set a quota of 100 respondents equally across four counties (Taipei, Taichung, Kaohsiung, and Pingtung). This approach was adopted to enhance both accuracy and reliability.

The data collection was then conducted during January-February 2022 using purposive sampling, targeting individuals aged 18 years and over who regularly drink coffee and reside near coffee shops and supermarkets. Due to the data collection being carried out during the Covid-19 pandemic, a self-administered survey questionnaire was deemed appropriate, taking into consideration the need for social distancing. The survey instrument utilized in this study comprises of three distinct sections. The first section, containing a total of 26 items (Table 3), is intended to assess the constructs of the extended Theory of Planned Behavior (TPB) model, including sensory belief, health belief, upscale belief, environmental belief, attitude, subjective norm, perceived behavioral control, and purchase intention. Respondents rate each item on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The second section is designed to inquire about coffee knowledge, coffee experience, and willingness to consume environmentally-labeled coffee. The third section collects demographic data, including gender, age, marital status, education, occupation, household size, and income. Before the final survey administration, a pre-test was conducted to enhance questionnaire clarity and reduce bias. Out of 400 questionnaires distributed, a total of 348 fully completed and coded questionnaires were utilized for analysis, resulting in a response rate of 87%.

After questionnaires were returned, researchers assessed the correlation results among the explanatory variables used in probit regression, including purchasing intention, past experience, knowledge of environmentally-labeled coffee, gender, age, marital status, education, occupation, household size, and household income. According to Hair *et al.* (2018, p. 578), calculating binary correlations among the independent variables and observing any bivariate correlation of 0.50 or greater suggests the potential for multicollinearity problems. A correlation coefficient with an absolute value greater than 0.7 generally indicates a substantial correlation between predictor variables. In this study, researchers observed that knowledge exhibits a positive and significant correlation with past experience (heard) (0.62*), while marital status is positively and significantly correlated with age (0.60*), albeit not surpassing the 0.7 threshold. It is reasonable to deduce that individuals with knowledge of environmentally-labeled coffee may have heard about it, although they might not always make purchases. Conversely, individuals with past experience may have heard about and purchased this coffee before. Therefore, researchers have concluded that there is no multicollinearity issue with the explanatory variables, and consequently, we proceeded to utilize these variables in the probit model.

This study analyzed participant demographics (Table 1). The gender distribution was nearly equal, with 50.57% male and 49.43% female. Most respondents fell in the 18-35 age group (64.37%), while 35.63% were in the 36-65 age group. Relationship status showed 67.53% as single and 32.47% with other statuses. Education-wise, 57.47% held a bachelor's degree or lower, and 42.53% had a master's degree or higher. Employment status revealed 88.22% were employed full-time including university students, while 11.78% were retired, self-employed, or housewives/househusbands. Household size was larger for 66.38% of participants and smaller for 33.62%. In terms of monthly household income, 55.17% reported TWD 60,000 or lower, and 44.83% had an income of TWD 60,000 or higher.

Table 1 - Sociodemographic characteristics of the respondents

Variables	**Description**	**Overall sample**		
		Frequency (%)	**Mean**	**SD.**
Gender	1 = Male	176 (50.57)	0.49	0.50
	0 = Female	172 (49.43)		
Age	1 = Senior (36-65 years)	124 (35.63)	0.49	0.50
	0 = Non-senior (18-35 years)	224 (64.37)		
Status	Marital status			
	1 = Single	235 (67.53)	0.68	0.47
	0 = Others	113 (32.47)		
Edu	Educational level			
	1 = Master degree or higher	148 (42.53)	0.43	0.49
	0 = Bachelor degree or lower	200 (57.47)		
Job	Occupation			
	1 = Work full-time outside home and student	307 (88.22)	0.88	0.32
	0 = Other (retired, self-employed, housewife/househusband)	41 (11.78)		
Size	Household size			
	1 = Small size (3 members or lower)	117 (33.62)	0.34	0.47
	0 = Large size (4 members or higher)	231 (66.38)		
Income	Household income			
	1 = TWD 60,000 or higher	156 (44.83)	0.45	0.49
	0 = Less than TWD 60,000	192 (55.17)		
n = 348				

Source: Author's computation.

