Impact of Sustainability Labeling in purchase intention and quality perception of dark chocolate

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ABSTRACT

Labeling is an important tool for consumer's perception of sustainability and quality of a product. Focusing on measuring the impact of sustainability labeling (seal and/or indication of Organic, Origin and Quality, and Sustainable Agriculture) in purchase intention and quality perception of products labeled by the quality and sustainability criteria, this study aimed to investigate dark chocolate (pack-1 kg) with six different percentage of cocoa, with and without such labeling. A blind test was carried out in the first evaluation session, in which the samples 1, 2 and 6 were better accepted by consumers. In the second session, all judges were able to see the percentage of cocoa and the label of each sample, and the chocolates 1 and 2 obtained the highest acceptance scores. It is possible to conclude that labeling had a positive impact on purchase intention and quality perception of dark chocolates.

Keywords: Sensory analysis, Purchase intention, Dark chocolate, Labeling, Sustainability

1. Introduction

Cacao cultivation is an important agricultural activity in areas of hot-humid climates. In 2009/2010, according to the International Cocoa Organization (ICCO, 2010), Brazil was the sixth largest producer of cocoa in the world and occupied the fifth position on processing cocoa for obtaining the main derivatives used the chocolate industry (liquor / cocoa mass and cocoa butter).

Brazil is the third largest producer of chocolate in the world; in 2012 the chocolate production has increased by 3.1% over 2011, with 732 000 tons. The country remains the fourth largest consumer of chocolate in the whole world, with per capita consumption of 2.2 kg per year, showing an optimistic scenario for the coming years, since three years ago this number corresponded to 1.65 kg. According to a balance sheet released by the Brazilian Association of the Chocolate, Cocoa, Peanut, Candy and Derivatives (ABICAB), there was also an increase in apparent consumption of 3.7%, with 717 000 tons (ABICAB, 2014).

These data evidence the economic and social importance of cacao cultivation. Brazil is the only country with the complete production chain, with a significant production, cacao processing, and high consumption of chocolates.

The sectors of cocoa cultivation and chocolate production have developed several projects related to sustainability around the world. Two certifications have focused on sustainability in the development of cocoa / chocolate: as organic chocolate and products with designation of origin, for example with Rainforest Alliance Certified seal. In Europe and in the United States, there is an increase in the organic sector, thus companies have been establishing some guidelines for its manufacture. According to the Organic Trade Association, consumers buy organic products not only for their nutritional benefits, but also to avoid the consumption of pesticides and additives, in addition to maintaining the environment and promote sustainability. This customer profile is very concerned about the social and environmental aspects of food, and possibly will keep brand loyalty if the product provides positive social and environmental impacts, despite the costs may be higher. Origin cocoa is a trend in the chocolate segment, since the characteristics of each region, such as climate and soil conditions influence the cocoa quality and can provide good results on cocoa liquor and chocolate flavor. As with wine and coffee, the place of origin of cocoa production is taken into account due to the different flavor notes peculiar to the region or farm that cultivates the fruit. In addition, proper farming, environmentally correct handling and processing allow obtaining better quality products, which also promotes sustainable regional development. The concept of origin cocoa considers not only the place of production, but also the environmentally management, with a focus on fruit quality and social concern for producers (SADAHIRA, 2010).

The role project aims to apply the Ecodesign (ISO/TR 14062, 2002) methodology in the production chain of cocoa in Brazil. The objective is evaluate the impact of sustainability labeling to contribute for the development of chocolates with focus on sustainability, in a Brazilian industry that export to over 30 countries and is one of

the topping leading manufacturers in Latin America (HARALD, 2014). In the scope of the project are chocolates with high cocoa content (>50%), business-to-business packs (>1kg), from "cradle to grave" LCA (ISO 14040, 2006; ISO 14044, 2006) (cocoa and sugar producer, packing, chocolate manufacturing and consumption). A research data collection at supermarkets identified two kinds of certification focused on sustainability in the development of cocoa/chocolate: certification of agricultural practices as organic cocoa and cocoa with designation of origin (without any seal or with Rainforest Alliance seal). The chocolates were produced and sensory evaluated by 126 consumers without restriction of age or sex.

This paper, a part of Ecodesign Project, aims to characterize by sensory analysis the profile of Brazilian consumers as the impact of labels and certification of organic, origin and quality or sustainable agriculture (Rainforest) on the acceptance and purchase intention of chocolates.

