ISBN: 978-628-95207-8-1. ISSN: 2414-6390. Digital Object Identifier: 10.18687/LACCEI2024.1.1.338

Approaches to business innovation applied in the food industry: A brief review

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***Abstract*– Currently, innovation applied to any productive sector, and even the educational sector, evokes a multiplicity of definitions that can cause confusion among the actors involved in the process. The objective of this study is to analyze and systematize the existing literature on the different approaches to innovation in the food industry. A bibliographic search was carried out using scientific databases and studies carried out on the global innovation index, technological and organizational innovation, competitiveness and development of new products were collected. The results show the evolution that the word "business innovation" has had in recent years, and its importance to achieve competitiveness and social benefit. It is concluded that innovation is a booming topic for global markets and is achieved with ideas that generate value implemented in the different managerial, commercial, organizational and technological areas of the food industry.**

***Keywords*—food industry, administration, business innovation, technological innovation, competitiveness.**

I. INTRODUCTION

Nowadays, the word innovation, used in any area of our lives, always has a positive connotation. In general contexts, innovation is defined as everything that is significantly modified to generate value. Business innovation encompasses changes in company activities at the organizational, product, process, marketing, and business model levels, with the purpose of being more competitive in the market [1-2]. Clarifying and internalizing the concept of business innovation is not only of interest to the company manager but also to the entire work team, from the person with the highest level of authority to the person with the lowest level of authority, according to the organizational chart. company general. In this way, everyone participates in the process and the company manages to differentiate itself from its competitors by gaining more customers and increasing its market share [3-4].

According to [2] the ideas that generate value in a company can be of three types: commercial, organizational and technological. A commercial innovation is the modification of commercial strategies by creating new marketing methods or making significant changes to them, which may include improvements in the product, price, distribution and promotion. An organizational innovation is a type of open innovation (changes that occur from the outside to the inside of the company) that are based on the exchange of knowledge, as a result, the modification of management methods and systems, functions, and new external relations that the company does. The latter is carried out through the strategic decisions taken by the management of the company [5]. Commercial and organizational innovation together form the so-called non-technological innovation.

For its part, technological innovation is any scientific or technological activity that the company finances to modify products and/or processes by implementing significant improvements or novelties which will be placed on the market to generate wealth [6]. According to the Oslo Manual (2005), companies that develop commercial, organizational and technological innovations will only be called innovations if they have been successful in the target market [7].

[4] refer that innovation in business activities can be distinguished into five types: Innovation in business or management models, innovation in processes, innovation in products, innovation in markets and organizational innovation. Regarding the degree of novelty that innovations in the processes and/or products of a company can have. [8] mention that innovation is categorized into radical innovation and incremental innovation, the first being related to significant changes in the product and/or existing processes, and the second representing a severe modification in the processes and/or products that involve more money and more risk [9-10].

Given this, we can perceive that the term innovation covers different approaches depending on the business environment in which it is developed, for this reason, the objective of this literary review is to systematically analyze the approaches presented by the different authors regarding the subject of business innovation.

II. BUSINESS INNOVATION IN PERU

Innovation in Peru can be measured through the Global Innovation Index (GII), proposed by Professor Soumitra Dutta in 2007, and published annually by the World Intellectual Property Organization (WIPO, for its acronym in English). The GII measures the capacity and performance of companies in innovation considering indicators such as: Institutions, human capital and research, infrastructure, market development, business development, production of knowledge and technology, and creative production. The indicators that make up the GII give a holistic vision of business innovation in different countries, allowing to appreciate its evolution in degree of competitiveness and in other cases to refine innovation policies, so the GII should not be limited to evaluating only business investment. in research and development activities or in patent production [11].

Digital Object Identifier: (only for full papers, inserted by LEIRD).
ISSN, ISBN: (to be inserted by LEIRD).
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In 2020, WIPO ranked 131 economies based on their performance in certain aspects of innovation. At the global level, the results of the top 5 economies are shown in Figure 1, and at the South American level, they are shown in Figure 2.