Table 2 shows the coffee consumption willingness regarding environmentally-labeled coffee. Out of 348 respondents, 78.16% (n = 272) expressed a willingness to engage in environmentally-labeled coffee consumption, while 21.84% (n = 76) declined. Among the participants, 69.25% (n = 241) reported previous exposure to environmentally-labeled coffee. Regarding coffee knowledge, 53.74% (n = 187) demonstrated familiarity.

2.2. *Measures and tools of analysis*

2.2.1. Confirmatory factor analysis and structural equation modeling

This study adopts eight latent constructs from previous studies (Table 3) (Chen & Tung, 2014; Huang *et al*., 2014; Lee & Yun, 2015; Liu *et al*., 2019b; Oroian *et al*., 2017; Paul *et al*., 2016; Petrescu & Petrescu-Mag, 2015; Ut-tha *et al*., 2021a; Wee *et al*., 2014; Yadav & Pathak, 2016; Zagata, 2012). Descriptive statistics indicate high reliability (Cronbach's alpha > 0.70) and mean scores ranging from 3.52 to 4.23. Confirmatory factor analysis (CFA) in AMOS 22 assesses convergent and discriminant validity. Structural equation modeling (SEM) analyzes relationships within the extended TPB model, while probit regression in Stata15 explores factors influencing the coffee consumption willingness.

Table 2 - Coffee consumption willingness regarding environmentally-labeled coffee

Variables	**Description**	**Overall sample**		
		Frequency (%)	**Mean**	**SD.**
Heard	Having heard or bought environmentally-labeled coffee before			
	1 = Yes	241 (69.25)	0.69	0.46
	0 = No	107 (30.75)		
Knowledge	Having background knowledge of environmentally-labeled coffee			
	1 = Yes	187 (53.74)	0.54	0.49
	0 = No	161 (46.26)		
CCW (Coffee consumption willingness)	Willing to engage in environmentally-labeled coffee consumption			
	1 = Yes	272 (78.16)	0.45	0.49
	0 = No	76 (21.84)		
n = 348				

Source: Author's computation.

Table 3 - Descriptive statistic and reliability of variables

Constructs/Measurement items	Mean	SD	Cronbach's Alpha Value	Source
Sensory belief (SB) SB1: I believe that environmentally-labeled coffee tastes good. SB2: I believe that environmentally-labeled coffee has greater aroma.	3.93	0.74	0.78	Lee & Yun (2015); Oroian *et al.* (2017); Zagata (2012)
Health belief (HB) HB1: I believe that consuming environmentally-labeled coffee keeps me healthier than non-environmentally-labeled coffee. HB2: I believe that consuming environmentally-labeled coffee is safer than non-environmentally-labeled coffee.	4.01	0.86	0.94	Lee & Yun (2015); Petrescu & Petrescu-Mag (2015); Wee *et al.* (2014)
Upscale belief (UB) UB1: I believe that environmentally-labeled coffee is synonymous with great quality. UB2: I believe that environmentally-labeled coffee has a respectable reputation. UB3: I believe that environmentally-labeled coffee has achieved global recognition.	4.23	0.70	0.89	Huang *et al.* (2014); Ut-tha *et al.* (2021a)
Environmental belief (ENB) ETB1: I believe that the production process of environmentally-labeled coffee plays a crucial role in protecting the soil, air, water, and food supply from contamination and pollution. ETB2: I believe that the production process of environmentally-labeled coffee demonstrates a higher level of environmental friendliness.	4.04	0.62	0.81	Ut-tha *et al.* (2021b); Wee *et al.* (2014)
Attitude (ATT) ATT1: Purchasing environmentally-labeled coffee is right thing to do. ATT2: Purchasing environmentally-labeled coffee is pleasant. ATT3: Purchasing environmentally-labeled coffee is desirable. ATT4: Purchasing environmentally-labeled coffee is favorable.	4.15	0.56	0.95	Chen & Tung (2014); Ut-tha *et al.* (2021a); Yadav & Pathak (2016)

