Segmenting the organic food market in Lebanon: an application of k-means cluster analysis

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Abstract
Purpose – The purpose of this paper is to discover profiles of organic food consumers in Lebanon by performing a market segmentation based on lifestyle and attitude variables and thus be able to propose appropriate marketing strategies for each market segment.
Design/methodology/approach – A survey, based on the use of closed-ended questionnaire, was addressed to 320 organic food consumers in the capital Beirut, in February and March 2014. Descriptive analysis, principal component analysis and cluster analysis (k-means method) were performed upon collected data.
Findings – Four clusters were obtained and labelled based on psychographic characteristics and willingness to pay for the most purchased organic products. "Localist" and "Health conscious" clusters were the largest proportion of the selected sample, thus these were the most critical to be addressed by specific marketing strategies, emphasising the combination of local and organic food and the healthy properties of organic products. "Rational" and "Irregular" cluster were relatively small groups, addressed by pricing and promotional strategies.
Originality/value – This is the first study attempting to segment organic food consumers into different categories in a developing country as Lebanon.
Keywords Consumer analysis and profiling, Lebanese organic market, Organic market segmentation, PCA and cluster analysis
Paper type Research paper

1. Introduction
The organic market is often regarded as one of the fastest growing sectors in the global food industry (Hjelmar, 2011). Retail sales were EUR62.6 billion in 2014 worldwide, and EUR26.2 billion in Europe alone (Willer and Lernoud, 2016). This increase is parallel to an increase in the number of articles concerning organic food consumption over time (from 2000 to 2011), which is also associated with the increased promotion and demand for organic food (Hemmerling *et al.*, 2015).

One approach to identifying the causes for the success of the organic market is to understand who purchases organic products. Organic consumer profiles have been explored in the past using demographic qualities to describe consumers (Nie and Zepeda, 2011), while few studies have focussed on the psychographic characteristics of organic consumers (de Oliveira Lima-Filho *et al.*, 2012). Hughner *et al.* (2007) suggested that an approach focussing on consumer lifestyles can provide a better understanding of their behaviour. Additionally, Aertsens *et al.* (2009) proposed that organic food consumption research should focus more on the influence of attitudes and values.

The largest organic food markets are in the USA, followed by Germany and France, and the highest per capita consumption in 2014 is also reported in the European countries

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(Willer and Lernoud, 2016). The highest percentages of literature on organic food consumption were also reported in the USA, followed by the UK, Italy, Germany and Greece (Hemmerling *et al.*, 2015). The situation is totally different in developing Mediterranean nations. Except for a few cases like Lebanon, the local organic market in most of the aforementioned countries is underdeveloped and the majority of organic production is export oriented (Al-Bitar, 2014). In Morocco, for example, the local market is in its early stages of development, and is mainly concentrated in the large cities of Rabat, Casablanca and Marrakech. Local consumers increasingly demand Moroccan organic products (Chibane and Amazzal, 2014). Similarly, the local organic market in Tunisia is still in its "infancy", with a promising potential due to the increasing awareness of local consumers (Maamer and Amara, 2014).

In Lebanon the situation is reversed. The local organic market is more developed than in other South Mediterranean countries while the organic production is insignificant. Several factors have contributed to the expansion of the market during the last 15 years. One important reason is the high level of awareness among the Lebanese people. A series of food scandals started in 2009, when high levels of pesticide residues were detected in locally grown fruits and vegetables. Grapes, strawberries, potatoes, and apples were found to contain up to 25 times more pesticides than internationally accepted levels according to Agence France-Presse reports (*Hurriyet Daily News*, 2009). As the results, many Lebanese began to reconsider their eating habits and attempt to find safer food alternatives, such as organic food (Atallah, 2010). Additionally, the involvement of business-oriented operators in large-scale projects and organic imports contributed to further expansion and stabilisation of local market growth (Pugliese *et al.*, 2013).

The consumer qualities and patterns of consumption in the Lebanese organic market, as an example of an emerging organic market in a third world country, are not inevitably the same as those in other well-established markets in developed countries. Thus, it is valuable to have more detailed studies of consumption in these markets in order to gain a better understanding of the organic food drivers when put in different scenarios.

2. Literature review

2.1 Review of the organic food sector in Lebanon

The traditional Lebanese diet is a healthy cuisine. The effect of Mediterranean culture is evident in the "healthy" consumption pattern of this highly urbanized country. The country's small geographical area and its inhabitants' strong attachment to their traditional diet have created a very similar food pattern throughout the whole country. A study exploring the effect of urbanisation on food consumption did not find any differences between rural and urban food consumption patterns (Mouawad, 2004). The cultural attachment to food translates into the great value Lebanese attribute to their local products (locally known as Baladi produce). Baladi is a term used to describe a wide range of "traditionally homemade" food, such as preserves and pickles, food brought "from the village", "natural and healthy" eggs, dairy products and honey from extensive farming in rural areas. This inclination of the Lebanese to choose a healthy diet, added to the low level of food safety in the country, has contributed to a rising interest in organic food as a natural alternative. Organic food has been attracting the attention of consumers, private bodies and the public sector since the 1990s (Pugliese *et al.*, 2013).