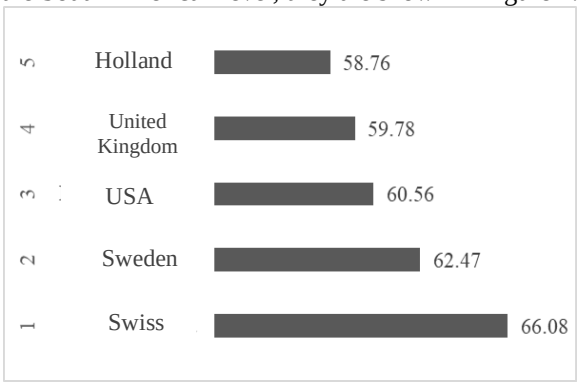

Fig. 1 Global Economic Innovation Index -Top 5.

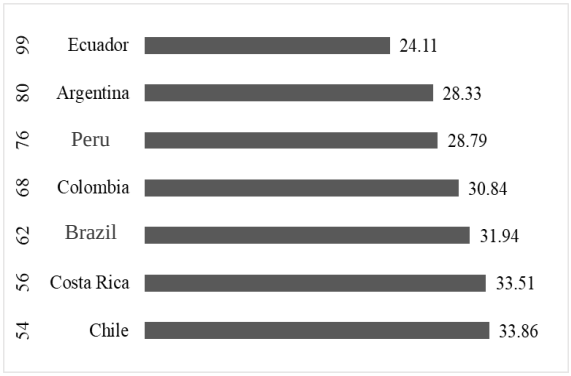

Fig. 2 Global index of economic innovation in South American countries.

The scores of the indicators evaluated to determine the GII in Peru for the year 2020 were the following: In the indicator creative production and production of knowledge and technology, values of 112 and 87 were obtained, respectively, in business development and in development of markets, 43 and 38, respectively, in infrastructure and in human capital and research, 68 and 57, respectively, and in the institutions indicator, a value of 72 [12-13]. These results by indicators allow us to appreciate that Peru presented weaknesses in market development and business development, which was strengthened by the COVID-19 pandemic that affected micro and small businesses that make up 99% of the business units in the country. Peru, 85% of jobs, and generate approximately 40% of BIP [14].

Figure 3 shows the results of the GII of Peru between the years 2011-2021.

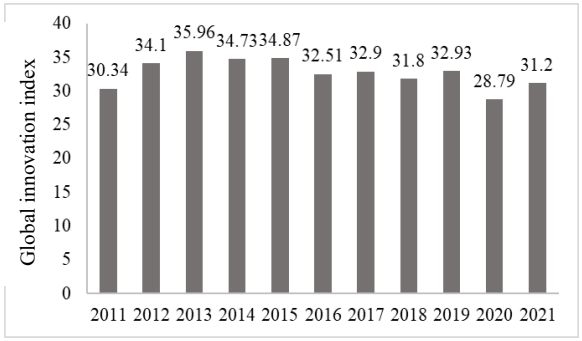

Fig. 3 Global innovation index of Peru between the years 2011-2021

As can be seen in figure 3, in 2020 Peru presented a decrease of 12.6% of the GII compared to 2019, however, the index increased slightly in 2021 reaching a value of 31.2. This slight growth could be strengthened by the actions implemented by the Peruvian government to reactivate the economy by creating support programs such as Reactiva Peru and the Business Support Fund for micro and small businesses (FAE-Mype), to grant loans with interest rates very low that oscillate between 1% and 4% per year [14]. However, even business innovation in Peru tends to be weak due to the disarticulation between academia-company-state, which does not allow collaboration and the transfer of knowledge to solve economic and social problems for the well-being of the country. The importance of academia-company-state articulation became more evident during the COVID-19 pandemic, since the solution came from investment in science and technology [15].

These events, even after the pandemic, continue to occur and are corroborated in the new WIPO list for 2023, where it was observed that Peru ranked 76th, a position similar to the one it obtained in 2020, thus dropping eleven positions. to which he obtained in 2022 (65th place) [36].

According to [37], innovations in industries in aspects such as culture, climate and processes influence business productivity, while innovation in products, services and marketing have a significant impact on the company's position in the international market. For this reason, Peru cannot yet be among the Top 5 innovative countries such as the USA, United Kingdom or Sweden, since the majority of Peruvian companies prefer to invest in the acquisition of goods (infrastructure) to achieve technological dependence, although this becomes unsustainable due to the continuous advances in science and technology; the least investment occurs at the level of human capital and research, market development, knowledge production and creativity [11].