Table 3 - Continued

Constructs/Measurement items	Mean	SD	Cronbach's Alpha Value	Source
Subjective Norm (**SN**) SN1: Most people who are important to me think that I should purchase environmentally-labeled coffee. SN2: Most people who are important to me and significant others purchase environmentally-labeled coffee. SN3: Government policies and media promotion would lead me to purchase environmentally-labeled coffee.	3.52	0.85	0.89	Paul *et al.* (2016); Ut-tha *et al.* (2021a); Yadav & Pathak (2016)
Perceived Behavioral Control (**PBC**) PBC1: For me, to purchase environmentally-labeled coffee is easy. PBC2: For me, to purchase environmentally-labeled coffee is the thing I usually do. PBC3: For me, to purchase environmentally-labeled coffee is under my control. PBC4: I can find all information needed to purchase environmentally-labeled coffee. PBC5: I have resources, time, and opportunities to purchase environmentally-labeled coffee when shopping.	4.00	0.79	0.99	Chen & Tung (2014); Ut-tha *et al.* (2021b) Yadav & Pathak (2016)
Purchase Intention (**PI**) PI1: I intend to purchase environmentally-labeled coffee. PI2: I would purchase environmentally-labeled coffee if it is possible. PI3: I would purchase environmentally-labeled coffee in the near future. PI4: I plan to purchase environmentally-labeled coffee on a regular basis. PI5: I will recommend others to purchase environmentally-labeled coffee.	4.22	0.84	0.99	Chen & Tung (2014); Ut-tha *et al.* (2021a); Wee *et al.* (2014)

2.2.2. Probit model

This study delves into actual consumer behavior, specifically examining their willingness to consume environmentally-labeled coffee, based on the Theory of Planned Behavior (TPB). Participants were asked to indicate their readiness to consume a 250-gram package of environmentally-labeled coffee, bearing certifications such as Fair Trade, Rainforest Alliance, UTZ, etc., if such products were available in the market. If respondents answered "yes," it indicated a higher likelihood of their willingness to partake in coffee consumption resulting from a one-unit increase in the individual independent variable. The primary focus centered on binary responses ("yes" or "no") as predictive indicators of behavior.

The probit model, commonly used in similar studies (Bannor *et al.*, 2022; Yang *et al.*, 2022), was adopted for probability prediction.

$$Yi = \alpha + \beta x + \varepsilon \tag{1}$$

The dependent variable, denoted as Y, is a binary response ($Y = 1$ if yes; $Y = 0$ if no), indicating whether a respondent is inclined to consume environmentally-labeled coffee or not. In Equation (1), Yi stands for the dependent variable, and x represents the independent variables. β denotes the regression coefficient and ε is the error term following a normal distribution. Yi can have two outcomes: 1 indicating a willingness to engage in consumption of environmentally-labeled coffee, and 0 representing the contrary choice.

The probit model (Equation 2) specifies a conditional probability using the standard normal distribution ($F(x'\beta)$). Predicted probabilities range from 0 to 1. Equation 2 formulates the probability in the probit model.

$$F(x'\beta) = \Phi(x'\beta) = \int_{-\infty}^{x'\beta} \Phi\left(z\right) dz \tag{2}$$

The model coefficients are determined using the maximum likelihood method, where the log-likelihood is maximized, as expressed by Equation (3):

$$\log = yF(x'\beta) + (1-y)\left[1 - F(x'\beta)\right] \tag{3}$$

To gain a probability-based understanding of the independent variables, the marginal effects can be calculated. These effects reveal the proportional change in the probability of the dependent variable ($Y = 1$) resulting from a unit change in an independent variable (x). The marginal effects for the probit model can be represented by Equation (4):

(4) $$\partial\rho / \partial x_j = \Phi(x'\beta)\beta_j$$

Significant estimated parameters and marginal effects in the probit model indicate the importance of independent variables. Further investigation and explanation are warranted for these significant factors.

