

# A Systematic Review of the Literature on Agri-Food Business Models and Choice Experiments of Consumers

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## ABSTRACT

The choice experiment (CE) is a stated preference method used to determine the respondent's preference. The CE can predict the attributes of a hypothetical product and how much consumers will appreciate them. Several scholars have investigated the reliability, validity, and design of the CE. However, as of right now, no academic studies have looked at its application in a variety of agri-food research, especially when analyzing food product categories and their attributes. This review also emphasizes the technical aspects of CEs, such as sample size, software, data analysis, and research implications. It was discovered that most CE studies are relevant to wealthier countries. Most of the evaluated studies looked at wine and meat as objects in the context of the CE investigations, which were centered around food safety, sustainability, origin, and health. The comprehensive literature research has identified three main categories of business models in the agri-food industry: technology-based, cooperative, and sustainable business models. The three new business model types can occasionally be adopted simultaneously and function well together. Future research in this field can benefit from an understanding of the various types of business models and the variations that can be found within them.

**Keywords:** Review, Agri-food, Business model, Sustainability, Digitalisation

## Introduction

New business models that enable the reconfiguration of company capacities to accept change are born out of changes in the external environment (Teece, 2010; Broccardo et al., 2023). Evans et al. (2017) state that business models are seen as a means of promoting open innovation, collaborative entrepreneurship, and intellectual property while also serving as a vehicle for innovation and a means of commercializing it. There has been an increase in interest in the effects of business model innovation on company competitiveness, according to Tell et al. (2016), Maucuer et al. (2022), and Shepherd et al. (2023).

A few papers that emphasize this include Tell et al., 2016; Biancone et al., 2022; Ulvenblad et al., 2014; nevertheless Through a thorough analysis of the academic literature, this study aims to shed light on the emerging business models in the agri-food sector and, in doing so, identify the key issues that the industry is currently facing in an extremely uncertain climate. Academics have not given the specific case of business models in the agri-food sector the attention it needs, despite the sector's importance.

The importance of the agri-food sector can be attributed to its supply of food products to the general public, its contribution to economic growth, and the jobs it creates. However, it also plays a significant role in maintaining and developing the rural environment, protecting natural areas and landscapes, and serving as the backbone of the community. Nevertheless, a sizeable amount of the global greenhouse gas emissions can be attributed to agriculture. Only one-third of greenhouse gas emissions are attributed to agriculture alone, according to the IPCC (2020). The influence of supply chain operations including food processing, transportation, and retailing that take place before customers arrive, as well as any post-consumer processes involving the production and management of food waste, are not taken into consideration in this figure. Thus, the term "agri-food sector" refers to a cross-cutting model that encompasses the entire food and agricultural industry and explains everything that occurs from the point of production on the farm until it is consumed in our homes. We therefore cannot talk about agriculture without also talking about other sectors and associated services.

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The business models that will rule in the next years are among the most divisive topics among the main actors in the agri-food industry, according to Wojtynia et al. (2021). In light of recent studies' conclusions that the theory on new business models in this sector is inadequately developed (Tell et al., 2016; Dressler and Paunovi\_c, 2020; Belyaeva et al., 2020; De Bernardi et al., 2022), there is a significant opportunity for new research to contribute to the definition of a more robust theoretical framework for understanding innovation in business models within the agri-food sector.

Most CE research in the agri-food industry focus on new product development (Zhu et al. 2018; Wan-yama et al. 2019), marketing tactics (Casini et al. 2016; Wu et al. 2017), and legislative recommendations (De Marchi et al. 2019; Ballco et al. 2020). The food industry faces a risk of market failure during the launch phase of new products since food innovation is frequently insufficient to achieve customer pleasure (Horvat et al. 2019; Guiné et al. 2020). In order to make strategic decisions, stakeholders need to be aware of the qualities that consumers value in a product (Dawoud 2019). Furthermore, food policies sometimes have the potential to be ineffective due to their inappropriate targeting (Guo et al. 2019).