Currently, organic production in Lebanon is limited and growing very slowly. High-production costs and marketing difficulties have limited increases in production quantities and in cultivated area (Pugliese *et al.*, 2013). The last available data showed that the total organic production area was 2,571 ha (2014), equivalent to 0.4 per cent of the total agricultural area, managed by 238 operators (Willer and Lernoud, 2015). Although production is low, the organic market is continuing to grow.

There are different outlets for organic products, concentrated mainly in the capital Beirut and primarily supplied by imports (65-70 per cent) (Atallah, 2010). Domestic marketing channels are mainly supermarkets with specialized corners for organic products, specialized organic shops and farmers' markets. Other outlets are organic bakeries selling only organic baked products. Moreover, there are also non-organic shops such as healthy food shops, fair-trade shops, slow-food shops and box schemes (The Healthy Basket) for indoor delivery, alongside restaurants offering organic menus and online delivery services. This diversification and expansion of the organic outlets reflects the development of the organic local market.

Despite the well-established market, few studies have investigated the characteristics of Lebanese organic consumers. This study is a first attempt to perform segmentation analysis of the organic market in Lebanon.

The objectives of this research are:

- to identify the profile of the Lebanese organic consumer;
- to understand organic consumption behaviour (willingness to pay (WTP), frequency of purchase, etc.);
- to perform psychographic segmentation based on lifestyle and attitude variables; and
- to address each market segment with the corresponding appropriate marketing strategy.

The general aim of this study is to contribute to the development of the local organic sector in Lebanon, in terms of both production and market. Providing stakeholders – mainly local farmers and marketers – with evidence of the local market demand and growth can encourage them to consider the organic alternative to cover the imported organic food market share.

3. Materials and methods

3.1 Sample Representativeness

To have a representative sample, our approach was based on the following:

- Sample distribution: the latest demographic data available from the Central Administration of Statistics (CAS, 2009) depicting the percentage distribution of the number of household members were used for sample distribution.
- Choice of survey location: Beirut hosts the majority of organic food outlets and is Lebanon's largest city. Around half of the Lebanese population resides in Beirut and its suburbs: 1.9 million inhabitants out of a total population of 4.14 million (data were taken from the website of CAS before conducting the survey in 2014).
- Homogenous food pattern: there is no great difference between the food habits of urban and rural consumers in Lebanon (Mouawad, 2004), therefore the consumers interviewed in Beirut were considered as representative of consumers around the country.

3.2 Data collection

Data were collected in Beirut during February-March 2014, and 320 organic food consumers were surveyed. Data were collected mainly through face-to-face (No. 292) interviews, in addition to online administered questionnaires (No. 28). The face-to-face questionnaire was administered to consumers in four organic shops (No. 82), two organic farmers' markets (No. 63) and one supermarket branch (No. 147); a closed-ended dichotomous (yes or no) and multiple choice questionnaire was used. Respondents were screened to include the main purchasers of food products within the household and the people who had already bought organic products previously. The following variables were addressed: socio-demographic characteristics: gender, age, education, income level, family composition; food shopping behaviour: food choice criteria, place of food purchase and a personality description; consumer's level of knowledge about organic food: first introduction to organic, source of information about organic and a personal understanding of organic (definition); organic consumption information: purchased products, consumption frequency, WTP, buying motives and purchase place.

3.3 Data analyses

Data were subjected to two types of analyses using SPSS software. First, a descriptive analysis was carried out to build the profile of the total sample. Then, multivariate analysis was performed: principal component analysis (PCA) followed by cluster analysis (k-means technique).

Based on descriptive analyses, relevant variables were selected for inclusion in PCA. PCA aims to reduce dimensionality of the matrix data, and simplify subsequent interpretations without losing any variability (Konishi, 2012), thus samples can be represented by new variables with fewer numbers. To determine the number of components to retain, we used the Kaiser Method, where we kept components with eigenvalues greater than 1.00.

Cluster analysis was carried out based on the resulting PCA components. The clustering method used was "k-means", where the number of clusters k is chosen a priori (four clusters were chosen according to the ability to interpret the clusters). Once the market segments were obtained, they were characterised, taking into account both consumers' socioeconomic characteristics and their attitudes towards organic food products and environmental issues.

4. Results

4.1 Sample description

The overall sample consisted of 320 organic food consumers responsible for family food shopping, the majority of whom are females (79 per cent) in the mature age profile (73 per cent are aged over 36), with a middle-class income (56 per cent), and a fair portion with children under the age of 18 (39 per cent).The most frequent occupations were employees (38 per cent) and the unemployed – including housewives (30 per cent). The majority had finished university (83 per cent).

