Articles

Incidence of packaging on the organoleptic quality of four brands of chocolate produced in the Amazonas Region

Incidencia del embalaje en la calidad organoléptica de cuatro marcas de chocolate producidas en la Región de Amazonas

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ABSTRACT

The first impression on consumers is the packaging of the product, through the extrinsic characteristics consumers generate expectations that influence the evaluation of the product and determine the probability of purchase. Therefore, the objective of

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this study was to determine the incidence of packaging on the organoleptic quality of four brands of chocolates that are produced in the Amazon region, under three phases (i) packaging condition, where the effect of packaging characteristics on the consumer's visual perception without tasting the chocolate was studied, (ii) blind condition without packaging, in which the organoleptic quality of each chocolate was determined using the sensory quality index, (iii) and the reported condition, evaluated the combined effect (first and second phase) determining the level of satisfaction, tastes, and preferences to finally measure the degree of incidence of the packaging design of the chocolates on the organoleptic quality in the four brands using Spearman's Correlation Coefficient. The degree of incidence between the design and the organoleptic quality with the highest significance was in the Palerca chocolate in the factors of; innovation in the shape of the packaging and the aroma of the chocolate (r= 0.6503), warmth in the color concerning the flavor of the chocolate (r= 0.6289), and the quality factor in the function of the color and aroma of the chocolate (r= 0.6163).

Keywords: Chocolate, Packaging, Agribusiness, Sensory Analysis, Agribusiness.

RESUMEN

La primera impresión en los consumidores es el envase del producto, a través de las características extrínsecas los consumidores generan expectativas que influyen en la evaluación del producto y determinan la probabilidad de compra. Por lo tanto, el objetivo de este estudio fue determinar la incidencia del envase en la calidad organoléptica de cuatro marcas de chocolates que se producen en la región amazónica, bajo tres fases (i) condición envase, donde se estudió el efecto de las

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características del envase en la percepción visual del consumidor sin degustar el chocolate, (ii) condición ciego sin envase, en la cual se determinó la calidad organoléptica de cada chocolate utilizando el índice de calidad sensorial, (iii) y la condición reportada, se evaluó el efecto combinado (primera y segunda fase) determinando el nivel de satisfacción, gustos y preferencias para finalmente medir el grado de incidencia del diseño del empaque de los chocolates sobre la calidad organoléptica en las cuatro marcas utilizando el Coeficiente de Correlación de Spearman. El grado de incidencia entre el diseño y la calidad organoléptica con mayor significancia fue en el chocolate Palerca en los factores de; innovación en la forma del empaque y el aroma del chocolate (r= 0.6503), calidez en el color referente al sabor del chocolate (r= 0.6289), y el factor calidad en la función del color y aroma del chocolate (r= 0.6163).

Palabras clave: Chocolate, Envasado, Agroindustria, Análisis sensorial, Agroindustria.

INTRODUCTION

Packaging is constituted as a complex instrument, which in addition to containing, preserving, and protecting the product, fulfills the function of informing the consumer (Ciravegna, 2017); the structure of its graphic elements and its iconic, verbal, and morphological components generate signals that are processed through cognitive and psychological mechanisms (Cardello, 2007).

To decipher the consumer's choice is to evaluate and measure the conceptualizations attributed to the product, whether favorable or unfavorable (Thomson et al., 2010); The aesthetic and symbolic value for consumers starts from the appearance of a product (Fernández & Bonillo, 2009); that is why product packaging has an important role in the food industry, given that its role is not only to attract attention but also to generate sensory expectations (Gunaratne et al., 2019).

Two types of stimuli are involved in the generation of sensory expectations; external stimuli, which are those sensations perceived by the senses; and internal stimuli, which derive from the experiences, motivations, and genetic conditions of the consumer (Ng

et al., 2013), the combination of these stimuli gives rise to perception, which conditions not only the vision that a person has but also his or her behavior and learning (Baptista et al., 2010).

Similarly, perceptions also constitute the pre-judgment beliefs about the product based on knowledge and memories (Okamoto & Dan, 2013); the act of rejection towards a product may occur when the consumer's expectations are not met (Deliza & Macfie, 1996), and if, on the contrary, the sensory perception meets the consumer's expectations, the product purchase is likely to be repeated (Paul et al., 2009). Likewise, the color of the packaging also becomes an important component to convey messages to the consumer regarding quality and price (Kuvykaite et al., 2009); for example, some research showed that black color is related to luxury and green color to organic and ecological products (Gómez et al., 2015); that is why, Goldberg et al. (1999) indicate that, if there is greater priority in the complementation of color in the product development, greater will be its ability to attract attention in the consumer.

Similarly, the effect of packaging images has a greater influence on product evaluation, even more than other elements such as size (Luis Méndez et al., 2011), making it an element of greater impact on the emotional responses of consumers (Bech-Larsen & Grunert, 2003), in addition to this, Kauppinen (2010) states that packaging images generate greater positive responses from consumers, creating unconscious reactions to the packaging and generating beliefs about the sensory characteristics of the brand (Bech-Larsen & Grunert, 2003).