Previous studies have shown significant differences in the application of CE, including sample size, software, and data processing (Cantillo et al. 2020; Sharma et al. 2020). Numerous academics have investigated its validity, reliability, and design (Reed et al. 2020; Mariel et al. 2021). However, there is still a dearth of research examining consumer preferences for agri-food products through an analysis of CE application trends and parallels. The only initiative review to date was done by Cantillo et al. (2020), and it was only for finfish. Compared to Cantillo et al. (2020), this review provides a more thorough viewpoint because it includes all agri-food items. The incorporation of more information from this

review could enrich the literature on CEs in agri-food products. Furthermore, the evaluation's findings can act as a roadmap for further research on the use of CEs in food products.

As the global agri-food industry grows, it is becoming more crucial to comprehend consumer preferences for certain food product features in order to improve the overall performance of the agri-food value chain. The increasing use of CEs suggests that there is a growing need for information about how consumers view the characteristics and attributes linked to food products. While industrialized nations are the main consumers of CEs, emerging nations can gain a great deal from this strategy as well. Researchers should give respondents precise instructions about the CE questionnaire in order to guarantee that there is no bias.

Subsequent studies on CE should concentrate on reduced alcohol content wines and specific food elements, such as natural food additives and alternative protein sources. Additionally, we recommend conducting study in developing or growing countries on alternative dietary ingredients. By acquiring knowledge about community preferences, the local government can develop a participatory policy. More specifically, given the current lack of data, further attention is required to examine consumer reactions to new food products among marketing concerns. Given the poor success rate of new product marketing in the food business, we urge food companies to conduct CE studies to ascertain customer preferences so that new product development can be focused toward consumer wants.

The CE technique can theoretically be implemented using a variety of software platforms, such as those created especially for CEs, open-source software, and multi-statistical packages. We strongly advise adopting open-source applications, such as R and Biogeme, since they are well-known, flexible, and cost-free. Moreover, LCA and WTP analyses are subsets of advanced analysis methodologies. Even though some scientists think that WTP in CEs cannot truly reflect the customer valuation, researchers can nevertheless utilize the data to determine prices.

Producers confront fierce competition both domestically and internationally because of the variety of agri-food products, customer demands, and the period of globalized trade. In order to assess and appropriately arbitrate the purchasing action and make decisions that ensure nutritional quality and well-being, consumers want a battery of precise and detailed information about the various processes that the agri-food product goes through before being present on the market at this level (Narula, Desore, 2016; Vitale and al., 2020; Gao and al., 2020; Eldesouky and al., 2020).

However, consumers today demand that a clear identity be created for agri-food products, one that can explain not only the product's components but also its production, processing, transportation, and marketing methods, in light of the numerous issues surrounding the safety of agri-food products and the careless production process (Chen et al., 2016; Yang et al., 2020).

At this point, public authorities strongly collaborate with producers to support the development of a system that can track the identity of agrifood products in order to meet public expectations and also to contribute to the valorization of the region's products, which are frequently penalized by antiquated procedures and practices that frequently result in a rejection of the good or service rendered (Miličić and al., 2017; Gao and al., 2020). Mass food products and those from the region have started to have an innovative conception based essentially on protection by labels that guarantee compliance with quality and responsibility standards, and this, always under the control of the public authorities in charge of this issue. This is because they want to stand out from the competition and effectively respond to market demand by ensuring quality and authenticity. This observation suggests that there are two main reasons for producers, public authorities, and even some other stakeholders to coordinate their efforts: the first is

strategic and primarily relates to businesses' and farmers' commitment to effectively meet consumer demand, and the second is related to the political commitments a state makes to support its interests development and promotion.

Regarding the strategic stakes for businesses and farmers, we can state that in this day and age of globalization and intense competition, it is critical for any agri-food business to establish a unique brand identity in comparison to market rivals by offering honest, dependable products and consistent business procedures. In order to do this, businesses and farmers raise the value of their produce by putting in place a labeling system, which is a crucial requirement based on the recognition of quality and processes engaged throughout production. At this level, the global scene exhibits a pretty broad range of labels, each with finely defined and highly particular properties.

For instance, the OASIS and NFS/ANSI labels are examples of agri-food labels that the United States has developed; however, the most well-known and renowned label is the USDA Organics label, which guarantees organic standards for agricultural products, especially in the production and processing phase (Bir and al., 2019; Skorbiansky, Adjemian, 2020). France has also developed a number of labels, including the Agriculture Biologique label, which is founded on standards of respect for the environment and animal welfare, the Label Rouge, which guarantees superior quality of agri-food products, and the Appellation of Controlled Origin (ACO), which ensures geographical originality.

