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Perception of buyers in regards to the quality and food safety of minimally processed vegetables

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This article is based on the buyer's general behavior with the objective of identifying the consumption characteristics of minimally processed vegetables. A descriptive approach was used to understand how buyers make their decisions on the day-to-day, with a non-probabilistic sample of 328 questionnaires employed at the largest circulation areas of the seven administrative regions of Campo Grande (MS), Brazil. The data was analyzed using parametric and nonparametric statistical techniques in order to understand the perceptions and demands of buyers during the decision-making process of purchasing vegetables. The key results show strong evidence of the consumption of vegetables, especially from elder buyers (66.7% every day). The vegetables are selected using the perception of appearance and price, while buyers indicate that the product brand is less relevant. It stood out that the higher the consumption, the greater consumer awareness about the quality, certification and food safety requirements of vegetables. It was demonstrated that buyers demand a greater product quality and food safety, and are willing to pay more for it; however, they report that they do not read labels or product information. The managerial implications present empirical information relevant to vegetable sellers and the inclusion of marketing strategies.

Key words: Vegetable consumption, certification of vegetables, consumer behavior, origin of vegetables.

INTRODUCTION

A food product when launched in the market, even if involuntarily, undergoes consumer analysis before being acquired. The criteria used vary, but generally the healthy characteristics of the product are considered, which in addition to its appearance are reinforced by information labels, origin and processing. Thus, the consumer behavior during the purchase is complex and interactive. The purchase of a product is influenced by the perception of its use and its value (Ferreira et al., 2010).

The production chain of minimally processed vegetables is characterized by the strong influence from the final consumer, once the details of the products' appearances constitute significant facts for the purchase to be completed. As with other segments of agribusiness, the desire and requests of buyers must always be considered. According to data from a survey by Silveira et al. (2011), the annual vegetable consumption per person in Brazil in 2002 was 29 kg, decreasing to 27 kg

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in 2008. The Midwest and the South (unlike the Southeast) were the regions where consumption of vegetables increased, reaching 28.6 kg per capita in 2008.

In Campo Grande (MS), according to data from Núcleo de Estudos e Pesquisas Econômicas e Sociais {Center of Economic and Social Studies and Research} (NEPES, 2013), the family budget has a share of 24.86% allocated to food, with vegetables contributing to 2.76%; in other words, 11.10% of the cost of food for a typical family in Campo Grande (MS), Brazil.

Analyzing consumer behavior and involvement in the buying process is extremely important for the sectors of production, processing and sale. According to Giglio (2013), there are means to identify customer demands and which strategies should be adopted in the consumer market. According to Amaral et al. (2007), the appearance, image and how the company communicates with consumers, determines its position in the market. Schiffman and Kanuk (2009) state that consumers make buying decisions taking into account their available resources, such as time, money and physical effort. It is a perceptive process for the consumer, who receives stimuli combined with motivation, emotion and expectation, interprets and processes the information received, and is encouraged and driven to carry out the economic transaction, or not.

The vegetables studied in this paper are the minimally processed, packaged, sanitized and available vegetables in a point of sale for consumer purchase. For Perez et al. (2008), minimally processed vegetables emerged as an interesting alternative for the consumer that does not have much free time. They are modified physically, maintaining the state of freshness, and have the appearance of a product with quality and safety.

Some aspects of the purchase of vegetables are classified by Lourenzani and Silva (2004): freshness (characteristic of quality accumulated from production, harvesting, handling, storage, exposure to consumption; considering the appearance, color, hygiene, etc.), image, price, convenience, types of packaging, availability of information, and food safety. With this same focus, Neves et al. (2011) point out (in order of importance) what consumers of vegetables consider in the purchase decision-making process: freshness, nutrition, taste, safety, price, and convenience. In regards to the aspects of the product, they report that consumers consider that food safety precedes the nutritional value, and follows: the potential lack of food, taste and appearance. In summary, the authors portray the additional concern of consumers regarding the safety and quality of food products available to them.