2. Methods

2.1. Manufacturing process

A research data collection was carried out at different supermarkets in the city of Campinas-SP to identify the organic chocolates and those with designation of origin or with Rainforest Alliance Certified Seal, from national manufacturers. Then, six dark chocolates containing different percentages of cocoa were selected for molding and demolding steps (Table 1).

Table 1: Chocolate samples selected in the Brazilian market, with label or indication of organic, with designation of origin and quality or with Rainforest Alliance Certified seal.

Samples (Chocolates)					
1*	2*	3*	4*	5**	6**
53% Origin and *Rainforest*	63% Origin and Quality	70% Organic from Amazon	75% Organic from Bahia	70% cocoa	45% Dark

Samples 1: 53% origin cocoa and with Rainforest Alliance Certified seal; 2: 63% origin cocoa with quality indication "*Salon du Chocolat* Award Winner"; 3: 70% organic cocoa from Amazon-Brazil; 4: 75% organic cocoa from Bahia-Brazil; 5: 70% cocoa; 6: 45% dark chocolate; *seal and/or indication of Organic, Origin and Quality or Sustainable Agriculture (*Rainforest*); ** without seal and/or indication of Organic, Origin and Quality, or Sustainable Agriculture.

The six chocolate samples were melted and submitted to tempering, molding, cooling and packaging. Then, the samples were melted in a microwave and subjected to the tempering step performed manually on a marble table. The chocolate mass was warmed to $50 \pm 1.0\,°C$ and then cooled to $29 \pm 1.0\,°C$ under constant movement at a rate of 2 °C / min. The pre-crystallization was monitored by a temper meter considering the tempering index between 4.0 and 6.0. The chocolate was dispensed manually into preheated polypropylene rectangle-shaped molds. Then, the molds were subjected to vibration to remove air bubbles, and the samples were cooled in cooling tunnel. The chocolates were demolded, packaged in aluminum foil and stored in a chamber at 18 °C.

2.2. Sensory Analysis

The impact of labeling on the acceptance and purchase intention of consumers was carried out with 126 consumers of dark chocolate, in the Sensory Analysis Lab, Department of Food Technology (DTA / FEA/UNICAMP) and Laboratory of Sensory Analysis of Cereal & Chocolate Research Center (Food Technology Institute - ITAL). The chocolates were evaluated by consumer acceptance test with consumers of dark chocolate (STONE & SIDEL, 2004).

The sensory evaluation of chocolates was performed according to a randomized complete block design, with no restrictions on age, gender and social class. The test was divided into two sessions, with a blind test performed in the first session, without revealing the origin or the certification seals.

In the second session, after the blind test, the assessors were informed about Organic and *Rainforest* seals, certificates of origin, and then the origin and/or certification of each chocolate sample was revealed, followed by the purchase intention and sensory acceptance analysis.

In both sessions, the samples were evaluated for the attributes aroma and chocolate flavor, chocolate melting in the mouth, bitterness, acidity, hardness or force required to break the chocolate, and overall impression, through a 9-point scale anchored as follows: 9 "like extremely"; 8 "liked"; 7 "liked moderately"; 6 "liked slightly"; 5 "neither liked nor disliked"; 4 "dislike somewhat"; 3 "dislike moderately"; 2 "dislike very much"; and 1 "dislike extremely". The purchase intent was assessed using a 5-point scale: 1 "definitely would buy"; 2 "probably buy"; 3 "I doubt if I would buy"; 4 "probably would not buy"; and 5 " definitely would not buy." The data were subjected to analysis of variance (ANOVA) and means were compared by Tukey's test at 5% significance level.

3. Results

Table 2 presents the results of the blind acceptance test in the first session with 126 consumers.

