Emirates Journal of Food and Agriculture. 2018. 30(11): 918-926
doi: 10.9755/ejfa.2018.v30.i11.1856
http://www.ejfa.me/

REGULAR ARTICLE

Customer experience with organic food: global view

Ladislav Pilař[1]*, Lucie Kvasničková Stanislavská[1], Stanislav Rojík[1], Roman Kvasnička[1], Jana Poláková[1], George Gresham[2]

[1]Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Prague, Czech Republic, [2]Davis College of Business, Jacksonville University, Jacksonville, USA

ABSTRACT

In recent years, organic food production has been rising dramatically both in the EU and the USA. Previous research on consumer perception of organic food has mainly employed questionnaire survey methods. However, in the current age of the social network phenomenon, social media could prove to be a rich source of data. Increasingly, consumers are using social networks to share personal attitudes and experiences. This shared content could inform us about consumer opinions. Social network analysis and related sentiment analysis could allow identification of consumers' experience and feelings about organic food. We investigated the perception of organic food using 1,325,435 Instagram interactions by 313,883 users worldwide. The data were recorded between July 4, 2016, and April 19, 2017. We identified three major hashtag areas (healthy, vegan, and clean food). The sentiment analysis revealed three dominant areas related to the #organicfood hashtag (feelings, taste, and appearance). Cluster analysis extracted four areas, as follows: Healthy living, Vegetarian, vegan, and raw diets, Clean eating, and Active healthy living. The mentioned communities are significant and useful at identification of customers values for farmers organic food product management and marketing communication in terms of product positioning.

Keywords: Organic food; Instagram; Social network analysis; Sentiment analysis

INTRODUCTION

Previous European studies of the food market and agricultural production have opened the broad discussion of food consumption and food quality (Turcinkova and Stavkova, 2009). By definition, agricultural production is the production of food, and is essential for ensuring the basic physical needs of mankind (Vosta, 2014). Development of the food market depends on consumer trust in production quality. Consumers form perceptions about food quality not only through objective product characteristics, but also through a combination of aspects related to personal needs, such as food safety, environmental impact, supporting local and rural communities, and other ethical aspects (Migliore et al., 2015).

Organic agriculture tends to be seen as one of the aspects above, since it is defined as an alternative that may benefit people and the environment, thus allowing long-term sustainability (Guayasamin et al., 2016). Organic agriculture does not allow the use of substances that endanger human health and the environment. To be considered organic, a product must be produced in an environment where agro-ecological principles are used as the basis of the production process, which includes responsible use of soil, water, air, and other natural resources, while respecting social and cultural relations (Guayasamin et al., 2016). Organic food represents food grown, stored, and/or processed without the use of synthetically produced chemicals or fertilizers, herbicides, pesticides, fungicides, growth hormones and regulators, or genetic modifications to achieve a sustainable agricultural system (Basha et al., 2015; Jones et al., 2001). Many studies show that, on average, organic food contains a higher concentration of antioxidants (Barański et al., 2014), higher levels of vitamin C (Worthington, 2001), and higher levels of phenolic compounds (Chassy et al., 2006), and there are higher levels of omega-3 fatty acids and conjugated α-linolenic acid in milk from ecologically reared animals (Butler et al., 2008). At the same time, there are lower pesticide residuals and concentrations of cadmium than in conventional food (Barański et al., 2014).

Consumers have demonstrated a growing tendency to seek high-quality food (Tian and Yu, 2013) and an increasing

***Corresponding author:**
Ladislav Pilař, Department of Management, Faculty of Economics and Management, Czech University of Life Sciences Prague, Prague, Czech Republic. **E-mail:** pilarl@pef.czu.cz

Received: 18 March 2018; **Accepted:** 25 August 2018

inclination towards organic food (Magkos, Arvaniti, and Zampelas, 2006) through alternative food channels, such as farmers' markets (Pokorna et al., 2015). Mostly, they purchase fresh produce such as fruit, vegetables, flowers, and live seafood. Perishable goods such as these need to reach consumers in the shortest possible time (Su et al., 2014). Meanwhile, farmers are able to address the increasing demand for organic food (Yu et al., 2014). According to the Organic Trade Association (2015), 83% of American families buy organic products at least occasionally. Organic product sales reached a total of $43.3 billion in 2015, 11% more than the record level of the previous year. Such expansion significantly surpasses the overall food market growth of 3%. Bio-food production in the EU is growing even faster (Sahota, 2012). At present, the EU is responsible for more than half of the global revenues in bio-food production and is the main destination of bio-food from Asia (Francis, 2012). In 2012, ecological crops were grown on 11.2 million hectares on the European continent, amounting to 2.2% of the used farmland. The value of the European bio-food market has been estimated at €22.8 billion. Sales in the EU constituted €20.9 billion of that amount. The value of the European bio-food market doubled between 2004 and 2012 (Bryla, 2015).

Studies have identified the following factors as consumers' motivations to buy organic food: the subjective norm (Chen, 2007; Zagata**,** 2012), the health attribute (De Magistris and Gracia, 2008; Haghiri, Hobbs, and McNamara, 2009; Lee and Yun, 2015; Yadav and Pathak, 2015), the ecological aspect (Lee and Yun, 2015; Teng and Lu, 2016), animal rights (Honkanen, Verplanken, and Olsen, 2006; Ueasangkomsate and Santiteeraku, 2016), food safety concerns, ethical self-identity (Michaelidou and Hassan, 2008), lifestyle (Basha et al., 2015), and local origin (Ueasangkomsate and Santiteeraku, 2016).

Motivation for purchasing organic food can be divided into two main categories, altruistic and egoistic (Padilla Bravo et al., 2013; Yadav**,** 2016; Kareklas, Carson, and Muehlingl, 2014). Altruistic motivations include environmental protection, animal welfare, and rural and local development (Vega-Zamora et al., 2013). Egoistic motivations include the view that bio-food is healthier and achieves more nutritional values (Grankvist and Biel, 2001). Researchers have produced conflicting results about the best predictor of bio-food purchases. Magnussona et al. (2003) consider egoistic motivations as the main factors that influence consumers' attitude and purchase behavior. On the other hand, Bravo et al. (2013) regard altruistic motivations to be better predictors of purchase behavior.