### **Consumer perception of agri-food products**

Although government officials are eager to establish systems for labeling that will benefit businesses and farmers, they first want to be more certain that the labels will be accepted by consumers. In order to achieve this, they use customer perception research to try and predict ahead of time the elements impacting attitudes, preferences, and the purchasing process. The latter is widely recognized in the scientific community as a behavioral analysis process that seeks to understand behavior as well as to identify points of convergence or divergence between the product in question and the estimated needs (nutritional value, quality, and physical characteristics of the product).

There is a wealth of research at this level in the literature, with a concentration on empirical studies that examine consumer behavior in relation to a variety of products (agricultural, industrial, artisanal, etc.) as well as an interest in comprehending this idea. Putting first things first, let's define consumer perception as the process by which a consumer organizes various categories of information related to his or her environment to gain a comprehensive understanding of an object, service, or event (Mamine and al., 2016; Stampa, Schipmann-Schwaze, Hamm, 2020). Customer perception frequently has a significant impact on consumers' purchase decisions. When considering the consumer as an individual acting in their environment, it is important to consider both the environmental factors and the factors that are specific to them (Feldmann, Hamm, 2015 ; Malone and al., 2017; Kirsten and al., 2017; Groening and al., 2018). In order to obtain a thorough understanding of a person's behavior, it is possible to analyze consumer perception at this level by concentrating on a number of variables that impact activities and actions that are directly related to the person's purchasing process. Additionally, any preventive measures that the person's environment may have taken can be examined (Henchion and al., 2017, Groening and al., 2018, Ripoll and al., 2018). Three consumer behavioral and socio-demographic characteristics, along with the involvement aspects, will be the main topics of discussion in this article.

In the same year, Vapa-Tankosic et al. (2020) carried out another survey, but this one was more concerned with how much customers were ready to pay for the so-called organic mile. The study's

findings unequivocally demonstrated that high values for particular sociodemographic traits, such as a high monthly income and a high degree of education, were responsible for the favorable level of perception of organic honey. These illustrations demonstrate how socio-demographic factors can, in fact, significantly influence how consumers view products with labels. Despite the fact that this is a relatively new trend, it seems that consumers with higher social status and varying levels of education are able to comprehend the advantages that branded products are expected to bring, both to society as a whole and to themselves. Conversely, other segments of society place little or no value on branded products and continue to believe that they are nothing more than marketing ploys. It's crucial to remember, though, that while these findings were true in certain situations, they are not always true.

Furthermore, a number of studies have demonstrated that consumers view items with labels that fall into a modest social category and study level favorably because of the uniqueness of the area in question and the way that it approaches, communicates, and creates awareness of this product typology. Additionally, it seems, and the majority of research conducted within this framework supports this notion, that women place a higher value on labeled goods and readily understand the connection between labeled goods and food safety. They are also more willing to pay a premium for these goods, which may be connected to their propensity for frequent shopping and their desire to purchase noteworthy and healthful goods for their families (Perito et al., 2019).

According to Wang and Gao's (2017) study, which examined 1422 customers' preferences for traditional sustainable rice in China, women—especially those with children—expressed favorable opinions.

Apart from the socio-demographic factors, there exist several elements associated with consumer behavior that either directly or indirectly impact their decision-making. It is true that the addition of a label to products—particularly food products—will, in the interest of farmers, businesses, and other stakeholders to know them, alter behavior somewhat and generate further commentary. We can thus perceive and evaluate the degree of label understanding, the level of commitment, and the degree of trust given by customers by taking into account these variables that are directly related to the consumption action (Pyburn and al., 2016; Owusu and al., 2017; Fan and al., 2019, Perito and al., 2019).