Table 2. Blind acceptance test of six different samples

Chocolate samples	Attributes						
	Flavor	Bitterness	Acidity	Aroma	Hardness	Melting	Overall impression
1 53% Origin and *Rainforest*	6.64 a	5.97 a	5.38 ab	5.98 a	6.12 ab	6.71 a	6.65 a
2 63% Origin and Quality	6.38 ab	5.86 a	4.96 ab	6.12 a	6.06 ab	6.39 ab	6.21 ab
3 70% Organic from Amazon	5.88 bc	5.89 a	4.75 b	6.22 a	6.07 ab	5.95 b	5.73 bc
4 75% Organic from Bahia	2.96 d	3.87 b	2.93 c	4.79 b	5.14 c	4.75 d	2.87 d
5 70% cocoa	5.53 c	5.24 a	5.12 ab	6.11 a	5.66 bc	5.36 c	5.60 c
6 45% Dark	6.15 abc	5.27 a	5.58 a	6.01 a	6.28 a	6.54 a	6.32 ab

Averages in the same column followed by the same letter are not significantly different by Tukey test ($p \geq 0.05$).

Although the sample 1 was more accepted by consumers, with a mean score lying in the category "moderately liked" for the attribute overall impression, it was not significant ($p \leq 0.05$) different from the samples 2 and 6, with a mean score lying in "slightly liked ".

With respect to the attribute chocolate flavor, sample 1 had the highest acceptance score in the category "moderately like", but did not differ ($p \leq 0.05$) from the samples 2 and 6, with a mean score lying in "slightly liked".

Concerning the bitter taste, despite the samples 1, 3, and 2 had the highest scores in the category "slightly liked", it did not differ statistically from the samples 5 and 6, which scored in "neither liked nor disliked".

As the attribute acidity, sample 6 was the most widely accepted, lying in the category " slightly liked ", but did not differ at a significance level of 5% from the samples 1, 2 and 5 that scored in "neither liked nor disliked".

The low acceptance of the sample 4 when compared to the other samples is mainly due to the attributes flavor, bitterness, acidity, aroma and melting which have received lower mean scores and influenced the overall impression. The results also indicate that Brazilian consumers enjoy chocolate containing low levels of cocoa than chocolates with high cocoa content.

Table 3 presents the purchase intention in the blind test.

Table 3. Purchase intention of chocolates in the blind test.

Purchase intention	Samples (blind test)					
	1 53% Origin and *Rainforest*	2 63% Origin and Quality	3 70% Organic from Amazon	4 75% Organic from Bahia	5 70% cocoa	6 45% Dark
Definitely would buy	41.27%	36.51%	26.19%	3.97%	26.19%	39.68%
Probably buy	42.06%	36.51%	25.40%	3.97%	28.57%	29.37%
I doubt if I would buy	9.52%	16.67%	29.37%	13.49%	22.22%	19.84%
Probably would not buy	5.56%	8.73%	12.70%	34.92%	18.25%	7.14%
Definitely would not buy	1.59%	1.59%	6.35%	43.65%	4.76%	3.97%

In general, samples 1, 2 and 6 had the highest scores in the purchase intention test. In contrast, sample 4 had the highest scores in the category "certainly would not buy", with over 40% intentions, demonstrating that the flavor has influenced purchase intention in the blind test.

Table 4 shows the results of the acceptance test after the information of the samples with or without labeling.

Table 4. Acceptance test of the samples with or without labeling

Samples	Attributes (with or without labeling)						
	Flavor	Bitterness	Acidity	Aroma	Hardness	Melting	Overall impression
1 53% Origin and *Rainforest*	7.01 a	6.37 a	5.62 a	6.55 ab	6.41 a	6.84 a	6.87 a
2 63% Origin and quality	6.85 ab	6.27 a	5.56 a	6.67 a	6.49 a	6.75 ab	6.90 a
3 70% Organic from Amazon	6.13 c	6.03 ab	4.84 b	6.37 abc	6.26 ab	6.30 b	6.11 bc
4 75% Organic from Bahia	3.20 d	3.96 c	3.02 c	5.01 d	5.32 c	5.02 d	3.03 d
5 70% cocoa	5.71 c	5.53 b	5.34 ab	6.09 bc	5.80 bc	5.60 c	5.60 c
6 45% Dark	6.30 bc	5.50 b	5.65 a	5.94 c	6.40 a	6.55 ab	6.28 b

Averages in the same column followed by the same letter are not significantly different by Tukey test ($p \geq 0.05$).

In the second session, the samples containing the seals were presented to the assessors. Both samples 2 and 1 were the most accepted by consumers, with a mean score lying in "like moderately" for the overall impression, with no significant differences at 5% level.

