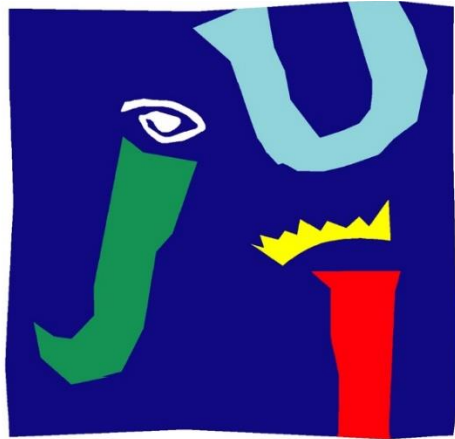


# Advances in Food Safety: Supermarket Awareness and Evaluation Study



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## ABSTRACT

This paper investigates the evolution of food safety with a focus on consumer awareness and practices in a specific supermarket. Consumers' perceptions are examined through surveys and qualitative analysis, highlighting their understanding of food safety and their expectations regarding the products they consume. In addition, the strategies implemented by the supermarket to ensure food quality and safety are analyzed, assessing their effectiveness and alignment with the UN Sustainable Development Goals (SDGs). This paper also highlights the importance of consumer education and transparency in business practices to strengthen consumer confidence and promote more sustainable practices in the food sector. This study contributes to a deeper understanding on how awareness and business practices can collaborate in the continuous improvement of food safety and sustainability.

## KEY WORDS

1. **Sustainability:** The ability to maintain a balance in the use of natural resources in order to meet current needs without compromising the needs of future generations.
2. **Food security:** Ensuring that all people have economic, physical and social access to sufficient safe and nutritious food that meets their dietary needs and preferences for a healthy and active life.
3. **Progress:** Referring to progress, improvement or development in terms of food security and sustainability, marking a movement towards specific targets and improved conditions.
4. **SDGs (Sustainable Development Goals):** Set of global goals established by the UN to address global challenges such as inequality, climate change, poverty, peace, justice and environmental degradation.
5. **Awareness-raising:** Process by which people are informed, educated and sensitized about specific issues, in this case food security and sustainability, with the aim of bringing about behavioral and policy changes that promote more responsible and sustainable practices.

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# **INTRODUCTION**

## **1-. CONTEXT**

Over the years, food safety has become a growing concern worldwide, both for companies in the food distribution sector and for consumers themselves. Food safety encompasses a range of measures and practices designed to ensure that products are safe for humans to consume, minimizing the risks of contamination, illnesses transmitted through food and adulteration.

Food safety is important as it has a direct impact on public health, the sustainability of the food chain and consumer confidence. The amount of illnesses transmitted through food, the increasing awareness of environmental risks related to production and the distribution, and concerns about product authenticity and quality have increased the need to address this issue comprehensively.

Therefore, in this context, the growing importance of this topic in today's society increases my interest in researching food safety, its advances and its implications for consumers and retailers. As a student of economics, I find it fascinating to investigate the practices and policies that make food safety be changing and advancing in response to consumer's needs and technological advances.

It is also worth noting that the retail sector plays an essential role in the food chain, acting as an intermediary between producers and consumers. Therefore, it is key to understand how these companies approach food safety and how they communicate this information to their consumers to understand the current and future landscape of food safety.

## **2-. JUSTIFICATION**

Having been able to make an internship at a food certification company that worked internationally, I have been able to see the critical importance of food safety in today's food industry. The company worked diligently to ensure that the food produced and distributed met the quality and safety standards in compliance with national and international regulations.

During my internship, in addition to gaining invaluable professional experience, my curiosity and interest in food safety has also been increased. By working with industry professionals, participating in certification processes and learning about the complexities that exist in the food supply chain, I have become aware of the many opportunities and challenges that exist in this area.

Inspired by my experience, I decided to conduct a research project on food security. My goal was to deepen into this currently important topic, exploiting its advances, dimensions and challenges.

With my Final Degree Dissertation, I would like to be able to contribute to the body of knowledge that exists in this field and be able to provide useful and relevant information for professionals, consumers and companies that may be interested in this topic.

The goal of my dissertation is not to be a definitive answer to all questions related to food safety. Rather, it aims to be a starting point that will open a new world of questions and possible future research.

### **3-. OBJECTIVES**

My decision to carry out a Final Degree Dissertation on food safety arose from a mixture of personal and professional motivations, and also as a recognition of the current importance of this topic in our society.

First of all, having been able to do an internship in a food certification company was crucial to drive this research project. During those months, I was able to delve into the world of food safety and become familiar with the processes, regulations and standards that rule this area. Knowing that I had valuable knowledge and resources available to me from the company and my colleagues, I took the opportunity to obtain useful information and documents to help me support my research and enrich my work.

In addition, choosing this topic for the Final Degree Dissertation has also been because it is a highly current and constantly developing topic. Researching on this topic allows me to keep up to date with the advances, challenges and emerging trends in the food industry, in a world where there is an increasing concern about food quality, safety and provenance.

Another important objective that has led me to undertake this work is to explore consumer awareness of food safety and how this may vary between different social groups. Therefore, my research seeks to analyze whether it is true or not that there is a significant difference in food safety awareness among different consumer groups, and if so, to analyze the factors that influence these differences.

In conclusion, the main objectives for which I have decided to carry out this dissertation have been to take advantage of the experience I have gained during my internship, to explore such a current and constantly developing topic, to analyze the differences in awareness among different groups of consumers, and how this affects large retail companies.

# **THEORETICAL FRAMEWORK**

## **1-. HOW AND WHEN FOOD SAFETY AROSE**

In order to deepen into the history of food security, it is essential to have a clear understanding of its general concept.

The Food and Agriculture Organization of the United Nations states that food security occurs when everyone has permanent physical, social and economic access to nutritious, safe and sufficient food to meet their nutritional needs and food preferences, as well as to lead an active and healthy life (UN, 1996).

This is why we relate the concept of food security to the availability of food, its nutritiousness, safety and wholesomeness.

Therefore, we understand that food security is the availability of nutritious, safe and sufficient food for everyone at any time they want it. Over the years, humankind has experienced significant challenges in ensuring that adequate food is available to everybody. Progress in food security shows changes in agricultural practices, technological and scientific advances, and public policies.

### **1.1-. BEGINNINGS OF THE HISTORY OF FOOD SAFETY**

Food security is an essential aspect that influences all societies and times. Throughout history, the way societies have managed the production, storage and consumption of food has been vital to their survival and well-being.

