INFLUENCING FACTORS FOR THE CONSUMPTION OF SOY AND DERIVATIVES

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Abstract

Soybeans was originated in China, and after had achieved the Asian continent, was brought by boat to the West. In Brazil, it started to be part of the farming activities around 1970.Nowadays, the grit is considered a commodity of great importance, and this year, domestic production may exceed the world's largest producer, the United States. The increase has been caused by the global consumption of soybeans and especially its derivatives. However, there are regions which the consumption is low, mainly due to the lack of experience and knowledge of many consumers. Therefore, this research aims to analyze the influencing factors for the consumption of soy and derivatives. For this, a quantitative-descriptive study was conducted with 110 consumers of both sexes, belonging to economic classes A, B, C and D, aged 18 or over. The results obtained reveal that consumption is low due to lack of habit and lack of knowledge about the benefits that soy and its derivatives bring to health.

Keywords: Alimentation, Consumer Behavior; Soy.

FATORES DE INFLUÊNCIA PARA O CONSUMO DE SOJA E DERIVADOS

Resumo

A soja teve sua origem na China, conquistando o continente asiático, e só depois foi trazida, por embarcações, para o ocidente. No Brasil, engajou suas atividades de cultivo por volta de 1970. Hoje, o grão é considerado uma commodity de grande importância, e neste ano, a produção brasileira pode ultrapassar o maior produtor do mundo, os Estados Unidos. Este aumento se dá pelo constante crescimento do consumo mundial de soja e principalmente de seus derivados. Entretanto, há regiões em que o consumo é baixo devido, principalmente, à falta de hábito e de conhecimento de muitos consumidores. Sendo assim, esta pesquisa tem o objetivo de analisar os fatores de influência para o consumo de soja e derivados. Para isso conduziu-se um estudo quantitativo-descritivo junto a 110 consumidores de ambos os sexos, pertencentes às classes econômicas A, B, C e D, com 18 anos ou mais. Os resultados obtidos revelam que o consumo é baixo devido à falta de hábito e por falta de conhecimento sobre os benefícios que a soja e derivados trazem à saúde.

Palavras-chave: Alimentação; Comportamento do consumidor; Soja.

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1. Introduction

The oldest reference of soy is given to an emperor of Chinese origin called Sheng-Nung, better known as Emperor of the Five Grains, since he cultivated rice, barley, soy, wheat and millet. Over time, soy evolved with it, becoming a nutritionally more complete food than before. At the end of the 15th century, the product expanded to the western part of the world and gradually acquired more and more consumers (EMBRAPA, 2009).

Soy is today one of the most valued crops in Brazil, being this the 2nd largest exporter of soybeans in the world. According to the Brazilian Agricultural Research Corporation (EMBRAPA, 2004), the first record of soy cultivation in Brazil took place in 1914, in the municipality of Santa Rosa, in the state of Rio Grande do Sul. Freitas (2004) states, however, that Soy was introduced in Brazil in 1882, in the state of Bahia, passing through the state of São Paulo before reaching the state of RS, where it finally managed to better adapt. Even so, the cultivation of the grain started to be considered of great importance for the national economy only in the 60's, gaining in the following decade (1970) the level of main planting culture in Brazil.

The agricultural sector in Brazil has undergone major transformations after the seventies, with a new development model, changing the idea of being a food importing country, to be a reference in agricultural production - a change that occurred from investments in new technologies by Brazilian research (EMBRAPA, 2004).

Despite the strong investment in soy planting, its consumption is associated not only with the grain, but also with its derivatives, such as milk, oil, flour and sauce. Research proves that soy is important for a balanced nutrition, but it is not restricted to this factor, having also in its favor the fact of having substances capable of helping in the prevention of the most diverse diseases, including breast cancer and others of similar danger - they are called isoflavones (JAYACHANDRAN; XU, 2019; SILVA et al., 2009; HERMAN et al., 1995).

Even so, the Family Budget Survey (POF), carried out by the Brazilian Institute of Geography and Statistics (IBGE, 2010), brings an interesting data regarding Brazilian consumption: between the years 2003 and 2009, the consumption of soy oil decreased 45.5%, while olive oil increased 13.8%. The information becomes even more important when considering that olive oil costs, on average, triple its less noble competitor, it is possible to say that (1) products considered healthy have a higher cost in general than foods considered harmful to health, such as semi-ready foods and fast foods, and (2) the variation in income per capita may be influencing the eating habits of the population.