3.2.3. Predicting coffee consumption willingness among consumers

This study proposes a model to predict the coffee consumption willingness (CCW) regarding environmentally-labeled coffee. In addition, the influencing factors, including purchase intention, past experience, knowledge, gender, age, marital status, education, occupation, household size, and household income are scrunitized. The model is represented as equation (5).

(5) $$P(Y = 1 / Xi) = G(\beta_0 + \beta_1 PI + \beta_2 Heard + \beta_3 Knowledge + \beta_4 Gender + \beta_5 Age + \beta_6 Status + \beta_7 Edu + \beta_8 Job + \beta_9 Size + \beta_{10} Income) = G(x\beta)$$

3. Results

3.1. *Measurement validation*

To evaluate the measurement model's construct validity, convergent and discriminant validity are examined. For convergent validity, significant standardized factor loadings (ranging from 0.65 to 0.99) on their posited indicators, with an average variance extracted (AVE) of 0.5 or higher are required. In this study, all AVE values are above 0.5, and all construct reliability (CR) values are greater than 0.7, confirming convergent validity. Discriminant validity is assessed by comparing the AVE of any two constructs with their squared correlation estimate. The results show that the diagonal AVE values are higher than the squared inter-construct correlations, providing strong evidence for discriminant validity (Hair *et al.*, 2019).

A set of indicators is applied to assess the accuracy of a measurement model. When sample sizes exceed 250, a significant chi-square statistic ($\chi^2(269\ df) = 482.689$, $p < 0.001$) is acceptable (Hair *et al.*, 2018). The rate χ^2/df obtained from the study ($\chi^2/df = 1.794$) is below the recommended threshold of five, indicating a good fit (Maichum *et al.*, 2016). Additionally, the goodness-of-fit index (GFI) is acceptable (0.907) (Ting *et al.*, 2019), and other indices meet or exceed the required threshold values, such as 0.982 for the comparative fit index (CFI), 0.979 for the Tucker-Lewis index (TLI),

0.961 for the normalized fit index (NFI), and 0.953 for the relative fit index (RFI); all are above the common required threshold of 0.90 (Maichum *et al.*, 2016; Nguyen *et al.*, 2019). Furthermore, the values of parsimonious normed fit index (PNFI) and parsimonious comparative fit index (PCFI) are above the recommended level of 0.5 (0.795 and 0.813, respectively) (Nguyen *et al.*, 2019).The root mean squared error of approximation (RMSEA) of 0.048 is below the critical level of 0.80 (Ting *et al.*, 2019). These findings collectively suggest that the model is well-fitted (Table 4).

3.2. *Testing of the structural equation model*

Once a satisfactory measurement model is obtained, a structural model is estimated to examine the hypotheses underlying the extended TPB model. For sample sizes greater than 250 (N > 250), a statistically significant χ^2 (χ^2 = 570.065; df = 276; $p < 0.001$) is acceptable (Hair *et al.*, 2018). The rate χ^2/df (χ^2/df = 2.065) is within the good fit condition (Maichum *et al.*, 2016; Senger *et al.*, 2017). GFI is 0.892, surpassing the critical threshold of 0.8, thus deemed an acceptable level (Ting *et al.*, 2019). The CFI, TLI, NFI, and RFI, which are 0.976, 0.971, 0.954, and 0.946, respectively, exceed the common threshold of 0.90, indicating a good fit (Maichum *et al.*, 2016; Nguyen *et al.*, 2019). Furthermore, the PNFI and PCFI values of 0.810 and 0.828, respectively, are higher than the general threshold of 0.5, indicating a good fit (Maichum *et al.*, 2016; Nguyen *et al.*, 2019). The RMSEA value of 0.055 demonstrates an acceptable level of close fit (Ting *et al.*, 2019). Consequently, the validation of these structures indicates a relatively good fit of the proposed theoretical models to the underlying data (Table 4).