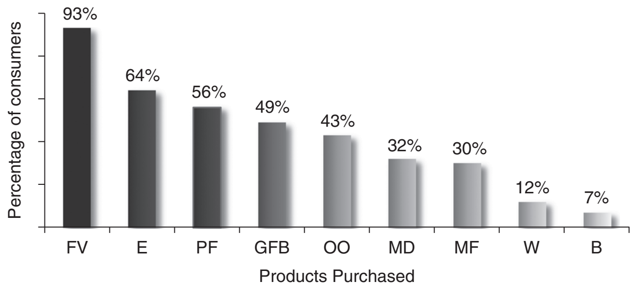
The sample also showed great concern for healthy aspects of food, and 58 per cent stated that they chose their food based on health aspects. Supermarkets are the main food shopping location for 54 per cent of the sample.

Our sample mostly consists of longstanding consumers: 64 per cent stated that they have been purchasing organic for over five years, confirming that organic is not new to the Lebanese consumer. The two most-mentioned reasons for consumption were the perception of organic as being healthy (41 per cent) and as being safe (37 per cent) The environmental concern was notably of low percentage (8 per cent).

The main destination of organic food purchase is from organic shops (40 per cent) followed by supermarkets (34 per cent).

Organic fresh fruits and vegetables are the most commonly purchased organic products (93 per cent), while alcoholic beverages (12 per cent) and organic baby foods (7 per cent) are the least purchased. The percentage of consumption for each organic food category is shown in Figure 1.

A big portion of the sample (58 per cent) perceives prices organic products to be slightly more than conventional. The percentages of consumers indicating that the cost of each organic food category is the same, slightly higher, or much higher in comparison with conventional food are shown in Figure 2. Although some differences were noted in the price perception of each product category, most consumers interviewed said that the price of organic is slightly higher.



Notes: FV, fresh fruits and vegetables; E, eggs; PF, processed food; GFB, grains, flour, bread and other bakery products; OO, olive oil; MD, milk and dairy products; MF, meat and fish products; W, wine and alcoholic drinks; B, baby food

Figure 1. Percentages of each category of organic products (per cent) purchased by Lebanese organic consumers (No. 320)

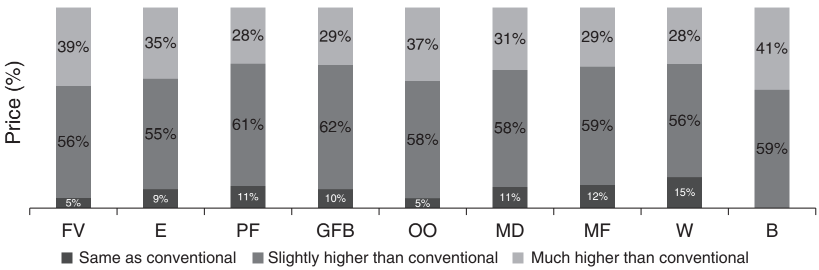


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Figure 2. Anticipated price of several organic food categories for organic food consumers (No. 320)

Concerning consumers' willingness to increase purchase of organic food products in the future, the majority (85 per cent) showed a positive attitude towards increasing their purchase on the condition that prices are lowered (39 per cent) and organic products become more available (34 per cent).

4.2 Results of PCA

PCA was performed, yielding new components, six of which had an eigenvalue above 1 and were thus retained. These components explain approximately 62 per cent of the cumulative variance in the data set as shown in Table I.

Based on the factor loading in the component matrix, we identified the variables that are mainly affecting the components (factor loading > |0.5|). The effect of each variable on the new component is shown in Table II.

These resulting components are the most significant factors defining the purchasing behaviour of organic food for our sample. They were used as segmentation variables in the k-means clustering that followed.

4.3 Cluster results

In order to find the more stable model of clusters, a random number of clusters were tested beforehand. The analyses yielded four organic food-related lifestyle clusters. They were characterised by a descriptive analysis of their most important variables, which allowed us

Table I.
Total variance explained of the PCA results

Component	Total	Initial eigenvalues % of variance	Cumulative %
1	2.169	16.687	16.687
2	1.358	10.448	27.135
3	1.279	9.837	36.972
4	1.110	8.535	45.507
5	1.071	8.238	53.745
6	1.033	7.948	61.693
7	0.915	7.037	68.730
8	0.868	6.677	75.408
9	0.768	5.904	81.312
10	0.672	5.173	86.485
11	0.660	5.075	91.559
12	0.579	4.450	96.010
13	0.519	3.990	100.00