On the other hand, does packaging denote product quality? Pedraza, states that the first effect that packaging generates in consumers is the message of quality before tasting the product (Pedraza, 2021), interpreting this value of quality and acceptability, which are appreciated by the senses, leads to a process of sensory analysis (Rodríguez et al., 2015), this tool is essential to obtain information on the aspects or attributes that determine the quality of a product, without minimizing the perception of quality from the consumer's point of view (Lavelli et al., 2006).

Under this context, and following Paul et al., (2009), analyzing sensory emotions is important to position products in the market, furthermore (Spinelli et al., 2014) state that packaging analysis can influence consumers' expectations and emotional responses. The objectives of the study were to (i) describe the main characteristics of packaging, (ii) measure the level of organoleptic quality of the product, (iii) measure the degree of correlation that exists between packaging and organoleptic quality, and (iv) determine the level of incidence of packaging on organoleptic quality. This study can support the development of the cocoa and chocolate chain through information and knowledge of

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the influence of packaging and quality on consumer perception of chocolate-producing organizations in the Amazon region.

MATERIALS AND METHODS

The study was non-experimental, this design "is performed without deliberate manipulation of variables and in which only the phenomena are observed in their natural environment and then analyzed" (Hernández et al., 2010, p. 149), the two study variables were analyzed; on the one hand, i) the sensory aspect of the packaging design of the chocolates through its factors (material, shape, color, and elements), and on the other hand, ii) the organoleptic quality of the chocolates was determined through the sensory quality index and the level of satisfaction of tastes and preferences.

Bagua chocolate was used, bitter chocolate based on cocoa paste with a percentage of 70% in a presentation of 50gr produced by the APROCAM cooperative, located in the province of Bagua (A) (APROCAM, 2022). Kuyay dark chocolate with 70% cocoa in 70 gr, winner of 3 medals, highlights the aromas of nuts, and dried fruits, with aromas typical of the Amazon, made from the cocoa paste by the Quya farm and Kuyay Chocolates located in the town of Jahuanga, district of Bagua Grande (B) (Kuyay Chocolates, 2022). Maná dark chocolate with a percentage of 70% fine aroma native cocoa in a presentation of 50 gr, is produced by Maná Chocolates located in the district of Chachapoyas. Chocolates Palerca, bitter with 70% cocoa in a presentation of 70 grams, is produced by the company Nupircacao E.I.R.L., located in the district of Bagua Grande. Figure 1.

The research was carried out at the Market Research Laboratory of the Agricultural Business Research Institute (INNA) of the National University Toribio Rodríguez de Mendoza of Amazonas, using the focus group technique in social research. Use was made of the Gesell Chamber, a space that allowed perceiving the behavior of the study participants in a balanced environment without disturbances or external factors that affect the result of the research (Sanchez, 2019). The sample consisted of 27 students enrolled in the Agribusiness Market Research course at the Professional School of Agribusiness Engineering of the UNTRM in the 2022 - I academic semester.

Figure 1. Regional chocolate brands, front, and back views.

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The study was conducted in three phases: the first called packaging condition; it studied the effect of the packaging characteristics on the consumer's visual perception without tasting the chocolate, where the packaging design was evaluated through factors of material, shape, color, and elements; in the second phase of blind condition without packaging, the organoleptic quality of each regional chocolate was determined through the sensory quality index in a tasting process; and in the third phase of the informed condition, the combined effect (first and second phase) was evaluated; that is, the packaging design and sensory characteristics were evaluated by determining the level of satisfaction, tastes, and preferences per consumer, and finally, the degree of incidence of the packaging design of the chocolates on the organoleptic quality of the four brands was determined (Figure 2).

