RESR Revista de Economia e Sociologia Rural
ISSN 1806-9479
ARTICLE

Profiling the consumer of agroecological products using cluster analysis

O perfil do consumidor de produtos agroecológicos sob a ótica da análise de cluster

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How to cite: Araújo, H. M., & Marjotta-Maistro, M. C. (2023). Profiling the consumer of agroecological products using cluster analysis. Revista de Economia e Sociologia Rural, 61(1), e243394. https://doi.org/10.1590/1806-9479.2021.243394

Abstract: In a context of searching for economic sustainability and health-promoting practices, agroecology presents itself as a point of integration of several knowledges: traditional, scientific, productive technical and economic-social. Moreover, in order to truly achieve sustainable agriculture, all aspects of food production, distribution and consumption need to be integrated, and consumers' choices can be considered as an impact factor on the environment. This article aims to characterize consumers in three agroecological markets in the municipalities of Belo Horizonte, Santana do Riacho and Jaboticatubas, in Minas Gerais. A primary data survey was used, with 191 questionnaires applied in three agroecological neighborhood markets. The statistical analysis used was cluster analysis; 2 clusters were identified: a) "Consumers Closer to Agroecological Knowledge"; and b) "Sustainable Consumers and Less Close to Agroecological Knowledge". These analyses allowed to identify the real perceptions of consumers regarding agroecological markets and to define assertively the limitations of the locations, in addition to showing which strategies are the most appropriate to simultaneously meet the needs of consumers and stimulate the sale of products, thus ensuring the financial viability of farmers.

Keywords: multivariate analysis, agroecology, consumer behavior.

Resumo: Em um contexto de busca por sustentabilidade econômica e práticas promotoras da saúde, a agroecologia apresenta-se como ponto de integração de diversos saberes: tradicionais, científicos, técnicos produtivos e econômico-sociais. Acrescenta-se que, para realmente se obter uma agricultura sustentável, todos os aspectos da produção, distribuição e consumo de alimentos precisam estar integrados e as escolhas dos consumidores podem ser consideradas um fator de impacto sobre o meio ambiente. Este artigo tem como objetivo caracterizar os consumidores de três mercados de proximidades agroecológicos nos municípios de Belo Horizonte, Santana do Riacho e Jaboticatubas, em Minas Gerais. Foi feito o levantamento dos dados primários, sendo aplicados 191 questionários em três mercados de proximidades agroecológicos. A análise estatística utilizada foi a análise de *cluster*. Identificaram-se 2 *clusters*, denominados: a) "Consumidores mais próximos dos conhecimentos agroecológicos"; e b) "Consumidores Sustentáveis e menos próximos dos conhecimentos agroecológicos". As análises possibilitaram identificar as reais percepções dos consumidores em relação aos mercados agroecológicos e definir de maneira assertiva as limitações locais. Além disso, mostraram quais as estratégias são mais adequadas para atender as necessidades dos consumidores e estimular a venda dos produtos, garantindo, assim, a viabilidade financeira dos agricultores.

Palavras-chave: análise multivariada, agroecologia, comportamento do consumidor.

Introduction

Currently, the search for productive sustainability and health-promoting practices allowed agroecology to become the central point that integrates several knowledge types, such as popular, traditional, scientific, technical productive and economic-social (Altieri, 2002; Caporal et al., 2011).

From a conceptual point of view, agroecology aims at a scientific paradigm shift in agriculture, because this field of knowledge does not fit into the conventional paradigm, reductionist and cartesian, but in a holistic paradigm, with a systemic approach that seeks to integrate several areas of knowledge for agricultural production, such as popular knowledge, with the historical information of farmers and traditional peoples, and the scientific data in different areas (physics, economics, agronomy, communication, history, anthropology, sociology, among others) (Caporal et al., 2011). According to Caporal et al. (2011), agroecology is situated in the field of complexity. "Complexus" has a Latin origin and it means "what is woven together", that is, agroecology seeks to unite the several areas of knowledge (Caporal et al., 2011).

In the productive dimension, agroecology allows, from the ecological principle of diversity, more cultural and biological options with less environmental deterioration than the current conventional approach (Caporal et al., 2011). In addition, agroecology aims to reduce dependence on commercial inputs; the use of renewable and locally available resources; the search to emphasize nutrient recycling; the introduction of species that create functional diversity in the system; the design of systems that are adapted to local conditions and make the most of microenvironments; the maintenance of diversity, in the spatial and temporal continuity of production; the optimization and elevation of yields, without exceeding the productive capacity of the original ecosystem; the rescue and conservation of local genetic diversity; and the rescue and conservation of local knowledge and cultures (Aquino & Assis, 2005). However, it is important to note that agroecology is not only the replacement of inputs, but a process that gradually seeks changes in the ways of managing agroecosystems and in attitudes and values of society (Caporal et al., 2011).