Social network analysis and food consumption

Social networks have gradually become a part of everyday life (Wu and Wang, 2016). Between 2016 and 2017, more than 300,000 Instagram users posted over 1,500,000 interactions concerning organic food. Analysis of social media allows the collection of data that cannot be obtained by other standard methods, such as interviews or questionnaire surveys. These data, created by hundreds of thousands of global users, could help us better understand global trends and the social, cultural, and environmental issues regarding organic food using advanced social network analysis tools.

Food represents an indispensable part of every person's life. It projects into our way of life, culture, and welfare. This gives rise to important interest in public health (Babar, Mejova, and Weber, 2015). The influence of social networks on young adult health has already been acknowledged (Valerlaus et al., 2015), and social network analysis helps us to understand social, cultural, and environmental issues of people's activities in the examined area (Hu et al., 2014). For example, Abbar, Mejova, and Weber (2015) used such data to predict national obesity levels, Capurro et al. (2014) to predict diabetes levels, and Valerlaus et al. (2015) to identify the demand for more food choices by young adults. However, more studies are required to provide fuller information about the population's health (Capurro et al., 2014).

Instagram was the chosen social network for the present study this research. Instagram is the fastest growing social platform (Harris, 2016; Wagner, 2015), and users spend more time on Instagram than on other social sites (Duggan, 2015). Official statistics claim that Instagram has 700 million active users, and, of those, about 300 million users sign in every day. Users upload 95 million photos every day, and Instagram's total stock of photos amounts to 40 billion (Omnicore, 2017). In 2011, Instagram introduced the possibility to insert hashtags (Baranovic, 2013). Hashtag represents a keyword preceded by the "#" symbol, for example, #organic. Originally, the hashtag served as a tool for organizing knowledge and facilitating topic searches (Small, 2011). The function of the hashtag has expanded through time, and now has a meta-communicative use (Giannoulakis and Tsapatsoulis, 2016). Daer, Hoffman, and Goodman (2014) defined the meta-communicative function of hashtags as follows: (1) emphasizing: to give emphasis or to catch attention; (2) critiquing: to express a verdict or a user's conclusion; (3) identifying: to identify a post's author; (4) iteration: to express the cause of certain humor.

The area of agriculture has seen many social network analyses in the field of technology adoption (Maertens and Barrett, 2013; Matuschke and Qaim, 2009), risk sharing (Fafchamps and Lund, 2003), and diversification (Johny, Wichmann, and Swallow*,* 2017). However, an analysis of the Instagram network, in terms of organic food focusing

on hashtag analysis connected to sentiment analysis and community analysis, has not yet been performed.

Sentiment analysis

Sentiment analysis involves processing natural language to monitor public dispositions in terms of a product or topic (Vinodhini and Chandrasekaran, 2012). It uses written language to assess opinions, sentiments, evaluations, attitudes, and emotions (Liu, 2012). It represents a suitable tool to assess the relationship between food and emotions, which has always previously been examined by human behavior research (Canetti, Bachar, and Berry, 2002). Sentiment analysis helps individuals find information and facilitates business decisions to increase the quality of a product or service. The growing importance of sentiment analysis correlates with the expansion of social media. Both individuals and organizations use the contents of these media for their decision-making (Liu, 2012).

Aim of the present study

This study aimed to identify the perception of organic food using 1,325,435 interactions by 313,883 users on Instagram worldwide. We also aimed to identify the most commonly used hashtags on social networks related to the term "organic food" using social network analysis, as well as the dominant sentiments of Instagram users about organic food using sentiment analysis. Finally, we aimed to compile a hashtag interconnection network and extract dominant communities.

MATERIALS AND METHODS

To record communication on the Instagram network, a script that indexes messages from users worldwide into a database was used. The script records messages on Instagram that include the "organic food" hashtag. The indexing took place between July 4, 2016, and April 19, 2017. During this period, the script detected 1,325,435 contributions by 313,883 unique users. Subsequently, so-called stopwords were taken away by means of a stopword list (Balucha, 2011) to decrease the data volume. The list contains stopwords in 29 languages. Stopwords are are words which do not contain important significance to be used. For example, the stopwords, such as "the" and "of", are too general to convey useful semantic information (Li et al., 2018). This reduction gave rise to a dataset consisting of 1,874,324 unique words. Then, user anonymization was carried out, replacing names with unique IDs. Frequency values were assigned to individual keywords and hashtags. This allowed for ordering of individual words from the most to the least frequent, and identification of the top 10 most frequent words and hashtags.

Sentiment analysis (based on adjectives) of areas related to #organicfood used a Netlytic program module (Gruzd, 2016) that uses the Gee Whiz Labs Inc. (2011) list of adjectives. This analysis allows classification of messages into one (or more) of the following categories: (1) Appearance, (2) Condition, (3) Negative Feelings, (4) Positive Feelings, (5) Shape, (6) Size, (7) Sound, (8) Time, (9) Taste, (10) Touch, and (11) Quantity.

The vast number of the messages (i.e., 1,325,435) called for a reduction of the dataset to enable the analysis of communities and individual hashtag interconnections. 100,000 messages were chosen at random. Subsequently, a filter removed all words from these messages starting with anything other than a 'hashtag #'. This dataset was imported into the Gephi 0.8.2 program through the Levalllois (2014) module. Based on this filter, a network containing 47,531 hashtags and 964,131 connections between these hashtags was identified. The following statistical methods were used to analyze the formed network:

The Average Degree

The average degree of a graph is a measure of how many edges there are in a set compared with the number of edges in a set (Carrington, Scott, and Wasserman, 2005).

$$(K) = \frac{2E}{N}$$

E: number of edges; N: number of nodes.

The Graph Density

The graph density was defined as the number of edges divided by the number of possible edges (Scott, 2000).

$$D = \frac{2(E - N + 1)}{N(N - 3) + 2}$$

E: number of edges; N: number of nodes.