Note: Extraction method: principal component analysis

Table II.
Component matrix showing factor loading

Variables	Components 1	2	3	4	5	6
Food choice criteria	0.10	0.33	0.19	−0.37	−0.51*	0.47
Personality	0.36	−0.03	−0.65*	−0.08	0.17	−0.30
First encounter with organic	0.53*	0.24	0.33	−0.20	−0.08	−0.04
Definition of organic	0.00	0.11	−0.16	0.72*	−0.31	0.23
Source of information	−0.18	0.30	−0.10	−0.36	0.37	0.26
Motives	−0.19	0.23	0.35	0.42	0.53*	0.30
Future intentions	−0.11	−0.25	−0.37	−0.14	0.17	0.62*
Gender	0.33	−0.55	0.47	0.04	−0.01	0.01
Age	0.34	0.55*	0.27	−0.02	0.28	−0.22
Education	0.67*	−0.08	−0.18	−0.09	0.19	0.18
Occupation	0.57*	−0.51	0.21	0.00	0.12	0.16
Income	0.63*	0.20	−0.15	0.24	0.13	0.15
Price	0.52*	0.26	−0.19	0.14	−0.30	0.05

Notes: Extraction method: principal component analysis. *Factor loading > $|0.5|$ indicate higher correlation between variables and components

to label them as follows: "Health conscious" cluster (No. 130), "Localist" cluster (No. 75), "Irregular" cluster (No. 59) and "Rational" cluster (No. 56). The distance of each principal component from the final cluster centres and the labelling of clusters is shown in Table III.

The largest cluster (41 per cent of total sample) is "Health conscious". This group labelled the "health" factor as the most important reason for buying organic (52 per cent) (Figure 3). In fact, being "healthy" is evident also in their personality description and food choice criteria. They buy organic equally in supermarkets and organic shops. The "Health conscious" cluster consists of highly educated consumers, mostly aged over 36 (86 per cent) and belonging to the middle classes. Their higher level of education is reflected in their good knowledge of organic food. While their WTP is limited, the vast majority expressed a positive future attitude towards increasing purchase of organic products (99 per cent) in case they will be able to afford it or if prices are decreased (44 per cent).

The "Localist" group is the second biggest cluster, accounting for 23 per cent of the sample. This is a poorly informed cluster, prevalently confused about organic and local "Baladi" products, although these consumers have been purchasing organic for a long time.

The majority has known about organic foods (93 per cent) and been purchasing organic (75 per cent) for more than five years. This did not enforce the organic concept, although they have known about organic for a long time, the majority confuse it with traditional food (56 per cent), as shown in Figure 3. They are attracted by the health and safety attributes of organic food, the notion that it is environmentally friendly, and their similarity with traditional products. Unlike the other clusters, males dominate in this cluster, with the highest percentage of educated individuals (44 per cent with a bachelor or higher degree), of high-profile jobs (43 per cent) and those in a high-income class (39 per cent).

The third “Irregular” cluster accounts for 18 per cent of the sample, and is mainly distinguished by an uneven approach to organic consumption. These consumers are knowledgeable about organic food and indicated a high WTP, but on the other hand they would not purchase more organic products because of the high prices. Showing a strong inclination to shop for food in organic shops (58 per cent), they seek “healthy food” (39 per cent had health attributes as a motive for choosing their food in general) with a strong inclination towards cheaper food. This group had the highest percentage of consumers choosing to buy organic because it is “Safe” (44 per cent), as is evident in Figure 3. Mostly middle-class consumers, with a high level of education, the “Irregular” group showed a great knowledge of organic products. This group declared that it is satisfied with the amount they currently buy, and that they might increase their purchase of organic goods if prices were reduced.

The “Rational” cluster (18 per cent) is a younger group of people, mostly aged between 26 and 35 (63 per cent). It contains a higher percentage of employees in comparison to other clusters, mostly in a low-income class (52 per cent). This younger section has been recently introduced to organic (64 per cent heard of organic less than five years ago). These consumers are well aware of the benefits and concept of organic, since 79 per cent chose the correct definition of organic as indicated in Figure 4, but they are limited by their

Component	Clusters “Health Conscious”	“Localist”	“Irregular”	“Rational”
1	−0.12	0.97	−0.00	−1.02
2	0.52	−0.55	0.52	−1.02
3	0.08	−0.36	0.68	−0.41
4	−0.01	−0.57	0.64	0.12
5	0.22	0.14	−0.01	−0.69
6	0.62	−0.27	−1.23	0.23
Cluster size (%)	41	23	18	18

Table III. The distance of each PC from the final cluster centres and the labelling of each cluster

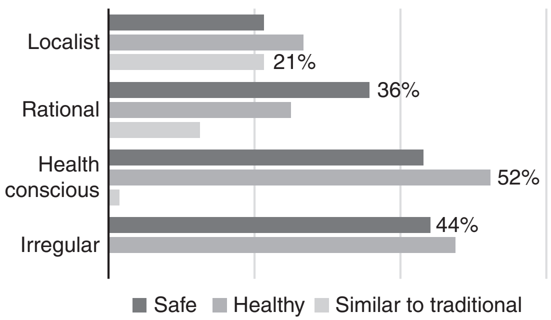

Figure 3. Main motives chosen for buying organic in percentage (per cent) for the four clusters

low purchasing power. The primary reason for this cluster to buy organic is that they consider it as a safe product in contrast to other clusters (36 per cent chose safety, illustrated in Figure 3), and they buy organic food mainly from supermarkets. This cluster has a low WTP, but they are very positive about consuming more organic food in the future.