From an economic perspective, agroecology is based on the ecological economy and the solidarity economy (Caporal et al., 2011; Norder et al., 2016). Within the solidarity economy, the search for income generation is linked to cooperative forms, the reduction of social contrasts and the promotion of quality of life, producing material and immaterial wealth, new values and relationships, aiming at the distribution and non-accumulation of wealth (Coelho de Souza, 2007). Ecological economics, on the other hand, provides a series of methodological contributions that allow quantifying, in agricultural accounting, the externalities of a production model. In classical economics, where the focus is given to the final product and price, natural resources and possible damage caused by a particular production model are not considered, such as environmental deterioration caused by loss of biodiversity, silting of rivers and lakes, erosion, soil contamination, and diseases related to pesticide use, among others (Caporal et al., 2011). Based on ecological economics, agroecological production systems "minimize negative externalities and, by being more parsimonious with respect to the use of natural resources and less dependent on external resources, end up significantly reducing environmental impacts" (Caporal et al., 2011, p. 86).

In this way, agroecological products originate in a system that respects specific local soil and climate conditions. They still have the characteristics of diverse polycultures with different cultivars, the use and optimization of local inputs, the use of alternative methods for disease control and population, in addition to maintaining the biological fertility of the soil, practice soil and water conservation and they do not use transgenic, synthetic nor agrochemical fertilizers (Gliessman, 2009).

This production system favors greater local diversification while preserving the environment. Additionally, agricultural sustainability requires several social components to be performed that are addressed in agroecology such as social equity, long-term vision, modifying dietary patterns,

farmer autonomy, local land control, use of local knowledge and direct human involvement in agricultural production (Gliessman, 2009).

The market for organic and agroecological[1] products has grown in recent decades (Willer et al., 2021). Campanhola & Valarini (2011) attribute this growth to five reasons: increasing consumer health awareness; increasing demand for the work conducted by environmentalists and environmentally concerned Non-Governmental Organizations (NGOs), some of which acted on certifying and opening new direct marketing channels for the producer; religious influence of organizations seeking human being spiritual balance via proper nutrition with food produced in harmony with nature; influence of groups contrary to conventional agriculture and large corporations that propose another productive model while criticizing the current one; and marketing strategies carried out by supermarket chains. According to these authors, the most relevant influences are not easily identifiable, concluding that a combination of all these factors led to the increased demand for organic and agroecological products. Access to organic products occurs through various distribution channels such as supermarkets, household baskets, hotels and restaurants, independent distributors, farmers' markets, specialty stores, institutional markets, online shopping, among others (Darolt, 2012).

Zamberlan et al. (2008), in a survey carried out in Rio Grande do Sul, identified that the market of organic and agroecological products most sought by consumers is in fairs (47.2%) and direct purchase from the producer (25%), with only 19.4% in supermarkets. The authors state that the organic production chain has no major differences in relation to the conventional production chain. The main difference refers to the presence of certification seals and the absence of intermediaries. Silva & Silva (2015) point to a duality in the organic production chain. For the authors, there is the organic market of globalized and liberalized commodities, standardized into commodities. These commodities generate inequalities among economic actors, since not all of them can guarantee the minimum quality and standardization requirements. At the same time, new organic markets are created. They are characterized by differential quality, known origin, close relations between producers and consumers, degrees of accessibility, new marketing circuits, new physical structures and social arrangements (Silva & Silva, 2015). The way they are governed also differentiate them from large markets, which the author calls "nested markets". They are integrated to the broad market, but as a specific segment, which, besides differentiated products, also have a distinct form of organization and are governed by new socio-technical networks, in which innovation has a collective dimension that allows access to resources and facilitates activities that could not occur individually (Silva & Silva, 2015).

Batalha & Buainain (2007) do not distinguish between the chain of organic products directed to the commodities market and new commercialization markets. For the authors, the whole organic production chain is different from that directed to the commodities market, because it has its competitiveness related to the non-differentiated product, production scale, low production costs and low added value, while the organic market has as main characteristics the differentiated products and the high added value, especially creating an image that shows the differentiation of the production process, reaching segmented and niche markets.

