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Consumer willingness to pay for vanilla using contingent valuation analysis

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ABSTRACT

Objective: To show the willingness to pay a premium for vanilla from the Totonacapan region through contingent valuation analysis for the strengthening of vanilla in the local market.

Design/methodology/approach: To contingent valuation methodology (CV) was followed to estimate the WTP, based on consumer surveys in the Totonacapan region. The information analysis was carried out by the XLSTAT 2019 software through logistic regression of the willingness to pay data in a binary response with a confidence interval of 95% and with 100 iterations, and maximization of the likelihood function with the Newton-Raphson algorithm.

Results: The results indicate that 55.63% of the consumers agree that certification increases the potential to pay a premium; the accessibility of vanilla is important for 66.56% of consumers; previous experience with the brands and product behavior is paramount for 56.95% of all consumers; regarding the origin of vanilla, it is important for 65.23% of consumers.

Findings/conclusions: Production by small-scale local producers is an appreciated quality because it is related with the symbolic dimension and is appreciated by 68.54% of consumers.

Keywords: attributes, food, identity, market, price premium.

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INTRODUCTION

A food with territorial identity (TIF) is a product with high degree of differentiation and, therefore, market niches can be more specific, although more profitable because they offer sensations, feelings, memories, awareness of place, and connection with history and culture (Pérez *et al.*, 2020). Since it is a much more specific market, the price of a TIF is influenced by consumer willingness to pay (WTP), since the price of the good purchased not only represents the monetary value of the inputs but also the sociohistorical processes, the preparation, and the history (Ascorbe, 2018).

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In strict sense, the market of TIFs cannot exist without consumers and their consumption preferences; therefore, the knowledge of consumers as a segment of the population that consumes a specific good is fundamental. Consumers have in their hands the possibility of choosing a product over another one based on the identification of particular satisfactors (Salgado, 2019).

The consumer, as a biological entity, responds to external social stimuli and of the species' reproduction, and this causes for values and feelings to be expressed in the behavior of access to chosen products. The characterization of consumers, as axis of the market, allows estimating the way in which their needs are satisfied as society (Sonoda *et al.*, 2018). Thus, some studies have shown that human values and their preferences are predictive tools for the consumption of foods. Therefore, some disciplines, such as those related to the market, carry out their advertising campaigns in order to respond to the needs of this segment of consumers (Otero and Giraldo, 2019).

Some methodologies are reported to estimate the consumer's potential to acquire a specific good in function of the attributes required by the individual and the collectivity. Allen (2000) suggested a theory that incorporates the tangible and intangible characteristics that make up a product as mediation to understand the consumption preferences of consumers.

Consumer preferences vary with utilitarian and symbolic attributes, tangible and intangible. An attribute is utilitarian when the good acquired fulfills an instrumental function and the attribute is symbolic when the affective feelings towards the product are reflected (Hernández-Montes, 2018).

A way of estimating consumer behavior in the presence of a product is the methodology of willingness to pay, following the contingent valuation method.

Estimation of the WTP through the contingent valuation (CV) method consists in performing surveys with direct consumers of the product with the intention of obtaining the purchase intent based on incorporating a premium derived from aggregating tangible and intangible attributes (Tudela-Mamani, 2017).

The CV method is based on the consideration of preferences mentioned by the users including the sociocultural and economic perspective. The intention of the method is to include the attributes mentioned in the planning and development of products that satisfy a need felt and which generate additional economic resources for the producers (Sahagún *et al.*, 2021).

Thus, the CV method also relates the sociodemographic characteristics of the consumers since, in large part, they determine the elements to make the best decisions for the links of the vanilla value chain and their WTP regarding the preferred attributes (Jaramillo, Vargas and Rojas, 2018).

Therefore, the objective of this document is to show the willingness to pay a premium for vanilla from the Totonacapan region through the contingent valuation for the strengthening of vanilla in the local market.

MATERIALS AND METHODS

A survey was applied to 302 people to obtain the data, using the binary scale where 1 means that the consumer is willing to pay a premium for a product, in this case vanilla,

considering its tangible and intangible attributes, and 0 when the consumer is not willing to pay for a differentiated product.

The information analysis was carried out using the XLSTAT 2019 software through logistic regression based on the data on willingness to pay in a binary response with confidence interval of 95%, and with 100 iterations and maximization of the likelihood function with the Newton-Raphson algorithm.