From basic methods of hygiene in ancient civilizations to today's complex regulations, the history of food safety shows a steady progression driven by scientific and technological progress, as well as by the response to emerging challenges. This historical journey allows us to understand how we have arrived at today's standards and the importance of constant innovation to ensure that the food we consume is safe and wholesome.



### **1.1.1-. EARLY CIVILIZATIONS AND FOOD SECURITY**

In ancient societies, food security relied mainly on subsistence agriculture. Agricultural societies such as those rooted in the Nile Valley, Mesopotamia and the Indus Valley implemented risk systems and grain storage methods to ensure constant food production. Even so, famines were still present due to war conflicts, plagues and different climatic factors. The first signs of food safety regulation that have persisted to this day are present in Kosher or Halal practices, which determine what it is forbidden and what it is allowed (Bianchi & Szpak, 2016).

### **1.1.2-. MIDDLE AGES**

During the Middle Ages, food shortages were still present in Europe and in different parts of the world. Agricultural practices were traditional, so food production was vulnerable to climatic changes and pests. Even so, the establishment of feudal systems and the union of territories helped to partially stabilize the food production.

Below, we list and detail, according to Bianchi & Szpak (2016), three important moments of the Middle Ages, which are strongly related to food security.

### **1.1.3-. AGRICULTURAL REVOLUTION**

In the 18th century, the Agricultural Revolution reflected a key transformation in food stability. The application of innovative strategies such as crop rotation, the use of fertilizers and the mechanization of agricultural work increased the productivity greatly. These advances reduced hunger in Europe and contributed to population growth.

### **1.1.4-. INDUSTRIAL REVOLUTION AND URBANIZATION**

The arrival of the Industrial Revolution marked a milestone in history by promoting urbanization and changing food production and consumption patterns. Advances in transportation and preservation, such as the implementation of refrigeration systems, facilitated the distribution of food over long distances. However, this progress also

brought with it new challenges in terms of food safety, such as the proliferation of risks associated with contamination and diseases produced by food.

The term “food security” emerged with greater prominence after World War II, focusing on ensuring adequate access to food for the entire global population. Although initially focused on food availability, it is noted that there were long-standing concerns related to the quality and safety of food products.

Thus, an examination of the period from the late 17th to the 19th century reveals a remarkable interest in food preservation research. Likewise, there is evidence of the progressive implementation of measures aimed at improving food safety and quality, together with the strengthening of regulatory standards in this area.

#### **1.1.5-. EVOLUTION OF FOOD SAFETY IN SPAIN**

If we talk about Spain, we can highlight the following points:

- In 1371 the “Llibre del Mostassaf de la Ciutat de València” was published, recognized by the Triptolemos Foundation as one of the first medieval codices dealing with food safety. This text includes measures to avoid cross-contamination, such as the separation of slaughterhouses and yards where animals are housed.
- During the 15th and 16th centuries, slaughterhouses began to be established that had to comply with various hygienic standards.
- In the 17th and 18th centuries, a sanitary stage was developed with important advances worldwide in the microbiology of food. Also, in this period, the fight against adulteration of food products began in several European countries.

#### **1.2-. THE NINETEENTH CENTURY, THE GREAT CHANGE**

During the 19th century, Spain experienced numerous advances in the field of food safety, mainly related to hygiene and public health, concepts that today are associated with food safety.

Among the most notable milestones (Sanz Lafuente, 2006) are the following:

- In 1840, the Madrid City Council appointed the first vets for meat inspection.
- In 1842, a Regulation for the inspection of food of animal origin was promulgated.
- In 1855, the General Health Law was presented.
- In 1859, a specific regulation for meat inspection was implemented, establishing the responsibilities of inspectors and the obligation to have slaughterhouses in municipalities with more than 2,000 inhabitants.
- Throughout the century, numerous scientific texts and manuals were published in Spain related to food inspection.
- Globally, the 19th century witnessed the development of sterilization and pasteurization methods, which would later have a significant impact on food safety.

Therefore, during this century, the focus of food safety in Spain was on ensuring the absence of pathogenic microorganisms and preventing fraud.

### **1.3-. ADVANCES DURING THE TWENTIETH AND TWENTY FIRST CENTURIES**

As in many other scientific fields, food safety experienced a remarkable development throughout the 20th century. According to Bianchi & Szpak (2016), we can highlight the following advances in the scientific field:

- Optimization of food packaging techniques.
- Improvements in analysis techniques and inspection systems.
- Fight against the increase in food- and animal transmitted diseases.
- Emergence of new food products, especially in the processed food sector.
- Research on food additives.
- Study of microorganisms such as *Escherichia coli*, salmonella, among others.
- Progress in food preservation, with the implementation of new techniques in the food industry.
- Implementation of quality and food safety self-monitoring systems within the industry.

Simultaneously, significant progress has been made in both the legal and institutional spheres. According to Bianchi & Szpak (2016), some key points include:

- In 1907, the International Bureau of Public Hygiene was established.
- Between 1943 and 1945 the FAO, the Food and Agriculture Organization of the United Nations, was created.
- In 1948, the WHO, the World Health Organization, was founded.
- The Codex Alimentarius, a collection of international food standards designed to protect the health and economic interests of consumers and to ensure fair trade practices in the food industry, began to be developed in 1962.
- In Spain, the Spanish Food Code (CAE) was approved by Decree 2484/1967, focusing on consumer protection.
- In 1984, consumer and user protection was strengthened.
- In 1995, Decree 2207/95 was enacted, establishing hygiene standards for food products.
- There are several laws at state and autonomous community level related to food safety and consumer rights.

### **1.3.1-. RAPESEED OIL, THE CRISIS THAT CHANGED THE COURSE OF FOOD SAFETY**

Canola oil, derived from the seeds of the Brassica napus plant, is an essential element in the food industry. Also known as canola oil, it has gained worldwide recognition thanks to its nutritional profile and versatility in cooking.

#### Development and Transformation

Historically, in ancient times, rapeseed oil found its use both as a fuel source and in the gastronomy of the Roman Empire. During the turbulent years of World War II, its demand had a sudden increase in Europe due to a shortage of other vegetable oil options. However, concerns about elevated levels of erucic acid in some rapeseed variants catalyzed the development of varieties with reduced levels of this compound, thereby improving its safety and acceptability. This development led to the oil being renamed

canola in some regions, in a gesture of recognition of its Canadian origin and low erucic acid content.