It is understood by Lopes et al. (2011) that the segregation of food into distribution groups is important, as customers have different needs and present different trends. Blackwell et al. (2005) complemented that consumers go through the process of recognizing a need, searching for information, evaluating alternatives, pre-purchase, purchase, consumption, post-purchase evaluation, and disposal. Marketing professionals need to be aware of this process in order to understand their consumer.

According to Silva and Machado (2009), the distribution channels of vegetables must be related to the consumer's daily life, after studying their preferences and influencers. Vegetables consumers, especially those who buy in supermarkets, consider the following factors: importance of food, product diversification and annual variety, exhibition, portion sizes, processing, cleanliness, and origin (Alcântara and Souza, 2009). These considerations are strengthened by Gains' (1994) proposed model cited by Batalha et al. (2009), in which food consumption behavior occurs with the interaction of three factors: food, consumer, and the context of consumption. These are related to food, influences of the smell, taste, flavor, nutrients and packaging. The following variables are associated with the consumer: habits, culture, personality, humor and psychology. Some attributes such as the conditions under which the vegetables were produced, are not perceived by consumers. Therefore, ensuring respect and responsibility for food will be a great challenge for entrepreneurs and producers, having to standardize processes to create a sense of confidence for the consumer Alcântara and Souza (2009).

In the scheme suggested by Spers (2011), the consumer perceives some attributes related to food and classifies them into extrinsic qualities (easily perceived by the consumer by the characteristics of the external environment, such as: quality label, brand, appearance, etc.) and intrinsic (product quality, food safety, nutrition, etc.). When making the purchase decision, the aspects that were assessed only by factors such as price, convenience and appearance, are now assessed by extrinsic and intrinsic qualities (Spers, 2011).

For Vitti et al. (2011), the evaluation of consumer perceptual values becomes important for the effective completion of an economic transaction. The vegetable supplier is responsible for evaluating what is being presented as a product, its image and promotion. Vegetables are very important for the human health, contributing to various vitamins and essential salts for the proper functioning of the body, and helping to prevent various diseases (Coelho, 2007). Therefore, one cannot ignore the importance of consuming vegetables on a daily basis. Consumers should be aware of its quality and safety.

In regards to the aspect of quality, the consumer evaluates the primary elements, such as those proposed by Garvin (1992): perceived quality (comparative advantage of similar products or substitutes), compliance (initial promised characteristics), reliability (consumer experience and proof of promised characteristics under compliance), aesthetic (smell, taste, appearance), durability (product life) and service (quick and easy to

acquire the vegetable). The aspects of perceived quality, compliance, reliability, and aesthetics, may be linked to the perception of vegetable consumers in regards to the use of chemicals in the production, conservation and visual.

According to Ventura (2010), there are significant changes in the consumer profile. New markets are growing and others must be rescued. The growing effort to improve quality of life can be perceived by the increased consumption of healthy products and services, the most obvious ones being food products. This study aimed to identify the perception and demands of consumers in Campo Grande (MS), Brazil, in the purchase of minimally processed vegetables, and to identify the attributes that influence during the decision-making process of acquiring such foods.

MATERIALS AND METHODS

The study was conducted in the city of Campo Grande (MS), Brazil, during the period of 1st May to 30th 2013. In order to meet the research objectives, a descriptive approach was used to understand how consumers make their purchasing decisions in the day-to-day, using a non-probabilistic sample constituted by the economically active population (EAP). According to data from IBGE (2013), out of the 832,352 people estimated for 2013, it was estimated that 454,404 was part of the EAP. The sample size was defined according to Fonseca and Martins (2006), considering the nominal variable and the finite population, with a confidence level of 95% and a sampling error of 7%, with the positive response rate of 0.50 of one of the research variables, making up a total sample of 328 individuals.