Figure 2. Methodological flow chart of the research

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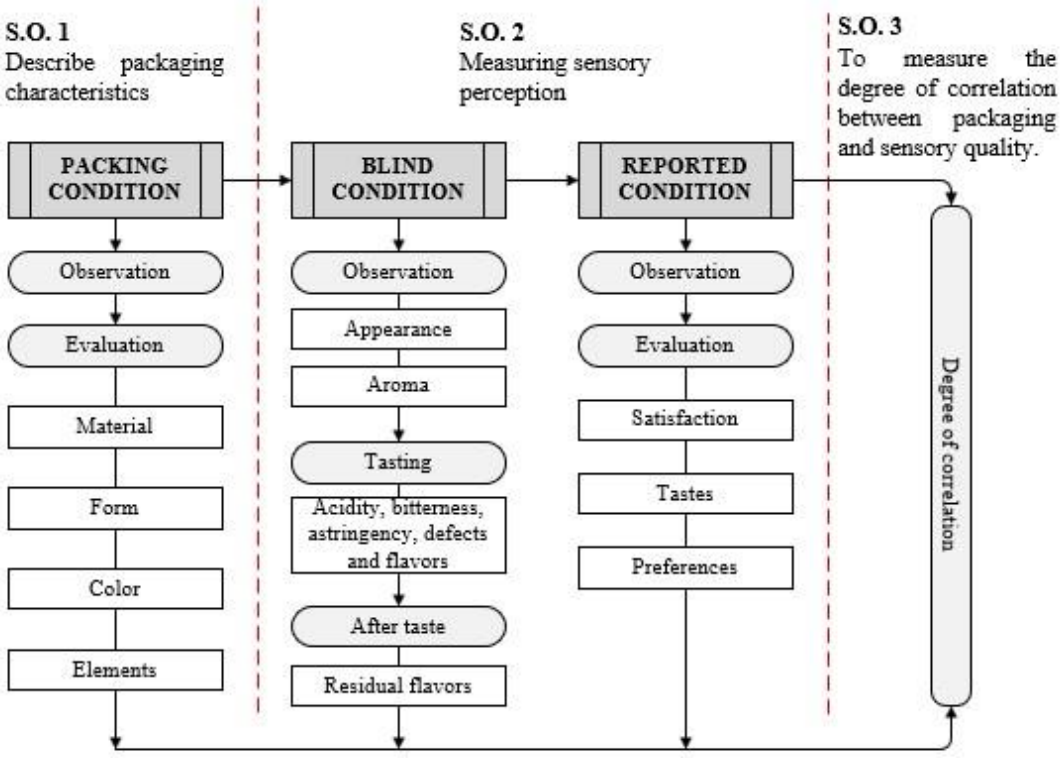

RESULTS

Place tables after conclusión

Impact of Packaging on chocolate organoleptic quality

A) Chocolate packaging factors

A.1 Chocolate packaging material

Table 1: *Characteristics of chocolate packaging material.*

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Code	Material characteristics
M1	Wrapping material: plastic/cardboard
M2	The protection provided by the enclosure
M3	Wrap sound

A.2 *Chocolate package shape*

Tabla 2

Characteristics of chocolate packaging shape

Código	**Shape characteristic**
F4	Packaging shape perception
F5	Ease of transport
F6	Packaging attractiveness
F7	Packaging shape innovation

A.3 *Chocolate packaging color*

Table 3

Chocolate packaging color characteristics

Code	**Color characteristics**
C8	Compatibility of the packaging with the product
C9	Quality in terms of color
C10	Color shade or hue
C11	Color saturation
C12	Color warmth
C13	Color coolness

A.4 Chocolate packaging elements

Table 4

Characteristics of chocolate packaging elements

Code	**Characteristics of the elements**
E14	Font size and type
E15	Number of illustrations
E16	Size of illustrations
E17	Packaging information

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E18	Brand logo

B) Factors affecting the organoleptic quality of chocolate

Table 5 *Factors of the organoleptic quality of Chocolate*

Código	**Organoleptic quality factors**
CA_AR	Aroma
CA_AC	Acidity
CA_AM	Bitterness
CA_AS	Astringency
CA_DF	Defects
CA_SAB	Taste
CA_PG	Aftertaste

C) Spearman's correlation coefficient

To determine the incidence of packaging design on the sensory quality of regional chocolates, Spearman's correlation coefficient was used. This type of correlation, unlike Pearson, is used for non-parametric data that do not meet the assumption of normal distribution (Ortega et al., 2009).

Table 6 *Spearman's correlation coefficient*

Rho de Spearman	**Interpretation**
r = 1	Perfect positive correlation
0,8 < r < 1	Very high positive correlation
0,6 < r < 0,8	High positive correlation
0,4 < r < 0,6	Moderate positive correlation
0,2 < r < 0,4	Low positive correlation
0 < r < 0,2	Very low positive correlation
r = 0	Null correlation
0 < r < -0,2	Very low negative correlation
- 0,2 < r < -0,4	Low negative correlation
-0,4 < r < -0,6	Moderate negative correlation
-0,6 < r < -0,8	High negative correlation
-0,8 < r < -1	Very high negative correlation
r = -1	Perfect negative correlation

Incidence of Packaging on the organoleptic quality of Bagua Chocolate.

There was an average negative correlation between the factors of packaging information and the acidity of the chocolate, with a value r = -0.4995, similarly the factor of packaging information with the aroma, with an r = -0.4748, which means that as one of the factors increases in rank the other decreases, there was also an average positive correlation between the factor of the size and type of the packaging with the bitterness of the chocolate, with an r = 0.3393, as well as the association between color saturation and aroma, with an r= 0.2649, which indicates that as one of the factors increases the other will also increase, on the other hand, the results show that there is no correlation between the factors of the coldness of the color of the packaging on the bitterness of the chocolate and likewise the coldness of the color of the packaging shows no association with the aftertaste factor. Table 7 and Figure 3.