Modularity

Modularity was designed to measures the strength of the division of a network within modules (also called groups, clusters, or communities). Networks with high level of modularity have dense connections among the nodes (hashtags) within modules, but sparse connections among nodes (hashtags) in different modules (Knoke and Yang, 2008). In addition, a component analysis was employed. Component analysis represents the number of components (number of hashtag groups) that are created on the basis of the modularity detection algorithm method (Blondel et al., 2008). Fundamentally, this is a method that shows groups of hashtags that are closely related to each other, so that individual groups of related hashtags can be identified using this method.

$$\Delta Q = \left[\frac{\sum_{in} + 2k_{i,in}}{2m} - \left(\frac{\sum_{tot} + k_i}{2m} \right)^2 \right] - \left[\frac{\sum_{in}}{2m} - \left(\frac{\sum_{tot}}{2m} \right)^2 \right]$$

$\sum_{in}$: sum of the weights of the link inside a community; $\sum_{tot}$: sum of the weights of the edges incident to nodes in a community; k_i: sum of the weights of the edges incident to node i; $k_{i,in}$: sum of the weights of the links from i to nodes in a community; m: sum of the weights of all the edges in the networks.

Visual representation

For the definition of network crowds and their types (visual polarization of individual hashtag groups), Force Atlas 2 was used as a graphical representation method (Smith et al., 2014). For cluster analysis a sample of 1,325,435 messages by 313,883 was inserted to Gephi 0.8.2, where was created the hashtag interconnection network see (Fig. 1).

RESULTS AND DISCUSSION

Statistical analysis was carried out in the initial part of the research. The analysis of the hashtag frequency of 1,325,435 posts allowed us to determine the 40 most frequently used hashtags (Table 1).

The top 10 hashtags allowed us to determine the basic user experience (Vaterlaus et al., 2015) in the area of organic food as healthy, vegan, and clean food.

The two most frequently used hashtags, #organicfood and #organic, are followed by #healthyfood. Variations of this hashtag and their occurrence in the top 40 (e.g., #healthy (5th place), #healthyeating (16th), #health (17th), #healthylifestyle (18th), #healthyliving (21st), and #healthylife (40th)) emphasize the importance of this hashtag. This leads to a conclusion that "healthy" represents the most important characteristic of organic food to consumers. This supports previous research that investigated customer motivations to purchase organic food. Primarily using questionnaire surveys and interviews, this previous work identified the health aspect as the main motivation for purchasing organic food (Yadav and Pathak, 2015; Bryla, 2016; Basha, 2016). Prada, Garrido, and Rodrigues (2017) confirmed this consumer sentiment, and claimed that organically produced foods were perceived as more healthful. On the other hand, some studies (Garcia and Teixeira, 2016; Olson, 2017) point out that no scientific research have failed to confirm an unequivocal impact of organic food on human health.

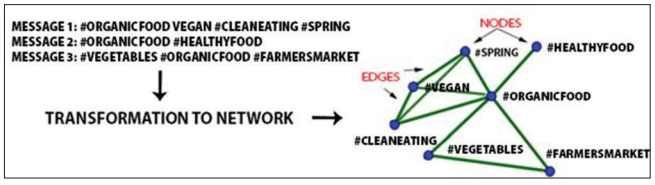

Fig 1. Transformation of data from dataset to hashtag interconnection network

Table 1: Top 40 hashtags in Instagram posts in the area of organic food

1–10	11–20	21–30	31–40
organicfood	glutenfree	healthyliving	instagood
organic	cleaneating	fitness	nature
healthyfood	vegetarian	homemade	rawfood
vegan	veganfood	nutrition	vegetables
healthy	plantbased	delicious	natural
food	healthyeating	love	paleo
instafood	health	bio	lunch
foodporn	breakfast	realfood	veggies
foodie	healthylifestyle	veganfoodshare	foodstagram
eatclean	yummy	wholefood	healthylife

The #vegan hashtag was the 4th most frequent. Variations of this occurred in the top 40 words, including #vegetarian (12th), #veganfood (13th), and #veganfoodshare (29th). Several studies have identified health-related reasons as the main motivations for following a vegan diet (Dyett et al., 2013; Izmirli and Phillips, 2011; Kerschke-Risch, 2015; Radnitz, Beezhold, and DiMatteo, 2015; Rothgerber, 2013; Timko, Hormes, and Chubski, 2012; Waldmann et al., 2003). Because the most frequently shared experience on Instagram in the area of organic food is "health", it obviously raises a lot of interest among consumers who follow the vegan diet. Some hashtags featured in the top 10 have no specific relationship with organic food, such as #instafood (7th) or #foodporn (8th). The "foodporn" hashtag has been a topic of several studies (Mejova et al., 2015; Hessel, Chenhao, and Lee, 2016; Mejova, Abbar, and Haddai, 2016), where people use this hashtag to create community about food and to gain social approval of shared food through liking, commenting and sharing.

Sentiment analysis

Table 2 shows the results of the sentiment analysis. Hashtags were divided into 11 categories, as follows: (1) Appearance, (2) Condition, (3) Negative Feelings, (4) Positive Feelings, (5) Shape, (6) Size, (7) Sound, (8) Time, (9) Taste, (10) Touch, and (11) Quantity. The results demonstrated three dominant areas (over 10% of the total), which users express (1) Positive Feelings, (2) Taste, and (3) Appearance. Hence, these areas are discussed in more detail (see Table 3).

The most dominant area is "Positive feelings", which accounted for 42.98% of the analyzed posts. A more detailed analysis of the area demonstrated that a significant proportion of " Positive feelings" area, i.e., 40.97%, comprised feelings expressing the idea of health (hashtags #healthyfood, #healthy etc.). These results are in line with

the findings with the findings that customers' motivation for buying organic food is more healthy (De Magistris and Gracia, 2008; Haghiri, Hobbs, and McNamara, 2009; Lee and Yun, 2015; Yadav and Pathak, 2015). Other feelings that occurred in the "Positive feelings" area were "good" with 13.04% and "great" with 12.3%.

