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Consumers' Perception and Behaviour on the Characteristics of Food and Agri-Food Products during the COVID-19 Pandemic

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Abstract

Regardless of its size and intensity, a crisis will always affect people in their capacity as consumers in some way or another. But what happens, and how does it affect a crisis that appears and manifests once every 100 years, such as the COVID-19 pandemic? Although a definitive answer to this question may elude us, it is evident that the COVID-19 pandemic has plunged consumers into a realm of significant uncertainty, requiring them to prioritise their health. This heightened health consciousness has directly influenced their purchasing decisions and consumption patterns, leading to heightened scrutiny of food and agri-food product characteristics, particularly in the early stages of the pandemic. This research effort aims to understand how consumers perceive and report specific characteristics of food and agri-food products during the initial phase of the COVID-19 pandemic, a crisis that has significantly affected consumer behaviour. By applying and using the statistical method, correspondence analysis will be possible. Identifying and observing which features became more important to consumers during that period and how they relate to them will be possible. The results of this analysis will provide a detailed picture of how the pandemic has influenced the food and agri-food market, thus contributing to a deeper understanding of how significant crises affect consumer behaviour and, by implication, the food industry.

Keywords: consumer, perception, behaviour, COVID-19, food.

JEL Classification: Q13.

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1. Introduction

There is a category of unpredictable and uncontrollable events that have varying durations of time, produce fear and insecurity, and generate material and human damage, officially called "crisis situations" (United Nations International Strategy for Disaster Reduction (UNISDR), 2009).

When a crisis occurs and manifests itself, it changes people's lives and behaviour. At the same time, a crisis can also unite them and focus their attention, knowledge, and resources to solve it and minimise damage (Fanelli and Di Florio, 2016; Pauchant and Mitroff, 1992).

Most of the time, a crisis breaks out surprisingly, either because of chance or because certain risks/hazards specific to any activity get out of control and degenerate (Brecher and Wilkenfeld, 2000; Shaluf et al., 2003).

Crises are many and varied. Their multitude and diversity are provided by the plurality of risks that can cause a crisis, risks present and existing in almost all activities undertaken by man or found in natural phenomena (Howitt and Leonard, 2009; Richardson, 1994).

Depending on the risk that generates a crisis, they can be classified into different categories, such as crises arising from the manifestation of natural phenomena, health crises, military crises, economic crises, or social crises. This categorisation of crises is essential because correctly classifying a crisis into the category that matches its specifics and characteristics means limiting the effects and reducing the time of manifestation, which helps better understand how people behave in those moments (Schenker-Wicki et al., 2010).

Health crises, with their potential to spread rapidly and uncontrollably, are among the most severe and significant crises that can occur and manifest.

A health crisis is a situation where a disease rapidly and uncontrollably spreads, posing a significant threat to a large number of people and causing substantial societal and economic damage (Barry, 2005; McCracken and Phillips, 2012).

Usually, the impact and repercussions of a health crisis are felt by the whole society, and because of this, other new crises can appear at the same time or in a short interval (Bavel et al., 2020; Ezell et al., 2021; Ho et al., 2020; Tavilani et al., 2021). In addition, they are also responsible for changes in people's behaviour from the perspective of citizens or consumers of products (food or non-food) or services (Vázquez-Martínez et al., 2021).

This article analyses how and whether a health crisis of the intensity of a pandemic can change consumers' perceptions and reports on nine general or particular characteristics of food and agri-food products.

More specifically, this research considers how and if the beginning of the COVID-19 pandemic (the period between the outbreak of the COVID-19 pandemic, March 2020, and the end of the lockdown, June 2020) changed the perception and reporting of consumers of food and agri-food products in Brăila County, Romania, on nine characteristics (brand; price; sustainable product characteristic; quality; quantity; shelf life; availability in store and at merchants; fast delivery and different

physical and chemical properties of the product with health effects) of food and agri-food products.

Carrying out this analysis is essential because the results obtained contribute to a better understanding of consumer behaviour manifested in health crises by referring to food and agri-food products from the consumption perspective. The article and the analysis found in its composition propose the research and study of a part of an event that has already ended (2020-2023) to understand it so that in the future, the producers, respectively, the traders of food and agri-food products, will be able to anticipate and react much better at changes in consumer behaviour when an event similar to the one analysed occurs. The importance of studying this topic is significant because the COVID-19 pandemic has generated significant changes in consumer behaviour regarding the consumption of food and agri-food products (Pătărlăgeanu et al., 2021).

