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Best Alternative Models to Increase Local Product Consumption A Case Study in Cukurova University

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ABSTRACT

The scope of the study is to analyze consumer profiles who prefers local food and motives to buy local food. The data of the study have been obtained through face to face interviews with the university students consisting 93. The method of ANP (Analytical Network Process) the weights used for to determine consumers priorities for local foods. The results of ANP, was used to determine the best design, with the method of “the best combinations of alternatives”(BeCA). BeCA gives optimum homogeneous preference combinations with the aid of 0-1 integer programming. The best combinations that were obtained were analyzed by selected appropriate statistical tests. Considering the results of the study, firstly; 39 students over 93 are assigned to 3 best groups. Secondly, students preferred fruits which are produced with domestic seed and local labour. Furthermore, students stated that they prefer organic and healthy foods –mostly fruits- and they want to reach that type of foods in their local food markets. Finally, students wanted to be informed about the foods by the TV broadcasts.

1. Introduction

In the literature there is no generally accepted definition of “local” food. Though “local” has a geographic connotation, there is no consensus on a definition in terms of the distance between production and consumption. Definitions related to geographic distance between production and sales vary by regions, companies, consumers, and local food markets. According to the definition adopted by the U.S. Congress in the 2008 Food, Conservation, and Energy Act (2008 Farm Act), the total distance that a product can be transported and still be considered a “locally or regionally produced agricultural food product” is less than 400 miles from its origin, or within the state in which it is produced. Definitions based on market arrangements, including direct-to-consumer arrangements such as regional farmers’ markets, or direct-to-retail/foodservice arrangements such as farm sales to schools, are well-recognized categories and are used in this report to provide statistics on the market development of local foods (Martinez, 2010). Studies showed that not only for the authorities but also for the con-

sumers “local food” definition is blurry. According to the study of the “Hartman Group” in 2007, consumers defined local foods as unique, authentic foods with the specific taste. Furthermore, when this questions asked in survey format consumers of 50 % tended to answer this as “made or produced within 100 miles and 37 % of them answered as “ made or produced in my state” (Hartman Group, 2007). Moreover, consumers declared that they tend to buy foods and beverages that are locally grown or produced (Culture of Wellness Report, 2013). It is important to interpret the term of local as a geographic concept which is widely accepted in the literature. Another report showed that for the consumers, “Local” continues to be a resonant assurance of fresher, more trustworthy food that is more likely to have been made in accordance with consumer values (Organic and Natural Report, 2016). It is important to interpret the term of local as a geographic concept which is widely accepted in the literature.

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In response to growing trends in the current food system toward global integration, economic consolidation, and environmental degradation, communities have initiated alternative, more sustainable food and agricultural systems (Feenstra, 2002). Encouragement of consumers to "buy local" has long been practiced by governments. In recent times this goal has assumed increasing prominence as many long-established industries in the developed economies come under threat from products manufactured in "protected" economies, trade blocs, and/or newly industrialized nations. Typically the objective of "buy local" campaigns is to encourage consumers to purchase locally made products in preference to imported goods. While the objectives of such campaigns enjoy widespread community and government support, the actual impact on purchasing behavior and as a result in favorably impacting on the country's balance of trade, often remain matters for conjecture (Elliott and Cameron, 1994). Farmers and other upstream operators have been called upon to engage in more direct relationships with end consumers: to produce, process and market products on a localized basis, in what have been described as alternative food 'chains', 'systems' or 'networks' (Weatherell et al., 2003). It is believed that food consumed closer to its point of production has the potential to provide economic, environmental and social benefits in relation to sustainable consumption at the local level. The impacts of food transport are complex, and involve many trade-offs between different factors. A single indicator based on total food kilometers travelled would not be a valid indicator of sustainability (DEFRA, 2005). Previous studies showed that consumers are generally positive about locally produced foods. Such as, they have feeling that foods have higher quality (Lee, 2000) and safe (Seyfang, 2004). One of the studies also found that there is a perception that local foods were fresher and tastier than other foods. Despite this, the focus groups in the study identified important barriers to purchasing local foods. These included price and inconvenient lifestyles (Chambers et al., 2007). Kadanalı et al (2016), found in their study that the purchase of local food products affect consumers living in Erzurum Province, furthermore factors affecting to buy local food are found as "benefit", "ingredients and habits", "supporting producer and transport distance.