The association between the packaging factors and the organoleptic quality factors of Kuyay chocolate revealed considerable positive correlations between the factor of the sound of the wrapper and the bitterness of the chocolate with an r= 0.5529, as well as the factor of the sound of the wrapper and the defects of the chocolate with an r= 0.5021, where it is affirmed that if any of these factors increase in rank, the other factor will also increase in rank, There is also a considerable negative association between the brand logo factor and chocolate aroma, with r = -0.5477, as well as showing that there is no correlation between the factors of information provided by the packaging and the astringency of the chocolate, as well as the saturation of the colors of the packaging on the aftertaste of the chocolate. Table 8 and Figure 4.

The evaluation of the incidence of packaging on the organoleptic quality of Maná chocolate showed average negative correlation coefficients for the association between the factors of packaging information and chocolate bitterness, with an r = -0.4630, and an r = -0.4220 for the factor of color quality on chocolate defects, on the other hand, on the other hand, there is also an average positive correlation between the color saturation factor and chocolate acidity, with an r = -0.4446, on the other hand, there is no correlation between the factors of several wrapper illustrations and chocolate astringency, and also the factor of packaging innovation on chocolate astringency. Table 9 and Figure 5.

The association between the factors of the packaging and the factors of the organoleptic quality of Palerca chocolate, show considerable positive correlation coefficients between the factor of innovation in the shape of the packaging and the aroma of the chocolate with an r= 0.6503, the factor of warmth in the color and flavor of the chocolate with an r= 0.6289, the factor of quality according to the color and aroma of the chocolate with an r= 0.6163, 6289, the quality factor in terms of the color and aroma of the chocolate with an r= 0.6163, where it can be affirmed that as the degree of one-factor increases

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so will the other, finally it is observed that there is no correlation between the factor of compatibility of the packaging concerning the product and the bitterness of the chocolate.

Finally, it is observed that there is no correlation between the packaging compatibility factor concerning the product and the bitterness of the chocolate and the brand logo factor on the taste of the chocolate. Table 10 and Figure 6

Table 7. *Spearman's Correlation matrix of packaging factors and sensory quality of Bagua Chocolate*

.	CA_AR	CA_AC	CA_AM	CA_AS	CA_DF	CA_SAB	CA_PG
M1	-0.0792	-0.0138	0.1217	0.0878	-0.2076	0.2738	-0.3144
M2	-0.0081	-0.1736	-0.1414	-0.2746	-0.4575	0.2756	-0.3482
M3	-0.1079	-0.1277	-0.0944	0.1289	-0.1737	-0.0509	-0.2136
F4	0.0431	-0.2117	0.0489	-0.0112	-0.1181	0.0901	-0.1044
F5	0.1015	0.1626	-0.1053	0.0564	0.0505	0.0435	0.0839
F6	-0.0392	0.0517	0.0842	0.0945	-0.0618	-0.0041	0.0650
F7	0.0391	0.0447	0.0659	-0.0354	-0.1943	-0.1946	-0.0201
C8	-0.1017	-0.1104	-0.0539	-0.1205	-0.2792	-0.2957	-0.1206
C9	0.2361	0.1538	0.0938	-0.0837	-0.2533	0.0381	-0.0442
C10	0.2245	0.1186	0.1380	-0.1035	-0.4038	-0.1372	0.0114
C11	0.2649	0.1301	0.1643	-0.1118	-0.3745	-0.1499	-0.0335
C12	0.2271	0.2415	0.0813	0.2273	0.0431	0.0053	0.0746
C13	0.1029	-0.0323	-0.0019	-0.2686	-0.3896	0.1058	-0.0083
E14	0.0791	-0.2050	0.3393	0.1497	-0.1703	0.1390	-0.2229
E15	-0.1938	-0.0305	0.0993	0.0353	-0.1270	-0.0421	-0.0169
E16	-0.1341	-0.0928	0.1497	0.0658	-0.2004	-0.0162	0.0251
E17	-0.4758	-0.4995	-0.0814	-0.1826	-0.4451	-0.1443	-0.4317
E18	0.2356	0.2448	0.4015	0.1875	0.0373	-0.1443	0.1330

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Figure 3. Correlation of packaging factors and sensory quality of Bagua Chocolate.