In addition, soy, like any other food, has a different impact in each region, which makes consumers' purchasing behavior different. According to Parente (2000), for an organization to be able to meet the wants and needs of consumers through marketing strategies and tactics, it needs to understand the decision-making process and the buying behavior of consumers.

Therefore, an analysis of eating habits is necessary and can present valuable information for organizations and stakeholders. The analysis of eating habits can expose in addition to the type of food that is eaten by a group, because as the analysis it is possible to identify the characteristics that are influenced by the cultural, economic, historical and social means of the group chosen (BURNIER; SPERS; GUERRA, 2020; QUEVEDO-SILVA; LIMA-FILHO; FAGUNDES, 2018; CASOTTI, 2002). Thus, this article aims to analyze the influencing factors for the consumption of soy and its derivatives. In specific terms, it is expected to define the influence of different social classes on the consumption of soy and its derivatives and to characterize this consumption.

2. Literature review

According to Kotler (1998) there are factors that have a great influence on consumers. These are subdivided into: culture, subculture and social class. The author says that, in the marketing sphere, culture is the main determinant of the individual's desires and behavior, because, over the years, the society of a certain place, begins to create values that end up influencing the behavior of consumers in a present and future time. Kotler (1998, p. 163) further states that: "Social classes are relatively homogeneous and lasting divisions of a society, which are hierarchically ordered and whose members share similar values, interests and behaviors".

For Weber (1999), social classes are established according to the distribution of some social values - money, prestige, education, etc. - in a society. According to Batalha et al. (2004), it is possible to find in the country a layer of the population with high purchasing power that has a pattern of food consumption close to that of more developed countries, but also a group of consumers who do not eat properly. In addition, Brazil is undergoing several changes that impact its socio-demographic structure, such as the expansion of urbanization, the increase in longevity of life, the decrease in the infant mortality rate and the increase in the number of women in the labor market.

Among healthy foods with great growth over the years, soy is highlighted by its high nutritional value, mainly due to the high concentration of protein (EMBRAPA, 2004). Although records affirm the presence of soybean cultivation in Brazil in the transition between the 19th and 20th centuries, soybean culture received great government incentive only in the 50s, with

the establishment of the official national triticulture incentive program, as it characterizes the soy, both technically and economically, as the best alternative to replace wheat, since it has better planting in winter, while soy is a great crop to be grown in summer (EMBRAPA. 2004).

The 2006 Agricultural Census (IBGE, 2006) reveals that soy was the fastest growing crop in Brazil between 1995 and 2006, 88.8%. In the case of total national production, Freitas (2011, apud VENCATO et al., 2010), states that the Brazilian productive scenario is optimistic, with projections that indicate that by the year 2020, Brazil will have a 40% production jump, it will surpass the United States in quantity produced and will become the world's largest producer of soybeans, as North American projections declare an approximate growth of only 15% until the same year.

IBGE (2013), through the Systematic Survey of Agricultural Production (LSPA), made in January 2013 a growth forecast in the soybean crop of 26.3% in relation to the year 2013, with an estimate of approximately 83 million tons of grain, in a harvested area of approximately 27 million hectares. The institute foresees a recovery in production, which fell in 2012 due to climatic problems that shook several producing countries, causing a reduction in world stocks. Most of the increase in production occurs in the South of the country, with a growth of 60.9%, with greater growth in Rio Grande do Sul (99.3%). In the Central-West Region, growth of 13.5% is expected. Even with a lower growth rate, the state of Mato Grosso remains the main national producer and exporter of soy.

For Barreto (2004), along with the growth in production, there is also a need for greater space for planting. One of the alternatives used is the optimization of the planted area, in an effort to maintain the expected growth and causing the least possible damage to biomes.

Figure 1: Soy production in Brazil - evolution by state from 1960 to 2003.
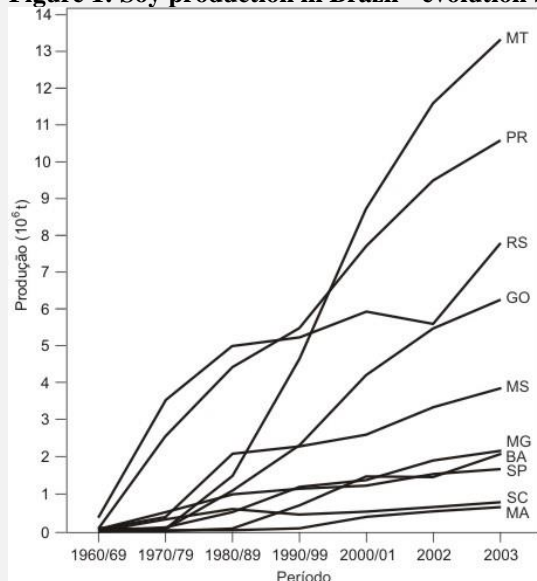
Source: EMBRAPA, 2004.