The scale adopted for the perceived importance of the interviewee was the seven-point Likert scale, ranging from 1. Not Important; 2. Irrelevant; 3. Not very relevant; 4. Neutral (undefined); 5. Not very important; 6. Important; 7. Very important. The other scales adopted were nominal and ordinal for the establishment of demography and vegetable consumption practices. The scales were developed by Amaral et al. (2007) and Batalha et al. (2009), with the adjustments made by the authors. The questionnaire and the project were sent to evaluation and approval of the Ethics Committee (Approved on 04/09/2013, protocol No. 246.304).

To analyze the consumer behavior in relation to the perception of food quality and safety of minimally processed vegetables, field research was carried out with a questionnaire divided into three parts: In the first part, a survey was conducted in relation to the consumer profile (gender, age, education level, and family income); the second part consisted of the perceived quality of vegetables; and the third part was comprised of questions about consumer behavior when acquiring vegetables. The questionnaire was applied to consumers in the major areas of people circulation of the seven administrative regions of Campo Grande city. The research had a social aspect, with voluntary and confidential interviews. The data was tabulated and processed in the Sphinx Lexical 5.0 and SPSS 21.0 softwares, applying univariate and bivariate analysis, obtaining stratification of consumers in relation to the usual signs of use.

RESULTS AND DISCUSSION

A data consistency analysis was conducted in order to find atypical or missing data, followed by parametric and non-parametric statistics analysis, when tolerable by the adopted scales.

Consumer profile for minimally processed vegetables

The results showed that the consumer profile for minimally processed vegetables in Campo Grande is made up of 57.9% of females; the most representative age group was between 18 and 34 years old, totaling 62.2% of respondents, and only 10.9% have a high school degree and 37.8% have a university degree. It is observed that 40.9% of respondents had an income of up to R$1,244, and 51.9% had an income between R$ 1,244 and R$6,220 (Table 1). The profile of respondents coincide with the characteristics of the new middle class, which has been growing in the country as a whole, changing the buying behavior and intensifying the perception of product quality, safety, and available information (SAE, 2013).

Frequency of consumption and consumer perception regarding the certification of minimally processed vegetables

It was sought to identify the main characteristics of perceptions relevant to the acquisition of vegetables. In order to evaluate the degree of dependence between the segmentation of vegetables consumers and the frequency of consumption (Castro and Neves, 2011), the chi-square test for non-parametric variables was used. The results are shown in Table 1.

It was found that for the chi-square test of independence ($p<0.05$), there were no significant associations between the frequency of consumption and the following segmentation variables: gender, education level, and family income. Segmentation by age group showed significant dependence on the frequency of consumption ($\chi^2 = 21.096$, $p = 0.012$). It is supposed that consumers within the ages of 35 to 60 years consumed more vegetables than younger consumers up to 34 years old. This conclusion contradicts Ventura (2010), which he reports that younger people purchase more vegetables than older people. As shown in Table 2, it was observed that those buyers who knew the meaning of food certification and those who buy certified products, are associated with the frequency of consumption of vegetables. The research showed that the higher the frequency of vegetable consumption by the consumer, the greater the indication of the perception of certification (52.9%) and the greater the purchase of certified products (48.3%). These results can contradict those found by Perez et al. (2008), who claim there is no significant association between consumers who know what certification is and consumers who buy certified

Table 1. Consumer profile of buyers and the frequency in consumption of vegetables.

Variables		n	Frequency in consumption of vegetables (%)				Pearson chi-square test	
			Every day	3 times a week	2 times a week	Once every 15 days	χ^2	p
Gender	Male	138	41.3	30.4	18.1	10.1	3.203	0.361
	Female	190	51.1	25.3	14.2	9.5		
Age (years)	≤24	109	36.7	30.3	21.1	11.9	21.096	0.012
	25 to 34	100	39.0	31.0	18.0	12.0		
	35 to 49	83	61.4	22.9	9.6	6.0		
	≥50	36	66.7	19.4	8.3	5.6		
Education level	Primary	57	47.4	29.8	14.0	8.8	9.741	0.372
	Secondary	134	44.0	28.4	20.1	7.5		
	Bachelor	124	46.8	27.4	12.9	12.9		
	Pos-Graduate	13	76.9	7.7	7.7	7.7		
Family income (R$)	≤ 1,244	134	40.3	29.1	18.7	11.9	7.842	0.550
	1,244 to 2,487	96	47.9	28.1	16.7	7.3		
	2,488 to 6,219	74	52.7	24.3	13.5	9.5		
	≥$6,220	16	62.5	25.0	4.2	8.3		