Intellectual property is another of the characteristics that an innovative country has. Inventions are technical and practical solutions that are offered to combat a problem that afflicts societies and that often negatively influences their quality of life. Additionally, these inventions can generate economic benefits to the country where they are developed, for example, the American company The Procter & Gamble is one of the leaders in patents for the bio-pharmaceutical-

chemical sector. The appropriability of these inventions allows them to be exported to different countries, so the receipt of royalties, licenses and other payment compensation for patents are key to the socio-economic growth of the USA [38-39].

In terms of intellectual property, Peru increased the number of patents registered by 100% compared to 2022, demonstrating a notable improvement in the field of innovation. It is worth highlighting that these inventions came mainly from Peruvian universities, 30% of these requests were made by women inventors, and there were 7,389 records of collective knowledge of indigenous peoples regarding the properties, characteristics and uses of Peruvian biodiversity [40].

From a business point of view, the sector that is most innovative in Peru currently is the technology, tourism and gastronomy, and financial sectors. In 2023, business creativity awards were awarded to Procesos MC Perú for the creation of Izipay, a platform for online commercial activities, AMAK Perú, for the creation of eco-friendly accommodations, and to TAPPOYO FINTECH for the creation of credit accessible to women of few resources under the figure of a collective loan, all of them focused on the sustainable development objectives of the United Nations Organization (ONU) [41].

III. BUSINESS INNOVATION IN THE FOOD INDUSTRY

The food industry is characterized for being one of the sectors that are constantly innovating, due to the new trends in human nutrition. The evolution of healthy eating habits began in the middle of the 20th century, when it was established that the food eaten should be nutritious, healthy and without adulteration or contamination. This was further consolidated during the world wars as governments promoted a varied diet of essential nutrients to combat nutritional deficiencies and the restoration of nutrients in foods that had been lost during processing [16-17]. In recent years, the coronavirus pandemic has caused the majority of consumers worldwide to prioritize healthy foods such as fruits and vegetables to strengthen the immune system and consume in less proportion, beverages and industrialized foods with a high content of sugars, fats and/or sodium [18].

To the previously mentioned, we must add the socialization of knowledge about the relationship between food and disease that consumers have today, advances in food science and technology, regulatory policies such as the Healthy Eating Law implemented by some countries such as Peru [19], and the projection reported by [20] that mentions that in 2030 there will be 8 billion new consumers; all this context requires food companies to innovate in their different areas to be more competitive in the global market.

According to [21], the innovation carried out by food companies are not synonymous with ideas or inventions, although both are bases for innovation, they must follow a process that will generate economic and social value. The food industry innovates when it develops new products, captures new markets and customers, and/or finds new partners [22], however, at this point it is worth highlighting the difference between diversification and innovation, the first is the result of the company's innovation, since through its value can be created beyond the organizational limits. For example, a food company dedicated to the production of yogurt can innovate in its product by creating a new one or significantly modifying the existing one, adding some type of essential nutrient that favors some physiological process of the human being, but business diversification will be achieved when the company offers other dairy products to the market (vertical diversification) or offers the base inputs used for dairy products such as milk (horizontal diversification) [23].

Business innovations in the food sector are mainly of the "technological innovation" type, according to the classification of [2]. This type of innovation focuses on the innovation of the process or product, and it is the one that generates the most economic benefit for the company because it is difficult to imitate, which leads to the cycle of the product or process being maintained as a novelty in the market in a sustainable manner. The company can carry out product innovations by introducing changes in the design or manufacturing, and innovations in the process by introducing new technologies in the production processes or improving the existing process. In both cases, the innovation must be successful in the market, otherwise it will not be considered as business innovation [22].

Innovations in process and/or product can be radical innovations or incremental innovations. In the case of the product, the company carries out incremental innovation by creating value on an existing product, whether by evolving the formula, the concept or the slogan to attract consumers in a different way, these innovations are carried out gradually [24]. “Tial” is a Brazilian beverage company that renewed its visual identity through its packaging, presenting more striking colors, a new brand logo and a slogan that said "Tasty and Authentic", the latter directly communicated to consumers that its products were free of synthetic additives [25]. In radical innovation, new products or processes that differ completely from those already existing in the company break out. This type of innovation can represent a new technological paradigm, create uncertainty and even encourage the appearance of new companies, inspired by the innovation of the product or process carried out. According to [26] in most South American countries in the food sector, such as Ecuador, incremental and not radical innovations are developed, due to being developing countries, which limits the use of technologies.