5. Discussion

When looking at the sample composition, we find that our sample fits the general profile of the Lebanese population in several ways. First, it fits the age distribution (73.6 per cent of Lebanese are above the age of 36), unemployment rate (22 per cent of the population) and literacy rates (95 per cent) (CAS, 2009), which indicates its representability of the population. While the percentage of people in the high-class income is different, only 7 per cent of the Lebanese are in the upper class vs 20 per cent of our sample. This is an indication of the high-purchasing power of people buying organic. As for females making up 79 per cent of the sample, this is due to the fat that they are the main food shoppers in the house.

On the other hand, the cluster analyses performed for Lebanese organic consumers divided them into different consumer clusters, demonstrating the diversity and complexity of this section of the food market.

The results showed that the Lebanese consumers buy organic for perceiving it as a healthier option and as a safer product. In agreement with the majority of studies related to organic consumers (Hughner *et al.*, 2007), health was also the main reason for consumers to buy organic food in Lebanon; it was the primary motive for three of the four clusters found. While motives ranged from the most important notion of health, to the safety attributes that organic products may present, less importance was given to the positive environmental effect of organic production. This low level of concern can be related to the notion that egoistic motives can be better predictors of organic food purchase than altruistic motives (Magnusson *et al.*, 2003) as in our case. This was also the case of another emerging organic market, i.e. Russia. In the Russian organic market, organic food consumption is mainly motivated by personal well-being while social or environmental concern is of low importance (Bruschi *et al.*, 2015). Food safety concern as a result of food hazards have led to an increasing demand for organic products in Lebanon. Previous research have proven this as well in other markets (Schifferstein and Oude Ophuis, 1998; Soler *et al.*, 2002; Bruschi *et al.*, 2015).

On the other hand, price is the main constraint to organic food consumption for the Lebanese consumers. Premium prices continue to hold back organic food consumption, especially in emerging organic markets (Callieris *et al.*, 2016; Thøgersen *et al.*, 2015). High costs were also the main constraint in many other developed markets (Lockie *et al.*, 2002; Makatouni, 2002; Zanoli and Naspetti, 2002; Magnusson *et al.*, 2003). The largest "Health Conscious" cluster had the strongest link with the concept of health. With a high level of

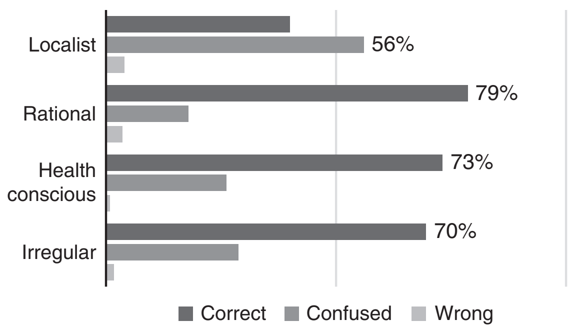

Figure 4.
Definition of organic agriculture in percentage (per cent) for the four clusters

organic knowledge, their attitude towards organic was positive. Consequently, this consumer segment is a promising target group for organic by using healthiness as a starting targeting point. This cluster can be influenced by focussing on the positive qualities of organic food (alleged healthy attributes and safety) to promote consumption. In addition, pricing strategies can be incorporated into marketing of organic goods, since this cluster indicates price as a future motive for increasing consumption. Pricing strategies available to organic retailers range from price reduction and price justification to changing the perception of value for money (Zanoli and Bähr, 2004). Reducing the price of organic is quite complex, it can be allied to supporting farmers with subsidies and reducing the price of organic inputs, which is too high in Lebanon. Shorter marketing channels can help provide the consumer with organic products at affordable prices. Thus, focussing on direct sales (farmers markets, farm and community supported agriculture) can contribute to higher consumption. Even then, organic will continue to have a higher price than conventional products. From a marketing point of view, justification of prices is one. Consumers must understand the factors that lead to the final cost of organic products, and they must believe that organic is worth the additional price because it offers a safer, less contaminated and environmentally friendly product.