The area of "Taste" contained three keywords that were present more than 20% of the time, as follows: "delicious" (26.83%), "yummy" (26.27%), and "fresh" (21.85%). The first two words express a positive attitude towards the taste of organic food. Thus, the degree of customers' environmental concern seems to play a significant role in the taste of organic food vs. conventional products. A study in this area claimed that organic food tastes better (Yiridoe, Bonti-Ankomah, and Martin, 2005; Hughner et al., 2007), while Schuldt and Hannahan (2013) found that people with a low level of environmental concern considered organic food less tasty.

The third dominant category, "Appearance", took up 13.58% of the analyzed posts. "Beautiful" represented the most frequent word and occurred in 49.48% of posts, followed by "clean" (8.87%) and "cute" (7.73%). The connection found between "organic food" and "beautiful" can be considered as untypical, since this combination has been found neither in previous studies focused on the perception and motivation of customers to buy organic food, nor in research dealing with the contents of organic food. On the contrary, previous work has found organic food to be frequently perceived as clean (e.g., Jones, Hill, and Hiller, 2001; Barański et al., 2014).

Table 2: Basic categories of sentiment analysis

Basic categories	
Basic categories	**Percentage representation**
Positive Feelings	42.98
Taste	22.73
Appearance	13.58
Touch	5.1
Size	4.46
Feelings (Bad)	2.97
Quality	2.47
Time	2.94
Shape	1.96
Sound	0.82

Table 3: Dominant areas of sentiment analysis

Positive Feelings		Taste		Appearance	
Healthy	40.97	Delicious	26.83	Beautiful	49.48
Good	13.04	Yummy	26.27	Clean	8.87
Great	12.3	Fresh	21.85	Cute	7.73
Nice	10.47	Sweet	10.68	Gorgeous	5.72
Happy	7.39	Tasty	8.18	Other	28.2
Perfect	5.17	Other	6.19		
Other (44 groups)	10.66				

Cluster analysis

For cluster analysis a sample of 1,325,435 messages by 313,883 was inserted to Gephi 0.8.2, where was created the hashtag interconnection network. Table 4 outlines the basic characteristics of the network.

This network contained 66,529 hashtags connected with 3.407.343 edges. This means that the average degree of a hashtag amounts to 102.

Degree distribution corresponds with the long tail attribute (Kordumova et al., 2016). There were only 10 hashtags with a degree higher than 500. On the other hand, most hashtags had a degree under 100, which is a strong indication of the standard behavior in social networks regarding hashtag usage (Kordumova et al., 2016). Degree distribution is shown in Fig.2 and Table 5.

We recorded data from around the world, which means that the number of recorded hashtags was generally

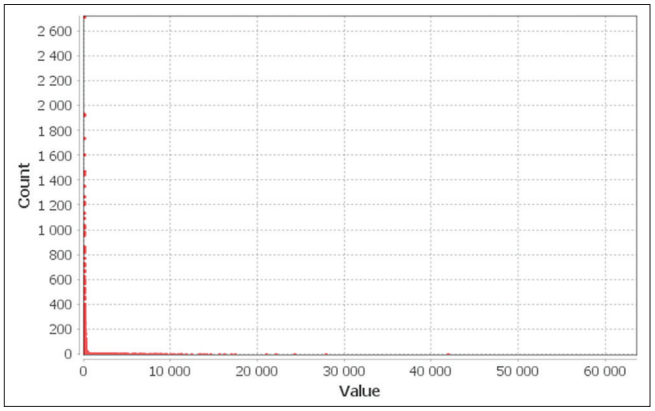

Fig 2. Degree distribution of interconnection network related to #organicfood hashtag

Table 4: Statistical characterization of the hashtag interconnection network

Characteristics	Values
Nodes	66,529 points (hashtags)
Edges	3,407,343 (connections between hashtags)
Average Degree	102.432 (on average, 1 hashtag is connected to another 102 hashtags)
Graph Density	0.002
Modularity	0.303

Table 5: Degree distribution of interconnection network related to #organicfood hashtag

Degree range	Number of nodes	Percentage
> 10,000	23	0.03%
9,999–101	10,452	15.71%
< 100	56,054	84.25%

high. Furthermore, the whole set of hastags contained typos as well as local hashtags (e.g., geographical names or companies). The community analysis required us to remove hashtags with a degree below 826 (numbers of top nodes = 1062) from the sample. This filter led to the extraction of four dominant communities that explain 92.57% of all hashtags in the examined sample, see Table 6.

Visual representation of social networks is crucial to understand the network data and convey the results of the analysis. Figure 3 shows the distribution between each crowd within the network. Visual representation allowed us to confirm the modularity results, i.e., 0.303 (see Table 4), which showed that communities are not highly isolated from each other, see (Fig. 3).

The visual representation of #organicfood hastag showed that the most interconnected communities were Healthy living (A) and Healthy lifestyle (D). Comparatively less overlap was seen between the VVR diets (B) and Clean eating (C) communities, but there was nonetheless a significant area of hashtag overlap. The visual representation also demonstrated that the Vegetarian community (B) stretched to related communities more than others. The Vegetarian community overlapped with the Healthy living (A), Clean eating (C), and Healthy lifestyle (D) communities. In general, all communities overlapped with others, which confirms the low value of modularity, i.e., 0.303, and indicates that communities were not highly polarized.

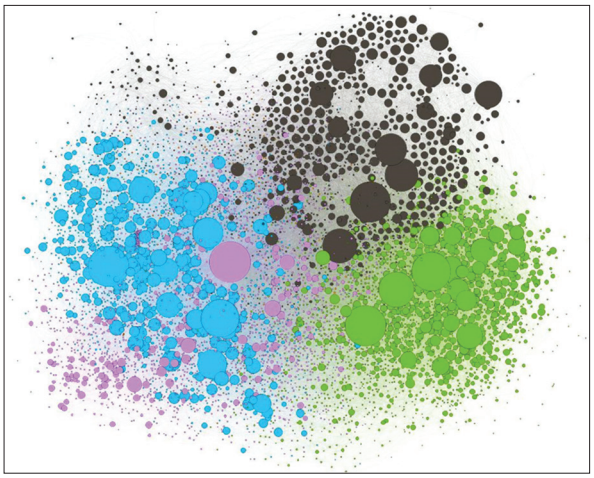

Fig 3. Visual representation of the component analysis. Note: Blue: Healthy living community; Brown: VVR diet community; Green: Clean eating community; Pink: Active healthy living community.