To estimate the WTP, the methodology called contingent valuation (CV) was followed. This method is characterized by the "creation" of a hypothetical market since values are estimated from particular specifications of the product studied (Roa, 2006).

In this study, the WTP scenarios were suggested for the variables:

- vanilla originally from the Totonacapan region,
- a product of natural origin,
- a product with denomination of origin,
- vanilla produced and processed by small-scale local producers,
- organic production,
- production under agroecological production schemes.

The proposals for WTP were 0%, 5%, 10%, 25%, 50%, 75% and more than 75%.

RESULTS AND DISCUSSION

The descriptive data show that 98.68% of the consumers are willing to pay a premium for vanilla from the Totonacapan region with a frequency of 298 and, on the other hand, 1.32% is not willing to pay a premium despite the distinctive characteristics of the product. When it comes to the variables considered as attributes to integrate them to the commercialization of the product and for consumers to be able to pay a premium are presented in Table 7.

The attributes of price, flavor and aroma are the characteristics preferred by consumers to pay a premium for vanilla from Totonacapan. The utilitarian dimension is considered more important than the symbolic dimension. Meanwhile, the denomination of origin, so important in TIFs, does not seem to be relevant in the presence of other attributes.

The differences in the behavior between consumers regarding paying a premium are related to multiple variables that can be analyzed further on. For example, the lifestyle, the

Table 1. Significance of logistic regressions of the willingness to pay in mezcal through the maximum likelihood method.

Variable	Min.	Max	Media	Dev. typical
With denomination of origin (DO)	1.000	5.000	4.060	1.372
Vainilla Origin	1.000	5.000	4.493	0.981
Taste	1.000	7.000	5.036	1.708
Flavor	1.000	7.000	6.288	1.236
Scent	2.000	7.000	6.659	0.764

sociodemographic relationship in the region, the knowledge about production processes, and the relation with identity, tradition, quality, and origin of vanilla.

The correlation matrix between variables for WTP by consumers indicates, statistically, that aroma and flavor is the combination of attributes most considered to pay a premium for vanilla. Meanwhile, the origin of vanilla and the denomination of origin is another one of the useful conditions to combine to pay premium; while the price and the origin of vanilla is the least likely combination to consider in order to differentiate vanilla from the Totonacapan region. The results are synthesized in Table 8.

Meanwhile, the hypothesis proves that there is no statistically significant relationship between the variables selected to pay the premium; the results of the null hypothesis test (H0) calculated by the equation $Y=0.987$ (WTP Variable) indicate that $\Pr>X^2$ for -2log likelihood is 0.012, for Score it is 0.005, and for Wald it is 0.047. Therefore, the null hypothesis is rejected, and it means that each attribute is different and that there are conditions to pay a premium. The mathematical way of expressing the formula to estimate the WTP is the following:

$$Pred(DAPOR) = 1/\Big(1+\exp\Big(-\big(-0.531-0.873*\text{That it has denomination of origin}$$
$$+1.211*\text{The origin of vanilla}-0.899*\text{The price}$$
$$+0.255*\text{The flavor}+1.176*\text{The aroma}\big).$$

Therefore, the standardized coefficients for the variable WTP reveal the values of $\Pr>X^2$ where there is significant difference of $p<0.05$ for the origin of vanilla; meanwhile, the other variables are not statistically significant.

Table 3. Coefficients standardized for the WTP variable.

Variable	Value	Standard error	Pr>Chi²
With DO	-0.660	0.431	0.126
Origin	0.654	0.264	0.013
Price	-0.846	0.492	0.085
Flavor	0.174	0.354	0.623
Scent	0.495	0.275	0.072

DO: Denomination of origin.

Table 2. Matrix of correlations between the attributes signaled to differentiate vanilla from the region.

Variable	With DO	Origin	Price	Flavor	Scent
With Origin (DO)	1.000	0.432	0.189	0.242	0.168
Origin	0.432	1.000	0.061	0.217	0.318
Price	0.189	0.061	1.000	0.297	0.190
Flavor	0.242	0.217	0.297	1.000	0.442
Scent	0.168	0.318	0.190	0.442	1.000

When it comes to the econometric analysis, the quotients explain the WTP with attributes that consider flavor, color and aroma that make the product characteristic and distinctive from the other products. On the other hand, if the product is added with attributes such as the quality and the price, it is likely for consumers to feel less attracted to acquire the good (Cervantes *et al.*, 2020). Table 4 indicates that the statistical significance for the value *p* calculated is lower than the estimated value alpha=0.05.