The similarity between organic and traditional food products was mentioned less, but is a noticeable motivation for purchasing organic. Organic products are often displayed near or with the traditionally made products which can be a reason for this confusion. In addition, the Lebanese consumers see a connection of organic with their traditions and thus with their origins. Consumers in the "Localist" cluster were the pioneers of organic consumption, but are the most confused in terms of mixing organic with Baladi food. A consumer segment found by Sanjuán *et al.* (2003) in Navarra region (Spain) had a similar case of confusion among consumers between organic products and locally grown produce, also associated with the strong links the locals have with rural areas. This connection with the traditional type of food (Baladi) in Lebanese mentality was analysed by Atallah (2010), showing that consumers prefer to integrate these two concepts. Integration is an important marketing step to overcome mistrust of organic quality and safety (Pugliese *et al.*, 2013). A further suggestion is to associate the organic product with its origin (locally or regionally produced) that can lead to a stronger positioning of both organic and local products. Although combining organic and traditional products is a good approach, it is important to clarify the difference between local and organic for Lebanese consumers, starting by explaining this difference, and by clearly separating organic products from Baladi in organic markets and shops. Therefore, it is important to include this cluster in awareness campaigns explaining the organic concept and practices to prevent confusion.

A high level of knowledge and demand for organic food are not always associated as is the case of the "Rational" cluster. Limitations due to purchasing ability hold back a promising sector of Lebanese consumers. Their purchasing frequency is low and their price perception of organic is high due to their lower income. Similar to this cluster, is the "promising" cluster found in Tunisia by Callieris *et al.* (2016). It was also composed of young and highly educated consumers, their low income and the high prices of organic preventing them from increasing their organic purchasing. This cluster has the potential to become a regular consuming cluster if producers and policy makers support the creation of market channels allowing price reduction. Price strategies adopted for the "Health conscious" cluster can also be used here.

As for the fourth group identified, "Irregular", health is again the foremost reason driving consumption of organic food. Although they are willing to pay a premium for organic, price is a limitation for their organic food choice. Some outlets offer organic products that are close in price to conventional products, while others offer products with much higher prices. While both types have their own product aspect to offer (packaged and unpackaged, claimed higher quality, better appearance, etc.), it is important for consumers to know that they have this choice in the market, and the freedom to choose where to shop according to their needs and economical capability. Marketing strategies can start by stressing the positive attributes of organic, such as safety, environmentally friendly, better organoleptic qualities, superior control system (certification), which prevail over the price limitation. Since this group shows the highest affiliation for brand, introducing them to local organic brand is a way to increase this cluster consumption. At present, Lebanon has several well-established organic brands and it would be practical to promote them by insisting on the guaranteed quality and integrity of organic products.

As this research showed four different segments in the organic market, they are not the same as those found by other researchers in other countries. This is due to the differences in culture, food perception, income levels, sampling procedures and many other factors in each country. This is an indicator for the need to have similar research in other countries, and especially in countries with emerging organic markets. This will add to the body of knowledge about the organic consumer and allow for better making of marketing strategies.

6. Conclusion

One major point to establish is that the Lebanese local market is strong and continues to grow despite low local production. The Lebanese organic consumer is quite sophisticated and knowledgeable about the organic concept, as shown by the diversification in the features of the clusters identified. Lebanese consumers range from the mature group that is able to pay for organic to younger consumers who are limited by their social status. Confusion about organic food still exists among Lebanese consumers, despite their knowledge. Mistaking organic with traditional food is an obstacle that has still to be dealt with, but is nonetheless a possible aspect on which to build in the future. One suggestion to boost the market is to add to the organic certification a "traditional food" index or "geographical" index. Awareness about the benefits of organic, not only for consumers but also for the environment is crucial for improving consumer knowledge.

The high prices of organic are still one of the main obstacles preventing consumers from increasing their consumption. While reducing the price of organic goods is quite complex, it is more important to work on changing the perception of value for money for promising potential consumers. Consumers must know why organic costs more and then decide to consume organic based on their knowledge.

The Lebanese organic market is progressing, and a great deal of effort is required to develop consumer recognition, the credibility of organic, and confidence in the organic certification system. The intention to purchase organic food in Lebanon depends on factors such as consumers' concern for their own health, their degree of trust in organic food, their degree of acceptance of organic food prices and their income status. Health and safety are the two most important factors motivating organic consumption in Lebanon. While these are significant, it is also important for the consumer to see organic food as part of a wider picture. Environmental awareness should be raised in order to change the perception of organic as being beneficial only for humans, and thus to have a market which is aware of the environmental aspects of organic food.

In the process of promoting development of the organic food market, responsibility lies with the public and private sector. First, there must be an attempt to reduce the cost of organic food in order to reduce market prices. One way to do this is by giving adequate support for organic food producers to lower the price at source. As the MoA sometimes offers support for conventional farmers by providing them with free or low-price inputs, the same and more should be provided to the organic sector in order to give it a boost. The second step can relate to promotional campaigns addressed to the entire market. It is crucial that public authorities wage information campaigns about the principles, the practices, and the environment and other benefits of organic farming. This is the only way to achieve future growth of the organic section and for consumers to be able to make informed purchase decisions regarding organic food.