It is important to note that Brazil is responsible for 33% of the total world exports, destining about 40% of its production for consumption by other countries. The importance of soy for the national GDP is easily identified when comparing the Gross Value of Production (VBP) of soy with the national VBP, of agribusiness in general and of agricultural production, because while these had growth of the annual rate between the years of 1995 and 2009 of, respectively, 2.86%, 2.30% and 2.80%, the soybean VBP had a growth close to 7.75% per year (HIRAKURI, 2011).

Several studies have emerged over the years, raising more and more accurate and important information about the benefits of soy in human nutrition. Soy, as a functional food, is capable of providing the most varied nutrients necessary for a balanced diet. For Penha et al. (2007, p. 92, apud CARRÃO-PANIZZI and MANDARINO, 1998), soy:

> It is rich in proteins, contains isoflavones, saponins, phytates, protease inhibitors, phytosterols, low molecular weight peptides, oligosaccharides and polyunsaturated fatty acids, which help to reduce the risk of chronic and degenerative diseases. It is also a good source of minerals such as iron, potassium, magnesium, zinc, copper phosphorus, manganese and B vitamins.

According to Embrapa (2009), soy is composed of approximately 40% protein, 20% lipids, 5% minerals and 35% carbohydrates. Although Brazil is the second largest producer of soy in the world, its population consumes little of the food and its derivatives. Despite significant characteristics, the potential of the food is still little known and many times not even the people responsible for its planting are aware of the richness of nutrients it contains.

The low consumption of Brazilians can be linked mainly to the lack of knowledge of the nutritional values of the food and the lack of habit of Brazilian consumers in acquiring it, because as stated by Morais (2001, p. 15), the use of soy has been associated for a short time the feeding of farm animals, such as cattle and pigs, and human consumption, still on a small scale, "was limited to descendants of Orientals, vegetarians and children with lactose intolerance or milk allergy".

Currently, with the wide variety of products derived from soy, the industry tries to take advantage of the needs of the population with the use of some of its derivatives, such as soy "milk", soy flour, soy "meat" and even even in biofuel (Embrapa, 2004).

Soy is a versatile food, which can be used in several ways, so that it adjusts to the consumer's preference, effectively replacing some products. This is the case, for example, of Textured Soy Protein (PTS), which can be substituted for beef, and can be used for the

preparation of foods such as hamburgers, pies, risottos, among other foods that mainly ask for ground beef. (SUAKI, 2007). In terms of protein alone, a kilo of beef has about a third of the protein presented in the same amount of soy (MOREIRA and RANGEL, 2009).

According to Barnes, Kim and Xu (1999), the risk of several diseases such as cancer of the esophagus, prostate, lung, rectal colon and breast; cardiovascular disease, diabetes, osteoporosis and Alzheimer's disease, can be reduced through the consumption of soy products.

Among the giant range of foods available today, soybeans and their derivatives are gaining more and more significance for the prevention of the most varied diseases. The effectiveness of soy in preventing various health problems, such as osteoporosis, cardiovascular problems and various types of cancer, has been proven, including cervical, prostate and breast cancer, which cause thousands of deaths per year in Brazil (ANTHONY et al., 1996; ARJMANDI et al., 1996; HERMAN et al., 1995; KENNEDY et al., 1995).

Another positive factor in the use of soybeans is the fact that, if used correctly in food, it also helps to fight obesity. Within soy there are so-called phytoestrogens, substances that help in improving the individual's lipid metabolism, in addition to being able to beneficially affect appetite control and body composition (PEIXOTO et al., 2011).

However, there are also nutritionists who believe that the consumption of soy may not bring health benefits, and quite the opposite, harm it. An example is the statement by Marques (2002, p. 14, apud MESSINA, 2002), that "the substances contained in this grain can inhibit the oxidation process of LDL, the bad cholesterol, which creates conditions for the clogging of the arteries". Even so, the number of surveys that reveal the positive side of soy consumption is much higher than the number that reveals the negative side of the grain and its derivatives, which may mean that the degree of relevance of soy for healthy eating is high.

3. Material and Methods

This is a single quantitative-descriptive cross-sectional study (MALHOTRA, 2006). The universe consists of residents of the urban area of Campo Grande-MS, belonging to economic classes A, B, C and D, aged 18 or over.