In this study, the starting point is accepted as the young people who are agricultural engineering students whether buying local food and caring to pick the products produced with their own local inputs. The aim of the study is to determine the tendency of the consumers for local foods which accepted as a geographical concept in an accordance with the literature and find under which circumstances consumers will be willing to consume local foods. Firstly, with the help of the ANP (Analytic Network Process), local food preference model was built. In the model, consumers' criteria weights were defined. Secondly, the weights were used to find the best 3 combinations which represent the

consumers with the highest probability of consuming the local foods. Besides consumer profiles another questions answered such as; where to produce, how to produce and where to sell the local foods. Adana (Çukurova Region) is a very important city for agricultural production in Turkey. For that reason, it is expected that the results of the study will bring financial benefits for the farmers of Adana.

2. Material and Methods

2.1. Material

This study consists both primary and secondary data. For gathering the primary data, the study conducted with the students of Çukurova University Agricultural Engineering Department. According to the student affairs office the number of enrolled students in Agricultural Engineering Department during 2015-2016 Academic Year is 2437 (Anonim, 2016). So, the population size counted as 2437 students. Population Proportion Sampling Method was used to determine the sample size. The formula is as follows (Newbold et al., 2012).

$$n = \frac{NP(1 - P)}{(N - 1)\sigma_p^2 + P(1 - P)} \quad (1)$$

n: sample volume

N: The number of students in the population

p: rate of the number of students in the population (to access a maximum volume of sample 0.50 was taken)

opx: Variance

With a 10 % the margin of error for a 95 % confidence interval estimated sampling size is 93 surveys. In addition secondary data obtained from the literature reviews.

2.2. Method

2.2.1 Analytical Network Process

The Analytic Hierarchy Process (AHP) and its generalization to dependence and feedback, the Analytic Network Process (ANP) are psychophysical theories of measurement. This means that they make the assumption that judgments about subjective feelings and understanding are essentially not very different than and depend on judgments about the physical world in which we acquire our experience and understanding. To make complex risky decisions we need not only judgments but also structures that represent our best understanding of the flow of influences. The basic structure in doing this is a hierarchy for the AHP and an influence network of clusters and nodes contained within the clusters for the ANP (Şahin and Miran, 2014). Priorities are established in the AHP and ANP using pairwise comparisons and judgment. Many decision problems cannot be structured hierarchically be-

cause they involve the interaction and dependence of higher-level elements such as objectives and criteria in a hierarchy on lower level elements. Not only does the importance of the criteria determine the importance of the alternatives as in a hierarchy, but also the importance of the alternatives themselves determines the importance of the criteria as in a network (Saaty, 2007).

Decision problem should be defined clearly and should be decomposed like a network with the help of brain storming or other decision making methods. Decision makers opinions should be evaluated and the

found that 19.4 % of the fathers graduated from primary school and 34.4 % of fathers graduated from high school. In addition, 31.2 % of mothers graduated from primary school. Approximately 7% of mothers are

network process should decompose rationally (Şahin et al., 2016).

3. Research Findings

3.1 Descriptive Statistics

According to the descriptive statistics 50.5 % of the participants are female, 46.3 % of respondents are falling age bracket of 21-22. Furthermore, 38.7 % of respondents completed high school in a town, 30.1 % of respondents spent their childhood in a village. Considering the family members education level data it has been

illiterate. Reverse to that same percent of mothers are graduated from university 70 % of respondents income is between 200 - 499 TL (Table 1).