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Appendix 1. Survey for Organic Food consumer in Lebanon

Section 1: Screening:

1. Are you responsible for the majority of food shopping in your family?
   - ☐ No
   - ☐ Yes.... continue
2. Have you bought organic products before?
   - ☐ No
   - ☐ Yes... continue
3. What is the number of people living in your household?
   - ☐ 1
   - ☐ 2
   - ☐ 3
   - ☐ 4
   - ☐ 5
   - ☐ 6
   - ☐ 7
   - ☐ >8

Section 2 : Food Choice criteria:

4. What is your criteria for choosing food? (one answer only)
   - ☐ Food of a brand I trust/ well-known brand.
   - ☐ Food that is good for my health.
   - ☐ Food of low price.
   - ☐ Food of good organoleptic (taste) and visual qualities.
   - ☐ Local product.
   - ☐ Food found in the nearest shopping place.
5. Where do you mostly buy food? (one answer only)
   - ☐ Supermarkets.
   - ☐ Health food shops.
   - ☐ Specialized organic shops.
   - ☐ Farmers market.
   - ☐ Mini-market/ grocery stores.
   - ☐ Nearest place.

6. How can you describe yourself? (one answer only)
   - ☐ I am very concerned about my health.
   - ☐ I Love to eat tasty food.
   - ☐ I like traditional food and family gathering.
   - ☐ I am modern and innovative.
   - ☐ I am concerned about nature.
   - ☐ I care about providing a comfortable life for me and my family
   - ☐ I am a spiritual person.

Section 3: Knowledge of Organic Products:

7. When have you first heard of Organic Food?
   - ☐ Recently (this year).
   - ☐ In the past 2-5 years.
   - ☐ Long time ago (more than 5 years).
8. Which definition do you think most suits organic products? (one answer only)
   - ☐ Products obtained in greenhouses without relationship with the environment.
   - ☐ Organic food are certified products obtained without the use of synthetic chemicals/pesticides, and where animals are not treated with medicine.
   - ☐ Organic are traditional (*baladi*) natural products produced without chemical fertilizers.
9. What is your main source of Information about organic?(one answer only)
   - ☐ TV, newspaper, magazines, radio.....
   - ☐ Social media, internet ...
   - ☐ Government media: campaigns...
   - ☐ School/university/work.
   - ☐ Friends/ family members.

Section 4: Organic consumption information

10. If you bought organic products before, when was the first time you purchased them?
   - Less than a year ago.
   - ☐ 1-2 years ago.
   - ☐ 3-5 years ago.
   - ☐ > 5 years.
11. Why do you buy organic products? (one answer only)
   - ☐ They are produced in an environmentally friendly way.
   - ☐ Organic products are safe.
   - ☐ Organic products remind me of traditional Lebanese food (*baladi*)

- ☐ They are healthy.
- ☐ Their organoleptic qualities (taste, smell...) are better than conventional.
- ☐ Organic is cool/ fashionable to consume.
- ☐ By buying organic I am supporting the local Lebanese agriculture/ and rural economy

12. Where do you usually buy organic products?
   - ☐ Supermarket.
   - ☐ Organic shops.
   - ☐ Health shops.
   - ☐ Online.
   - ☐ Farmers market.
   - ☐ Home delivery (box scheme).
   - ☐ Directly from farmer (on farm...)

13. What is mostly the origin of the organic food products you buy?
   - ☐ They are mostly Lebanese products.
   - ☐ They are mostly imported products.
   - ☐ I don't know.

14. Which of these organic products do you usually buy?

Product	How often do you buy it?	How much do you pay for this product?
Fresh Fruits and vegetables & legumes.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Meat and fish products.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Eggs.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Grains, flour, bread, & other bakery products.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Processed foods (Jams, pickles, olives, juices, spices, dried herbs, dried fruits..).	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Olive oil.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Milk and dairy products.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.

Wine & other alcoholic beverages.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.
Baby food.	☐ Once or sometimes/year. ☐ Once or sometimes/month. ☐ Once or sometimes/week. ☐ Daily.	☐ The same as conventional. ☐ A bit more than conventional. ☐ Much more than conventional.

15. Would you increase your purchase of organic products in the future?
    - ☐ Yes.
    - ☐ No.
16. Yes I would increase my purchase of organic products if (one answer only):
    - ☐ They become always available where I usually buy organic food.
    - ☐ There is more choices in products.
    - ☐ Their price is lowered.
    - ☐ I get more information about organic food via more advertisement.
    - ☐ There is more promotion on organic products in the shopping place such as discounts, offers...
    - ☐ The package/appearance of organic products is improved.
17. No I will not increase my purchase of organic products in the future, because (one answer only):
    - ☐ I think price is too high.
    - ☐ Organic products are not always available and there is few choices among organic references.
    - ☐ Quality is poor.
    - ☐ Sales points are far/difficult to reach.