In this way, the obtained results can help to form a picture of the perception and how consumers relate to the consumer behaviour of food and agri-food products from the perspective of the decisions they make regarding consumption habits (Pătărlăgeanu et al., 2020).

The need to study, understand, and know these aspects is generated by the increasingly circulated hypothesis of the outbreak of a new health crisis. Even the European Food Safety Authority (EFSA) and the World Health Organisation claim another health crisis will appear soon (EFSA Panel on Animal Health and Animal Welfare (AHAW) et al., 2024; World Health Organisation (WHO), 2024).

The structure consists of six parts: the introduction; the second part is a review of specialised literature on the researched problem; the third part is the purpose of the research; the fourth part is the methodology used in the analysis; the fifth part is the research results, and the sixth part is the conclusions that can be drawn from the completion of this work.

2. Problem Statement

Over time, epidemics and pandemics were crises that, once manifested, changed society and people's behaviour (Barry, 2005; Berche, 2022; Cinti, 2005; Heymann and Rodier, 2004; Quarantelli and Dynes, 1977).

The two types of health crises are particular because they spread quickly, have a broad intensity, have very low predictability, and affect many people (Ho et al., 2023). For example, if there were an epidemic or a pandemic from the Middle Ages until the 20th century, people's lives would suffer because the vast majority of activities carried out then were directly or indirectly influenced by the manifestation of the disease and the crisis (Brecher and Wilkenfeld, 2000; Preston, 2019; Reinhart and Rogoff, 2009). In the 21st century, the circumstances are similar to those of the Middle Ages to the 20t^{h} century, and the experience provided by the emergence of the COVID-19 pandemic (2020-2023) has demonstrated and confirmed this to us (Phillips, 2020).

The COVID-19 pandemic is one of the most complex, intense, and important health crises in human history. This crisis has been a challenge and a concern for humanity because it has generated significant social and economic effects in both essential areas (food or medical) and less critical areas (Pătărlăgeanu et al., 2021). Its impact on society cannot be compared to that of any health crisis that has appeared and manifested in the last 100 years, and its effects have partially or totally changed people's way of life and behaviour (Sarkis et al., 2020). From a medical point of view, COVID-19 is less lethal than diseases such as SARS-CoV, MERS-CoV, tuberculosis, Ebola, or bird flu, diseases that, in turn, have generated epidemics or pandemics (Rabaan et al., 2020). However, the fact that initially not much information was known about the virus that produces it and that a worldwide lockdown was imposed caused a change in people's behaviour as consumers (Griffin et al., 2023; Mahase, 2020; Organizația Mondială a Sănătății (OMS) | World Health Organization (WHO), 2020a, 2022; Sun et al., 2020).

The lockdown is a security measure adopted as an emergency by the government of a state in an attempt to prevent and protect its citizens from potential or specific existing dangers (Gilbert et al., 2020). This measure limits some rights and freedoms by changing people's behaviour (Béné, 2020). The lockdown imposed in 2020 was an extraordinary measure because never in the 21st century has such a decision been adopted by all countries worldwide and for a long time (Grunert et al., 2021; Mégarbane et al., 2021).

At the same time, this measure produced one of the most exciting and vital changes in people's behaviour in the 21st century. More precisely, the lockdown imposed due to the emergence and manifestation of the COVID-19 pandemic has changed people's behaviour manifested as consumers of food and agri-food products (Pantano et al., 2020). Then, people of all ages related differently to these products in terms of the features they were looking for (Ellison et al., 2021; He and Harris, 2020; Wang et al., 2020).

The reasons for their behaviour were various.

On the one hand, it was the specificity of crises, a specificity that triggered unpredictable, irrational, ambiguous, and impulsive behaviour (Brug et al., 2009; Woodside, 2012). In this way, the fear of a possible sudden infection with COVID-19 and the limitation of travel time outside the home or the operating hours of the shops were some factors that contributed to the change in behaviour (Jribi et al., 2020).

On the other hand, the lack of money for food purchases, the increase in prices and the abundance of wrong information about the evolution of the pandemic contributed to the change in consumer behaviour (Abd-Alrazaq et al., 2020; Farooq et al., 2020).