The stage of the production chain related to the commercialization of products has, according to Carvalho & Costa (2012, p. 103), "the function of transporting the goods desired by the final consumer to the place and time defined, in the form and quantities requested with satisfactory prices to all actors in this chain. This step can occur in different ways, being classified by Campanhola & Valarini (2011) in three main groups. The first and second groups are directed to

[1] The concept of agroecology in this article covers the so-called organic and other terms that meet the principles established by Federal Law No. 10,831/2003, which provides for the organic farmer. The terms are used to unify the crops that differ from the conventional, agrochemical or industrial agriculture.

the domestic market. In the first one, sales occur in retail as in organic and agroecological fairs, direct sales from the organic/agroecological producer, responsible purchasing groups, online sales, institutional markets, local cooperative markets and local association markets. A new trend is represented by local specialty stores, restaurants, regional brands and home delivery. In the second group (wholesale), distribution is carried out in distributors and supermarket chains. The third group is export-oriented.

Another form to distribute organic products is called long and short chains. The long chain market is represented by the export market integrated with the processing agroindustry (Wilkinson, 2008). The short marketing channels are characterized by the distribution of products that mobilize up to one intermediary between producer and consumer (Chafotte & Chiffoleau, 2007 *apud* Darolt, 2012). This distribution can occur via direct or indirect sales, for example, via cooperatives, associations, specialized stores, institutional markets and small local markets. In this way they cover home deliveries, free and specialized fairs, commercial events, sales on the property, institutional markets, rural tourism, organized consumer groups, among others (Darolt, 2012). For short marketing channels, there is also the denomination of proximity markets, surpassing the geographical proximity and reaching the close relationship of trust, affection, exchange of knowledge and solidarity built between farmers and consumers. The most traditional proximity market is the fair, where producers sell their goods in natura or processed, outdoors in stalls. The products come, in most cases, from their own production, from 30 to 100 km away. The diversity of goods found in organic fairs is reduced, with a preponderance of vegetables and a limitation of fruits, cereals, dairy products, and meat. This is one of the main reasons why it is difficult for the consumer to follow a strictly organic diet. The baskets delivered at home facilitates the consumer's life by choosing the products and receiving them without having to go to the place of sale (Darolt, 2012).

Darolt (2012) points to the need to create more markets based on short marketing circuits, conditioning agroecology advance with increasing consumer demand. Gliessman (2009) says that to truly achieve sustainable agriculture, all aspects of food production, distribution and consumption need to be integrated, placing the consumer awareness and choice as an impact factor on the environment and the economy and its contribution to direct agriculture towards sustainability. As also noted by Araújo & Marjotta-Maistro (2018), one of the possibilities to encourage the consumption of agroecological products is the study of consumer behavior and the use of marketing tools.

As for the consumer behavior, it is "the study of the processes when individuals or groups select, purchase use, or discard products, services, ideas or experiences to satisfy needs and wants" (Solomon, 2011, p. 33). In other words, understanding consumer behavior involves understanding the consumer's decision making process. According to Solomon (2011), the study of consumer behavior allows to identify which variables influence consumption, how the superiority of a product compared to others is determined, what are the situations that affect the purchase decision, what are the factors that determine that the consumer is satisfied and whether he will buy again and how and what is the information that consumers pass on to others, among others. Still according to the same author, when the consumer identifies a need, the desire to satisfy it arises. The desire generates a state of tension that the consumer seeks to eliminate or reduce and, depending on the dimension of this tension, the urgency of consumption is determined. The more urgent it is, the greater the impulse to consume. The study of consumer behavior allows one to reduce the consumer's state of tension by offering goods and services that meet their desires.

As for organic and agroecological products, there are several studies of consumer behavior, namely Guimarães (2013); Moura et al. (2010); Roboredo et al. (2010); Hoppe et al. (2012); Brunini et al. (2011); Oliveira (2012); Noronha (2008); Graff (2015); Neutzling (2010); Porto & Nordi (2019); Marques & Esquerdo (2019), among others.

After identifying and characterizing these consumers, there are numerous techniques for market segmentation with similar characteristics to facilitate defining specific marketing strategies for each group (Dahlstrom, 2012). According to Dahlstrom (2012), in order to define a good segment, some rules should be followed, such as the size of the segment to be significantly substantial; to be identifiable and measurable, ensuring the possibility of creating categories; accessible and able to respond to the strategies created. There are some techniques that perform segmentation: demographic segmentation with characteristics such as gender, income, profession, age; geographical place of residence; and psychographic, such as attitudes, values, lifestyles etc.