### Nutritional Benefits and Usage

Canola oil has the distinction of being low in saturated fat and rich in monounsaturated and omega-3 fatty acids, all of which are recognized for their cardiovascular health benefits. Its mild flavor and high smoke point make it perfect for frying, baking and salad dressing, which has driven its use in a wide range of food products, from margarines and mayonnaise to pastries and snacks.

### Food Safety Impact

Canola oil makes a significant contribution to global food security. Its accessible and economical production helps meet the dietary needs of millions of people, decreasing the dependence on other imported oils. In addition, canola cultivation improves soil health and encourages crop rotation, promoting sustainable and safe agricultural practices.

As a whole, rapeseed oil is an essential component of the world's food supply, standing out for its nutritional benefits and its role in food security. Its evolution and development highlight the importance of innovation in agriculture and the food industry (Smith, 2020).

## **1.4-. FOOD SAFETY IN THE 21ST CENTURY**

The beginning of the 21st century witnessed a collective awakening among consumers, accompanied by a stricter implementation of measures in the food industry. Despite these advances, food safety challenges persisted, putting the effectiveness of control systems into the test. Events such as the “mad cow” outbreak or Bovine Spongiform Encephalopathy (BSE) are indelibly etched in the memory of the field.

As a result, the development of food safety has undergone a remarkable transformation in both legislative and scientific terms. The optimization of control and production

procedures, together with increased public awareness, has led to the development of safer and risk-free food for everyone.

However, food safety remains a global challenge. Despite the increase in global food production, fundamental problems related to unequal distribution and limited access to food persist. Climate change, armed conflicts and economic crises act as factors that aggravate food insecurity in various regions.

Current policies are focused on ensuring food safety, promoting agricultural sustainability and improving supply chains. Precision agriculture, biotechnology and sustainable agricultural practices represent areas of research and development with promising potential to strengthen food security in the future.

The history of food security is a narrative marked by progress and persistent challenges. From ancient times to the present, humanity has sought to ensure a stable and secure food supply. In the face of new global challenges, innovation and international collaboration are presented as essential pillars to ensure food security at a global level, thus contributing to the improvement of humanity's quality of life (Bianchi & Szpak, 2016).

### **1.5-. THE FUTURE OF FOOD SECURITY**

As we focus on the future of food safety, we anticipate a remarkable integration and application of cutting-edge technologies, such as artificial intelligence and biotechnology, in all aspects of agricultural production and the food supply chain. These new trends promise to transform the way food is grown, processed, distributed and consumed, with potentially significant implications for food safety and quality.

More specifically, artificial intelligence presents the potential to radically change agriculture through process optimization, early detection of crop diseases, monitoring of weather conditions, and efficient management of resources such as water and fertilizer. This could not only increase the productivity and efficiency of agricultural systems, but also decrease the risks associated with crop loss and the spread of diseases, thus contributing to food security worldwide.

Moreover, biotechnology presents new tools to strengthen crop resistance to diseases, pests and adverse environmental conditions, while at the same time improving their

nutritional value and sensory quality. In addition, genetic manipulation and synthetic biology could facilitate the creation of entirely new crops that are more adaptable to the changing market and new environmental requirements.

In this context of technological advances, international policies and regulatory systems are expected to be strengthened to ensure food safety and quality. Cooperation between governments, international organizations, the private sector and civil society will be essential to address emerging challenges such as climate change, urbanization and the growing demand for food in an increasingly populated and connected world.

In summary, the future outlook for food security suggests a scenario full of opportunities and challenges. Technological innovation, international cooperation and commitment to sustainability will be key factors in building safer, more adaptable and sustainable food systems for next generations (Smith, 2020).

## **2-. THE IMPORTANCE OF FOOD SAFETY CERTIFICATION**

Obtaining food safety certifications is a key element in ensuring the success and reputation of new food companies. By obtaining the backing of the appropriate certifications, these entities not only demonstrate their commitment to the highest standards of food safety, but also establish a strong relationship of trust with consumers. Below, some essential aspects to consider during the certification process will be briefly outlined (FasterCapital, n.d.):

- Adherence to current standards: Food safety certification ensures that start-ups follow the guidelines and regulations set by the relevant authorities. This aspect ranges from proper food handling, storage and preparation to maintaining optimal hygienic conditions at all stages of production.
- Reputation building: Obtaining the appropriate certification gives emerging companies a significant competitive advantage by demonstrating their unwavering commitment to food safety. This provides customers with the assurance that the products offered meet rigorous quality standards, thus promoting consumer loyalty and confidence.

- Building trust: In an environment where concerns about food safety and contamination are on the rise, consumers are increasingly aware of the safety practices implemented by companies in the industry. Obtaining the appropriate certification provides consumers with a sense of security and peace of mind, knowing that products have undergone rigorous inspections and audits to ensure their safety.
- Opening up new markets: Many distributors and retailers now require food safety certification as an initial step in establishing business relationships. By obtaining this certification, companies can have the opportunity to expand their market reach and explore new areas for growth and development.
- Promoting continuous improvement: The certification procedure generally involves regular audits and evaluations, which motivates companies to constantly improve their food safety protocols. This constant learning process ensures an optimal safety standard for consumers, which in turn fosters trust and brand loyalty.

To exemplify these points, consider the case of an emerging organic baby food company. By obtaining food safety certification, this company not only reassures parents by guaranteeing the absence of dangerous contaminants and compliance with rigorous quality standards, but also consolidates its brand reputation and generates trust among consumers, encouraging them to choose its products over those of its competitors.

### **3-. FOOD SAFETY CHALLENGES**

As confirmed by the specialists at the AINIA Technology Center (The Food Tech, n.d.), the challenges in food safety are:

- The global food landscape is undergoing an accelerated transformation due to the rapid increase in demand and international food trade. However, this growth also brings with it a worrying increase in diseases produced by food, posing a future where public health is threatened.



- The increase in global demand for food and the expansion of trade present significant challenges. These challenges are not only reflected in trade terms, but also have a direct impact on health and the economy. The costs associated with disease caused by food outbreaks are significant, affecting the productivity and reputation of specific sectors, products and companies.
- At the same time, there is an increasing dependence on imports of food raw materials, especially from less developed countries, where hygiene and quality standards may be low. This situation raises significant food safety concerns.
- An additional major challenge is the emergence of antibiotic-resistant bacteria, constituting a global threat to public health. The rapid spread of these strains, driven by global interconnectedness, represents an imminent danger. The presence of resistant pathogens in food increases the risk of outbreaks and deaths associated with these infections.