In relation to these results, it would be suitable to similarly analyze the areas of hashtags #vegan, #vegetarian, #cleaneating and attach a deeper analysis of individual sub-segments of the identified communities.

Follow-up research could also segment and compare individual regions and try to find differences in perception of organic food by the consumers in the US and Europe or in other localities. Approximately 11% of posts that included #organicfood hashtags were published with a geolocation which provides additional usable information from social network analysis. This would allow us to compare regional results.

Practical implications

Organic food is gaining in popularity both in the US and in Europe. The present research has identified some potentially important implications for organic food producers and sellers. While the direct distribution of farm goods to the consumer has been an organized human behavior since medieval times, the academic community has been slow to recognize this market's commercial and sociological importance today. However, the types of foods, farms, and consumers have changed (Zhong et al., 2017), and it is necessary to identify these trends and product positioning in order to maintain the competitiveness of products. Farm markets are very much a commercial business today, and are not just local farmers with the day's crop meeting the locals at an agreed upon convenient transaction destination (Oñederra-Aramend et al., 2018).

Social network analysis explored the most common hashtags used on Instagram in relation to organic food, which were found to be (1) healthy, (2) vegan, and (3) clean food. There is high customer demand for the option to purchase goods directly from producers, because they prefer high-quality foods with this characteristic (vegan organic food, etc.). This product characteristics is useful for organic food producers, especially if they use direct channels to sell organic food to customers, such as farmers' markets, where organic food is one of the most desirable products (Pilař et al., 2018).

Table 6: Community characteristics

Name of community	Category size	Highlighted keywords from category
Healthy living	34.79%	Organicfood, organic, healthyfood, healthy, healthyliving
VVR diets (vegetarian, vegan, and raw diets)	24.27%	vegetarian, veganfood, veganfoodshare, rawfood, vegetables
Clean eating	21.65%	eatclean, glutenfree, cleaneating, realfood, wholefood
Active healthy living	11.86%	plantbased, freshfood, homemade, fitness, nature

To succeed in selling produce through alternative chains, such as farmers' markets, or competing with multinational corporations, farmers should respond to customer values and communicate effectively with their consumers. According to the present results, organic food should be produced with vegetarian, vegan, and raw food diets or gluten-free and whole food diets in mind (see Table 6). In marketing communication, product packaging should focus on communicating 'health' issues, such as active living; this area was found to be important in 11% of the cohort studied in the present work.

CONCLUSION

The analysis of communication related to organic food on Instagram showed that users mostly linked their organic food experience with "healthy", "vegan", and "clean food" characteristics, as expressed by their choice of hashtags. Sentiment analysis showed that posts were mostly connected with Feelings, where the predominant area was "healthy"; with Taste, where they mostly expressed a "delicious" quality; and with Appearance, which mainly dealt with the term "beautiful". Social network analysis revealed that Feelings represented the main content of consumers. The community analysis extracted four dominant communities, i.e., Healthy living, VVR, Clean eating, and Active healthy living. These results support the claim that content connected to organic food is communicated by an active segment of a population who actively try to improve their health. Such results may be used by producers, processors, and vendors of organic food on social networks for effective communication to the potential customers.

The existence of a strong VVR community is a significant finding. Previous research has never recorded the connection between organic food and these terms such as vegetarian, negan and raw. The results constitute a useful tool for marketing communication in terms of product positioning with an organic food label. The mentioned communities are significant and strong. The community analysis results revealed that the communities in the organic food area were not polarized, were not polarized which means that the individual values of the identified communities are accepted among communities (for example, the community connected to vegan food will not negatively respond to the values that the community associated with healthy living).

ACKNOWLEDGMENTS

This article was supported by the Internal Grant Agency (IGA) PEF ČZU Prague, under "Regionální značení jako konkurenční výhoda", number 20171033.

REFERENCES

Abbar, S., Y. Mejova and I. Weber. 2015. You Tweet What You Eat: Studying Food Consumption Through Twitter. In: CHI '15 Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems, pp 3197-3206.

Barański, M., D. Srednicka-Tober, N. Volakakis, C. Seal, R. Sanderson, G. B. Stewart, C. Benbrook, B. Biavati, E. Markellou, C. Giotis, J. Gromadzka-Ostrowska, E. Rembiałkowska, K. Skwarło-Sońta, R. Tahvonen, D. Janovská, U. Niggli, P. Nicot and C. Leifert. 2014. Higher antioxidant and lower cadmium concentrations and lower incidence of pesticide residues in organically grown crops: A systematic literature review and meta-analyses. Br. J. Nutr. 112: 794-811. http://dx.doi.org/ 10.1017/S0007114514001366.

Balucha, A. 2011. Stop-words. Google Code Archive - Long-term Storage for Google Code Project Hosting. Available from: https://www.code.google.com/archive/p/stop-words/.

Baranovic, M. 2013. What #Hashtags Mean to Mobile Photography. DP Review. Available from: https://www.dpreview.com/post/1256293279/hastag-photography.

Basha, M. B., C. Mason, M. F. Shamsudin, H. I. Hussain and M. A. Salem. 2015. Consumers attitude towards organic food. Procedia Econ. Fin. 31: 444–452. http://dx.doi.org/ 10.1016/S2212-5671(15)01219-8.

Blondel, V. D., G. Jean-Loup, L. Renaud And L. Etienne. 2008. Fast unfolding of community hierarchies in large networks. J. Stat. Mech. 2008: 1-6. http://dx.doi.org/ 10.1088/1742-5468/2008/10/P10008.