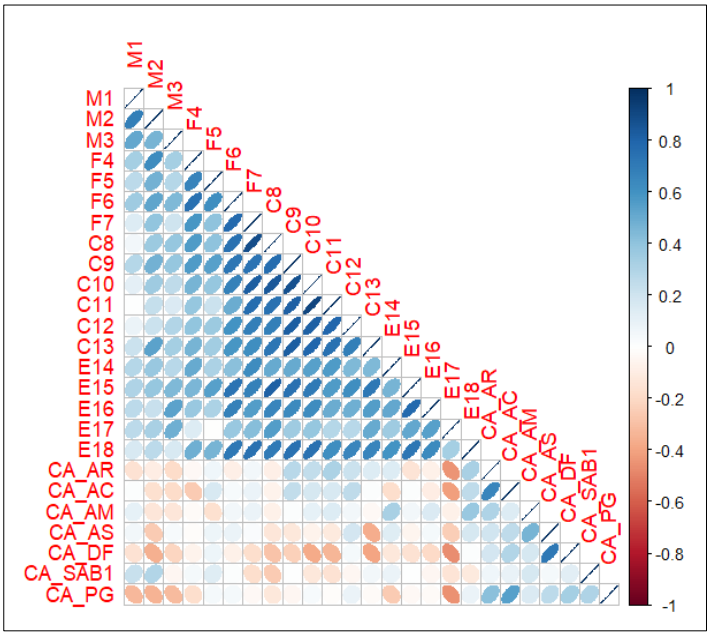

Table 8. *Spearman's correlation matrix of packaging factors and sensory quality of Kuyay Chocolate*

	CA_AR	CA_AC	CA_AM	CA_AS	CA_DF	CA_SAB	CA_PG
M1	-0.0944	-0.2407	-0.2619	-0.0656	0.2191	-0.0347	0.1909
M2	0.2158	-0.0478	-0.0539	0.0000	0.2061	0.1072	-0.0213
M3	-0.1540	0.1219	0.4421	0.5529	0.5021	-0.0447	0.1562
F4	-0.1021	-0.1469	0.0332	0.0599	0.1191	0.0385	0.0984
F5	0.2028	0.0250	0.0642	0.0548	0.3187	0.0421	0.0573
F6	-0.0638	-0.2782	0.0509	0.0111	0.0609	-0.2079	-0.1733
F7	-0.0999	-0.0793	-0.0974	-0.0493	0.1260	-0.0363	0.0848
C8	-0.3034	-0.2648	0.0339	0.0406	0.0309	-0.2241	-0.2493
C9	-0.2929	0.0929	-0.0416	0.0370	0.0278	0.0958	0.1835
C10	-0.2820	-0.1157	-0.0838	0.0775	0.0160	0.0163	0.0829
C11	-0.3136	-0.1027	0.1428	0.2108	0.1776	-0.1766	-0.0028

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C12	-0.3493	-0.1366	0.0101	0.0951	0.0698	-0.1349	-0.0266
C13	-0.3780	-0.3117	0.2359	0.1607	0.0380	-0.3277	-0.0895
E14	-0.1972	-0.3154	0.2679	0.2754	0.2454	-0.2317	-0.1844
E15	-0.0409	-0.2968	0.1512	0.2536	0.3664	0.0163	-0.0485
E16	-0.2022	-0.2280	0.1325	0.0935	0.2124	-0.0910	-0.0576
E17	0.0221	-0.2336	-0.0108	0.0000	0.0528	0.0590	-0.0213
E18	-0.5477	-0.2808	-0.0032	-0.0729	0.0429	-0.4224	-0.3309

Figure 4 Correlation of packaging factors and sensory quality of Kuyayy Chocolate.

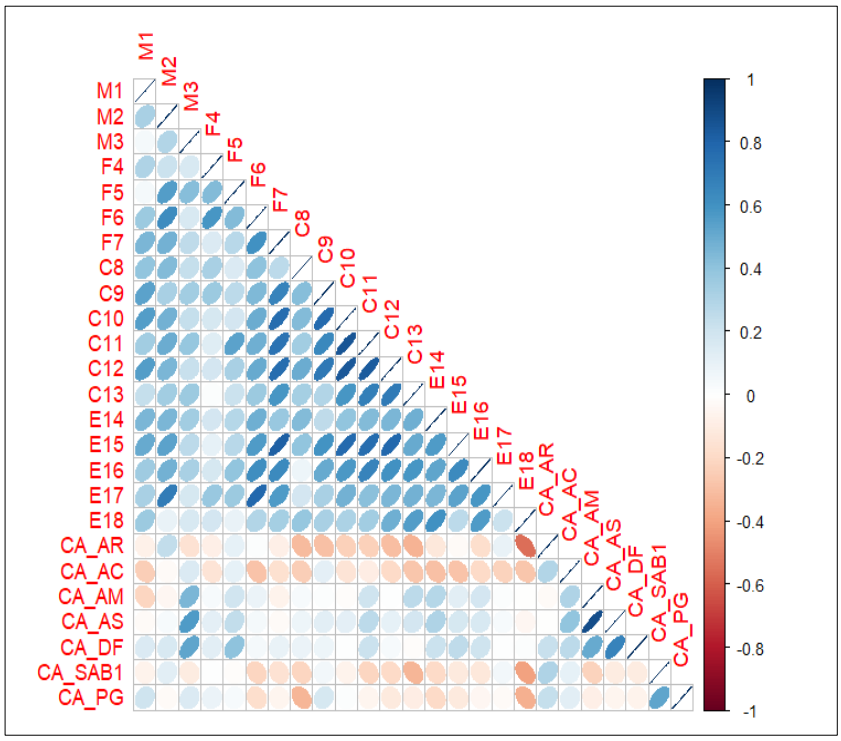

Table 9. Spearman's correlation matrix of packaging factors and sensory quality of Maná Chocolate