As an example of technological innovation in the food sector, we can mention the launch of the Coca Cola Zero carbonated drink by The Coca-Cola Company. The Coca Cola Zero drink is an innovation of the Coca Cola original flavor product, which has been sold massively since 1953 and which contains the original ingredients of the formulation created by its founder, pharmacist John Stith Pemberton. However, with the constant changes in food in the global market and adapting to the needs of consumers, the company decided to reinvent its

original product by replacing sugars with sweeteners such as aspartame in its formulation to reduce the caloric content [27]. According to the Direct Marketing portal, 6 out of 10 drinks of the company's total sales in 2019 correspond to its products that do not have added sugar, which is why the great success of the product is inferred [28].

For its part, the Peruvian company Laive S.A. made business innovation by launching children´s bottled mineral water with Disney designs on the bottle. In this innovation process, the company had to collect information about the client, competitors and markets; which allows the connection from outside to inside the company, generating ties with customers and promoting the well-being of society [29]. Through this bottled water, the Laive company seeks to promote the consumption of water in children between 3 and 12 years of age, with an attractive, practical and innovative product that allows children to have fun so that they stay hydrated and encourage consumption healthy habits from an early age [30]. In this context, many innovations in the food sector begin through the identification of a problem and the observation of consumers who make up niche markets that are little or not served at all, such as people with chronic diseases such as anemia, lactose intolerance and gluten, and/or people with lifestyles that promote vegetarianism and veganism.

In Peru, 1.8 million women between 15 and 49 years old have anemia, as do 700 thousand children between 6 months and 3 years old. This evident problem was the motivation for the creation of an innovative product developed by the Peruvian company from Ayacucho, Agroindustrias Garay. EIRL. The NutriH cookie is the emblematic product of this company, and within its formulation it presents ingredients such as fortified wheat flour, lentils, sangrecita, Quiwicha, egg, chia, among others. In addition, they have proteins, minerals and vitamin C to improve the absorption of nutrients. In the confectionery category, the company has developed NutriH chocolate that contains 40% organic cocoa and spirulina, and which is also intended to combat anemia due to the high iron and protein content that this microalga presents [42-43]. Table 1 shows the current innovations made in food and reported in the scientific literature.

TABLE I
INNOVATIONS BY FOOD CATEGORY

Category	Problem identification	Ingredients	Characteristic of product	Final Products	Ref.
Beverage	The need to consume juices that stimulate immunity	53.12 ml of beet, 40 mL of grape juice, 1.88 mL of turmeric juice and 5 mL of lemon juice	Ascorbic acid: 14.17% and antioxidant activity of 93.94%.	Beet-based functional beverage	[44]
	Unsatisfied vegan niche market	14% finger millet, 5% sugar, 2% pineapple powder and 2% *Lactocaseibacillus rhamnosus*	Total phenolic count: 17.64 mg gallic acid (GAE)/g and flavonoids: 8.59 mg quercetin/g. High nutritional quality.	White finger millet probiotic beverage	[45]
	Lactose intolerance	Milk processed by ultrafiltration (lactose removal greater than 95%)	Decreased the viscosity and made the milk taste smoother	Milk beverage	[46]
Bakery	Excessive sucrose consumption	Base ingredients for biscuit with 1.92% Kestose	Increased texture and color in the cookies.	Sugar free cookies	[47]
	Lack of sustainability in production	Base ingredients for biscuit with partial substitution of wheat flour for 50% beer bagasse	Cookies with beer bagasse had a 20% increase in fractureability.	Cookie with beer bagasse	[48]
	Wide use of synthetic additives	Base ingredients for biscuit with 1% biosurfactant produced by *Saccharomyces cerevisiae*	Increased lipid content: 11%. Textural analysis revealed an increase in firmness	Cookies with natural biosurfactant	[49]
Confectionery	Food insecurity	Gelatin gummies with 3% freeze-dried açai	Increased proteins and minerals by 36.7% and 414.3%, respectively. Phenol content: 0.081 mg GAE g^{-1}	Gummies	[50]
	Food insecurity	Gelatin gummies with 5% spirulina	Lipids: 1.7% Minerals: 0.4% Phenolic content: 0.190 mg de GAE g^{-1}	Gummies	[50]
	Protein deficiency	Tilapia skin and rice powder	Gelatin extracted from tilapia skin contains 96.77% protein and high gel strength	Gummies	[51]

Innovation in the food industry must be based on scientific and manufacturing knowledge, and be aligned with consumer preferences to guarantee competitiveness and profitability. It is even necessary for Peruvian companies to take advantage of indigenous raw materials so that they can create innovative systems. and sustainable with a valorization approach. This can be generated from human capital, since they have intellectual competencies and skills necessary to develop new products and services; However, competitiveness cannot be achieved if human capital is only exposed to organizational routines or viewed as operational labor [52-53].