Because of this, most studies are primarily committed to studying the elements and variables associated to the purchase activity, rather than heavily emphasizing segmentation by sociodemographic variables due to their relevance and readability. Numerous factors are associated with consumer behavior, including individual factors (personality, self-image, attitudes, lifestyle, etc.), so-called environmental factors (family, culture, status, and role, etc.), and psychological factors (motivations, brakes, emotions, learning, etc.). Numerous factors can be looked at, all within the context of how labelled agri-food products are perceived. These include the attention paid to labels, the degree of familiarity with different types of labels, concerns about health and the environment, sense of responsibility, and commitment to the environment and society (Jonell and al., 2016 ; Bhattarai, 2019). At this level, a number of empirical investigations have been conducted to unequivocally demonstrate that the factors immediately associated with the consumption activity determine a significant portion of the degree of perception, whether it be positive or negative.

When it comes to the relationship between individual variables and behavior, a wealth of literature has been written about it for a long time. This literature first emerged as a result of the efforts of Murray (1938), Maslow (1954), and Schultz (1966) to elucidate the many needs of individuals. At this stage, people have emerged as discrete entities that respond differently to the same circumstances and whose actions are still mostly enigmatic. In their latest work on perception analysis based on 36 Spanish



consumers, Eldesouky et al. (2020) focused primarily on examining the individual characteristics that underlie consumer behavior, especially in relation to beliefs and experiences regarding food eco-labeling.

These factors were first able to pinpoint the usually positive attitude of the customers as well as the barriers that prevented them from making the purchase, including their lack of product knowledge and the accessibility of food items with labels. The latter study, whose primary goal is to analyze consumer preferences for labelled food products like beans, is quite similar to Silva and al.'s (2018) work in that it also concludes that consumers have a favorable attitude since they prefer the labelled option even when the food product is well-known.

While it is true that a customer's psychological and individual characteristics have a significant role in their purchasing behavior, their external environment can also have an impact on their behavior due to the effects they may encounter from their culture, family, or society. It is true that Fan and colleagues (2019) bring up the subject of how culture influences and shapes consumer behavior. In fact, the study has unequivocally demonstrated that the relationship to the local culture fosters a favorable opinion of broccoli customers, who are prepared to spend extra for local varieties.

Because they contribute to the development or enhancement of a communication and awareness system that can spread a positive perception of and a broad appreciation for labeled agri-food products, all of these examples can support the idea that it is important to concentrate primarily on the variables that are directly related to the action of purchasing. By guaranteeing that products and manufacturing, processing, and marketing procedures are valued responsibly by society and the environment, it is possible to meet the strategic and political difficulties in this way.

### **Research methods**

Secondary data, as defined by Loewy and Guffey (2009), is information that already exists in some way but wasn't primarily obtained for the current need for data. Since secondary data is frequently the first kind of data to be gathered, it frequently serves as the starting point for data gathering. The fact that the secondary data has already been gathered for a purpose unrelated to the current study issue is a significant constraint. Such information might not address the subject at hand or might just offer a portion of what is anticipated. It's possible that the information is out of current or inaccurate. It is very important that secondary data be examined first as these can provide invaluable background information that can be used to define the project, develop objectives and specify the most appropriate methodology. The secondary data can consist of both published and raw summaries. Several organizations gather and store different data to support their operations. The secondary data can save costs and time and it requires careful representation to enhance that the data which the researcher finds is actually similar and useful.

Credibility, reliability, and transferability can all be integrated to improve the quality of qualitative research. Credibility is dependent upon three factors: 1) the researcher's reputation; 2) exacting techniques; and 3) a philosophical conviction in the need of qualitative research. In qualitative research, rigor is defined as using a methodical approach to research design, thorough data collection and analysis, and clear communication. A researcher's experience, education, and credential presentation all contribute to their credibility. Credibility is considered the qualitative equivalent of internal validity in quantitative research (Patton, 2002).

## Discussion and conclusion

In their analysis of global case studies, Donner et al. (2020) concentrate on the study of value creation processes from agro-industrial waste. They suggest six business models to utilize waste in the industry: biogas plant, upcycling entrepreneurship, environmental biorefinery, agricultural cooperative, agropark, and support structure. Although they have different organizational structures and methods of creating value, they are both highly dependent on partnerships and their ability to adapt to shifting external circumstances. Additional studies on SBM can be found in Muller et al. (2022), which pinpoints tactics for green innovation in family businesses; Nazzaro et al. (2020), which discusses how to integrate CSR into the industry's business models; and Secundo et al. (2022), which examines the connection between the digitization of businesses and in the industry and the UN Sustainable Development Goals' accessibility.