The same author cites a study of consumers in North America conducted by the Roper Starch Worldwide company in which green consumers are divided into five groups: true greens, money greens, near greens, grumblers, and apathetics:

True Greens: consumers with strong environmental values who seek positive change. They also tend to be politically active in the search for sustainability. These individuals are four times more likely to avoid buying products marketed by companies that are not environmentally conscious (...). Money Greens: are also interested in sustainability issues, but are not willing to be politically active (...) Almost Greens: appreciate the merits of environmental causes, but do not take this appreciation with them into the marketplace. While these consumers are unlikely to pay more for green products, they can be convinced to do so with the right appeal (...). Grumblers: tend to be cynical about their ability to promote change and are relatively ignorant of ecological concerns (...) believe that green products are too expensive and are not as efficient as similar non-organic products (...). Apathetic: do not care about sustainability (...) (Dahlstrom, 2012, p.111).

In Brazil, there are several studies that use market segmentation to characterize the consumers, such as Rodrigues et al. (2013) that segmented the conscious consumption market in the city of Lavras, Minas Gerais state, Brazil. The result allowed the characterization of three segments: "the concerned but consumerist"; "ecologically aware consumers"; and "the undefined".

As for the organic production, Missagia & Rezende (2011) classified 428 consumers of organic products in four segments: hedonists, busy, vain and holistic.

Andrade & Bertoldi (2012), classified consumers of organic fairs in Belo Horizonte in seven groups: (1) "social interaction; (2) "socially and environmentally responsible"; (3) "health and economy": (4) "safe food": (5) "pleasure and nostalgia (6) "pleasure and energy (7) "practical - it makes my life easier".

Guimarães (2013), in cluster analysis, identified three profiles: (1) carefree consumers, (2) low conscious consumers and (3) conscious consumers.

As previously mentioned, the advance of the commercialization of agroecological products is conditioned to the increase in consumers' demand, and the study of consumer behavior and segmentation of this market is a potential tool to guide the development of strategies that stimulate consumption. As agroecology has a perspective that surpasses the strictly productive approach also elucidated above, this article starts from the following question: are the consumers of agroecological proximity markets aware of what they are purchasing, going beyond the product itself, but considering the holistic context of its production? Thus,

this article aims to trace the profile of the consumer of agroecological products from three markets in Minas Gerais, using cluster analysis statistical methodology.

Methodology

The secondary (documentary research and direct observation) and primary data techniques were used. The primary data collection consisted of a field survey, specifically a survey with 116 questions applied to the consumers of three local markets that sell agroecological products direct to the public in Minas Gerais: *Terra Viva Fair (TV)* in Belo Horizonte, *Raízes do Campo Fair (RC)* in Jaboticatubas and *Mercadinho Tá Caindo Fulô (TCF)*, in the district of Santana do Riacho. The survey took place in 2016 after being approved by the Ethics Committee on April 11, 2016 (CAAE 54272216.0.0000.5504).

The choice of the locations was based on the fact that they present, on one hand, clear contrasts and, on the other, similar aspects. The similar aspects are related to the form of collective organization of markets for direct sales to consumers who have as their principle the commercialization of agroecological products and the solidarity economy. The contrasting aspects refer to the points of sale organized in agroecological fairs (*Terra Viva* and *Raízes do Campo*) that take place weekly or in a fixed place of commercialization *(Mercadinho Tá Caindo Fulô*). In addition, the location of the markets is distinctly located in the countryside (*Mercadinho Tá Caindo Fulô and Raízes do Campo*) or in the capital (*Terra Viva*), and may have a greater range of distinct consumer behavior characteristics.

The consumer sample was selected based on non-probabilistic convenience sampling whose size was determined by local population characteristics (Levin, 1987). The *Terra Viva* farmers' market, in Belo Horizonte (MG), was considered to have a finite population. The other two, *Tá Caindo Fulô* local market, in Santana do Riacho, and *Raízes do Campo* farmers' market in Jaboticatubas, both in Minas Gerais state, were considered to have infinite population since there was no way to define it because the first is a fixed selling point, with no control over the number of people circulating, and the second is a farmer's market that takes place in the town square.

The formula used to determine the sample (n) based on the proportional estimate (Levin, 1987) considered 90% confidence with a 10% error. Equations 1 and 2 were used to specify the sample number considering infinite and finite populations, as follows:

$$n = \frac{z^2 \times p \times q}{e^2} \quad (1)$$

$$n = \frac{N \times p \times q \times z^2}{\left(p \times q \times z^2\right) + \left(\left(N-1\right) \times e^2\right)} \quad (2)$$

In which:
N = population;
n = sample size;
z = critical value corresponding to the desired degree of confidence;
p = number of individuals who belong to the studied population;
q = number of individuals who do not belong to the studied population (q = 1 – p);
e = maximum error allowed.