#### **4-. NON-CERTIFIED FOODBORNE DISEASES**

Non-certified foodborne diseases (NCDs) pose a major challenge to public health worldwide. These diseases result from consuming food contaminated with harmful microorganisms such as bacteria, viruses, parasites or toxins. Non-compliance with food hygiene and safety standards contributes to the spread of these pathogens in food, thus raising the risk of illness among the population.

A typical case of non-certified foodborne illness is salmonellosis, caused by *Salmonella* bacteria. This bacterium can be present in a large variety of food, such as undercooked meats, eggs, unpasteurized dairy products and contaminated fresh vegetables. Salmonellosis can manifest with symptoms such as fever, diarrhea, vomiting and abdominal pain, and in severe situations, it may require hospitalization.

Another significant illness is food poisoning caused by *Escherichia coli* (*E. coli*) bacteria. This microorganism can contaminate raw or undercooked meat, as well as unpasteurized dairy products and fresh vegetables. *E. coli* poisoning can manifest with severe symptoms such as bloody diarrhea, fever, vomiting and, in more severe cases, kidney failure, especially in young children and adults.

Preventing uncertified illnesses caused by food requires careful attention to food safety at all stages of the production chain, from agricultural production to final consumption. Public health authorities and regulatory agencies play an indispensable role in implementing and enforcing regulations and controls to ensure food safety (CDC, 2021).

## **5-. SUSTAINABLE FOOD: WHAT IT IS AND HOW TO ACHIEVE IT**

Food security comprises a broad and complex concept that deals with the availability, and use of food in a healthy and nutritious way to meet the dietary needs and food preferences of everyone, at all times and in all situations. It ensures that people have physical and economic access to a sufficient quantity of safe and nutritious foods that meet their dietary requirements and tastes for an active and healthy life.

This issue is analyzed from various perspectives, ranging from food production and distribution to food consumption and associated public policies. Currently, food security is an issue of great importance on the world agenda, given that it impacts both public health and the economic and social development of countries.

From an economic point of view, food security is closely linked to food production, distribution and consumption, as well as to the factors that influence these processes, such as food prices, availability of natural resources, agricultural and trade policies, among others. Economists play a crucial role in the analysis and design of policies related to food security, as they seek to maximize efficiency and equity in the production and distribution of food, while ensuring environmental sustainability and fair access to food (Sen, 1986).

Some tips for achieving sustainable food could be (University of La Rioja, n.d.):

- Opt for higher quality meats. Choose animal products from extensive livestock farming systems, where animals are grass-fed. In addition to being more sustainable, these practices contribute to lowering atmospheric methane concentrations and improving soil health.
- Consume local products. By preferring local products, it is not only reduced the environmental impact, but it is also strengthened the economic and social impact on our community.

- Reducing the amount of animal-derived foods in our diet is fundamental. These products are the main generators of greenhouse gas emissions and their consumption often exceeds nutritional recommendations. An excellent sustainable and easy-to-implement alternative is to replace animal-derived foods with legumes, which offer a high protein content with a high biological value.
- Opting for seasonal products, as they guarantee freshness, quality and more convenient prices. By preferring local foods at their best moment of ripeness, we contribute to responsible consumption and support the producers of our region.
- Reducing the purchase of processed products is key for having sustainable diet, giving priority to fresh options.
- Opting for food grown in an agroecological manner ensures responsible use of the soil, without the use of harmful chemicals.
- Supporting fair trade is essential to promote economic and social sustainability in producing nations.
- Avoiding the purchase of food transported by air is crucial due to its high carbon footprint per kilogram of product.
- Reducing household food waste not only leads to lower consumption, but also minimizes its environmental impact.
- Buying products in bulk, because the shelf life is shorter and should be properly preserved after purchasing to avoid problems. This reduces the impact of packaging.

Although they may seem insignificant on their own, all these changes, when taken together, have great positive consequences for the preservation of our planet.

## **6-. SDGs: INNOVATION TO ACHIEVE THE 2030 AGENDA**

### **6.1-.SDGs: ¿WHAT ARE THEY?**

The Sustainable Development Goals (SDGs) were launched in 2015 by the United Nations as an international response to the effects of globalization and industrialization. This plan was created to ensure a more prosperous and sustainable future for everyone. The SDGs include 17 specific goals, each with detailed targets that address global issues

such as poverty, climate change, peace, justice, inequality and environmental degradation. These goals are interconnected, so that actions in one area can impact outcomes in other areas.

The implementation of these goals seeks to balance economic, social and environmental sustainability. In 2000, the United Nations defined eight goals, known as the Millennium Development Goals (MDGs), aimed at meeting the basic needs of the most disadvantaged. These goals were (MDGs, 2000):

- Improving maternal health
- Ensuring environmental sustainability
- Achieving universal primary education
- Reducing child mortality
- Eradicating extreme poverty and hunger
- Promoting gender equality and women's empowerment
- Developing a global partnership for development
- Combating HIV, malaria and other diseases

Fifteen years after the presentation of these goals, in 2015, the United Nations presented the 2030 Agenda, which included the SDGs. The 17 goals of this agenda are:



United Nations (2015). The 17 Sustainable Development Goals.

The SDGs cover various stages of social progress, economic growth and environmental protection. Their main aspirations are (ACCIONA, n.d.):

- Decreasing global inequalities, with a particular focus on gender equality.

- Promoting development opportunities through inclusive education and decent jobs.
- Eliminating poverty and hunger by ensuring a healthy life for all.
- Protecting the environment by addressing climate change and preserving terrestrial and marine ecosystems.
- Driving innovation and develop resilient infrastructures, creating sustainable communities and cities in terms of production and consumption.
- Ensuring universal access to basic services such as clean water, sanitation and sustainable energy.

To improve our health, it is essential to make changes in our food system, in the overall quality of the diet and in the nutritional status of the population. Adopting good nutrition ensures well-being and the development of human's potential. Within the SDGs, there are 7 goals that are closely linked to food. They are the following ones (Food Alliance, n.d.):

#### GOAL 1: ENDING POVERTY

Eliminating poverty globally means ensuring that all people have equitable access to essential services, natural resources, land and technologies. In addition, it is crucial to improve access to fruits and vegetables to raise the nutritional quality of the population.