The work of Mehrabi et al. (2022) stands out among these publications because it offers a list of new SBMs in the agri-food industry that, while not all-inclusive, effectively captures the latest developments in this field. Here is a list of creative SBMs based on this classification.

Model for sustainable collaborative innovation: To reposition themselves in the market and satisfy societal demands, companies in the agri-food industry are implementing sustainable innovation at various points along the value chain. Effective implementation of these innovative processes necessitates a team effort centered on integration techniques (vertical and horizontal) and consistent, cooperative behavior from all value chain participants. A work by Stanco et al. (2020) examines a successful model of this kind. A new class of business model known as "circular business models" has been recognized by certain writers in recent years. In light of this, McDougall et al. (2022) distinguish three levels on which to develop new business models based on the circular economy: (a) internal circular operation and pollution prevention; (b) supply chain circular operation; and (c) societal circular operation. Esposito et al. (2020) review the literature on circular business models in the agri-food sector. Donner and Radic (2021) analyze 41 instances of circular business models in the olive oil sector, while Klein et al. (2022) analyze four cases of the implementation of circular business models in the potato sector.

Lastly, Donner and deVries (2021) examine eight European business case studies and offer a theoretical framework on the innovation in circular business models within the industry, linking it to biotechnological innovation. Within this framework, a newly recognized field of co-creation is identified and is currently gaining substantial prominence.

## Technology based business models

The notion of Agriculture 4.0 (Latino et al., 2023) is the result of the digitization and technological evolution processes in the agri-food industry. Of the many facets of this concept that have been studied in the literature, the examination of the related business models has received less attention. Apostolopoulos et al. (2021) come to the conclusion that the COVID-19 pandemic has unquestionably aided in the creation of new business models based on cutting-edge digital technology. The new technologies that are most affecting the business models in the agri-food industry are identified in a number of the examined articles. Among them is artificial intelligence (DiVaio et al., 2020; Lezoche et al., 2020), The subjects of Internet of Things, bigdata, and blockchain are discussed by Mahdad et al. (2022), Lezoche et al. (2020), and Liu et al. (2020). Hunt et al. (2005), on the other hand, analyze how e-business models referred to as "extended product and enterprise" are utilized to assist agri-food supply chain activities through their case study examination.

A classification of the primary business models that can be used in the agri-food industry is suggested by Vlachopoulou et al. (2021) based on the taxonomy of digital business models put forward by Rappa (2000). The "e-Marketplace" paradigm facilitates the interchange of information, factors, and goods between farmers, partners, and consumers by means of a technology platform (Fritz et al., 2004; Canavari et al., 2010; Strzebicki, 2015). Charging a fee for each transaction is one of the most common business model types for e-marketplaces. The marketplace handles the payment processing and levies a fixed fee or a percentage when a customer pays a supplier. An effective implementation of this strategy in the Chinese market is examined by Yang et al. (2020).

According to Velacopoulou et al. (2021), the "subscription" model involves a recurring price and provides both a paid membership option that enables the combination of a trial or free level of service and a premium one, as well as free membership with time or access limits. One such would be agricultural machinery leasing programs, which lower costs for farmers by matching up idle equipment with farms that require machinery. In this way, farmers in various locations might lease a combine harvester that costs hundreds of thousands of euros but is idle for much of the year, allowing equipment to be used year-round. Organizations that use data as a critical resource for managing their operations are referred to as using the data-driven (DD) model (Vlachopoulou et al., 2021). A study on innovation in food processing was carried out in 2018 by the consulting firm McKinsey, which looked at the elements that propel innovation in this particular business model. It was found that as data becomes more readily available, organizations are using sophisticated analytics to gain insights and discover how to operate their operations more profitably (Santhanam et al., 2018). Spijker (2014) divides Data-Driven models into five subcategories.

### **Future research**

As the introduction makes clear, the academic literature has not given enough consideration to the unique situation of business models in the agri-food industry, even in spite of the growing interest in research on innovation in business models (Tell et al., 2016). (Ulvenblad et al., 2014; Tell et al., 2016). This is true even though the agri-food industry is crucial to rural development, economic expansion, and environmental preservation. But as this research explains, this industry bears a significant portion of the blame for deforestation, soil fertility loss, water pollution, and greenhouse gas emissions. This fact has resulted in the need for more knowledge and theory regarding the development of new business models that allow the sector to adapt to these changes, along with structural changes in the sector regarding consumer behaviour, the technological and environmental environment, and even the global geopolitical situation.