According to Levin (1987), p and q values are equal to 0.5 when unknown. This assumption considers the number of people/ratios going to the fair to purchase regardless of being present

at the farmers' market or local market. Considering the parameters Z = 1.645, p = 0.5, q = 0.5, and, e = 0.10, the sample sizes were defined as 68 and 54 for infinite and finite populations, respectively.

Therefore, the sample size was defined as 191 consumers, 55 at the *Terra Viva* farmers' market, 68 at the *Raízes do Campo* AgroEcological farmers' market, and 68 at the *Tá Caindo Fulô* local market. The survey was conducted from July to October 2016 and the data were analyzed using multivariate analysis.

The cluster analysis interdependence technique was chosen because the variables are random and interrelated at the same time and cannot be interpreted isolated since no single variable can adequately characterize the model studied. Additionally, multivariate analysis provides a simpler data presentation, allowing an easier interpretation of results without loss of information (Fávero et al., 2009). According to the same authors, although cluster analysis (CA) is an exploratory technique, it does not provide accurate answers and is not appropriate for inferences on population characteristics; however, it indicates responses that may lead to other explorations. Cluster analysis consists of grouping predetermined variables that are internally homogeneous, heterogeneous and mutually exclusive, using measurements of similarity or distance between observations. Another CA characteristic is that the statistical variables chosen for the groupings are selected by the researcher.

The cluster analysis started by selecting the variables to verify the distance between the observations. Out of 116 possible variables, the 15 selected ones believed to be the most strategic for clustering are: (1) consumer understanding of what is an organic/agroecological product; (2) whether consumers perceive a difference between organic and agroecological products; (3) purchase of conventional products when agroecological products are not found; (4) importance of identifying whether the product is really agroecological; (5) influence of family farming seal on purchases; (6) habit of reading labels; (7) perception of agroecological products' accessibility to the entire population; (8) consumers visits to the farms; (9) influence of knowing the producers and production during purchase; (10) purchase of agroecological products to contribute to environmental preservation; (11) purchase of agroecological products to contribute to sustainability; (12) purchase of agroecological products to contribute to sustainable local/rural development; (13) purchase of agroecological products to strengthen family farming and/or solidarity enterprises; (14) purchase of agroecological products due to the lack pesticides; and (15) purchase of agroecological products because they are non-transgenic.

After selection, the variables were standardized by the Z score method to avoid distortion in the structure of the clusters whose variables were on different scales. The data were submitted to six distinct linking methods: Single Linkage, Complete Linkage, Average Linkage, Centroid, Median Linkage, Waver Linkage and Ward. The result of the pseudo-F test indicated Ward as the best binding method. Additionally, the generated dendrograms indicated the Ward bonding method as the best algorithm. The pseudo-F test indicated the number clusters as ideal. After defining the clusters, the second step of data analysis was to segment consumers in relation to clusters and locations. In order to perform that, 23 variables linked to marketing strategies were selected according to the questions of the survey, followed by the chi-square test to verify the dependence between the variables and the researched cluster/location.

In order to perform this test, the null hypothesis (h_o) is stated as "consumers in locations/places/markets grouped in cluster 1 or cluster 2 are independent of: (1) how consumers learned about the places; or (2) advance planning of purchases; or (3) identifying the agroecological product because they know the producer; or (4) identifying the agroecological product because they trust the local; or (5) identifying the agroecological product due to certified quality seals;

or (6) identifying the agroecological product via appearance indicator; or (7) failure to identify the agroecological product; or (8) how strong was the influence of the certification seal on the product purchase; or (9) how strong was the influence of the producer presence on the product purchase; or (10) the greatest difficulty of the place; or (11) consumer behavior regarding sorting waste; or (12) consumer behavior regarding composting waste; or (13) consumer behavior regarding reusing packaging; or (14) consumer behavior regarding the disposal of waste in ordinary waste; (15) consumer behavior regarding price research prior to buying at certain locations; or (16) intention to overpay the agroecological product; or (17) internet access; or (18) musical performances and events happening while in the market; or (19) the best way to communicate with consumers; or (20) the difficulty of being a consumer of agroecological products; or (21) enough reliable information to make the best choice for food consumption; or (22) the participation in social movements to search for agroecological products; or (23) participation in pro-environment movements.