#### GOAL 2: ZERO HUNGER

The world is not making an adequate progress towards eradicating hunger by 2030. It is vital to increase agricultural productivity and promote sustainable food production to reduce the risk of hunger. There is a need to update dietary guidelines in all countries and promote nutrient-dense foods that are affordable.

#### GOAL 3: HEALTH AND WELL-BEING

Globally, chronic non-communicable diseases, such as hypertension and type 2 diabetes, are responsible for the majority of premature deaths, with obesity and poor diet

being influential elements. However, adopting healthier lifestyle habits, such as a diet rich in fruits, vegetables and plant proteins, combined with increased physical activity, can be beneficial for health at all stages of human development.

#### GOAL 4: QUALITY EDUCATION

There is a strong connection between education and food, since poor nutrition has a negative impact on the learning process and academic performance. Educational institutions present themselves as optimal environments to instruct on healthy and sustainable eating habits, as well as to provide knowledge on the proper preparation and consumption of nutritious foods.

#### GOAL 6: CLEAN WATER AND SANITATION

It is imperative to move towards sustainable water management in food production. This resource is essential not only for human consumption, but also because approximately 70% of the world's freshwater supply is used for agricultural activities. Optimizing food production processes can also reduce contamination of aquifers and contribute to preserving and improving water quality.

#### GOAL 10: REDUCTION OF INEQUALITIES

Ensuring adequate nutrition involves maintaining an optimal energy balance, which may differ by geographical region. Nutrition plays a key role in the health and growth of communities, so it is crucial to work on reducing disparities in accessing to safe and nutritious food.

#### GOAL 13: CLIMATE ACTION

Agricultural and livestock activities are closely related to climate change. It is essential to mitigate greenhouse gas emissions from these sectors and to adopt food production

systems that are resilient to climate change. This leads to more holistic production, where agriculture is intertwined with aspects such as energy, nutrition and food security.

## **6.2-. HEALTHY EATING: BUSINESS MODELS LEADING INNOVATION IN SDGs**

The benefits of adopting healthy eating are innumerable: it reduces the risk of disease, slows the aging process, improves mood and reduces fatigue, among others. Society is increasingly aware of these benefits, especially after the 2020 pandemic, with 80% of Spaniards showing greater concern for their health and opting for a healthier diet.

In response to this demand, companies in the food sector are increasingly betting on offering healthy and organic products. These companies are implementing several innovations to adapt to this new reality, such as reducing the use of fertilizers, lowering sugar levels in their products and promoting local food.

This trend, coupled with more efficient management in social and environmental terms by the food industry, and the drive towards healthier products, is radically transforming the food sector [Confidential personal communication].

### **6.2.1-. INNOVATIVE TRENDS IN THE HEALTHY FOOD MARKET**

The change in lifestyle habits towards healthier choices and the growing concern for sustainability are having a significant impact on the agri-food market. Consumers are demanding organic products from companies, made with natural ingredients and meeting specific ethical standards. In Spain, the consumption of organic products has experienced a significant increase, placing us among the ten countries with the highest demand for these products.

In addition to consumer demand, there is an additional pressure from government authorities. Governments and public bodies recognize the benefits of maintaining a healthy population and, therefore, are promoting strategies and regulations that encourage the production and consumption of this type of products [Confidential personal communication].

### **6.3- THE EUROPEAN GREEN DEAL**

The European Green Deal represents an ambitious initiative of the European Union to bring about a transformation towards economic sustainability on the continent. Presented by the European Commission, this proposal aims to address contemporary environmental and climate challenges by promoting a modern, resource-efficient and competitive economy.

#### Origin of the European Green Pact

On December 11, 2019, Ursula von der Leyen, President of the European Commission, unveiled the ambitious European Green Pact. This plan emerges as a forceful response to the growing global alarm about climate change and the environmental crisis. Its purpose is clear: to place Europe at the global top in terms of sustainability. This agreement seeks not only to mitigate environmental impacts, but also to establish a comprehensive framework that will put the European Union on the path to climate neutrality by 2050.

#### Main Objectives

The European Green Pact sets out a series of interconnected goals aimed at reshaping the continent's economy. Among them, the following stand out:

- **Climate Neutrality by 2050:** The pact's main objective is to make Europe the first climate-neutral continent by 2050. This implies reducing the greenhouse gas emissions to net-zero levels.
- **Sustainable Economic Growth:** The aim is to promote economic growth that does not depend on the depletion of natural resources. This will be achieved through the adoption of a circular economy, in which products and materials are reused and recycled rather than discarded.
- **Clean and Affordable Energy:** To revolutionize the European energy landscape by promoting renewable energy sources, boosting energy efficiency and reducing dependence on fossil fuels.



- Sustainable Mobility: Implement more environmentally friendly and efficient transportation systems, encouraging the adoption of electric vehicles and other low-emission transportation alternatives.
- Ecosystem Protection and Restoration: Safeguard biodiversity and restore degraded ecosystems, ensuring that economic activities do not harm the environment.
- Farm to Fork Strategy: Forge an equitable, healthy and environmentally friendly food system. This includes reducing the use of pesticides and chemical fertilizers, as well as encouraging sustainable agricultural practices.
- Just Transition: Ensure that the shift to a green economy is inclusive and equitable, supporting the regions and communities most affected by this transformation.

### Implementation and Challenges

To achieve these goals, the European Commission has designed a detailed action plan covering a wide range of specific policies and measures. These include regulatory reforms, financial stimuli and the mobilization of both public and private investments. It is estimated that around 1 trillion EUR in sustainable investments will be required over the next decade to achieve the targets set.

However, the European Green Pact faces a number of challenges, such as the need to ensure collaboration between member states, the involvement of all economic sectors and public acceptance. The transition to a greener economy could entail significant short-term costs, but the long-term benefits in terms of public health, job creation and preservation of the natural environment are incalculable.

In short, the European Green Pact represents a comprehensive and ambitious roadmap to sustainability. Its goals reflect a firm commitment to environmental protection and the fight against climate change, aspiring to make Europe a world leader in this field (Gómez, 2020).

#### **6.4-. THE EUROPEAN STRATEGY: 'FROM FARM TO TABLE'**

The Farm to Fork Strategy stands out as a major initiative of the European Commission, aiming to revolutionize the European Union (EU) food system towards a sustainable, fair and healthy model. This strategy represents a key component of the aforementioned European Green Pact, the EU's ambitious plan to address the challenges of climate change and environmental degradation.