[31] carried out a descriptive investigation through case studies of five small and medium-sized companies in Colombia with the objective of relating the variable of human talent management and organizational innovation. Surveys and interviews were carried out with the actors participating in the business and innovation processes. The results showed that SMEs innovated at the organizational level between 31% and 84%, and that these innovations are mainly related to changes

in organizational practices to improve corporate performance in management processes. However, the managers of the companies mention that there is some resistance to change in the organizational component because most of these companies are family and have an unconventional organization where the unity of command and the subordinates are heirs who do not have the capacity optimal to occupy management positions. For this reason, the relationship between innovation and human talent management is not the most suitable and requires greater business capacity to establish relevant strategies in innovation activities that allow the development of the staff of small and medium-sized companies. Some of these strategies could be the establishment of a family protocol that guarantees the corresponding functions of each member of the family unit and the formation of an impartial leadership that avoids generational change with resistance to change. For [32] organizational innovation is based on knowledge of human capital, leadership, organizational culture and the structure of the organization. It is worth noting that organizational innovations and technological innovations are related to each other, since the first complements and reinforces the second, and vice versa. [33-22].

Following the classification of [4], business innovation can be divided into innovation in business or management models, innovation in processes, innovation in products, innovation in markets and organizational innovation. In this sense, an innovation in management models can be seen in the Smartphone application launched by Supermercados Peruanos S.A in 2012. This management model promoted online shopping, where customers could buy the various products offered by the company online and from anywhere, without having to travel to the company, which meant greater customer acquisition [34]. According to what was referred by the general manager of the Peruvian virtual supermarket "Doña María", in the next five years the volume of sales of virtual supermarkets will be greater than physical stores and the turnover of online supermarkets will exceed US$ 10 million. Currently, 5% of Lima people buy in supermarkets online [35].

The types of innovation in processes and products, innovation in markets, and organizational innovation that [4] propose are equivalent to technological innovation, commercial innovation, and organizational innovation, respectively, proposed by [2]. In an investigation carried out by [26] it was identified that 64.9% of food companies carry out product innovation, 56.1% in processes, 44.9% in markets, and only 31.95% in organizational innovation, despite the importance of the latter, because it allows other innovations to develop.

Finally, companies that decide to innovate face challenges that vary depending on the geographic context. In the study carried out in seven Latin American countries, it was found that the economies present inflation and instability due to political governance, which makes it difficult to meet the requirements of an informed consumer and the acquisition of more modern technology [54]; unlike Europe and Asia, which have greater financial resources for innovation, which has allowed progress in the sustainability of companies between 2008 and 2019, reducing the factors that contribute to climate change and showing that financial and innovation indicators have a significant impact on environmental performance [55]. Government strategies such as decentralization and the promotion of the European Union have made innovation instruments available, through development agencies, business incubators, technological institutes, financing funds for science, technology and entrepreneurship, which have revalued agility, flexibility and adaptation of these companies.

IV. CONCLUSION

Business innovation in Peru is limited by the disarticulation of the academic-business-state sectors, which slows down business competitiveness and economic development. Investment in science and technology, human capital and technology transfer is promising to be highly competitive in the global market.

Considering the above, the literature shows various classifications of innovation, which can be confusing for the company and make its development and implementation difficult. However, after the analysis it can be concluded that all the classifications have one point in common, innovation is to generate economic value in the company through significant changes in processes and/or products, at the organizational and commercial level.

Companies in the food sector face constant changes due to new consumer eating trends, which implies innovating in their processes, products, organization and marketing to sustainably maintain themselves in the global market and differentiate themselves from their competitors.

Innovation is a process that must be understood by company personnel for its successful application, reflected in continuous training, high market share, product positioning, economic benefits, among others. Large companies develop all types of innovation more continuously than small and medium-sized companies; however, this can vary if they bet on areas of innovation, being able to outperform large companies.

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