For the calculation of the sample size, an infinite population was considered. Using a confidence interval [CI] of 95% and standard error [EP] of 10%, based on the formula for calculating the size of the simple random sample to describe the population proportion (BUSSAB; MORETTIN, 2011), we arrived at to a sample of 97 individuals. However, for greater security, 110 questionnaires were applied, causing the PE to be reduced to approximately 9.4% (AAKER; KUMAR; DAY, 2001).

To carry out the study, socioeconomic variables were used, such as age, sex and social class related to soy and its derivatives, the frequency of consumption and the level of education of the interviewees. In addition, other variables were addressed, such as cultural influences, healthy alternatives, caloric reduction, taste appreciation, lack of habit, price of products, all related to food and / or their frequency of consumption.

The variable knowledge was also analyzed compared to the level of education of the participants. Therefore, the study will use these variables to define the influence of different social classes on the consumption of soy and its derivatives in the chosen region, as well as to define the degree of consumption of these items, so that it is possible to trace the socio-demographic profile of consumers. of soy.

For data collection, a structured questionnaire with a face-to-face interview (direct interrogation) was used, with approach in supermarkets, gyms, universities, restaurants and companies in general, close to large shopping centers.

The questionnaire was divided into two parts, in the first part, a numbered green card was given to the interviewees containing options according to the 5-point Likert Scale, where they should choose one of the numbers. The objective was to verify the degree of pleasantness of soy and derivatives for these consumers. In addition, respondents also had to say how often they consumed these foods or whether they did not and indicate what would be the main reason for consumption or non-consumption.

In this part of the questionnaire, statements were also made (Chart 1) about soybeans and derivatives to the interviewees to verify their knowledge. For this, they received a numbered blue card, also based on the 5-point Likert Scale, where they should choose between different degrees of agreement or disagreement for each variable, choosing one of the numbers.

Chart 1: Variables related to the respondents' level of knowledge

Code	Variable
Nut	Soy milk has a higher nutritional value than milk
Prot	Soy is rich in protein
Fat	Replacing milk with soy milk helps to decrease body fat
Expen	Soy products are expensive
Vitam	Milk contains more vitamins than soy mil
Heal	Soy is a healthy food
Pest	Soy milk is healthier than cow's milk, as it contains no hormones or pesticides
Meat	Meats have less protein than soy

Source: authors.

In the second part of the questionnaire, personal data was collected from respondents such as sex, education and age. To avoid age distortions, an orange card was given to consumers

who were aged 18 to 60 years or older, grouped into four age groups containing a number from 1 to 4, where they would have to say which number represented their age group. Finally, in the last questions, the interviewees should say the quantity they had of certain goods in order to determine their social class based on the Points System of the Brazilian Association of Research Companies (ABEP).

Data analysis was divided into two stages, being performed with the aid of the Minitab software (MINITAB, 2010). The first was done through descriptive statistics, using frequency distribution, measures of central tendency and dispersion. In the second, an exploratory factor analysis was performed using the variables present in Chart 1. This procedure was necessary to reduce the data, facilitating its understanding, as instructed by Hair et al. (2009), also allowing to verify how many and which dimensions are perceived by the consumers studied. To determine the number of factors, the Latent Root criteria were used, together with the Scree test; to distribute the factor loads among the factors, the Varimax orthogonal rotation technique was used (HAIR et al., 2009). Then, multiple scales were created using the arithmetic mean of the variables of each factor and validated with Cronbach's Alpha, since all factors presented values above 0.70, as recommended by Hair et al. (2009).

4. Results

Table 1 presents the socio-demographic data of the studied sample:

Table 1: Sample profile

Sex		Product	Consumption frequency		
			never	sometimes	always
Female	57,27%	Soy flour	74,55%	23,64%	1,82%
Male	42,73%	Soy milk	55,45%	36,36%	8,18%
Education		Soy meat	73,64%	21,82%	4,55%
Elementary school	2,73%	Soybean seed	68,18%	28,18%	3,64%
High School	13,64%	Soybean	70,00%	29,09%	0,91%
University education	80,91%	Tofu	70,00%	23,64%	6,36%
Postgraduate studies	2,73%	Shoyu	10,91%	39,09%	50,00%
Class		Soy yogurt	77,27%	18,18%	4,55%
A	5,45%				
B	51,82%				
C	40,91%				
D	1,82%				

Source: Research data.