It should also be mentioned that the change in consumer behaviour and the different reporting on food and agri-food products was also generated by the advice and information appearing in the media about the benefits of consuming healthy food and agri-food products and the benefits of having a balanced diet (Jayawardena and Misra, 2020). Moreover, the idea that food can be the "shield" of people in the fight

against viruses has also contributed to this hypothesis (Gibson et al., 2012; Naik et al., 2010). This advice and information about the benefits of a healthy diet has been supported and demonstrated by the low number of cases of disease recorded in the "blue zones" around the globe (Stefanadis et al., 2022). There, people, through a healthy diet and lifestyle, managed to protect, prevent, and fight against COVID-19 much better than those in regular areas (Janssen et al., 2021; Jayawardena and Misra, 2020).

At the same time, even the World Health Organisation drew up a food guide suggesting that a healthy diet consists of daily consumption of 5 fruits and vegetables in 4 distinct portions (World Health Organization (WHO), 2020b).

3. Research Questions / Aims of the Research

This article analyses how and if a health crisis of the intensity of a pandemic can change consumer perception and reporting of a series of general or particular characteristics specific to food and agri-food products. Specifically, this research considered how and if the COVID-19 pandemic, between March and June 2020, changed the perception and reporting of consumers in Brăila County, Romania, on nine characteristics, see Table 1.

The question that started this analysis was: How important were the following characteristics of food and agri-food products during the March-June 2020 period of the COVID-19 pandemic?

Then, to obtain an answer, two hypotheses were issued:

Null hypothesis (H0): there are no significant differences, and there is no different reporting concerning the preference for one or more characteristics that the consumers of food and agri-food products in Brăila County, Romania, had in mind when the COVID-19 pandemic appeared (March-June 2020).

Alternative hypothesis (H1): there are significant differences, and there is a different reporting of preference for one or more characteristics that consumers of food and agri-food products in Brăila county, Romania, had in mind at the time that the COVID-19 pandemic appeared (March-June 2020).

4. Research Methods

The method called correspondence analysis was used to analyse the data in the framework of this article, providing an answer to the question from which it started or confirming one of the hypotheses.

Correspondence analysis is a multivariate statistical technique that calculates the coordinates found in the rows and columns of a contingency table, the relationships between the nominal variable categories, and creates a two-dimensional graph (biplot) for the correspondence tables (Greenacre, 2015; IBM, 2024). Two-dimensional graphs or biplots provide an image of coordinates calculated on two axes, visually representing the relationships between categories (Greenacre, 2015; IBM, 2024). To perform this analysis, you must use statistical software such as SPSS, SAS, or R. Also, these softwares offer dedicated functions and

automatically perform calculations or generate graphs. These statistical programmes are necessary because correspondence analysis uses many formulas and mathematical calculations (Chi-square decomposition or Eigenvalues and vectors) (Greenacre, 2015; IBM, 2024).

This analysis is a quantitative research and the software used was SPSS. The data used for this research was collected via an anonymous online survey in 2022 through Google Forms. The people who participated in this survey were people from Brăila county in Romania, over 18 years old, and the sample consisted of 408 people/eligible respondents out of a total of 422 (18 respondents were not eligible). The survey was conducted between April and June 2022. All information received from respondents was treated strictly confidential by the ethical norms that govern high-quality research worldwide.

Even if the survey is a research method that does not provide an overview/general picture, it gives a picture for a certain period of time. This particularity of the survey perfectly suited the purpose of this article and its analysis. More precisely, the fact that the study was carried out during the period when the COVID-19 pandemic was still unfolding and the fact that the specificity of this research method captures the reaction for a specific moment and in a particular context all these characteristics help to understand the specifics of a crisis.

Regarding the question and the answer options used for this research, they can be seen in Table 1.

Table 1. Research data

Characteristics of food and agri-food products followed by consumers in Brăila county, Romania, at the time of the outbreak of the COVID-19 crisis and during the lockdown period (March-June 2020)	**Scale of importance**				
	Very important	**Important**	**Less important**	**Very little important**	**Insignificant**
Brand	102	171	93	28	10
Price	129	187	44	13	31
Sustainable product	114	186	78	17	9
Quality	289	104	6	3	2
Quantity	125	181	79	14	5
Shelf life	277	99	19	6	3
Disponibility	155	163	63	15	8
Fast delivery	96	154	96	28	30
Beneficial properties for health	214	127	45	10	8

Source: author's own research and processing.