Bravo, P. C., A. Cordts, B. Schulze and A. Spiller. 2013. Assessing determinants of organic food consumption using data from the German national nutrition survey II. Food Qual. Prefer. 28: 60-70.

Bryla, P. 2015. The development of organic food market as an element of sustainable development concept implementation. Probl. Ekorozwoju. 10: 79-88. http://dx.doi.org/ 10.1002/jsfa.3235.

Butler, G., J. H. Nielsen, T. Slots, C. Seal, M. D. Eyre, R. Sanderson and C. Leifert. 2008. Fatty acid and fat-soluble antioxidant concentrations in milk from high- and low-input conventional and organic systems: Seasonal variation. J. Sci. Food Agric. 88: 1431-1441.

Canetti, L., E. Bachar and E. M. Berry. 2002. Food and emotion. Behav. Proc. 60: 157-164. http://dx.doi.org/ 10.1016/S0376-6357(02)00082-7.

Capurro, D., K. Cole, M. J. Echavarría, J. Joe, T. Neogi and A. M. Turner. 2014. The use of social networking sites for public health practice and research: A systematic review'. J. Med. Internet Res. 16(3). http://dx.doi.org/ 10.2196/jmir.2679.

Carrington, P. J., J. Scott and S. Wasserman. 2005. Models and methods in social network analysis. Canadian J. Sociol. Online. 10: 328. http://dx.doi.org/ 10.1590/S1415-65552006000400015.

Daer, A. R., R. Hoffman and S. Goodman. 2014. Rhetorical Functions of Hashtag Forms Across Social Media Applications. In: Proceedings of the 32nd ACM International Conference on The Design of Communication CD-ROM - SIGDOC '14., p 1-3.

Duggan, M. 2015. Mobile Messaging and Social Media 2015. Pew Research Center. (August), p. 20. Available from: http://www.pewinternet.org/files/2015/08/Social-Media-Update-2015-FINAL2.pdf.

Dyett, P. A., J. Sabaté, E. Haddad, S. Rajaram and D. Shavlik. 2013. Vegan lifestyle behaviors: An exploration of congruence with

health-related beliefs and assessed health indices. Appetite. 67: 119-124. http://dx.doi.org/ 10.1016/j.appet.2013.03.015.

Fafchamps, M. and S. Lund. 2003. Risk-sharing networks in rural Philippines. J. Dev. Econ. 71: 261-287. http://dx.doi.org/10.1016/S0304-3878(03)00029-4; http://dx.doi.org/10.1016/S0304-3878(03)00029-4.

Francis, C. 2012. Looking east looking west: Organic and quality food marketing in Asia and Europe. Int. J. Agric. Sustain. 11: 89-91. http://dx.doi.org/ 10.1080/14735903.2012.697656; http://dx.doi.org/ 10.1080/14735903.2012.697656.

Garcia, J. M. and P. Teixeira. 2017. Organic versus conventional food: A comparison regarding food safety. Food Rev. Int. 33: 424-446. http://dx.doi.org/10.1080/87559129.2016.1196490.

Gee Whiz Labs Inc. 2012. Adjective List and Adjectives List. Keep and Share. Available from: https://www.keepandshare.com/doc/12894/adjective-list.

Giannoulakis, S. and N. Tsapatsoulis. 2016. Evaluating the descriptive power of Instagram hashtags. J. Innov. Dig. Ecosyst. 3: 114-129. http://dx.doi.org/ 10.1016/j.jides.2016.10.001.

Grankvist, G. and Biel, A. 2001. The importance of beliefs and purchase criteria in the choice of eco-label food products. J. Environ. Psychol. 21: 405-410. http://dx.doi.org/ 10.1006/jevp.2001.0234.

Gruzd, A. 2016. Netlytic: Software for Automated Text and Social Network Analysis. Available from: www.http://www.Netlytic.org.

Gruzd, A. 2016. Netlytic: Software for Automated Text and Social Network Analysis. Netlytic - social media text and social networks analyzer. Available from: http://www.Netlytic.org.

Guayasamin, P.R., R. T. Peixoto, J. C. Albinoc and H. R. Hernándezd. 2016. Value chains for organic products in neighboring municipalities of Rio de Janeiro, Brazil. Agroecol. Sustain. Food Syst. 40: 352-380. http://dx.doi.org/10.1080/21683565.2015.1137531.

Haghiri, M., J. E. Hobbs and M. L. McNamara. 2009. Assessing consumer preferences for organically grown fresh fruit and vegetables in eastern New Brunswick. Int. Food Agribus. Manag. Rev. 12: 81-100.

Harris, M. 2016. Marketing with Instagram, the Fastest Growing Social Platform! The Medium Well. Available from: http://www.mediumwell.com/marketing-instagram.

Hessel, J., T. Chenhao, and Lee, L. 2016. Science, AskScience, and BadScience: On the Coexistence of Highly Related Communities. The 10th International AAAI Conference on Web and Social Media.

Honkanen, P., B. Verplanken and S. O. Olsen. 2006. Ethical values and motives driving organic food choice. J. Consum. Behav. 5: 420-430. http://dx.doi.org/ 10.1002/cb.190.

Hu, Y., L. Manikonda and S. Kambhampati. 2014. What We Instagram : A First Analysis of Instagram Photo Content and user Types. In: Proceedings of the 8th International AAAI Conference on Weblogs and Social Media. p595-598.

Hughner, R. S., P. McDonagh, J. Stanton and A. Prothero. 2007. Who are organic food consumers? A compilation and review of why people purchase organic food. J. Consum. Behav. 6: 94-110. http://dx.doi.org/ 10.1002/cb.210.

Chassy, A. W., L. Bui, E. N. Renaud, M. Van Horn and A. E. Mitchell. 2006. Three-year comparison of the content of antioxidant microconstituents and several quality characteristics in organic and conventionally managed tomatoes and bell peppers. J. Agric. Food Chem. 54: 8244-8252. http://dx.doi.org/ 10.1021/jf060950p.