Table 1
Demographic statistics of the consumers

<i>Demographic Statistics of the Consumers</i>	<i>Data</i>	<i>Number</i>	<i>%</i>
<i>Age of the Respondent</i>	19-20	18	19.4
	21-22	43	46.3
	23 +	32	34.5
N= 93			
<i>Gender</i>	Female	47	50.5
	Male	46	49.5
<i>Completed the high school in</i>	Town	36	38.7
	City	26	28.0
	Big City	31	33.3
Standard Deviation= 0.85 N= 93			
<i>Spent childhood in</i>	Village	38	30.1
	Town	26	28.0
	City	15	16.1
	Big City	24	25.8
Standard Deviation= 1.17 N= 93			
<i>Father's Education Level</i>	Primary School	18	19.4
	Secondary School	25	26.9
	High School	32	34.4
	University	18	19.4
Standard Deviation= 1.02 N= 93			
<i>Mother's Education Level</i>	Primary School	29	31.2
	Secondary School	30	32.3
	High School	22	23.7
	University	6	6.5
	Illiterate	6	6.5
Standard Deviation= 1.33 N= 93			
<i>Household Income</i>	Below 1000TL	5	5.4
	1000-1999	27	29.0
	2000-4999	47	50.5
	5000-9999	12	12.9
	10000TL +	2	2.2
Mean= 2.77 Standard Deviation=0.82 N= 93			
<i>Scholarship</i>	Below 100TL	5	5.4
	100-199	13	14.0
	200-499	64	68.8
	500-999	9	9.7
	1000TL +	2	2.2
Mean= 2.89 Standard Deviation=0.73 N= 93			

3.2 Priorities of Different Agricultural Product Options with Analytic Network Process

A. Alternatives: Agricultural product alternatives of ANP model;

A.1. Local agricultural product produced in Adana: It includes fresh vegetables, fruits and dried herbal products produced within the boundaries of Adana province.

A.2. Agricultural products produced outside of Adana in the Mediterranean region: Fresh vegetables, fresh fruits and dried herbal products produced in the provinces outside the province of Adana in the Mediterranean region.

A.3. Agricultural product produced in a region other than the Mediterranean region: it includes fresh vegetables, fresh fruit and dried herbal products produced on the inside of the borders of a region other than the Mediterranean region.

B. Seed: Seed criteria used in production of ANP model:

B.1. Imported seed, B.2. Seeds produced in the country.

C. Product Distribution Location: Product distribution channels of the ANP model:

C.1. Market, C.2. Grocery, C.3. Supermarket / Hypermarket

D. Contact Location: Contact of ANP model: D.1.TV, D.2. Newspaper, D.3. Internet.

E. Labor used in production of ANP model: E.1. Local labor force, E.2. Out of region labor force.

F. Production patterns of ANP model: F.1. Traditional, F.2. Organic, F.3. Product manufactured with good agricultural practices (GAP).

G. Adana Preferred Purchases for Consumers: ANP model's preference for purchasing: G.1. To consume more products, G.2. Consuming better quality products, G.3. Consuming cheaper products.

H. Product Properties: Product features of ANP model: H.1. Price, H.2. Taste, H.3. Health.

J. Product Group: Product group of ANP model: J.1. Fresh vegetables, J.2. Fresh fruit, J.3. Dried herbal products (Table 2).

Table 2

Average of ANP values of agricultural product alternatives

		Mean	Median	Standard Dev	Min.	Max.	Friedman/Kendall's Test
Alternatives (Where Produce) to	Agricultural product produced in Adana province	0.317	0.317	0.065	0.231	0.439	0.015*
	Produced in a Mediterranean country outside of Adana	0.321	0.320	0.043	0.218	0.449	
	Produced in a region other than the Mediterranean region	0.362	0.399	0.088	0.225	0.549	
Alternatives (Seed)	Imported seed	0.423	0.435	0.041	0.367	0.500	0.989***
	Seeds produced in the country	0.577	0.565	0.041	0.500	0.633	
Alternatives (Distribution Location)	Bazaar	0.385	0.453	0.150	0.087	0.577	0.168*
	Greengrocer	0.275	0.278	0.116	0.109	0.766	
	Supermarket / Hypermarket	0.340	0.283	0.184	0.100	0.804	
Alternatives (Contact Location)	TV	0.373	0.319	0.247	0.080	0.794	0.203*
	Newspaper	0.170	0.103	0.152	0.042	0.685	
	Internet	0.457	0.413	0.290	0.103	0.818	
Alternatives (Labor)	Local labor force	0.629	0.725	0.158	0.104	0.746	0.176*
	Out-of region labor force	0.371	0.275	0.158	0.254	0.896	
Alternatives (Production Patterns)	Traditional	0.253	0.234	0.055	0.218	0.463	0.388*
	Organic	0.376	0.392	0.084	0.238	0.511	
	Product manufactured with good agricultural application	0.371	0.386	0.081	0.265	0.520	
Alternatives (Preferred Purchases)	To consume more products	0.203	0.162	0.087	0.109	0.371	0.437*
	To consume more quality products	0.499	0.554	0.186	0.233	0.706	
	Consuming cheaper products	0.298	0.215	0.153	0.112	0.648	
Alternatives (Product Properties)	Price	0.282	0.279	0.054	0.217	0.348	0.422*
	Taste	0.313	0.281	0.053	0.262	0.501	
	Health	0.405	0.385	0.081	0.225	0.514	
Alternatives (Product Group)	Fresh vegetables	0.367	0.444	0.131	0.074	0.746	0.741**
	Fresh fruit	0.520	0.474	0.114	0.199	0.742	
	Dried herbal products	0.112	0.099	0.078	0.051	0.348	