5. Findings

After the analysis, different results were obtained, as seen in Table 2, Table 3, Table 4, Figure 1, Figure 2, Figure 3, and Figure 4.

In Table 2, the analysis has four dimensions, but only the first two are significant.

In this sense, dimension 1 obtained the result of .370 for "singular value," .137 for "inertia", and "the proportion of inertia" recorded the value of .845. Dimension 2 also for the same indicators obtained .130, .017, and .104. The values of the two cumulative dimensions have a percentage of 94.9% of the cumulative total of the proportion of inertia. The values of the other two dimensions do not add a significant percentage to the proportion of inertia, their cumulative percentage being 5.1%, see Table 2.

Given these obtained results, the graphical representation of the analysis will be a two-way representation.

Table 2. Summary analysis

Dimension	Singular Value	Inertia	Chi Square	Sig.	Proportion of Inertia		Confidence Singular Value	
					Accounted for	Cumulative	Standard Deviation	Correlation 2
1	**.370**	**.137**			**.845**	**.845**	.015	.040
2	**.130**	**.017**			**.104**	**.949**	.020	
3	.088	.008			.048	.996		
4	.024	.001			.004	1.000		
Total		**.163**	590.869	**<.001a**	1.000	1.000		
a. 32 degrees of freedom								

Source: author's own research and processing.

Table 3 and Figure 1 of the analysis constitute an overview of the distribution of points in a row, i.e., they show how each attribute contributes to the variable "Characteristics of food and agri-food products followed by consumers in the county Brăila, Romania, at the time of the outbreak of the COVID-19 crisis and during the lockdown period (March-June 2020)" (Greenacre, 2015).

In the first dimension, see Table 3 and Figure 1, the characteristics "Quality" and "Shelf life" obtained the values of .339 and .257 and were the characteristics (points) that contributed the most to the dimension (Contribution of point to inertia of dimension), see Table 3 and Figure 1.

In the second dimension, see Table 3 and Figure 1, the characteristics "Price" and "Quantity" obtained the values of .555 and .139 and were the characteristics (points) that contributed the most to the dimension (Contribution of point to the inertia of dimension), see Table 3 and Figure 1.

Regarding the contribution of the dimension to the inertia of the point (Contribution of Dimension to the inertia of point), see Table 3 and Figure 1; in the first dimension, the characteristics (attributes) "quality" and "shelf life" contributed the most," .999 and .990. The rest of the characteristics (attributes) contributed

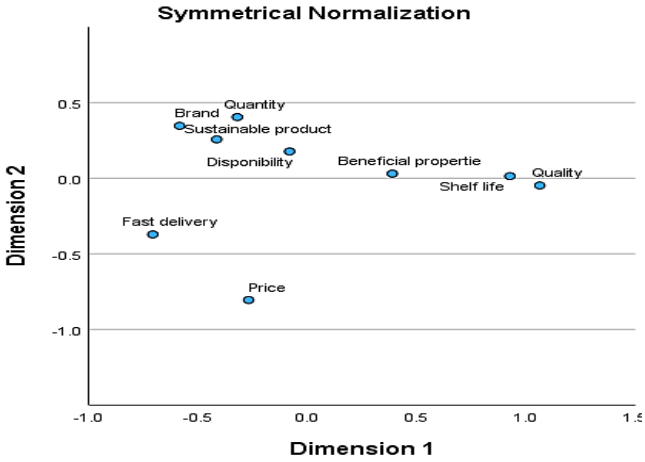
unequally. And, in the second dimension, the characteristics (attributes) "price" and "availability" contributed the most, .664 and .514, see Table 3 and Figure 1.

Table 3. Row Points of analysis

Characteristics of food and agri-food products	Score in Dimension		Inertia	Contribution				
	1	2		of Point to Inertia of Dimension		of Dimension to Inertia of Point		
				1	2	1	2	Total
Brand	-.585	.346	.017	.103	.102	.850	.105	.955
Price	-.269	-.806	.014	.022	**.555**	.210	**.664**	**.874**
Sustainable product	-.415	.256	.009	.052	.056	.809	.108	.917
Quality	1.063	-.048	.047	**.339**	.002	**.999**	.001	.999
Quantity	-.320	.404	.008	.031	**.139**	.563	.314	.878
Shelf life	.926	.013	.036	**.257**	.000	**.990**	.000	**.990**
Disponibility	-.081	.177	.001	.002	.027	.312	**.514**	.826
Fast delivery	-.707	-.372	.026	.150	.118	.792	.077	.869
Beneficial properties for health	.388	.030	.006	.045	.001	.965	.002	.967
Active Total			.163	1.000	1.000			

Source: author's own research and processing.