	CA_AR	CA_AC	CA_AM	CA_AS	CA_DF	CA_SAB	CA_PG
M1	0.3369	-0.0862	0.0958	0.0450	-0.2198	0.0997	-0.0658
M2	0.0794	0.2394	0.1486	0.0826	-0.1856	-0.0941	-0.1181
M3	-0.0742	-0.0292	-0.0080	-0.0778	-0.3574	-0.1483	-0.2512

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F4	0.4280	0.1339	0.2493	0.2438	-0.0132	-0.0167	0.1170
F5	-0.0150	0.0211	0.2400	0.1683	-0.2305	-0.0176	0.1555
F6	0.0616	0.1074	0.3469	0.2405	-0.1487	-0.0198	0.2800
F7	-0.0197	-0.0753	-0.1806	-0.0066	0.0443	0.0742	0.0151
C8	0.0108	-0.0433	-0.2023	-0.2492	-0.2247	-0.0445	-0.2107
C9	-0.0944	-0.1490	-0.0874	-0.0410	-0.4220	0.1552	-0.1752
C10	-0.0043	0.1486	0.0221	-0.1205	-0.2793	-0.0136	-0.2094
C11	0.3229	0.4446	0.1957	-0.0335	-0.1042	0.0110	-0.1384
C12	0.0397	0.0149	0.0501	-0.0551	-0.1238	0.2855	-0.2181
C13	0.1203	-0.0276	-0.1564	0.2139	-0.2234	0.3789	-0.1137
E14	0.2534	0.1178	0.1022	-0.0880	-0.1230	-0.0621	-0.1978
E15	-0.2809	-0.0384	0.1830	0.0000	0.0106	0.3600	0.0684
E16	0.2174	0.0723	0.0599	0.1855	0.0909	0.0119	0.1278
E17	0.1823	-0.2866	-0.4630	-0.2400	-0.1380	0.1155	-0.4341
E18	0.2598	-0.0879	-0.1035	0.0328	0.2251	0.2128	0.2418

Figure 5. Correlation of packaging factors and sensory quality of Maná Chocolate

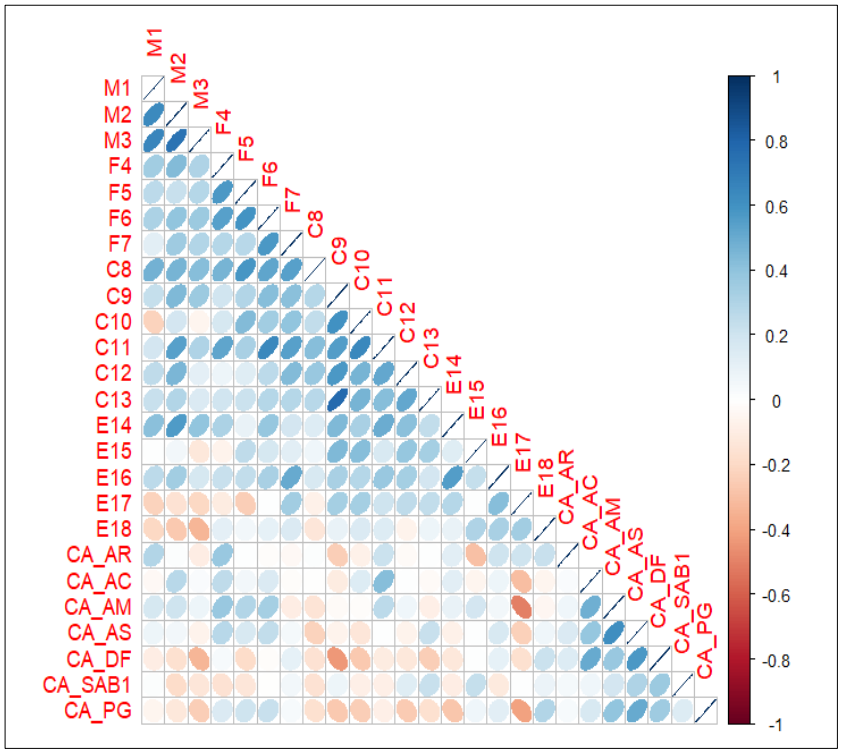

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Table 10. *Spearman's correlation matrix of packaging factors and sensory quality of Palerca Chocolate*