The blind test showed that chocolate 1, 2, and 6 were the most accepted for the majority of the attributes. However, in the second session where the assessors knew the cocoa content and the seals of each sample, samples 2 and 1 were the most accepted and received higher scores than those in the blind test, showing that the labeling with seals had an impact on the overall acceptance of chocolates.

For the attribute flavor, the sample 1 had the highest score lying in the category "like moderately", followed by the sample 2 with a mean score also in the category "like moderately".

Samples 1, 2 and 3 had the highest scores for the attribute bitter taste in the category "liked slightly", and differed statistically from the samples 5 and 6.

Again, the sample 4 was less accepted by consumers for flavor, bitterness, acidity, aroma and melting attributes at a significance level of 5%, with a mean score on the overall impression lying in the category "dislike moderately".

Even after the information of the organic seal, the chocolate 4 remained less accepted than the other chocolates, demonstrating that the taste was the most important factor for consumers.

As shown in Table 4, after the revelation of the seals, the acceptance scores increased for samples 1, 2 and 3. The sample 2 contained an origin cocoa with quality flavor indication, as twice winning the award for best chocolate flavor at the *Salon du Chocolat* in Paris, France. The sample 1 contained the sustainable agriculture *Rainforest* seal, and the sample 3 contained the declaration of organic cocoa from Amazon-Brazil.

It is verified in the second session that the samples were separated into groups, once the samples 2 and 1 received the highest acceptance scores for almost all attributes, and did not differ at a 5% significance level. On the other hand, samples 3, 5 and 6 formed the second group receiving the highest acceptance scores, and did not differ at a significance level of 5% for the attributes evaluated.

In general, it is possible to say that the labeling influenced the sensory acceptance of chocolates after the second session, when the assessors knew the percentage of cocoa and the seals of each sample. Samples 1, 2 and 3 received the highest scores from one test to another, and no changes were observed for the sample 5, evidencing the positive impact of labeling.

Table 5 presents the results of consumer purchase intent after the information about labeling of chocolates.

Table 5. Purchase intention in the second session after information about labeling.

Purchase intention	Samples					
	1 53% Origin *Rainforest*	2 63% Origin and quality	3 70% Organic from Amazon	4 75% Organic from Bahia	5 70% cocoa	6 45% Dark
Definitely would buy	51.6%	50.0%	29.4%	6.3%	24.6%	42.9%
Probably buy	36.5%	33.3%	35.7%	7.1%	34.1	27.0%
I doubt if I would buy	9.5%	12.7%	19.0%	18.3%	20.6%	19.8%
Probably would not buy	2.4%	3.2%	11.9%	26.2%	14.3%	7.9%
Definitely would not buy	0.0%	0.8%	4.0%	42.1%	6.3%	2.4%

Again, the chocolate 1, when compared with the blind test, obtained the largest percentage of purchase intention with 51.6%, followed by samples 2 and 6.

It is noticed that after revealing the information of the samples to consumers, the positive effect on purchase intention increased and the negative effect decreased, except for the sample 5. Regarding the sample 4, the uncertainty regarding the purchase intention increased, thus showing the seal and / or indications may have impacts on the sensory acceptance and purchase intention by consumers.

4. Discussion

Johansson et al. (1999) found an impact of labeling on the form of production (conventional and organic) in the sensory preference of tomato consumers. After informing about the cultivation techniques, the authors observed that the labeled organic samples increased the preference scores, but that information was less important when the tomatoes were sweeter and had more intense taste when compared with those grown ecologically and presenting high acid taste.

Levin and Gaeth (1988) studied the effect of labeling on the perception of four sensory attributes of meat. The judges were informed that a sample contained "75% lean ground beef" and the other contained "25% fat ground beef". Although both samples contained the same fat content, information was passed differently for the judges. The results showed that the 75% lean beef was evaluated as low fat with better quality than the sample labeled 25% fat beef.

In this study, it was observed that the labeling had an impact on the consumer acceptance and purchase intention, once those samples containing quality seals presented the highest sensory scores when compared with those chocolates without such labels.

5. Conclusion

It was possible to observe that the consumer's behavior changed when quality and sustainability labels have been informed, since the sensory acceptance and purchase intention increased for the samples containing the seals. Moreover, it appears that the sensory attributes were also important for Brazilian consumers, once among the samples with seals, the chocolates with lower cocoa content were more accepted in both sessions.

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