And the graph to show the ranges of the standardized coefficients with a confidence level of 95% is presented in Figure 1.

The results from the surveys suggest that the frequency of consumption of vanilla in the region varies in great relation with the gender, and the results are shown in Table 11.

The number of foods and beverages with vanilla base make it a product that is consumed daily. A relevant theme to study in upcoming research is the consumption of vanilla by season of the year. The vanilla consumption intent varies in function of the product elaborated based on vanilla, whether in confectionery, foods, or beverages. The local establishments offer the product during the entire year and the consumers acquire them because of desire or for satisfaction. The low temperatures have an impact on the

Table 4. Results from the econometric model of willingness to pay (WTP) per attribute.

Parameters model				Verisimilitude	
Variable	**Marginal Effect**	**Standar Error**	**Pr>|z|**		
Price	−0.005	0.003	0.964	X^2	13.674
Taste	0.005	0.003	0.057	gl	5
Scent	0.005	0.005	0.155	p	0.018
Color	0.002	0.004	0.326		
Quality	−0.002	0.005	0.670		

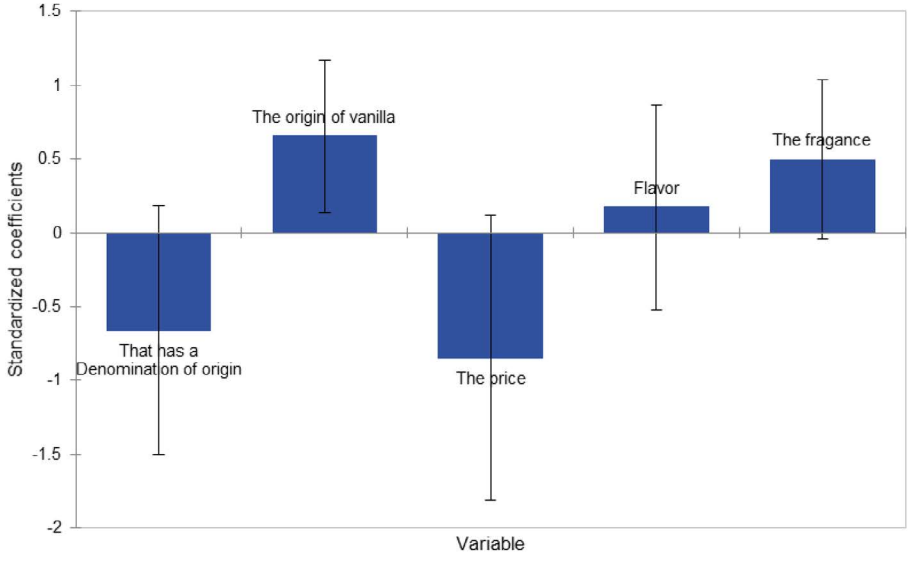

Figure 1. WTP by standardized coefficients at a confidence level of 95%.

Table 5. Frequency of vanilla consumption by gender.

Frequency	Female (%)	Male (%)	General (%)
Once a month	26.71	24.82	25.83
Once a week	11.80	13.48	12.58
More than 2 times a year	7.45	8.51	7.95
Once a year	6.21	7.09	6.62
Several times in a month	28.57	30.50	29.47
Several times in a week	19.25	15.60	17.55

increase in consumption of confectionary and hot beverages, and consumption is preferred in cold foods during the period of high temperatures.

Many times, consumers ignore the ingredients with which foods and beverages are elaborated, and this has an effect on the response regarding the frequency of vanilla consumption. Consumers choose consciously to consume several times per year the various vanilla-based products.

Based on education and gender, the preference for vanilla happens among the people with highest degree of education (38.51% for women and 40.43% for the case of men). Based on the logistic regression, schooling has a direct influence on consumption and preference, since, without it being a written rule for all the sectors, the academic degree perceives products from the goodness of consuming local, safe products of natural origin (Gutiérrez *et al.*, 2012). The complete information is presented in Table 6.

Regarding the consumption, no significant differences ($p>0.05$) were observed between the preference for products and the frequency of shopping. Knowledge is a defining factor of the attitudes and practices in socioeconomic and psychological aspects that consumers take into account when they choose to buy a product (Espinel, Monterrosa-Castro and Espinosa-Pérez, 2019).