Legend: n – number of respondents in the segment; R$1 =US$0.31.

Table 2. Frequency in consumption of minimally processed vegetables vs. knowledge of what certified food product is and if they would buy products with a certification of origin.

Variables	Frequency in consumption of vegetables (%)					Pearson chi-square test	
	Every day		Times a week	2 times a week	Once every 15 days	χ^2	p
Knows what certified food product is	Yes	52.9	27.2	12.6	7.3	9.309	0.025
	No	38.7	27.7	20.4	13.1		
Would buy products with a certification of origin	Yes	48.3	28.6	15.0	8.2	11.209	0.011

products.

Table 3 shows that the higher the frequency of consumption of vegetables by the consumer, the greater the awareness of the importance of quality in vegetables. The Student *t* test was used for the extracted data from the Likert scale of 7 points. Consumers who indicated they consumed vegetables every day also affirmed that this attitude is very important, since an average of 6.8 was obtained from the questions on the Likert scale 1-7 (1 = not important to 7 = very important). The χ^2 test indicated that there was a highly significant association between consuming vegetables every day and its importance for health ($p < 0.001$). This statement portrays that consumers consider the quality of vegetables in their daily consumption to be important.

Information on label and quality of minimally processed vegetables

Buyers deemed that the information on the packaging labels of vegetables was important, such as: production, transportation, and processing; as indicated in the seven-point scale of importance (1 = not important to 7 = very important), obtaining an average of 6.1 points and a standard deviation of 1.37. These values portrayed the importance of labels in vegetables.

In regards to the understanding of food safety of vegetables, 84.5% of buyers demonstrated knowledge of the application of pesticides in vegetable production; 91.2% believe that their intensive or indiscriminate use can harm the health of human beings; and 70.4%

Table 3. Frequency in consumption of minimally processed vegetables vs. the importance of the quality in vegetables for its consumption.

Variables		Frequency in consumption of vegetables				Student *t* test	
		Every day	3 times a week	2 times a week	Once every 15 days	*t*	p
Importance of the quality in vegetables for its consumption	Average	6.8	6.3	5.7	5.3	24.738	0.001

reported they can choose between vegetables produced by the conventional system versus the organic system due to information in points of sale. 78.4% of buyers would like to get information about the production cycle, transporting, and processing of vegetables. These values are related to the proposals presented by Castro and Neves (2011) and Alcântara and Souza (2009), which report consumer interest in vegetables related to safety information on the label and vegetables quality.

Types of minimally processed vegetables and where to buy

In regards to preferences for vegetables, this matter was addressed with 15 alternatives represented by 15 common vegetables with multiple choices of up to five options. The main vegetables bought/preferred by consumers were: lettuce (*Lactuca sativa*) with 17.6%, tomato (*Solanum lycopersicum*) with 13.4%, carrot (*Daucus carota*) with 11.4%, beet (*Beta vulgaris esculenta*) with 8.7%, and chives (*Allium schoenoprasum*) with 8.2%. Consumers reported purchasing vegetables in the city's traditional points of sale. In a multiple-choice question (up to three options), 33.1% of consumers preferred supermarkets, 26.6% preferred street markets, and 14.7% chose grocery stores/among others.