Results and discussion

Two clusters were identified from the cluster analysis, which can also be observed in the dendrogram. Figure 1 shows the dendrogram indicating the level of similarity or the Gower similarity coefficient between observations on the vertical and on the horizontal axis.

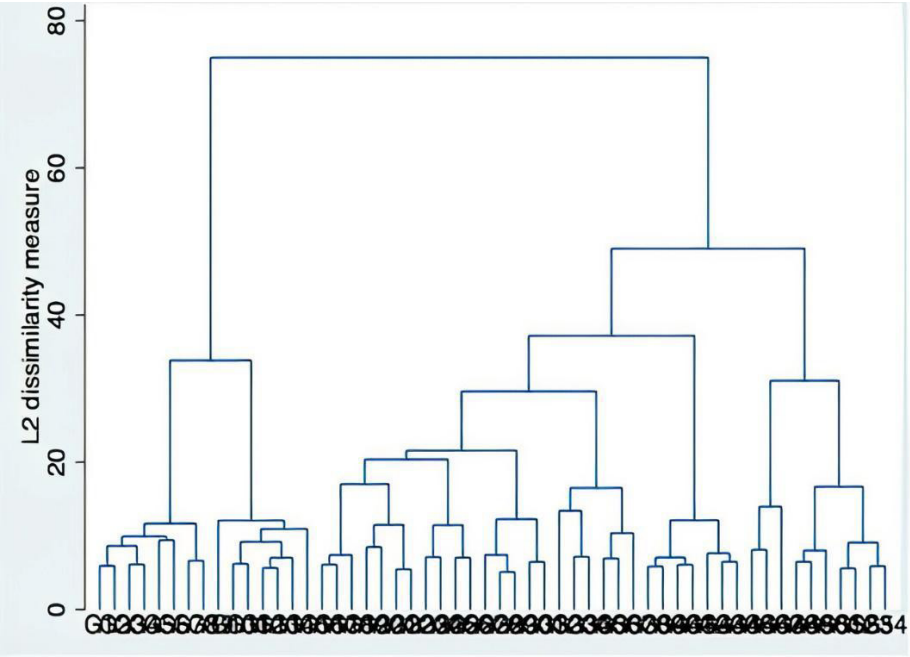

Figure 1. Result of the cluster analysis by the Ward method. Source: Data from the field survey.

Cluster 1 grouped 46 consumers, while the cluster 2 grouped 145 consumers (Figure 1). In the cluster 1, the participating consumers were divided as follows: 18 (32.8% of 55) from the *Terra Viva* farmers' market, 18 (26.4% of 68) from *Tá Caindo Fulô* local market, and 10 (14.7% of 68) from the *Raízes do Campo* farmers' market. In the cluster 2, they were divided as follows: 37 (67.2% of 55) from the *Terra Viva* farmers' market, 50 (73.6% of 68) from *Tá Caindo Fulô* local market, and 58 (85.3% of 68) from *Raízes do Campo* farmers' market. The profiles from each cluster were grouped based on the analysis of the average responses to the questions,

and a preliminary analysis of the two groups showed very similar profiles, with few elements differentiating the profiles. However, it is pertinent to present which variables differentiated the groups the most, i.e., the more distant variables. In order to do this, the Chi-square (χ^2) test was used since it allows comparisons between clusters and the defined variables to verify the distances between the observations. Fifteen crossings were performed, and, for all of them, the null hypothesis (h_o) can be generically described by the following sentence: "the participation in cluster 1 or 2 is independent of the analyzed question (questions 1 to 15 aforementioned)".

Ten out of the 15 variables were significantly different, i.e., h_o was rejected at 10% significance level, as follows: (1) consumer perception of the difference between organic and agroecological product; (5) influence of family farming seal on purchases; (6) habit of reading labels; (7) perception of agroecological products' accessibility to the entire population; (10) purchase of agroecological products to contribute to environmental preservation; (11) purchase of agroecological products to contribute to sustainability; (12) purchase of agroecological products to contribute to sustainable local/rural development; (13) purchase of agroecological products to strengthen family farming and/or solidarity enterprises; (14) purchase of agroecological products due to the lack pesticides; (15) purchase of agroecological products as non-transgenic products.

Therefore, it is concluded that consumers are grouped in clusters based on these variables, or these characteristics that differentiate the clusters among themselves.