For these reasons, this paper reviews, summarises, and arranges the literature that has already been written about new business models in the agri-food industry. The primary goals of this analysis are to: (1) give researchers studying this topic a comprehensive overview of the research that has been done so far; and (2) identify any research gaps that need to be filled in order to expand upon or supplement the findings that have been obtained so far. SBM, TBM, and CBM are the three primary business model types in the agri-food industry, according to the SLR. SBMs consider social and environmental aspects while concentrating on generating advantages for a broad spectrum of stakeholders. TBMs concentrate on the industry's technical innovation and digitization processes. Lastly, CBMs concentrate on novel, cooperatively based forms of competition that deviate from conventional models. The three new business model categories work well together and can occasionally be implemented simultaneously. For



novice researchers in this area, identifying these categories of business models and the variations that fall under each of them is a good place to start. Furthermore, the results of the SLR enable us to draw the conclusion that novel business models in the agrifood industry are a subject of current research interest. It has been receiving more attention from researchers lately, as evidenced by the significant rise in articles on the subject since 2017, which points to the topic's potential importance as a research area in the future. Recent publications on digitisation and technological innovation have been highly cited; therefore, it is probable that this will be one of the most extensively investigated subtopics in the years to come. Certain research gaps were found from the literature evaluation and should be investigated further in the future. First off, the findings indicate that qualitative research approaches were used for the majority of the investigations. Moreover, our evaluation does not fully address the relationship between the degree of sustainable objective execution in agri-food business models and digitalization and technical innovation in these models. The only research on this subject can be found in Secundo et al.'s (2022) publication, which examines the connection between the sector's companies' digitization and their capacity to meet the Sustainable Development Goals of the UN. In a similar vein, even though the COVID-19 pandemic has spurred innovation in agri-food business models, we have noted a dearth of studies addressing issues resulting from labour or raw material shortages, potential energy crises, or external reliance on local markets for demand fulfilment. The current conflict, which started in Ukraine in 2022, has shown how inadequate international markets—primarily the European market—are to handle issues resulting from this kind of crisis.

### Limitations

This study's flaws stem from its methodology and are common to all literature reviews. First, this review may have omitted pertinent works in this field of study due to the criteria it established for time, language, publication type, and database selection. Therefore, in order to complement the findings presented in this research, it is advised that additional evaluations be conducted in the upcoming years using alternative criteria. Second, there's a chance that any inadvertent mistakes made throughout the group of researchers' numerous rounds of verification and rigorous methodology may have slipped into the analysis. The goal of this review was to examine and compile the body of research on innovative business models in the agri-food industry. Three research questions served as our guides during this process, the answers to which we present below. Finding the published literature's research profile was the aim of RQ1. We examined author, temporal, origin, technique, and contextual trends in response. We found that most of the research in the field have been published in the last few years (2020–2022), indicating a rapid increase in the number of studies in the field. We also observe that the majority of research is published in a small number of publications.

The primary methodologies employed in the literature are also summarised in the study profile. Using qualitative analytic techniques, we found that case analysis is used most frequently, while quantitative methodologies are used less frequently. Analysing the literature's major themes was the goal of RQ2. In summary, it is noteworthy that the majority of the articles analysed (55.5%) discuss business models in which agent collaboration becomes the crucial component. Sharing models, allocation models, specialisation models, and inclusive business models are a few examples of these models. We deduced three main themes, which are presented in sections 4.1 to 4.3. But a lot of these CBMs also have technology-based and/or sustainable aspects, therefore there is frequently overlap between the business models. Conversely, research gaps and future research topics were the main emphasis of RQ3. In

Section 5, we discuss the limitations of the current research and offer potential directions for future study. These are summed up in four propositions that highlight the need for more empirical work to develop more systematic approaches based on innovation and sustainability in order to address the issues raised by supply chain risks, COVID-19, and other crises as well as the primary economic, social, and environmental challenges facing the agri-food industry.

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