Consumers report that vanilla is purchased by price (in Mexican pesos) and by amount of product (in liters when it is essence, extract), in grams (when purchased as pod). The essence is acquired in presentations of 250, 500, 750 mL, 1.0 and 2.0 L. The extract is purchased in containers of 100, 250, 500 mL, and 1.0 L. When it is purchased in pod, consumers prefer

Table 6. Vanilla consumption by gender and education in the Totonacapan region.

Frequency	Woman					Man				
	Scholarship				Total	Scholarship				Total
	B	MS	P	S		B	MS	P	S	
Once a month	10	14		19	43	15	8		12	35
Once a week	5	9		5	19	8	3	1	7	19
More than two times a year	2	5		5	12		7		5	12
Once a year	3	3		4	10	3	4		3	10
Several times in a month	10	16	3	17	46	10	9	2	22	43
Several times in a week	11	8		12	31	6	7	1	8	22

Note: B: basic education, HS: high school, G: graduate studies, and U: undergraduate studies.

to buy 50, 100, 250, 500 g and more than 1.0 kg. The purchase information by consumer is presented next in Table 7. Regarding the brands that offer vanilla in the region, there are up to 137 brands identified. Of them, the brand *Xanath* is the one most frequently mentioned, followed by *Zanilli*, *Papantla* and *Gaya*; and some local brands such as *Milán*, *Ojital*, *Paloma* and *Vailicpap*. Artisanal vanilla is a common way of consuming the product and preferred by 48.95% of the consumers.

The origin of the vanilla consumed in the Totonacapan region is identified to be from Papantla (54.64%) and some regions of Oaxaca and Mexico City (synthetic products).

Money exchange for the merchandise happens at street stalls in the communities of the region, although the minority of the product is acquired through this path. Purchasing vanilla at the plot is common among 12.58% of the consumers; this way of exchange guarantees that the process is natural and innocuous and the price is fair for both parts: the consumer acquires a product at a reasonably lower price than the one offered in stores of the community, and the producer sells at a better price than to the intermediary. The difficulty of way of selling is in the travelling of consumers to the plots. The characteristic of this trade is that artisanal vanilla is consumed directly from the field to the table.

The candy shops, market and supermarkets are the main centers of money exchange for vanilla, since they represent 78.81% of the total purchase of brands and presentations. Meanwhile, 8.28% of the purchase is carried out in local and specialized stores in the sale of primary origin products and with scarce transformation processes.

Regarding the perspective on the quality of vanilla, 87.09% of the consumers have the opinion that the product is of excellent quality; 12.25% feel satisfied for the vanilla acquired and 0.66% of the consumers doubt the quality of the vanilla. These consumers are the most

Table 7. Preferred presentations of vanilla in the Totonacapan region to purchase in the market.

State	Presentation	Frequency	
		Totonacapan	Others
Essence	250 mL	66	6
	500 mL	49	2
	750 mL	3	0
	1 L	22	6
	2 L	4	1
Extract	100 mL	45	2
	250 mL	44	1
	500 mL	13	0
	1.0 L	5	1
Pods	50 g	7	0
	100 g	0	1
	250 g	4	0
	500 g	5	2
	>1.0 kg	5	0
Other presentations		7	1

important to attend when the purpose is to rescue the sensorial attributes of vanilla from the Totonacapan.

Willingness to pay for tangible and intangible sensorial attributes

The WTP through contingent valuation is the maximum willingness to pay by individuals through direct grouped questions and binary response. Zero for not accepting to pay premium and one for accepting to pay.

The consumers report that vanilla certification gives them security about the healthiness and safety for human consumption; 55.63% totally agree that certification will be an important attribute when buying a product obtained in the region. In contrast, 6.62% of the consumers consider that certification is not a necessary quality to integrate in the final product for the market.

According to the accessibility to vanilla in the market, the consumers are of the opinion that vanilla in the regional markets is an incentive to acquire it; thus, 66.56% of the consumers think that the vanilla is purchased because it exists in the local market. And, for their part, 8.28% of the total consumers surveyed mention that even when there is no vanilla in the market, it can be obtained because they prefer the product to use it in their daily activities.