Regarding the contribution of the χ^2 test to the dependence between variables, only one variable stood out for the cluster 2. The responses of the variables that most contributed to the dependence on cluster 1 were as follows: the consumer does understand the difference between an organic and an agroecological product; family farming seal does not influence purchases; consumers do not have the habit of reading labels; the agroecological product is accessible to the entire population; consumers do not purchase agroecological products to preserve the natural resources; they consume agroecological products to contribute to family farming and solidarity enterprises and to sustainable rural development; because these products do not have pesticides; and are not transgenic products. In the cluster 2, the χ^2 test indicated that consumers buy agroecological products to contribute to sustainability.

According to these characteristics, consumers in cluster 1 are considered as "Consumers closer to agroecological knowledge" and consumers in cluster 2, as "Sustainable consumers less close to agroecological knowledge", since both are consumers of agroecological products. However, the cluster 1 is more dependent on variables that characterize agroecology in its principles, such as the differentiation of agroecology from organic agriculture, product is not genetically modified, no pesticides, strengthening family farming, solidarity-based enterprises, and the consumers in the cluster 2 aims that these products become accessible to the entire population. Moreover, these consumers do not read labels, and the presence of family farming seal does not influence the purchase.

Cluster 2 was named "Sustainable consumers less close to agroecological knowledge" especially because the variable that generated the most dependence, that is, the product was purchased to contribute to sustainability, but independent of the characteristics that define agroecology. Therefore, it is not possible to say how the consumers in this cluster understood or defined sustainability since this question was not asked to the consumers during field research. However, according to Cunha et al. (2011), the term sustainability can be perceived as a product attribute related to consumer social and environmental awareness, so we considered that the respondents understood that consuming agroecological products is directly linked to economic and social development while guaranteeing the preservation of natural resources for future generations, since this understanding is linked to the concept of sustainability constituted since

the 1980s, with the Budtland Report. Among the 23 variables studied, 19 were significantly different so the null hypothesis, h_o, was rejected at 10% significance. Therefore, it is possible to segment consumers in the previously obtained locations/clusters according to the following variables 1, 2, 3, 5, 6, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22 and 23.

The responses to the variables that contributed the most to dependence according to the χ^2 test are described below. *Terra Viva* farmers' market consumers that grouped in Cluster 1 (TV1) learned about the place through social networks; plan purchases in advance; the certification seal has little influence on the purchase; the main difficulty is the price; researched price before buying in the local; would pay up to 20% more for the agroecological product; best communication is through social networks; price is the biggest obstacle to being a consumer of agroecological products; do not believe there is sufficient and reliable information to make the best choice for food consumption. Furthermore, the *Terra Viva* consumers that grouped in Cluster 2 (TV2) identify the agroecological product by the certification seal, reuse packaging, and musical performances and events do not influence the decision to go to the venue.

Tá Caindo Fulô consumers that grouped in Cluster 1 (TCF1) claim to make compost or give the residues to domestic animals while stating that participation in social movements influences the decision to consume agroecological products. On the other hand, *Tá Caindo Fulô* consumers that grouped in Cluster 2 (TCF2) identify the agroecological product by the appearance, and the presence of the producer does not influence the decision on purchasing the products.

The χ^2 test results indicated no contributions of the *Raízes do Campo* consumers in Cluster 1 (RC1). However, the consumers in Cluster 2 (RC2) identify the agroecological product by knowing the producer, no internet access and have never participated in environmental actions.

Consumer profile analysis aims at encouraging demand for agroecological products and knowledge influences greatly consumer choice (Solomon, 2011; Dahlstrom, 2012). This result indicates that a small fraction of consumers of organic and agroecological products are knowledgeable about these products. Therefore, the surveyed farmers' markets and the local market should develop social and environmental marketing strategies (Kotler & Lee, 2011; Paiva & Proença, 2011; Dahlstrom, 2012; Zenone & Dias, 2015) to raise awareness on supporting agroecology, focusing on the cluster "Sustainable consumers less close to agroecological knowledge". Also, as a proposal, the local markets could offer consumer service advice on using the products since many consumers are, for example, unaware of the socio-biodiversity of Cerrado products, not able to differentiate products, and unconventional food plants, among others. From the perspective of environmental marketing, consumers could be informed on product seasonality to increase awareness about changing behavior and own eating habits by consuming according to the natural production cycles following the principles of the agroecological harvesting season.