Regarding the profile of the interviewees, it is clear that the majority is composed of women, just over 80% have higher education and slightly more than half belong to class B. Regarding the consumption of soy derivatives, no product had a high frequency of

consumption, what is most consumed is soy sauce, used as a seasoning, followed by soy milk. In addition, when asked about the reason for consuming this type of product, most stated that they consume it because it is a healthy product. It was also possible to identify that the consumption of soy yogurt was higher among women and that of soy meat was higher as income increased.

It is important to highlight that several products were never consumed by most of the interviewees, as in the case of soy flour, soy meat, soy beans and tofu. When asked about the reasons for not consuming these products, most said they were out of habit followed by dislike.

In order to analyze consumers' perception of soy products, a factor analysis was first performed in order to reduce the data and facilitate its understanding, and mainly to verify how many and which dimensions are perceived by the consumers studied. After the preliminary analysis, it was realized that, based on the criteria of the Latent Root together with the Scree test, the number of factors should be three (HAIR et al., 2009).

Thus, when examining the factor loads for each variable, it is possible to notice that there is a logical link between the variables of each factor, making it even possible to name them. Thus, the six factors defined are: Nutritional benefits [Factor 1], Healthy food [Factor 2] and, finally, Disadvantages [Factor 3].

After that, multiple scales were created using the arithmetic mean of the variables of each factor and validated with Cronbach's Alpha, since all factors presented values above 0.70, as recommended by Hair et al. (2009).

Table 2: Factor loads.

Variábles	Factor 1	Factor 2	Factor 3
Soy milk has a higher nutritional value than milk	0,716		
Soy milk is healthier than cow's milk, as it contains no hormones or pesticides	0,630		
Meats have less protein than soy	0,834		
Soy is rich in protein		0,821	
Replacing milk with soy milk helps to decrease body fat		0,723	
Soy is a healthy food		0,682	
Soy products are expensive			-0,833
Milk contains more vitamins than soy mil			-0,640

Source: Research data

Healthy food [Factor 2] was considered the most important factor for respondents, receiving an average score of 3.8, that is, most respondents believe or associate products derived from soy with a healthy diet.

Next is Factor 3 Disadvantages of soy, mainly related to the price of this type of product, with an average score of 3.2, demonstrating that there are still barriers to be broken for the dissemination of this type of product.

And finally, the factor that had the lowest average score was the first, nutritional benefits, with an average score of 2.9, indicating a certain indifference of respondents in relation to the nutritional advantages of these products. This may be related to the fact that many consumers do not have a high level of knowledge on this subject.

5. Final considerations

This paper aimed to analyze the influencing factors for the consumption of soy and its derivatives. In specific terms: (1) define the influence of different social classes on the consumption of soy and its derivatives; (2) Characterize the consumption of soy and its derivatives. To this end, a single quantitative-descriptive cross-sectional study was conducted, with the universe composed of residents of the urban area of Campo Grande-MS, belonging to economic classes A, B, C and D, aged 18 or over.

The results obtained reveal that consumption is low due to lack of habit and lack of knowledge about the benefits that soy and its derivatives bring to health. Of the products consumed, the main reasons were for being considered healthy and pleasant, with women between 19 and 39 years of age being those who consume the most, perhaps because it is a less caloric and healthier alternative for food. The most consumed soy derivative is soy sauce, as it is considered a seasoning used in salads and other foods. It is important to remember that soy sauce is widely used in the region of Mato Grosso do Sul, due to the fact that it is strongly influenced by Japanese culture.

In a similar survey, carried out by Behrens and Da Silva (2004) at the State University of Campinas (UNICAMP), it showed similar results, even working with a different audience and in another Brazilian state. The results of the research showed that in 2004, the population of Campinas had knowledge parameters about soy and its derivatives close to that indicated in the results of this research. Even with the increase in the number of surveys for this purpose, it is still difficult to draw a profile for the Brazilian consumer. Therefore, it is advisable to carry out more research of the same content in order to better understand the Brazilian soy consumption.

Keynes (1936) points to a model called "model to explain the influencing factors in the evolution of economic systems", where he considers investment as a driver of progress and which corresponds to the willingness to consume. This model points out the incentive to invest, the preference for liquidity and the propensity to consume as essential trends. Considering the

approached model, it is important to continue investing in improving production and promoting products, providing the population with relevant information that may cause an increase in the consumption of soy and its derivatives.

The present has important managerial implications, as it allows producers and entrepreneurs the possibility of getting to know their consumers' eating habits better. The main limitations found in this study were: the small number of variables studied, the small sample studied and the fact that the data collection was done in a non-probabilistic way, thus restricting the results.

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