*0.10, **0.05, ***0.01 shows significant level

In this part of the study, a network of purchasing decision models were established with the Analytical Net

work Process and the questions raised were asked to the consumers (Figure 1).

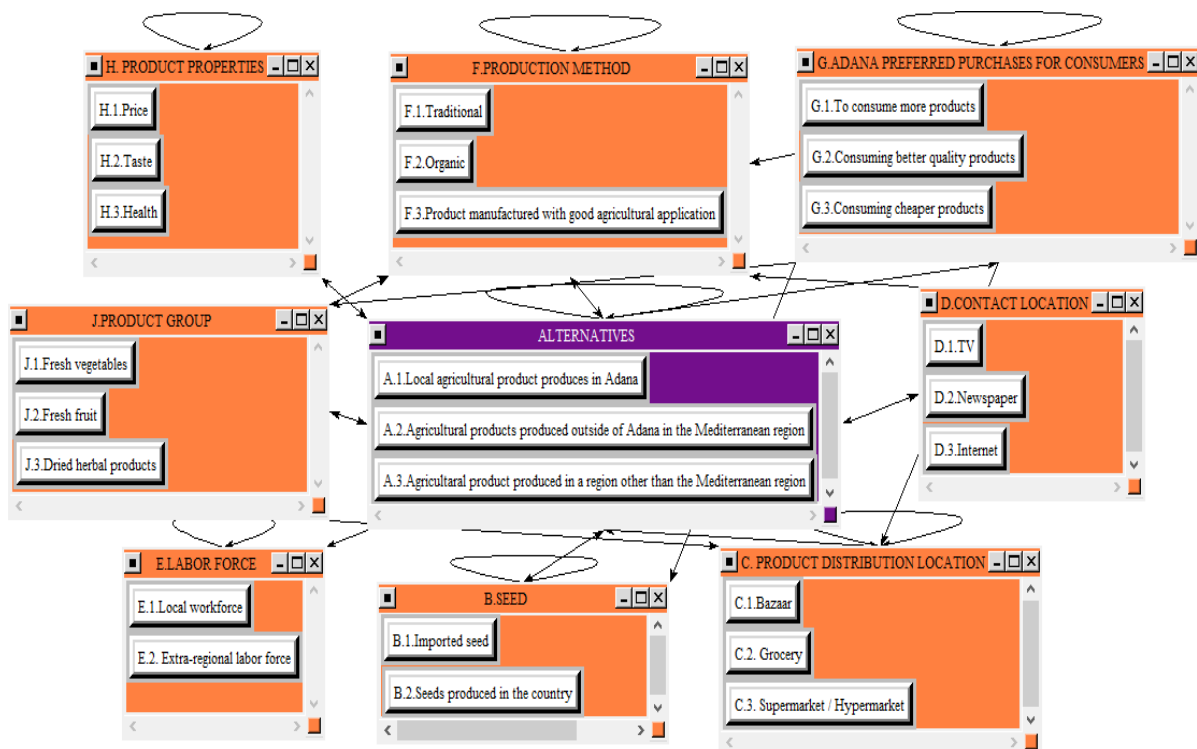


Figure 1
Analytic Network Process Model

3.3 Models with the Highest Likelihood of Consumers' Adoption

From the local product preference model created with the aid of ANP, the weights given by consumers to various criteria and options were measured. Utilizing these weights, the most suitable models that consumers would prefer were determined by 0-1 integer programming. In fact, the 0-1 integer model here tries to

determine the maximum benefit to be gained by maximizing the choice of consumers according to the weights given to the options or criteria. Y_i : i. Consumer (0-1), x and z : possible selection criteria or alternatives; N : number of consumers, m : number of criteria, t = number of options, a : criterion weight, b : Option weight

$$\begin{aligned}
 &Max \sum_{i=1}^n y_i \\
 &\sum_{i=1}^n a_{ij}x_j + \sum_{i=1}^n b_{ik}z_k \geq (\max a_{ij} + \max b_{ik})y_i \\
 &\sum_{j=1}^m x_j = 1 \\
 &\sum_{k=1}^t z_k = 1 \\
 &x_j: 0 - 1, z_k: 0 - 1,
 \end{aligned}
 \tag{2}$$