##### Origin and Development

The European Commission announced the official launch of the Farm to Fork Strategy on May 20, 2020. In addition, the COVID-19 pandemic, by highlighting weaknesses in the global food system, has accelerated the need for a more resilient and sustainable approach to food production and consumption.

##### Main Objectives

The Farm to Fork Strategy is based on a series of ambitious and multifaceted objectives that span from agricultural production to final consumption. Its main goals include:

- **Pesticide and Fertilizer Use Reduction:** In line with the strategy, it aims to reduce by 50% the use of chemical pesticides and by 20% the use of fertilizers by 2030. This objective aims to mitigate adverse impacts on biodiversity and human health.
- **Promotion of Organic Agriculture:** The aim is for at least 25% of agricultural land in the EU to adopt organic methods by 2030. This measure is aimed at promoting environmentally sustainable agricultural practices and reducing dependence on chemical inputs.
- **Improving Animal Welfare:** The strategy focuses on establishing guidelines to radically improve animal husbandry and transport conditions, advocating livestock practices that are ethical and responsible in their entirety.
- **Reducing Food Waste:** An ambitious goal of halving food waste by 2030 is pursued. This will be achieved by implementing policies and practices that

optimize the supply chain and promote more conscious and sustainable consumption.

- **Promoting Healthy and Sustainable Diets:** The strategy advocates a transition to more balanced and sustainable diets, encouraging a reduction in the consumption of meat and ultra-processed foods, and promoting an increase in the consumption of fruits, vegetables, legumes and whole grains.
- **Research and Innovation:** Research and innovation in sustainable agricultural technologies, circular food systems and nature-based solutions will be actively promoted as an integral part of the strategy.

### Implementation and Challenges

The implementation of the Farm to Fork Strategy requires a close collaboration between member states, EU institutions, farmers, food companies and consumers. Coherent policies and adequate funding will be crucial to achieve the set objectives.

However, the strategy faces a number of challenges. These include resistance from certain agricultural and agro-industrial sectors, disparities in economic and technical capabilities between member states, and the need to reconcile environmental sustainability with economic profitability.

### Expected Impact

If successfully implemented, the Farm to Fork Strategy could establish Europe as a world leader in food sustainability. It is anticipated that it will not only improve public health and environmental protection, but also strengthen the resilience of the food system for future crises and contribute to climate change mitigation.

In summary, the Farm to Fork Strategy represents a comprehensive effort to transform the EU food system, addressing environmental, health and economic challenges. Its success will depend on political will, cross-sectoral collaboration and the commitment of all actors involved (European Commission, 2020).

# **CASE STUDY**

## **1-. INTRODUCTION TO THE CASE STUDY**

The best way to understand how something is affecting today is to observe its impact on people and businesses working day to day. By analyzing how ordinary consumers and everyday businesses interact with trends and changes in food safety, we can get a realistic and practical view of their influence.

Studying people in their daily lives and companies in their day-to-day operations allows us to see firsthand how they adapt to new standards, expectations and challenges. This approach provides us with concrete and relevant data that reflects the reality of the marketplace, beyond theories and assumptions. It is in this context where we can truly appreciate how current decisions and behaviors are shaping the future of food safety and sustainability.

Typically, a traceability study follows a forward direction, from the most to the least, in this case, starting with companies and ending with consumers. This traditional approach analyzes how companies' decisions and practices affect consumers' habits and behaviors. However, in my case, I have decided to conduct a reverse study.

The study will start by analyzing consumers through a survey. This initial analysis will permit to understand their opinions, preferences and habits related to food safety and sustainability, and their opinion about local products.

From the results obtained, it will be explained how this consumer behavior influences the practices and policies of companies involved in food production and sales.

This inverse approach provides a valuable perspective on how consumer expectations and demands can drive changes in the food industry, highlighting the importance of understanding the consumer to promote more responsible business practices aligned with market needs. It is also worth noting that understanding the level of awareness and knowledge that people have on this topic allows us to identify areas where further intervention or education is required.

In this analysis, it is aimed to demonstrate how consumers are becoming increasingly aware of the importance of the food they eat. They are looking much more closely at the provenance and nutritional value of the products they choose, and this is influencing their purchasing decisions. They are also considering the way supermarkets and other food companies work, preferring those establishments that adopt sustainable practices.

This analysis therefore seeks to highlight how consumer behavior is putting pressure on food companies to adopt more responsible and sustainable practices. Those businesses that do not adapt to these demands risk losing customers and facing criticism for failing to meet the increasingly high standards of quality and sustainability demanded by today's conscious consumers.

## **2-. SYSTEM METHODOLOGY**

In order to test food safety developments related to consumers and their purchases, a survey has been conducted with the 'Forms' platform. With this approach accurate and relevant information needed about consumers will be obtained, which is essential to understand their perceptions, experiences and behaviors around food safety better.

Food safety is a very important area that spans from food production and processing to food distribution and consumption. Ensuring that food is safe involves a series of regulations and controls that must be complied with at every single stage of the food chain. However, consumer perceptions and experiences are essential in evaluating these processes and identifying areas for improvement or progress.

A survey has also been designed in such a way that detailed information can be collected on different aspects of food safety. This covers different questions about the importance that consumers give to the provenance of the product, or whether they are aware of the commitment of their trusted supermarkets to sustainability or not, for example.

To conduct this survey, the 'Forms' platform is used because of its ease and accessibility of use for both the surveyor and the participants, as 'Forms' allows to design a customized survey with a variety of question types, from open-ended to multiple choice, which permits to collect both qualitative and quantitative data. In addition, its ability to distribute the survey electronically allows to obtain a broad and diverse scope, covering different demographics and geographic regions.

This analysis will provide a comprehensive view of how consumers perceive food safety and whether they follow practices to ensure that the food they consume is safe or not.

Therefore, the decision to conduct the survey was made in order to assess consumer awareness of food safety. Another of the main objectives for which the survey has been conducted is to assess the importance that consumers attach to products and their seasonality. We want to understand the extent to which these factors influence respondents' purchasing decisions and food preferences.

This approach will facilitate the identification of current consumer concerns and may also help companies to improve their food safety practices and policies, thus ensuring amore effective consumer protection.

Two different surveys have been conducted using the same questions for both. The first survey was addressed to my social environment (ref.7), i.e. friends, family and acquaintances who do not work specifically in the field of food safety. The second survey was addressed to workers of a food certification company (ref.8), who have training and experience directly related to food safety.