3.3. *Hypotheses testing*

Based on the proposed paths depicted in Figure 3, the findings confirm that sensory belief (SB) is significantly and positively associated with attitude towards environmentally-labeled coffee (ATT), supporting hypothesis H1 (β = 0.18**). However, SB does not exhibit a significant influence on purchase intention (PI), thus hypothesis H2 is rejected. Health belief (HB) does not significantly predict ATT, indicating rejection of hypothesis H3. Similarly, HB does not significantly affect PI, and hypothesis H4 is also rejected. Upscale belief (UB) positively impacts ATT, providing support for hypothesis H5 (β = 0.13*). However, UB does not significantly affect PI, and hypothesis H6 is rejected. Environmental belief (EB) positively influences ATT, providing support for hypothesis H7 (β = 0.13*). However, EB is not

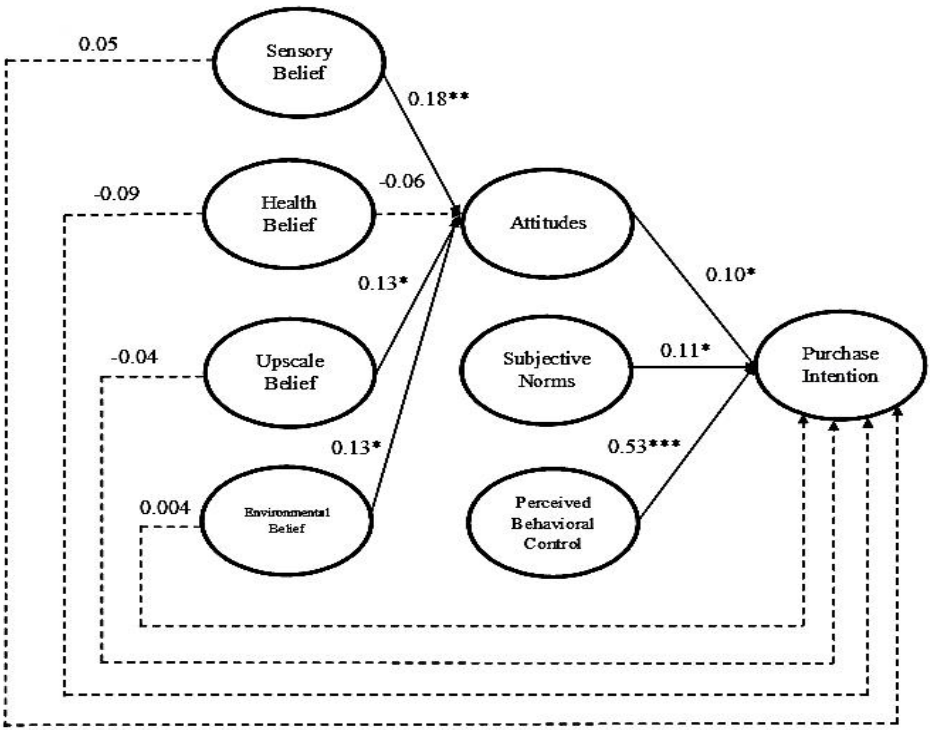
significantly associated with PI, indicating rejection of hypothesis H8. Finally, ATT, subjective norm (SN), and perceived behavioral control (PBC) are all significantly and positively associated with PI, supporting hypothesis H9 (β = 0.10*), hypothesis H10 (β = 0.11*), and hypothesis H11 (β = 0.53***), respectively.