In Table 3, Best 3 models were offered to increase consumption of local products. If the conditions specified in the first of these models are met, the benefits of 14 consumers in the first model, 13 in the second model and 12 in the last model will be maximized. The low number of consumers included in the models indicates

that there is generally no consensus among consumers. As a main reason for this, it may be considered that local product consciousness has not yet occurred. In addition, for consumers to prefer more local products; Model 1 shows; foods should be produced outside the Mediterranean Region, must be a local labor force, must be an organically produced product, be produced from domestic seed, be found in agricultural product market, advertised on TV, pay attention to quality standards, be healthy product and fruit varieties. In Model 2; foods should be produced outside the Mediterranean Region, using local labor force, being organic, producing from domestic seed, being found in local product market, advertising should be done on TV, pay attention to quality standards, foods should be vegetables and cheap. Lastly, in Model 3 foods should be a local product produced in Adana, using local labor,

produced with good agriculture practice, produced from domestic seed, found in local product market,

advertised on internet, cheap and healthy product, especially fruits (Table 3).

Table 3

Consumers' likelihood of local product selection the top three models

Criteria	Model No		
	Best 1	Best 2	Best 3
Alternative	Produced in a region other than the Mediterranean region	Produced in a region other than the Mediterranean region	Agricultural product produced in Adana province
Seed	Domestic seed	Domestic seed	Domestic seed
Product Distribution	Bazaar	Bazaar	Bazaar
Location			
Contact Location	TV	TV	internet
Labor	Local	Local	Local
Production Shape	Organic	Organic	Product manufactured with good agricultural practice
Preferences Related to Purchasing in terms of Adana Consumer	To consume more quality products	To consume more quality products	Consuming cheaper products
Product feature	Health	Price	Health
Product group	Fresh fruit	Fresh Vegetables	Fresh fruit
Preferred number of consumers	14	13	12
Percentage in total	15.05	13.98	12.90

In the Model 1 descriptive data is as follows: consumers' age above 23 (50.0 %), male (57.1 %), those who completed high school in a city (35.7 %), spent their childhood in a town or in a city (28.6 %), 200-499 TL income bracket (64.3 %), show the most preferred consumer profile of agricultural products produced outside the Mediterranean region. The Model 2 is as follows; consumers over the age of 23 (53.8 %), female (53.8 %), those who completed high school education in a town (30.8 %), those who spent their childhood in a town (38.5 %) and 200 - 499 TL income bracket

(69.2 %) which is the most preferred consumer profile for agricultural products produced outside the Mediterranean region. In the Model3, consumers are in the 21-22 age group (58.3 %), female or male (50 %), those who completed high school education in a town or big city (41.7 %), those who spent their childhood in a village or town (16.7 %) and 200-499 TL income bracket (58.3 %) shows the third consumer profile, which will most prefer the local product by the students (Table 4).

Table 4
The three most likely likelihood of local product selection by consumer profiles