For the *Terra Viva* consumers in the cluster "Consumers closer to agroecological knowledge", the marketing through social networks should continue but not focusing on forcing sales during the farmers' market. Since the purchases are planned in advance, more producers should be encouraged to have websites and sell online. The pricing policy should aim at a maximum price 20% less than in other locations, given that these consumers research prices before buying and consider price as the biggest obstacle to become a consumer of agroecological products. In addition, it is important to invest on information about food consumption, given that consumers seem to lack sufficient and reliable information to make the best choice. On the other hand, consumers from the *Tá Caindo Fulô* in this same cluster stated that belonging to social movements influences the search for agroecological products. Therefore, local social movements may play an important role in marketing strategies, as well as consumers that

make compost or feed residues to domestic animals show that awareness about waste proper disposal is a strong value, which can be linked with this agroecological market, thus improving the local brand. The χ^2 test results show no contributions from the *Raízes do Campo* consumers to this cluster.

For the *Terra Viva* consumers belonging to the "Sustainable consumers less close to the agroecology" cluster, the certification seals are important to identify organic products, so it is suggested that all producers should seek to implant the certification seals to differentiate their products. Moreover, these consumers reuse packaging, showing that, as in *Tá Caindo Fulô* local market in cluster 1, awareness about proper waste disposal is an important value for these consumers, and can also be used to link the place image with these practices as a differential compared to other locations. Musical performances and events do not influence the decision to go/visit the venue, demonstrating that Social and Environmental Marketing strategies to raise awareness about event-centered agroecology should not be used for this cluster since they are not effective.

On the other hand, the *Tá Caindo Fulô* consumers in this cluster identify agroecological products by the more "natural", "rustic" appearance so that the certification seal does not influence the purchase, and when investing in packaging, labels and information, these items should link the product to life in the countryside, referring to more natural products and closeness to country life to stimulate the purchase. The producer presence does not influence the purchase, indicating that the sale through sellers rather than the producers can continue as it is, so the producer can devote more time to production. The consumers of the *Raízes do Campo* farmers' market in cluster 2 require a strategy more focused on higher sociability and affectivity between producers and consumers, since these consumers identify the agroecological product with knowing the producers. Furthermore, communication strategies should not be focused on the internet given that these consumers do not have access to the network. Moreover, these consumers do not participate in pro-environment actions so a possible channel for environmental awareness is via social and environmental marketing strategies aimed at changing consumer behavior (Kotler & Roberto, 1992; Kotler & Armstrong, 2000; Kotler & Lee, 2011; Dias, 2014).

Although the price was a dependent variable only in cluster 1, for the *Terra Viva* consumers, price policy is always present in the agroecological discussions, as observed in Ciprandi & Follmann (2007); Barbosa et al. (2011); Pinto et al. (2018), Leite & Teles (2019). A possible action to mitigate this difficulty is to verify the profitability of consumers in the identified segments, to assess whether the adopted pricing policy is appropriate and to define effectively the most appropriate pricing policies to serve the segments, taking into consideration the value perception by the consumer (Solomon, 2011).

Conclusions

This article started from the following question: are the consumers of agroecological proximity markets aware of what they are acquiring, going beyond the product itself, but rather coming from a holistic context of its production? Thus, it aimed to trace the profile of the consumer of agroecological products from three nearby markets in Minas Gerais state, using cluster analysis statistical methodology.

The cluster analysis pointed to two clusters: 1 with 24% of interviewed consumers named "Consumers closer to agroecological knowledge" and cluster 2 with 76% of interviewed consumers named "Sustainable consumers less close to agroecological knowledge". Cluster 1 consumers

are more dependent on variables that characterize agroecology in its principles while in cluster 2, the variable with the highest dependence was the purchase of products in that local to contribute to sustainability, but it was independent of characteristics that define agroecology.

Grouping consumers according to the local/cluster allowed identifying consumer profiles regarding the marketing mix and environmental marketing variables facilitating the elaboration of marketing strategies for each group. The market and farmers' markets must act on these segments by choosing the already existing most successful key factors that have a best response to these segments, or according to the segment profiles, build skills to serve those markets aiming to achieve a more effective marketing strategy.

This research highlights that studying marketing strategies, consumer behavior and using quantitative analysis such as cluster analysis and market segmentation can potentially identify consumer real perceptions of agroecological products and assertively define the local limitations and which strategies are best suited to, simultaneously, meet the needs and wants of consumers, achieving the goals of organizations. Moreover, stimulating the sale of products ensuring the financial viability of farmers and organizations, thus providing agroecological praxis in a context in which the marketing theory and practice go hand in hand to stimulate growth, demand and contribute to build an agroecological system aiming at food sovereignty.

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Received: September 09, 2020.
Accepted: October 24, 2021.
JEL Classification: M31, Q01, Q13