Figure 1. Row points of analysis



Source: author's own research and processing.

Table 4 and Figure 2 of the analysis provide a comprehensive presentation of how each attribute contributes to the characteristics (attributes) of the variable "Characteristics of food and agri-food products followed by consumers in Brăila county, Romania, at the time of the outbreak of the COVID-19 crisis and during the lockdown period (March-June 2020)". These findings, based on the distribution of points in the column (Greenacre, 2015), are crucial for understanding the consumer behaviour during the COVID-19 crisis.

In the first dimension, the "Very important" attribute contributes the highest, .533, to the inertia of point to dimension (Contribution of point to the inertia of dimension). This precise data underscores the reliability of our analysis; see Table 4 and Figure 2.

In the second dimension, the "Insignificant" attribute contributes the highest, .844, to the inertia of point to dimension (Contribution of point to inertia of dimension), see Table 4 and Figure 2.

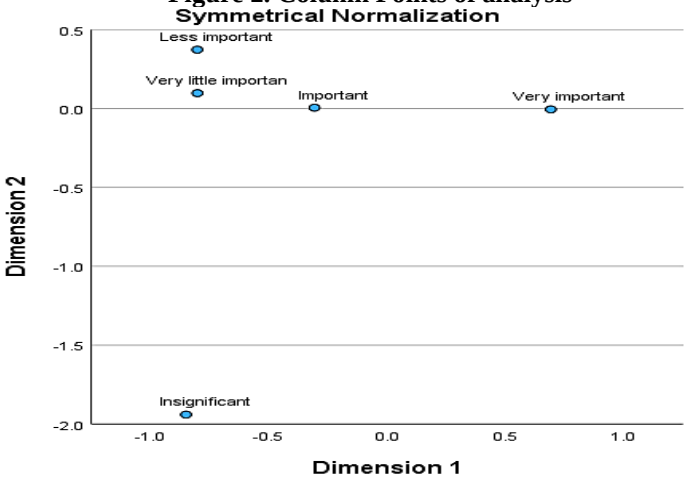
Regarding the contribution of the dimension to the inertia of the point (Contribution of Dimension to the inertia of point), see Table 4 and Figure 2; in the first dimension, the "very important" attribute contributed the most, .955. In the second dimension, the "insignificant" attribute contributed the most, .985, see Table 4 and Figure 2.

Table 4. Column Points of analysis

Scale of importance	Score in Dimension		Inertia	Contribution				
				of Point to Inertia of Dimension		of Dimension to Inertia of Point		
	1	2		1	2	1	2	Total
Very important	.692	-.006	.074	**.533**	.000	**.995**	.000	**.995**
Important	-.307	.005	.017	.096	.000	.773	.000	.773
Less important	-.802	.373	.038	.250	.153	.892	.068	.960
More less important	-.802	.097	.011	.064	.003	.796	.004	.800
Insignificant	-.850	-1.940	.022	.057	**.844**	.348	**.637**	**.985**
Active Total			.163	1.000	1.000			

Source: author's own research and processing.

Figure 2. Column Points of analysis



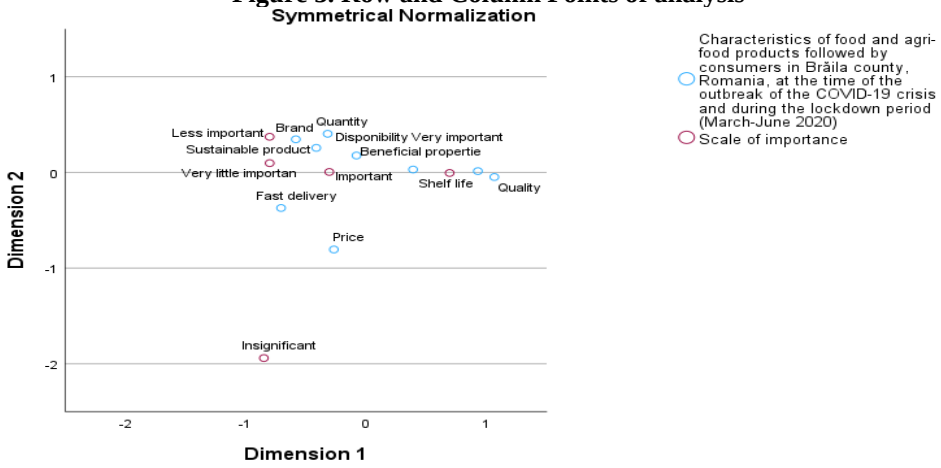
Source: author's own research and processing.