	CA_AR	CA_AC	CA_AM	CA_AS	CA_DF	CA_SAB	CA_PG
M1	0.2376	0.1418	0.2467	0.2265	-0.0153	0.6146	0.2793
M2	0.5065	0.0767	0.2936	0.4125	0.1292	0.4120	0.0891
M3	0.3017	0.5087	0.3784	0.1980	0.1825	0.3670	0.3014
F4	0.4320	0.1815	0.3258	0.1766	0.1033	0.1458	0.2207
F5	0.1383	0.0865	0.0975	0.1712	0.1842	0.1925	0.3040
F6	0.3585	0.3345	0.2384	0.2015	0.0948	0.3798	0.2121
F7	0.6503	0.2702	0.1795	0.2450	-0.0327	0.3949	0.1566
C8	0.3404	0.0140	0.0028	-0.0523	-0.3099	0.5010	0.3104
C9	0.6163	0.1531	0.0313	0.1141	-0.1600	0.6127	0.2532
C10	0.5629	0.2531	0.1171	0.1581	0.0340	0.4643	0.1267
C11	0.5041	0.4607	0.3385	0.1727	-0.0295	0.5033	0.1740
C12	0.4022	0.3095	0.1344	0.1546	-0.0725	0.6289	0.2842
C13	0.5254	0.4231	0.0844	0.1110	-0.0805	0.3549	0.0574
E14	0.5399	-0.0379	-0.0256	-0.1480	-0.3265	0.4203	-0.0246
E15	0.1872	0.0926	-0.0349	0.0979	-0.1129	0.4311	-0.0745
E16	0.4209	0.1796	-0.0535	-0.1510	-0.2932	0.4789	-0.1222
E17	0.2523	0.4660	0.1950	0.0495	-0.0226	0.0731	-0.0105
E18	0.3818	-0.0627	-0.0482	-0.2021	-0.3479	-0.0083	-0.2644

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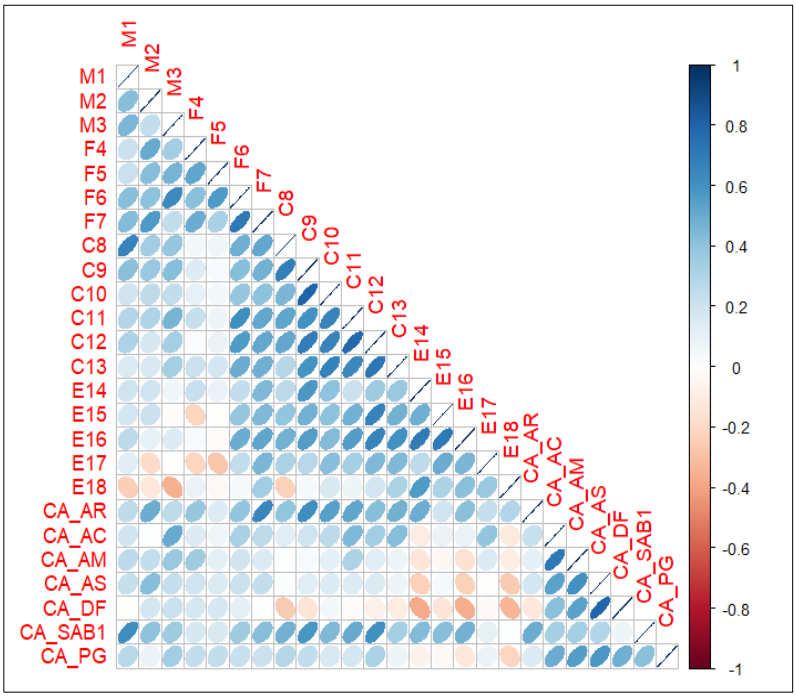
Figure 6. Correlation of packaging factors and sensory quality of Palerca Chocolate.



A tool for the willingness to buy and the sensory taste of chocolate is the packaging design, this research evidenced significant differences between the characteristics of the packaging of the chocolates and the expected good taste, in the informed condition phase the rating towards the taste after a tasting process decreased significantly because these did not meet the expected expectations. The research by Gunaratne et al. (2019) demonstrated this effect across three conditions: blind, packaging, and reported; for the first case, there were differences in liking for good taste according to the chocolate packaging, while, in the second condition, there was significant evidence in the frequency of emotion-based terms from the packaging and reported conditions, finally, taste scores in the reported condition decreased when the expectations created by the packaging were not met.

From the color of food, taste expectations are generated in consumers (Spence, 2016). Huang & Wan (2019) examined how the incongruence of packaging color and flavor labeling influence consumers' evaluation after a virtual reality experience, their research showed that liking was less when the packaging color was incongruent with its flavor label and the packaged food brand was more innovative when the product packaging

colors were improper with the flavor labels. In this position, this research showed little compatibility of the packaging color with the product, where more than 50% stated that this characteristic is at a regular level for Bagua, Maná, and Palerca chocolates and an excellent compatibility for Kuyay chocolate, on the other hand, the brand of the chocolates did show congruence with the expectations expected by the consumers.