The main reason for doing two different surveys is to be able to compare also the levels of awareness and knowledge about food safety between these two groups. We see on the one hand that we have a group of people from my social environment who do not have a professional background in food safety, and on the other hand, professionals who daily work with strict rules and regulations to ensure the quality and safety of food.

The results of these surveys may reveal whether there are significant differences in the level of awareness and knowledge of food safety between the two groups. It is expected that the workers of the food certification company should demonstrate greater knowledge and awareness of the importance of food safety due to their training and professional experience in this field. Supposedly, my social environment could also have less knowledge and awareness on this topic, because they do not face the same challenges and regulations daily as the professionals of the certification company do.

### **3-. CONSUMER DATA ANALYSIS**

In the questionnaire, questions of different types, have been asked covering topics such as age, nationality, and type of residence (whether the respondents live in a town or in a city).

It is worth noting that in the survey conducted with the certification company, it can be seen that the average age of the participants is between 35 and 50 years old. In addition, the vast majority of respondents live in cities. On the other hand, in the survey conducted in my social environment, the average age of the participants is younger, ranging between 18 and 35 years. It should also be noted that in this case almost all the respondents reside in towns.

However, for the purpose of this analysis, the focus is going to be on the questions that provide valuable information about the awareness that respondents have about food

safety and the origin of the products, and also the importance they give to the local product.

By investigating how respondents value and inform themselves about the origin of their food, we can gain important insights into consumption habits and possible concerns about the food products available on the market.

In the following, the results obtained in the two surveys described above are compared (Gaspar, 2024):

1-. Important characteristics for choosing one product and not another: in this question it has been observed that respondents working in a certification company highlight three main characteristics of the products, which are price, quality and origin. This group, working directly with food certification, shows an appreciation of the origin of the product, recognizing its importance in the field of food safety, support for the local economy and sustainability.

On the contrary, the results of the survey conducted in my social environment, composed of people who are not related to food certification, show us that the respondents mostly emphasize the price and quality of the product, leaving the origin in second place. This difference is largely due to the fact that the respondents are not familiar with the processes and standards that non-local products go through.

2-. Product origin: on this question there is a notable difference between the two groups surveyed. The majority of respondents from the certification company indicate that they always check the provenance of the product on the label before making their purchase. This practice reflects their knowledge and awareness of the importance of food provenance, which is probably influenced by their daily work with food quality and safety standards.

On the other hand, a large proportion of the people surveyed in my social environment say that they only check the origin of the product 'sometimes'. This behavior can be attributed, in part, to a lack of knowledge of the significant differences in the quality and freshness of products when they are local or seasonal and when they are not.

3-. Trusted supermarkets with consideration for sustainability or not: of the certification company's respondents, almost half of them indicate that they are knowledgeable about whether their trusted supermarket considers the environment and sustainability in its operations. This level of knowledge reflects a greater awareness and concern for sustainable practices among those who work with product certification on a daily basis.

In contrast, the majority of respondents in my social environment indicate that they do not know whether their supermarkets consider the environment and sustainability in their management. This difference can be attributed to the lower importance these consumers place on food safety and sustainability compared to those who are professionally involved in product certification.

#### **4-. MASS RETAILING SALES TECHNIQUES**

From the analyses and comparisons we have made above, we can see that consumers with a close relationship to food safety and production processes have higher expectations regarding the sustainability of supermarkets. This group of consumers, which includes those who are professionally involved in product certification, has a broader level of knowledge and greater sensitivity to sustainable practices in the food supply chain.

On the other hand, these shoppers show a more thorough analysis when selecting which items to purchase, considering aspects such as seasonality and product provenance. This inclination toward local and seasonal products reveals a concern for supporting more sustainable agricultural practices and fostering the local economy.

It is clear that the market landscape and commercial dynamics are profoundly influenced by the changing opinions and needs of consumers. As consumers change their preferences, demands and purchasing behaviors, large retailers, as key players in the commercial arena, are also forced to adapt and evolve accordingly.

The most important companies and retail chains, aware of the need to remain relevant and competitive in an ever-changing business environment, strive to stay aligned with trends and changes in consumer behavior. This close connection between consumers and major retailers is expressed in several ways.

On the one hand, companies closely monitor consumer opinions through market research, surveys, data analysis and direct feedback. This information enables them to better understand their customers' needs and desires, identify new trends and anticipate changes in the market.

In this regard, it can be clearly seen that major retailers are closely tied to consumer demands and expectations. As these change and evolve, the major companies in the market respond in an agile and flexible manner, adjusting their products, services and business practices to meet the ever-changing needs of their customers.



One effective way to observe how major retailers are adjusting to the changes and needs of consumers is by analyzing their improvement plans and initiatives related to sustainability and the environment. In a world where environmental awareness and demand for responsible business practices are on the rise, companies in the retail sector are motivated to evolve and proactively respond to these expectations.

LIDL stands out as one of the leading and most solid distribution companies in Spain. The company has positioned itself as a leader in the sector thanks to its ability to adapt to changing consumer needs and its commitment to sustainability and environmental stewardship. To better understand how LIDL is addressing these changes, it is essential to examine its improvement plans and sustainability initiatives.

#### **4.1-. LIDL SUPERMARKETS**

For LIDL, sustainability is an essential pillar of its business model, and its commitment in this area guides all its actions, covering the entire value chain. This comprehensive approach includes everything from the management of natural resources to interaction with customers and the community, including a responsible supply chain and efficient distribution. Each of its actions contributes significantly to its sustainability plan, characterized by the following aspects (LIDL Spain, 2023):

##### Resource Management

In LIDL, sustainability begins with careful management of natural resources. The company is devoted to minimizing the environmental impact of its operations by reducing energy and water consumption and promoting sustainable agricultural practices among its suppliers. LIDL actively works to ensure that the marketed products are responsibly sourced, encouraging the use of sustainable and certified raw materials, such as fish from Marine Stewardship Council (MSC)-certified fisheries and agricultural products with the GlobalG.A.P. seal.

##### Responsible Supply Chain

Sustainability at LIDL is reflected throughout its supply chain, where strict policies are in place to ensure that suppliers meet high environmental and social standards. This involves regular audits and continuous collaboration with suppliers to improve production

practices. LIDL is committed to eliminating child labour and ensuring fair working conditions throughout its supply chain. In addition, the company promotes fair trade and supports small farmers and local producers, helping them to adopt more sustainable practices and improve their quality of life.