To purchase the vanilla, previous experience with the brands and with the behavior of the product is fundamental for 56.95% of the total consumers; meanwhile, for 6.95% of these the experience is not important because they consider that vanilla, regardless of the brand and the origin, is the same from their utilitarian perspective. The preference for the origin of the vanilla has an important effect because the consumers choose vanilla produced in the region. The piece of data that supports this statement is that 65.23%

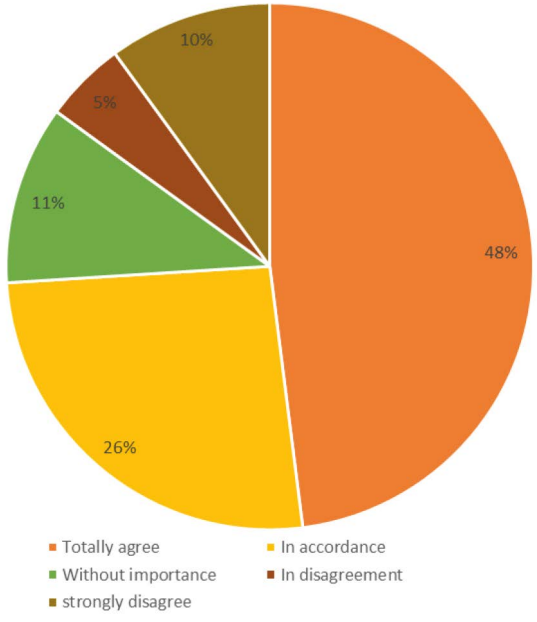

Figure 2. Willingness to pay for vanilla with certification.

recognize that they prefer vanilla obtained in the municipalities of the Totonacapan region; for 4.64% of the total consumers the origin is not relevant. Small-scale producers relate the ancestral knowledge with the culture and history of vanilla in the region; therefore, the consumers are of the opinion that vanilla produced by small-scale producers is of quality and guarantees safety. A total of 68.54% of the consumers prefer for vanilla to be produced, elaborated and sold by small-scale producers, considering that the product is healthy and generates economies of scale.

The production systems by small-scale producers retake the knowledge used in the past and contribute with 1% of the production processed in the entire world (Barrera-Rodríguez *et al.*, 2009). The economy of small-scale producers is strengthened with the production and commercialization of vanilla in the region. Other important attributes for consumers and their influence in the willingness to pay is presented in Table 14. The data reported suggest that consumers consider market attributes, such as price, as important to select a vanilla. However, in monetary terms, the price varies in function of the value which a consumer is willing to pay to acquire a good or service (Ramos, Huacchillo and Portocarrero, 2020). According to Jaramillo (2016), with a higher price the percentage of positive responses to the question of the WTP is lower. This is in the understanding that price is one of the most defining variables for a product to have acceptance among consumers.

The aroma is one of the most important attributes when it comes to choosing vanilla and as intangible attribute, the quality is. The price is one of the least important attributes when comes to preferring vanilla, as long as it is a quality product; meanwhile, for the consumers, the origin of the product is not a relevant quality. Although vanilla is a recognized product, the consumption trends consider that a product is good regardless of whether it is a local product or from another region. In other research studies, it has already been determined that it is important to understand the origin in the containers and the information supplied in the market (Lacaze, 2009). Paying a premium for a product is the maximum willingness to pay for the consumer and the existing prices in the market to identify segments of consumers in the market. The WTP assumes that, for all the consumers, the price is a defining factor in the purchasing process of the product and the willingness to pay a premium (Hernández *et al.*, 2022). The responses associated with the WTP for the different attributes of vanilla from the Totonacapan region are presented in Table 9.

Table 8. Relevant attributes for the consumer to prefer vanilla.

Condition	Quantity (%)						
	Price	**Taste**	**Scent**	**Origin**	**Quality**	**SA**	**Origin**
Totally agree	57.62	80.79	84.77	76.16	84.77	73.18	30.13
Agree	22.85	13.91	11.92	13.25	10.26	17.55	14.90
Without importance	9.60	4.30	1.66	6.29	2.98	6.95	19.54
Desagree	5.63	0.66	0.99	1.99	0.99	1.32	10.60
Totally desagree	4.30	0.33	0.66	2.32	0.99	0.99	24.83

SA: sensorial attributes.

Table 9. Willingness to pay based on the most important tangible and intangible attributes for consumers.