Chen, M. F. 2007. Consumer attitudes and purchase intentions in relation to organic foods in Taiwan: Moderating effects of food-related personality traits'. Food Qual. Prefer. 18(7): 1008–1021. doi: 10.1016/j.foodqual.2007.04.004; http://dx.doi.org/10.1016/j.foodqual.2007.04.004.

Izmirli, S. and C. J. C. Phillips. 2011. The relationship between student consumption of animal products and attitudes to animals in Europe and Asia. Br. Food J. 113: 436-450. http://dx.doi.org/10.1108/00070701111116482.

Johny, J., B. Wichmann and B. M. Swallow. 2017. Characterizing social networks and their effects on income diversification in rural Kerala, India. World Development. 94: 375-392.

Jones, P., C. C. Hill and D. Hiller. 2001. Retailing organic foods'. Br Food J. 103: 358-365. http://dx.doi.org/ 10.1108/00070700110396358.

Kareklas, I., J. R. Carlson and D. D. Muehling. 2014. I eat organic for my benefit and yours: Egoistic and altruistic considerations for purchasing organic food and their implications for advertising strategists. J. Adv. 43: 18-32. http://dx.doi.org/10.1080/00913367.2013.799450.

Kerschke-Risch, P. 2015. Vegan diet: Motives, approach and duration. Initial results of a quantitative sociological study. Ernaehrungs Umschau. 62: 98-103. http://dx.doi.org/ 10.4455/eu.2015.016

Knoke, D. and S. Yang. 2008. Social Network Analysis, Social Networks. Available from: http://www.books.google.com/books?id=buiJi6HtGusC&pgis=1.

Kordumova, S., J. Gemert and C. G. M. Snoek. 2016. Exploring the Long Tail of Social Media Tags. 23rd International Conference on Multimedia Modeling, p51-62.

Lee, H. J. and Z. S. Yun. 2015. Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food. Food Qual. Pref. 39: 259-267. http://dx.doi.org/ 10.1016/j.foodqual.2014.06.002.

Levalllois, C. 2014. Convert Excel and CSV files to Networks. Available from: .https://www.gephi.org/plugins/#/plugin/excelcsvimporter

Li, X., A. Zhang, C. Li, J. Ouyang and Y. Cai. 2018. Exploring coherent topics by topic modeling with term weighting. Inform. Proc. Manag. 54: 1345-1358.

Liu, B. 2012. Sentiment Analysis and Opinion Mining Mining. Synthesis Lectures on Human Language Technologies. [Draft], Synthesis Lectures on Human Language Technologies. http://dx.doi.org/ 10.2200/S00416ED1V01Y201204HLT016.

Maertens, A. and C. B. Barrett. 2013. Measuring social networks' effects on agricultural technology adoption. Am. J. Agric. Econ. 95: 353-359. http://dx.doi.org/ 10.1093/ajae/aas049.

De Magistris, T. and A. Gracia. 2008. British food journal the decision to buy organic food products in Southern Italy. Br Food J Int J Retail. 110: 929-947. http://dx.doi.org/ 10.1108/00070700810900620.

Magkos, F., F. Arvaniti and A. Zampelas, 2006. Organic food: buying more safety or just peace of mind? A critical review of the literature. Crit. Rev. Food Sci. Nutr. 46: 23-56. http://dx.doi.org/10.1080/10408690490911846.

Magnusson, M. K., A. Arvola, U. K. Hursti, L. Aberg and P. O. Sjödén. 2003. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behavior. Appetite. 40: 109-117. http://dx.doi.org/ 10.1016/S0195-6663(03)00002-3.

Matuschke, I. and M. Qaim. 2009. The impact of social networks on hybrid seed adoption in India. Agric. Econ. 40: 493-505. http://dx.doi.org/ 10.1111/j.1574-0862.2009.00393.x.

Mejova, Y., S. Abbar and H. Haddadi. 2015. #Food Porn. In Proceedings of the 5th International Conference on Digital Health 2015 - DH '15 P 51–58. http://dx.doi.org/ 10.1145/2750511.2750524.

Mejova, Y., S. Abbar and H. Haddadi. 2016. Fetishizing Food in

Digital Age: #food Porn around the World. Proceedings of the 10th International AAAI Conference on Web and Social Media (ICWSM 2016).

Migliore, G., G. Schifani and L. Cembalo. 2015. Opening the black box of food quality in the short supply chain: Effects of conventions of quality on consumer choice. Food Qual. Prefer. 39: 141-146. http://dx.doi.org/ 10.1016/j.foodqual.2014.07.006.

Michaelidou, N. and L. M. Hassan. 2008. The push and pull towards organic: Clarifying the roles of health consciousness, food safety concern and ethical identity. Int. J. Consum. Stud. 32: 163-170. http://dx.doi.org/ 10.1111/j.1470-6431.2007.00619.x.

Olson, E. L. 2017. The rationalization and persistence of organic food beliefs in the face of contrary evidence. J. Clean. Prod. 140: 1007-1013. http://dx.doi.org/ 10.1016/j.jclepro.2016.06.005.

Organic Trade Association. 2015. Organic Market Analysis' Available from: https://www.ota.com/resources/market-analysis.

Pokorna, J., L. Pilař, T. Balcarová and I. Sergeeva. 2015. Value proposition canvas: Identification of pains, gains and customer jobs at farmers' markets'. Agris On-line Pap. Econ. Inform. 7: 123-130.

Prada, M., Garrido, M. V. and Rodrigues, D. 2017. Lost in processing? Perceived healthfulness, taste and caloric content of whole and processed organic food. Appetite. 114:175-186. http://dx.doi.org/ 10.1016/j.appet.2017.03.031.

Radnitz, C., B. Beezhold and J. Di Matteo. 2015. Investigation of lifestyle choices of individuals following a vegan diet for health and ethical reasons. Appetite. 90: 31-36. http://dx.doi.org/ 10.1016/j.appet.2015.02.026.

Rothgerber, H. 2013. A meaty matter. Pet diet and the vegetarian's dilemma. Appetite. 68: 76-82. http://dx.doi.org/ 10.1016/j.appet.2013.04.012.