About how the variable features and attributes are dispersed, we should check Figures 3 and 4.

Therefore, following the interpretation of the graph and the results obtained, it can be stated that there is a very strong association between the characteristics "quality," "properties beneficial for health" and "shelf life" with the "very important" attribute; and the characteristics "brand", „sustainable product", and "quantity" are associated with the "less important" attribute; see Figure 3 and Figure 4.

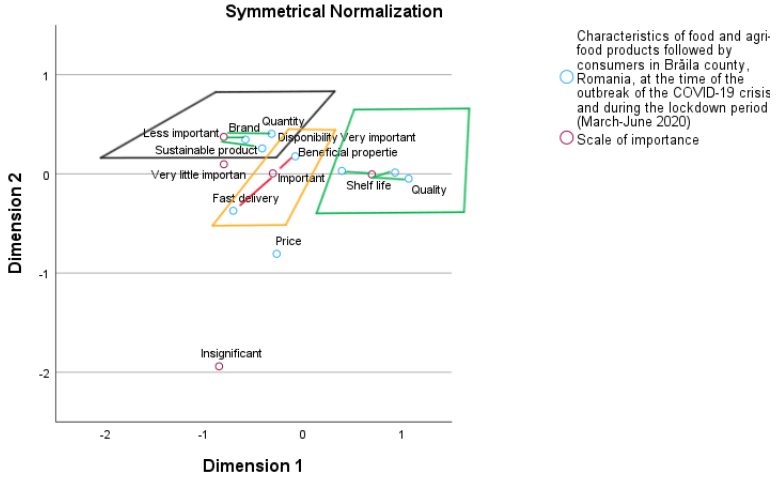
The characteristics "availability", "price", and "fast delivery" are pretty tricky to associate with any attribute because their positioning does not allow an interpretation that is 100% correct. But if we abstract from this fact, the characteristics "availability" and "fast delivery" can be associated with the attribute "important", see Figure 3 and Figure 4.

Figure 3. Row and Column Points of analysis



Source: author's own research and processing.

Figure 4. Row and Column Points of analysis 2



Source: author's own research and processing

6. Conclusions

Our analysis, which focused on the impact of the COVID-19 pandemic (March-June 2020) on consumer perception and reporting in Brăila County, Romania, revealed some intriguing insights. These findings, detailed in Tables 2, 3, 4 and Figures 1, 2, 3 and 4, respectively, shed light on how a health crisis and subsequent lockdown period can significantly influence consumer reporting behaviour and the importance they assign to various characteristics of food and agri-food products.

Among the characteristics presented in the analysis, the most important relationships are between the characteristics "quality", "properties beneficial for health," and "shelf life" with the attribute "very important" and the characteristics "brand," "sustainable product" and "quantity" are associated with the "less important" attribute. Therefore, the results obtained confirm the alternative hypothesis, which claims that there are significant differences and different reports compared to the preference for one or more characteristics that consumers of food and agri-food products in Brăila County, Romania, followed at the time when COVID-19 appeared (March-June 2020).

For producers and traders of food and agri-food products, the implications of our findings are clear. When a health crisis occurs, prioritising the characteristics of 'quality', 'properties beneficial to health', and'shelf life' can help meet the criteria and expectations of consumers, ensuring continued demand for your products.

Regarding the limitations of this analysis, it should be remembered that no analysis is 100% perfect.

The present analysis used in this article may be limited by the handling of the data used, which may generate inaccurate estimates and difficulties in interpretation; the misinterpretation of the results, especially by people unfamiliar with this technique; and the impossibility of concluding cause and effect. For these reasons, it is essential not to make assumptions about the direction or nature of the relationships between the variables but only to observe the existing associations between the variables and the associations related to the sensitivity of the data distribution.

Future research that can start from this article and the analysis carried out should consider the extension to spatial data, the qualitative interpretation of the results, or research that compares different scaling methods.

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"During the preparation of this work the author(s) used Grammarly: Free AI Writing Assistance in order to check to correct the grammatical errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication."

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