Table 4 - Goodness-of-fit results in confirmatory factor analysis and structural equation modeling

Indicators	Ideal Value	Confirmatory Factor Analysis (CFA)		Structural Equation Modeling (SEM)		References
		Results	Judgement	Results	Judgement	
Chi-square (χ^2)	P > .05	482.689 (P < .001)	Significant p-values expected (N > 250)	570.065 (P < .001)	Significant p-values expected (N > 250)	Hair *et al.* (2018)
χ^2/df	< 5 (acceptable fit)	1.794 (482.689/269)	Acceptable fit	2.065 (570.065/276)	Acceptable fit	Maichum *et al.* (2016); Senger *et al.* (2017)
GFI	> 0.9 (good fit) 0.8 - 0.89 (acceptable fit)	0.907	Good fit	0.892	Acceptable fit	Ting *et al.* (2019)
CFI	> 0.9	0.982	Good fit	0.976	Good fit	Maichum *et al.* (2016); Nguyen *et al.* (2019)
TLI	> 0.9	0.979	Good fit	0.971	Good fit	
NFI	> 0.9	0.961	Good fit	0.954	Good fit	
RFI	> 0.9	0.953	Good fit	0.946	Good fit	
PNFI	> 0.5	0.795	Good fit	0.810	Good fit	
PCFI	> 0.5	0.813	Good fit	0.828	Good fit	
RMSEA	< 0.05 (close fit) 0.05 - 0.08 (fair fit) 0.08 - 0.10 (mediocre fit) > 0.10 (poor fit)	0.048	Close fit	0.055	Fair fit	Ting *et al.* (2019)

Source: Author's computation.

Figure 3 - The results of the research model



*Note 1 - * p < 0.05; ** p < 0.01; *** p < 0.001*
Note 2 - "-" indicates significance; "---" indicates insignificance

3.4. *Predicting the coffee consumption willingness*

The results of probit regression analysis supported hypothesis H12, demonstrating that purchase intention significantly and positively influenced coffee consumption willingness (CCW) regarding environmentally-labeled coffee. Hypothesis H13 received partial support, revealing significant positive effects of variables such as past experience, product knowledge, age, and household size on coffee consumption willingness (CCW). The model exhibited a satisfactory fit. The results revealed that the probability of CCW increased by 14.26% for a one-unit increase in purchase intention. Moreover, the probability of CCW increased by 23.72%, 12.49%, 11.90%, and 11.50% with a one-unit increase in past experience, household size, product knowledge of environmentally-labeled coffee, and age, respectively (Table 5).

Table 5 - Predicting the coffee consumption willingness regarding environmentally-labeled coffee

Variables	Probit		
	Marginal effects	**Coef.**	***t*-value**
Purchase intention (PI)	0.1426	0.69	4.41***
Past experience (Heard)	0.2374	0.95	4.21***
Background knowledge of environmentally-labeled coffee (Knowledge)	0.1190	0.56	2.46*
Gender	-0.0267	-0.13	-0.69
Age	0.1150	0.61	2.21*
Marital status (Status)	0.0437	0.20	0.74
Education (Edu)	0.0189	0.09	0.45
Occupation (Job)	-0.0487	-0.27	-0.69
Household size (Size)	0.1249	0.69	2.77**
Household income (Income)	0.0054	0.03	0.13
Number of obs = 348 Log likelihood = -118.14112 LR chi2(11) = 129.02 (.000)*** Pseudo R2 = 0.3532 Correctly classified (%) = 83.62% Hosmer and Lemeshow test = 0.1165			

Note: *,**, and *** indicate $p < 0.05$, $p < 0.01$, and $p < 0.001$, respectively.
Source: Author's computation.