Sahota, A. 2012. Global market. In: Willer, H. and L. Kilcher, (Eds), The world of Organic Agriculture. Statistics and Emerging Trends 2012; Research Institute of Organic Agriculture (FiBL) and International Federation of Organic Agriculture Movements (IFOAM): Switzerland, Frick and Germany, Bonn, pp121-127.

Scott, J. 2000. Social Network Analysis: A Handbook. SAGE Publications. Available from: http://www.scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Social+Network+Analysis+A+Handbook#6.

Schuldt, J. P. and M. Hannahan. (2013). When good deeds leave a bad taste: Negative inferences from ethical food claims. Appetite. 62: 76-83. http://dx.doi.org/ 10.1016/j.appet.2012.11.004.

Small, T. A. 2011. What the hastag? A content analysis of Canadian politics on twitter. *Inform. Commun. Soc*. 14: 872-895. http://dx.doi.org/ 10.1080/1369118X.2011.554572.

Smith, A.C., L. Rainie, B. Shneiderman and I. Himelboim. 2014. Mapping Twitter Topic Networks: From Polarized Crowds to Community Clusters. In Pew Research Center. Available from: http://www.pewinternet.org/2014/02/20/mapping-twitter-topic-networks-from-polarized-crowds-to-community-clusters.

Su, J., J. Wu and C. Liu. 2014. Research on coordination of fresh produce supply chain in big market sales environment. Sci. World J. 2014: http://dx.doi.org/ 10.1155/2014/873980. http://dx.doi.org/ 10.1155/2014/873980.

Teng, C. C. and C. H. Lu. 2016. Organic food consumption in Taiwan: Motives, involvement, and purchase intention under the moderating role of uncertainty. Appetite. 105: 95-105.

Tian, X. and X. Yu. 2013. The demand for nutrients in China. Front. Econ. China, 8: 186-206. http://dx.doi.org/ 10.3868/s060-002-013-0009-9.

Timko, C. A., J. M. Hormes and J. Chubski. 2012. Will the real vegetarian please stand up? An investigation of dietary restraint and eating disorder symptoms in vegetarians versus non-vegetarians. Appetite. 58: 982-990.

Turcinkova, J. and J. Stavkova. 2009. Changes in consumer behavior on the market with food. Acta Univ. Agric. Silvicul. Mendel. Brun. 57: 173-178. http://dx.doi.org/ 10.11118/actaun200957030173.

Ueasangkomsate, P. and S. Santiteerakul. 2016. A study of consumers' attitudes and intention to buy organic foods for sustainability. Procedia Environ. Sci. 34: 423-430. http://dx.doi.org/ 10.1016/j.proenv.2016.04.037.

Vaterlaus, J. M., E. V. Patten, C. Rochec, J. and A. Youngd. 2015. Gettinghealthy: The perceived influence of social media on young adult health behaviors. Comput. Hum. Behav. 45: 151-157.

Vega-Zamora, M., P. R. Manuel, M. Murgado-Armenteros and T. R. Francisco. 2013. The influence of the term "organic" on organic food purchasing behavior. Procedia Soc. Behav. Sci. 81: 660-671. http://dx.doi.org/ 10.1016/j.sbspro.2013.06.493.

Vinodhini, G. and R. Chandrasekaran. 2012. Sentiment analysis and opinion mining: A survey. Int. J. Adv. Res. Comput. Sci. Softw. Eng. 2: 282-292.

Vosta, M. 2014. The food market in the CR and its regulation within the framework of the EU agricultural policy. Agric. Econ. 60: 279–286.

Wagner, K. 2015. Instagram Is the Fastest Growing Major Social Network. Recode. Available from: https://www.recode.net/2015/1/9/11557626/instagram-is-the-fastest-growing-major-social-network.

Waldmann, A., J. W. Koschizke, C. Leitzmann and A. Hahn. 2003. Dietary intakes and lifestyle factors of a vegan population in Germany: Results from the German Vegan study. Eur. J. Clin. Nutr. 57: 947-955. http://dx.doi.org/ 10.1038/sj.ejcn.1601629.

Worthington, V. 2001. Nutritional quality of organic versus conventional fruits, vegetables, and grains. J. Altern. Complement. Med. 7: 161-173. http://dx.doi.org/ 10.1089/107555301750164244.

Yadav, R. 2016. Altruistic or egoistic: Which value promotes organic food consumption among young consumers? A study in the context of a developing nation. J. Retail. Consum. Serv. 33: 92-97. http://dx.doi.org/ 10.1016/j.jretconser.2016.08.008.

Yadav, R. and G. S. Pathak. 2016. Intention to purchase organic food among young consumers: Evidences from a developing nation. Appetite. 96: 122-128.

Yiridoe, E. K., S. Bonti-Ankomah and R. C. Martin. 2005. Comparison of consumer perceptions and preference toward organic versus conventionally produced foods: A review and update of the literature. Renew. Agric. Food Syst. 20: 193-205. http://dx.doi.org/ 10.1079/RAF2005113.

Yu C. H., J. C. Yoo and S. B. Yao. 2014. Farmers' willingness to switch to organic agriculture: A non-parametric analysis. Agric. Econ. 60: 273-278.

Zagata, L. 2012. Consumers' beliefs and behavioural intentions towards organic food. Evidence from the Czech Republic. Appetite. 59: 81-89. http://dx.doi.org/ 10.1016/j.appet.2012.03.023.

Zhong, Y., Z. Huang and L. Wu. 2017. Identifying critical factors influencing the safety and quality related behaviors of pig farmers in China. Food Control. 73: 1532-1540. http://dx.doi.org/10.1016/j.foodcont.2016.11.016.

Oñederra-Aramendi, A., M. M. Begiristain-Zubillaga and E. Malagón-Zaldua. 2018. Who is feeding embeddedness in farmers' markets? A cluster study of farmers' markets in Gipuzkoa. J. Rural Stud. 61: 22-33. http://dx.doi.org/ 10.1016/j.jrurstud.2018.05.008.