Attribute	Willigness to pay the premiuim (%)						
	0	**5**	**10**	**25**	**50**	**75**	**>75**
Originally from Totonacapan	2	2	5	10	32	34	15
Natural	3	2	4	7	23	39	24
With designation	3	6	14	14	24	24	16
Produce and processed by small producers	1	3	4	7	20	43	22
Produced without chemicals	2	3	5	7	17	38	26
Under agroecological principles	2	3	4	10	19	42	20

The WTP for vanilla from the Totonacapan region is likely to be paid by 65.89% of the consumers when a premium is in the range of 50% to 75%. When comparing the results with other studies conducted, it is proven that the probability of paying a premium is lower as the percentage offered to consumers increases (Pérez *et al.*, 2012). For the WTP of a premium of 0%, the results indicate that the p-value calculated is higher than the significance level alpha=0.05, and given that the proportions are equal, there is no statistical significance. The value of X^2 is 1.337 and the *p*-value 0.931.

According to the Monte Carlo method (number of simulations equal to 5 thousand), the result for the WTP for a premium of 0% indicates that the calculated *p*-value is better than the significance level alpha=0.05 and, therefore, the proportions are equal.

The statistical tests show that with the WTP with premium of 5%, the proportions are equal since the value of calculated p is higher than the significance level alpha=0.05 and, by the Monte Carlo method, the value of X^2 is 3.533 with simulations of 5 thousand.

For the premium of up to 10%, the WTP is not statistically significant when it comes to the proportions since the calculated p-value is higher than the significance value alpha=0.05. The value of X^2 is 13.830 by the Monte Carlo method with 5 thousand simulations.

For the premium of 25%, the WTP is not statistically significant because the proportions are equal according to the calculated *p*-value that is higher than the significance value alpha=0.05. The Monte Carlo method results in X^2 of 4.664. When it comes to the

Table 10. Analysis of the significance between the proportions of WTP according to the premium.

Willingness to pay	Price to pay						
	0%	**5%**	**10%**	**25%**	**50%**	**75%**	**>75%**
Originally from Totonacapan	2a	2a	5a	10a	32a	34a	15a
Natural	3a	2a	4a	7a	23a	39a	24a
With designation	3a	6a	14a	14a	24a	24a	16a
Produce and processed by small producers	1a	3a	4a	7a	20a	43a	22a
Produced without chemicals	2a	3a	5a	7a	17a	38a	26a
Under agroecological principles	2a	3a	4a	10a	19a	42a	20a

*Proportions with the same letter within columns are statistically equal ($p \leq 0.05$).

premium of 50%, the WTP is not statistically significant because the calculated *p*-value is higher than the value of significance alpha=0.05 and it is considered that the proportions are equal. The Monte Carlo method indicates a value of X^2 of 8.115.

The same situation applies to premiums of 75% and more than 75% given that the *p*-value is higher than the significance level alpha=0.05. In both cases, the Monte Carlo method indicates values of X^2 of 10.478 and 5.860, respectively. Regarding the Marascuilo method, the data indicate that there is no difference between the proportions, confirming that the groups are equal with a calculated *p*-value higher than the significance value alpha=0.05. There is no significant difference between the proportions.

CONCLUSIONS

The WTP of vanilla from the Totonacapan region through contingent valuation indicates that the attributes of price, flavor, aroma, color and quality are important to add them to the vanilla product to make the product more attractive for the local market. The WTP is probably the preference to pay by 65.89% of the consumers when the premium is in the range of 50% to 75%, and it is proven that the probability to pay a premium is lower as the percentage offered to the consumers increases. The gender and the education have an influence on the WTP for a premium that includes attributes such as flavor, aroma, price and quality. With higher degree of education, the preference is to pay a premium for attributes related to the symbolic dimension of vanilla. The knowledge of culture and history is an indication of the willingness to pay a premium, since yearning is a strong incentive to make the purchase because you acquire a "piece of history".

The promotion of vanilla as a product with territorial identity can be driven by the following strategies compiled by consumers.

- The mouth-to-mouth recommendation among consumers suggests that it is very useful when it comes to sharing the benefits of acquiring a local product. The family, friends and workmates are fine elements to share the experience of a local product, and from the confluence in the local market. Social networks, in these days, are a very powerful tool for the generation, distribution and tracking of information about a product of interest.
- The use of the internet through pages created for the promotion of vanilla in free platforms is an alternative.
- Planning and implementation of campaigns and advertising announcements in the region and publicized in social networks, media and internet.
- Sample of products elaborated with vanilla.
- Promotion of a vanilla market in the region and rescue of ancestral knowledge and other forms of trade.

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