The expected taste of a product is a function of the color of the packaging, this is if consumers do not gain experience or access to the product (Mai et al., 2016). In this line, Marques da Rosa et al. (2019) investigated how packaging shape and color impact consumer expectations, flavor association, and preferences in non-category products, it was revealed that packaging shape (preference for round to angular packaging) impacts flavor association and influences preference, on the other hand, angular packaging revealed higher associations with the sweet taste of the product, while for our part, this study analyzed the shape of the packaging in terms of perception of shape, ease of transport, attractiveness of the packaging, innovation in packaging shape and packaging material, showing that the cardboard material of the chocolate wrapper significantly outperforms the plastic material of the other chocolates in terms of tastes and preferences, and in terms of its association with chocolate flavors no significant relationships were evidenced for any case.

As stated by Sugrue & Dando (2018) "Packaging features play a very important role in capturing attention and generating expectations about the perceived quality of a product". Gislason et al. (2020) analyzed the effect of package design on consumers' perceived quality of beers, they analyzed package design from label color, label shape, label complexity, and bottle shape, where they concluded that label color and bottle type, significantly affected product evaluations with perceived quality, while the other two factors did not. In contrast, this research evaluated the brand logo and its relationship with the quality factors (aroma, acidity, bitterness, astringency, defects, flavor, and aftertaste), where the results showed that this characteristic did not significantly affect any factor of the sensory quality of the chocolates, and, as for the type of wrapper (cardboard and plastic), there were no representative associations concerning the quality factors evaluated for the Bagua, Kuyay, and Maná chocolates, while for the Palerca chocolate (plastic wrapper) it showed considerable positive correlations about flavor, bitterness, bitterness, astringency, defects, flavor and aftertaste.

From the position of Albar et al. (2016); point out that at the fresh food purchase stage, packaging and price are possible signals of quality; K.G. McLean et al. (2017), investigated the influence of packaging design on 251 consumers' perceptions of the quality of fresh carrots, they rated quality and perceived value (price) based on packaging type (plastic

bag, plastic box, cardboard paper) and label color (blue, brown, gray), they obtained that the main attribute influencing consumer perceptions for higher value and quality were plastic and cardboard packaging, this meant for consumers a quality product, local, organic and able to be inspected. In contrast, this study analyzed the design of chocolate packaging in terms of material, shape, color, and elements related to sensory quality, the factor that most attracted the attention of the participants was the shape of the packaging for Bagua chocolate, for Kuyay and Maná chocolate it was the information presented on the packaging and for Palerca chocolate it was the size of the chocolate, Likewise, for 42% of participants the relationship between the packaging and the perceived quality of Maná chocolate was good, for Kuyay chocolate 39% stated a relationship between good and excellent and for Bagua and Palerca chocolates a regular relationship, it is necessary to mention that this research did not include the price factor for the analysis of packaging about quality.

CONCLUSIONS

The packaging was analyzed in terms of material, shape, color, and elements of the Bagua, Kuyay, Maná, and Palerca chocolates. The packaging that obtained the best ratings in terms of these attributes was the Kuyay chocolate, meeting high expectations (ratings of good and excellent) in terms of perception of the shape of the packaging, The Maná chocolate received poor to good ratings for most of the evaluation factors, and the Bagua and Palerca chocolates did not fully meet expectations for some of the packaging evaluation factors.

Sensory attributes of aroma, acidity, bitterness, astringency, defects, flavor, and aftertaste of each chocolate were evaluated, the best attributes were for Bagua and Maná chocolates, followed by Palerca chocolate and finally Kuyay chocolate, all the chocolates were found on a scale of fair with scores ranging between 4 and 6, as for defects in chocolate quality, it is concluded that the chocolate that presented the highest perception of defects was Kuyay chocolate, while Palerca chocolate was the one that presented the fewest defects.

Regarding the level of satisfaction, tastes, and preferences in the reported condition phase, more than 50% of the participants were very satisfied and satisfied after consuming Bagua and Maná chocolates, the chocolate that exceeded the expectations of 42% of the participants was Bagua chocolate, the chocolates that had the highest relationship between packaging and perceived quality were Maná and Kuyay approved by 42% and 39% of the participants, and in terms of likelihood of purchase, 50% stated that they would be likely and very likely to purchase Maná and Bagua chocolates.

There was no significant evidence between the packaging factors and organoleptic quality in the four chocolate brands, the most representative relationship values were: for Bagua chocolate there were medium negative correlations between the packaging information factors and chocolate acidity (r = -0.4995) and the packaging information factor with respect to aroma (r = -0.4748), for Kuyay chocolate considerable positive correlations were revealed between the wrapper sound factor and chocolate bitterness (r= 0.5529) and the wrapper sound factor in relation to chocolate defects (r= 0.5021), for Maná chocolate there were negative mean correlation coefficients for the association of the packaging information factor and chocolate bitterness (r = -0.4630) and for the color quality factor on chocolate defects (r = -0.4220), Finally, for Palerca chocolate, there were significant positive correlation coefficients between the packaging innovation factor and chocolate aroma (r= 0.6503), the color warmth factor with respect to chocolate flavor (r= 0.6289), and the quality factor with respect to chocolate color and aroma (r= 0.6163).

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