4. Discussion and Conclusions

This study explores factors influencing Taiwanese consumers' intention to purchase environmentally-labeled coffee. It examines how attitude, subjective norms, and perceived behavioral control serve as predictors of this intention. Additionally, the study investigates the role of sensory, health, upscale, and environmental beliefs in shaping attitudes and purchase intention. Furthermore, it analyzes the relationship between purchase intention, consumer characteristics, and coffee consumption willingness.

The study shows that a positive attitude significantly influences Taiwanese consumers' intention to purchase environmentally-labeled coffee, aligning with similar findings observed by Ut-tha *et al.* (2021b) in Thailand. This trend of positive attitudes driving green purchase intention is corroborated

by research conducted by Ruangkanjanases *et al.* (2020) in Taiwan, Shukla (2019) in India, Hameed *et al.* (2019) in Pakistan, Zhang *et al.* (2018) in China, and Emekci (2019) in Turkey. Collectively, these studies emphasize the substantial impact of positive attitudes on green purchase intention, highlighting that favorable attitudes consistently boost consumers' likelihood of making environmentally-friendly purchases.

This study focused on Taiwan highlights the factors that shape consumer attitudes towards environmentally-labeled coffee, with particular emphasis on sensory beliefs such as taste and aroma, which aligns with the Theory of Planned Behavior. Similar findings were observed in an Indonesian study by Utama *et al.* (2021), emphasizing the significant role of taste and aroma in shaping coffee-related attitudes. Moreover, the study indicates that upscale beliefs, which associate environmentally-labeled coffee with quality and prestige, have a positive impact on attitudes. This aligns with similar findings drawn from research conducted in Thailand by Ut-tha *et al.* (2021b).

In Taiwan, environmental beliefs exert a significant impact on attitudes toward environmentally-labeled coffee, consistent with findings in other regions. Singh and Pandey (2018), Shukla (2019), Hameed *et al.* (2019), and Emekci (2019) all observed the positive influence of environmental concerns on attitudes and purchase decisions across various countries. Notably, in this study, health beliefs did not directly affect attitudes and purchase intentions, different from previous research. Instead, sensory beliefs, particularly those related to taste and aroma, emerged as the most influential factors in shaping attitudes. Therefore, their critical role in marketing environmentally-labeled coffee to Taiwanese consumers cannot be overlooked.

In general, prior research consistently demonstrates that attitudes tend to be more predictive of purchase intention than subjective norms. This is evident in studies such as Ramirez-Correa's (2020) research on specialty coffee in Brazil, Ruangkanjanases *et al.*'s (2020) study on environmentally-friendly products, Ut-tha *et al.*'s (2021b) study on certified coffee in Thailand, and Hoeksma *et al.*'s (2017) investigation into consumers' intentions to purchase meat from mobile slaughter units in the Netherlands.

This study in Taiwan yielded slightly different results, with subjective norms exhibiting slightly higher predictive power than attitude, contrasting with prior findings. This aligns with research by Shukla (2019) and Emekci (2019), emphasizing subjective norms' greater influence on purchase intentions, particularly among millennial Indian and Turkish consumers. These results suggest that individuals feeling social pressure for environmentally-conscious behavior are more likely to have stronger intentions for green purchases. This outcome is consistent with research by Hameed *et al.* (2019), where subjective norms significantly predicted eco-

conscious behavior among Pakistani consumers, underscoring the role of subjective norms in guiding environmentally responsible behavior.

This study reveals a significant and positive association between perceived behavioral control (PBC) and the intention to purchase environmentally-labeled coffee among Taiwanese consumers, aligning with extensive literature. Ruangkanjanases *et al.* (2020) and Shukla (2019) found that PBC positively affect purchase intentions for green products in Taiwan and India, respectively. These findings suggest that when consumers feel a greater sense of control over their environmentally-friendly purchases, it strengthens their intention to make such choices. Notably, this study highlights PBC as the most influential predictor of purchase intention for environmentally-labeled coffee in Taiwan. This finding is consistent with recent studies in South Africa, where PBC demonstrated the highest predictive power concerning the intention to consume specialty coffee (Van der Merwe & Maree, 2016), as well as the intention to opt for organic coffee among consumers in Indonesia (Khaliqi *et al.*, 2021). These results underscore consumers' confidence in their ability to gather information, allocate time, and manage finances for such purchases. They emphasize the pivotal role of perceived behavioral control in driving actual purchase behavior.