### Efficient Distribution

Efficient distribution is another key element of LIDL's commitment to sustainability. The company has made significant investments in modernizing its logistics and transportation to reduce its carbon footprint. This includes the adoption of more efficient vehicles and the optimization of transport routes to reduce CO2 emissions. In addition, LIDL has implemented advanced energy management systems in its logistics centers and stores, having as a result a reduction in energy consumption and promoting the use of renewable energy sources wherever it is feasible.

### Commitment to Customers

LIDL demonstrates its commitment to sustainability through its relationship with customers. The company strives to offer high-quality products at affordable prices, ensuring that these products are produced in a sustainable way. LIDL actively promotes responsible consumption among its customers, offering a wide range of ecological, organic and fair-trade products. In addition, the company is working to reduce the use of plastics in its packaging and encourages recycling by implementing packaging return programs and using recycled materials on its products.

### Impact on Society

LIDL is committed to society and strives to have a positive impact on the communities in which it operates. The company has various social initiatives, such as programs to donate food and fight against food waste, as well as to support people in vulnerable situations. It works closely with non-governmental organizations and food banks to ensure that unsold products reach those who need them the most. In addition, LIDL promotes environmental education and awareness among its employees and customers, actively contributing to a more informed and engaged society.

### Innovation and Continuous Improvement

LIDL demonstrates its commitment to sustainability through a constant search for innovation and improvement. The company invests significantly in research and development to discover new ways to reduce its environmental impact and improve its sustainable practices. This involves incorporating advanced technologies into its production and distribution processes, as well as actively collaborating with experts and organizations to stay at the top of sustainability.

### Transparency and Reporting

LIDL reaffirms its commitment to transparency in all its sustainable initiatives. The company provides detailed sustainability reports that document its progress and challenges, enabling stakeholders to assess its performance and its impact on the environment and society. This transparency strengthens the confidence of consumers and other stakeholders in LIDL's commitment to sustainability.

It is therefore clear that sustainability is at the heart of LIDL's business model. Its commitment spans the entire value chain, from resource management to interaction with customers and society. Through its actions, LIDL demonstrates that it is feasible to integrate business success with environmental and social responsibility, thus setting a standard in the retail industry towards a more sustainable future.

## **4.1.1-. LIDL'S SUSTAINABILITY STRATEGY**

LIDL's sustainability strategy is structured around two fundamental pillars: "Good for the planet" and "Good for people". The combination of these two areas ensures that the impact of its actions is perceived as "Good for you", involving all consumers and stakeholders in a comprehensive and beneficial approach.

### Good for the Planet

The first pillar, "Good for the Planet," focuses on the implementation of practices and policies aimed at reducing the environmental impact of LIDL's operations. This commitment includes several initiatives, such as (LIDL Spain, 2023):

- Emissions Reduction: LIDL is committed to significantly reducing CO2 emissions by optimizing its logistics chain and adopting renewable energy in its stores and logistics centers.
- Sustainable Resource Management: The company actively promotes the efficient use of natural resources by reducing water and energy consumption and encouraging the use of recycled and sustainable materials in its products and packaging.
- Biodiversity Conservation: In collaboration with its suppliers, LIDL ensures that agricultural and fishery products are sourced sustainably, contributing to the protection of ecosystems and biodiversity.

### Good for People

The second basis, "Good for People," focuses on improving the social and economic conditions of everyone involved in LIDL, including employees, suppliers, customers and local communities. The main initiatives comprise (LIDL Spain, 2023):

- Employee Development and Welfare: LIDL promotes programs for the professional and personal development of its employees, ensuring equitable and safe working conditions.
- Support for Local Suppliers: The company promotes fair trade and supports small local suppliers, helping them to adopt sustainable practices and improving their business capability.
- Community Initiatives: LIDL actively collaborates with local communities through social investment programs, donations and volunteer activities that benefit people and strengthen community ties.

### Good for You

The integration of the areas "Good for the Planet" and "Good for People" results in a global impact that LIDL defines as "Good for You". This implies that the company's sustainable actions not only benefit the environment and communities, but also generate direct value for consumers. With this integrated strategy, LIDL achieves (LIDL Spain, 2023):

- High Quality Products: LIDL is committed to providing premium products that are safe, sustainable and accessible to all consumers.

- Transparency and Trust: The company strives to build strong relationships with consumers through transparency in its practices and compliance with rigorous sustainability standards.
- Contribution to General Wellbeing: LIDL seeks to generate a positive impact on people's lives, improving health and well-being, as well as protecting the environment.

In short, LIDL's sustainability strategy, which is articulated around the areas of "Good for the planet" and "Good for people", enables the company to generate a positive impact that is "Good for you". This holistic approach ensures that each sustainable action by LIDL benefits both the environment and society, creating a virtuous cycle that improves the quality of life of all its stakeholders and promotes a more sustainable and responsible future.



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## **CONCLUSION**

This paper has explored the evolution of food safety, analyzing both consumer awareness and the practices implemented by supermarkets to ensure food quality and safety. Throughout the study, it has become evident that food safety has advanced significantly, driven by increased consumer awareness and demand for safe and high quality products.

The survey results and the qualitative analysis done reveal that consumers are increasingly informed and concerned about food safety, showing a greater willingness to support sustainable and transparent practices. This awareness has motivated supermarkets to adopt more rigorous and transparent policies, aligning with the Sustainable Development Goals (SDGs) and promoting practices that ensure the traceability and integrity of food products.

However, the study also points to areas for improvement, such as the need for continued consumer education and greater communication by supermarkets about their food safety policies. The collaboration between well-informed consumers and committed supermarkets is essential to achieve a safer and more sustainable food system.

In summary, this work highlights the importance of education, transparency and shared responsibility between consumers and retailers in the continuous improvement of food safety. The progress made so far is promising, but it is key to sustain and strengthen these efforts to meet future challenges and ensure long-term food safety.

I hope this work is just the beginning of a great deal of food security research. As we move forward, it is crucial that both businesses and consumers raise awareness and adopt more responsible and sustainable practices. Food safety is not a static goal, but a continuous process of improvement and adaptation to new challenges.

I am confident that the findings of this study will inspire other researchers to look deeper into this field and develop new strategies and policies to strengthen the safety of our food. I also hope that companies will continue to adopt proactive and transparent measures, and that consumers will continue to educate themselves and demand products that meet high quality and safety standards.

It is only through the collaboration and commitment of all stakeholders that we can ensure a safe and sustainable food system for the present and future generations.

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