Consumer perception and main considerable attributes during the acquisition of minimally processed vegetables

Eight attributes were analyzed in regards to its importance in the vegetable purchasing decision: appearance, brand, organic vegetables, conventional vegetables, origin, place of purchase, packaging, and price. The results are presented in Table 4. When the attributes of vegetables in function of the frequency of consumption were evaluated, it appears that there are significant differences in the appearance, or freshness, among vegetables. The results indicate that these attributes are more important for those who indicated a higher frequency of consumption. Respondents who consume vegetables every day indicated on the Likert seven-point scale that appearance was the most important attribute (mean = 6.62). When the results were segmented by buyers' gender, instead of frequency of consumption, only the attribute of price showed averages with significant differences at 5% ($t = 2.404$ and $p = 0.017$). Women give more importance to price (mean = 6.17 and standard deviation = 1.383), than men (mean = 5.78, standard deviation = 1.608).

Willingness to pay more for a minimally processed vegetable containing food quality

It was proven that 66.7% of consumers are willing to pay more for a vegetable according to its label information about food quality and safety, even though the dependence was insignificant ($\chi 2 = 3.673$, $p = 0.597$). About 53% of consumers said they were willing to pay 5% to 10% more than the traditional value for a vegetable with proof of origin, as this proved to be an important factor. It is concluded that consumers perceive the value, not the price, provided that sufficient information is obtained in regards to the choice of vegetables with food safety and product quality. This finding is substantiated by what Castro and Neves (2011) presents, in that the certified vegetable is a value perceived by the consumer.

In the diet of the average Campo Grande resident, the consumption of vegetables is substantial mainly for seniors. It was observed that there is a consumer concern in regards to food safety and product quality, even though half of these consumers reported that they do not read labels. The supplying of vegetables with information about origin and handling is important and influences the consumer's willingness to pay more. The attributes of appearance, organic vegetables, and conventional vegetables are factors that attract purchases. When gender was analyzed, only the price of vegetables was shown as significant. The results of this study reveal some relevant considerations for business owners in regards to the sale of vegetables in supermarkets, grocery stores and street markets; the results showed that the consumer is willing to pay more for vegetables if there is reliable information regarding its production, handling, transportation, and availability. In

Table 4. Descriptive statistics of the attributes of vegetables and multiple comparisons in relation to the variable.

AVVVVVV Variables VVVARIBLE	Frequency in consumption of vegetables								
	Daily		3 times a week		2 times a week		Once every 15 days		Significant differences at p<0.05 between the averages of groups of frequency in consumption
	Group A, n=154		Group B, n=52		Group C, n=90		Group D, n=24		
	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	Average	Standard deviation	
Appearance	6.62	0.834	5.90	1.432	6.18	1.312	6.13	1.296	A & B, A & C
Brand	4.58	1.950	4.29	1.764	4.21	1.777	3.50	1.911	nsd
Organic vegetables	6.01	1.391	5.08	1.770	5.49	1.831	5.13	2.071	A & B
Conventional Vegetables	5.49	1.581	4.92	1.835	5.10	1.656	4.29	1.574	A & D
Origin	5.95	1.450	5.42	1.601	5.61	1.548	5.38	2.081	nsd
Area of commercialization	5.73	1.626	5.69	1.449	5.69	1.548	5.46	1.444	nsd
Packaging	5.72	1.623	5.56	1.602	5.44	1.690	5.58	1.442	nsd
Price	6.15	1.404	6.12	1.278	5.92	1.501	5.96	1.367	nsd

Legend: nsd – no significant difference at p<0.05, between the groups of frequency in vegetable consumption.

addition, the consumer recognizes the existence of food safety and product quality. The entrepreneur's effort in the use of marketing capabilities has prospects of an assured return if supported by the perceptions of the main attributes considered in the choice of vegetables.

Conclusion

The consumer of vegetables values products containing information about its production and post harvest processing. Product quality combined with the perception of food safety convinces the consumers to pay more for vegetables.

Conflict of Interest

The authors declare they have not conflict of interest.

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