Section 5: Socio-demographic characteristics:

1. Gender:
    - ☐ Female.
    - ☐ Male.
2. Age:
    - ☐ 18 to 25 years.
    - ☐ 26-35 years.
    - ☐ 36-45 years.
    - ☐ > 45 years.
3. Education level:
    - ☐ Less than high school.
    - ☐ High School.
    - ☐ University degree.
    - ☐ Higher than university degree (PhD, doctor...).

4. What is your occupation/ work?
   - ☐ Unemployed.
   - ☐ Housewife.
   - ☐ Retired.
   - ☐ Employee.
   - ☐ Head of business, trader, craftsman.
   - ☐ Manager, higher intellectual profession.
   - ☐ Other (specify):..

5. What is your household income/month (income of all family members)?
   - ☐ <600 $
   - ☐ 600 $- 1500 $
   - ☐ 1500-3000$
   - ☐ 3000-5000 $
   - ☐ 5000 - 10000 $
   - ☐ > 10000 $

6. Is there any children at your house?
   - ☐ No
   - ☐ Yes:
     - o <3 years old, number: ....
     - o 3-12 years old, number: ....
     - o 12-18 years old , number:........

Can you give us your email/ telephone number and name?

Any comments about organic products in Lebanon or suggestions for improvement of the sector?

Place and date of interview.

Thank You!

Appendix 2

Variables	Measurement (code)	Use in analyses
Gender	Female (2) Male (1)	Used in PCA
Age	18-25 years 26-35 years 36-45 years ⩾45 years	Used in PCA
Education	Less than high school High school University degree Higher than university degree (PhD, doctor […])	Used in PCA
Occupation	Unemployed Housewife Retired Employee Head of business, trader, craftsman Manager, higher intellectual profession	Used in PCA
Level of income (house hold income/month)	< $600 $600-1,500 $1,500-3,000 $3,000-5,000 $5,000-10,000 > $10,000	Used in PCA
Family composition: children at your house	No Yes < 3 years old 3-12 years old 12-18 years old	Used to describe the cluster
Food choice criteria	Food of a brand I trust/well-known brand (4) Food that is good for my health (6) Food of low price (1) Food of good organoleptic (taste) and visual qualities (3) Local product (5) Food found in the nearest shopping place (2)	Used in PCA
Place of purchase	Supermarkets (6) Health food shops (4) Specialized organic shops (5) Farmers market (3) Mini-market/grocery stores (2) Nearest place (1)	Used to describe the cluster
Personality description	I am very concerned about my health (1) I Love to eat tasty food (2) I like traditional food and family gathering (3) I am modern and innovative (4) I am concerned about nature (5) I care about providing a comfortable life for me and my family (6) I am a spiritual person (7)	Used in PCA
First encounter with organic	Recently (this year) (1) In the past 2-5 years (2) Long time ago (more than 5 years) (3)	Used in PCA
Knowledge of organic: defining of organic products	Wrong definition (1) Correct definition (3) Confusing definition (2)	Used in PCA
Source of information about organic	Traditional media (5) Social media (4) Government media: campaigns […] (3) School/university/work (1) Friends/family members (2)	Used in PCA

(*continued*)

Table AI.
All the variables measured, their corresponding code, and their specific use in the analyses

Variables	Measurement (code)	Use in analyses
First time you purchased organic	Less than a year ago (1) 1-2 years ago (2) 3-5 years ago (3) 5 years (4)	Used in PCA
Reason to buy organic	They are produced in an environmentally friendly way (2) Organic products are safe (6) Organic products remind me of traditional Lebanese food (Baladi) (2) They are healthy (5) Their organoleptic qualities (taste, smell […]) are better than conventional (3) Organic is cool/ fashionable to consume (4) By buying organic I am supporting the local Lebanese agriculture/ and rural economy (2)	Used in PCA
Place of organic products purchase	Supermarket (1) Organic shops (4) Health shops (3) Online (2) Farmers market (7) Home delivery (box scheme) (5) Directly from farmer (on farm […]) (6)	Used to describe the cluster
Origin of the organic food products purchased	They are mostly Lebanese products (3) They are mostly imported products (2) I don't know (1)	Used to describe the cluster
Sum of purchased products	1-9 categories	Used to describe the clusters
Frequency of purchase	Once or sometimes/year (1) Once or sometimes/month (2) Once or sometimes/week (3) Daily (4)	Used to describe the clusters
Approximate price paid in comparison with conventional	The same as conventional (1) A bit more than conventional (2) Much more than conventional (3)	Used in PCA
Intention to increase purchase of organic products in the future	Yes (1) No (0)	Used in PCA
Positive future intention if	They become always available where I usually buy organic food (5) There is more choices in products (3) Their price is lowered (1) I get more information about organic food (6) There is more promotion on organic products in the shopping place (2) The package/appearance of organic products is improved (4)	Used to describe the clusters
Negative future intention because	Price is too high (1) Organic products are not always available and there is few choices among organic references (2) Quality is poor (4) Sales points are far/difficult to reach (3) I buy enough (5)	Used to describe the cluster

Table AI.

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