When examining coffee consumption willingness, which reflects actual behavior according to the theory of planned behavior, this research highlights that purchase intention significantly and positively influences coffee consumption willingness regarding environmentally-labeled coffee among Taiwanese consumers. This finding is in line with Emekci (2019), who emphasizes the direct impact of intention on green buying behavior in Turkey. It suggests that individuals with higher intentions to engage in environmentally-labeled coffee purchases are more likely to manifest such consumption behavior. Consequently, intention serves as a mediator between attitude, subjective norm, perceived behavioral control, and coffee consumption willingness among Taiwanese consumers.

Consumer characteristics, including knowledge and past experience, significantly influence Taiwanese consumers' coffee consumption willingness. Zhang *et al.* (2018) found that informed Chinese consumers with prior online vegetable purchase experience exhibited positive attitudes and willingness to pay a premium. Similarly, Iqbal *et al.* (2022) noted that knowledge and education level affect preferences, particularly for hygienic tetra pack milk in Pakistan. Age also emerges as a factor, as older consumers in Ghana show a preference for indigenous foods like chicken (Bannor *et al.*, 2022). Furthermore, household size demonstrates a positive correlation with coffee consumption willingness in Taiwan, where larger households exhibit a higher likelihood of engaging in coffee consumption.

These findings have significant implications for promoting sustainable coffee consumption in alignment with United Nations Sustainable Development Goal (SDG) 12. Stakeholders in the coffee industry, including producers, marketers, and policymakers, can utilize these insights to advance sustainable practices and consumer choices. By implementing tailored practices and marketing strategies that emphasize sensory profiles, upscale packaging, and environmental labels, they can effectively engage consumers. Furthermore, collaboration with influencers and public agencies in strategic marketing campaigns can raise awareness among the public. Moreover, leveraging purchase intention and consumer traits as targeting tools through education can positively influence behavior. Additionally, policymakers can play a crucial role in this endeavor by refining certification programs to support sustainable coffee production. Lastly, offering diverse retail choices and conducting educational campaigns that cater to various preferences can significantly shape consumer choices in favor of sustainability.

Building upon these implications, the research findings contribute significantly to existing knowledge in the field. They reaffirm that positive attitudes drive green purchase intention, aligning with global findings. Researchers explore factors shaping consumer attitudes, including sensory beliefs, upscale perceptions, and environmental concerns. Subjective norms exhibit higher predictive power than attitudes for green purchase intention in Taiwan, highlighting social pressures' role. Perceived behavioral control is the most influential predictor, emphasizing consumers' confidence in making eco-conscious choices. Moreover, purchase intention mediates the relationship between attitudes, subjective norms, perceived behavioral control, and coffee consumption willingness. Demographic factors such as knowledge, past experience, age, and household size significantly influence coffee consumption willingness. In conclusion, this study advances understanding and provides practical insights into eco-conscious choices among Taiwanese consumers, contributing to sustainable consumption knowledge.

In recognizing the study's limitations, it's important to note that the data collection occurred during the challenging context of the Covid-19 pandemic, potentially introducing disruptions and influencing consumer behavior due to lockdowns and economic uncertainties. To address this, future research should validate these current findings in post-pandemic conditions. Another limitation is the data's geographic scope, limited to four counties in Taiwan, potentially not capturing the entirety of the environmentally-labeled coffee market. Expanding research to encompass more regions would provide a more comprehensive understanding. Additionally, potential response bias and self-reporting bias are inherent in survey-based research, even with anonymity measures. Future studies may consider qualitative methods or complementary data sources for validation.

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