		Top Models					
		Best 1		Best 2		Best 3	
		n	%	n	%	n	%
<i>Age of the Respondent</i>	<i>19-20</i>	2	14.3	2	1.4	1	8.3
	<i>21-22</i>	5	35.7	4	30.8	7	58.3
	<i>23 +</i>	7	50.0	7	53.8	4	33.3
<i>Gender</i>	<i>Male</i>	8	57.1	6	46.2	6	50.0
	<i>Female</i>	6	42.9	7	53.8	6	50.0
<i>Completed the high school in</i>	<i>Town</i>	3	21.4	4	30.8	5	41.7
	<i>City</i>	5	35.7	3	23.1	3	25.0
	<i>Big City</i>	4	28.6	3	23.1	5	41.7
<i>Spent childhood in</i>	<i>Village</i>	3	21.4	4	30.8	2	16.7
	<i>Town</i>	4	28.6	5	38.5	2	16.7
	<i>City</i>	4	28.6	1	7.7	1	8.3
	<i>Big City</i>	3	21.4	3	23.1	4	33.3
<i>Father's Education Level</i>	<i>Primary School</i>	3	21.4	4	30.8	2	16.7
	<i>Secondary School</i>	3	21.4	5	38.5	4	33.3
	<i>High School</i>	4	28.6	2	15.4	2	16.7
	<i>University</i>	4	28.6	2	15.4	4	33.3
<i>Mother's Education Level</i>	<i>Primary School</i>	3	21.4	6	46.2	3	25.0
	<i>Secondary School</i>	5	35.7	5	38.5	3	25.0
	<i>High School</i>	3	21.4	-	-	4	33.3
	<i>University</i>	1	7.1	1	7.7	1	8.3
	<i>Illiterate</i>	2	14.3	1	7.7	1	8.3
<i>Household Income</i>	<i>Below 1000TL</i>	-	-	2	15.4	-	-
	<i>1000-1999</i>	3	21.4	3	23.1	4	33.3
	<i>2000-4999</i>	9	64.3	6	46.2	6	50.0
	<i>5000-9999</i>	1	7.1	2	15.4	2	16.7
	<i>10000TL +</i>	1	7.1	-	-	-	-
<i>Monthly Grant or Scholarship</i>	<i>Below 100TL</i>	1	7.1	-	-	1	8.3
	<i>100-199</i>	2	14.3	3	23.1	3	25.0
	<i>200-499</i>	9	64.3	9	69.2	7	58.3
	<i>500-999</i>	2	14.3	-	-	1	8.3
	<i>1000TL +</i>	-	-	1	7.7	-	-

4. CONCLUSION

As a result of the study, with the help of BeCa analyze 3 different “local food consuming models” developed for the new generation of consumers who are also university students.

Considering the findings of the study, it can be said respondents who fell medium income bracket preferred foods produced outside the region. Contrast with this result respondents preferred local labor. When we

5. REFERENCES

- Anonim (2016). Çukurova Üniversitesi Öğrenci İşleri Daire Başkanlığı Kayıtları. Adana.
- Chambers S, Lobb A, Butler L, Harvey K, Traill WB (2007). Local, national and imported foods: A qualitative study. *Appetite*, 49(1): 208-213.
- Culture of Wellness Report (2013). <https://www.hartman-group.com/acumenPdfs/local-trend-2014-12-11.pdf>, (Access Date: 01.06.2017).
- DEFRA (2005). Food Miles Report.
- Elliott GR, Cameron RC (1994). Consumer Perception of Product Quality and the Country-of-Origin Effect. *Journal of International Marketing*, 2(2): 49-62.
- Feenstra G (2002). Creating space for sustainable food systems: Lessons from the field. *Agriculture and Human Values*, 19(2): 99-106.
- Hartman Group (2007). Consumer Understanding of Buying Local. <https://foodhubresources.files.wordpress.com/2015/06/consumer-understanding-of-buying-local.pdf>, (Access Date: 01.06.2017).
- Kadanalı E, Tercan S, Dağdemir V. (2016). Tüketicilerin Yöresel Gıda Ürünleri Tercihi: Erzurum İli Örneği. *Uluslararası Katılımlı 12. Ulusal Tarım Ekonomisi Kongresi*, Cilt 3: 663-672.
- analyze other two groups it can be seen that their monthly income bracket is quite same. But Model 2 respondents differs from other two by the product feature part as they care about the price. Other two groups give importance to health. For this study it can be said that income level is independent from product feature.
- Finally, for future studies the reasons of “foods preferred produced outside the Mediterranean Region” fell the best two groups should investigate for adoption of the term “local food”. Furthermore, the outcomes of the study could be helpful for the decision makers of health and food sectors while creating new policies.
- Lee R (2000). Shelter from the storm? Geographies of regard in the worlds of horticultural consumption and production, *Geoforum*, 31(2): 137-157.
- Martinez S (2010). Local food systems; concepts, impacts, and issues. Diane Publishing.
- Newbold P, Carlson W, Thorne, B (2012). Statistics for business and economics. Pearson.
- Organic and Natural Report (2016). <http://store.hartman-group.com/content/organic-and-natural-2016-report-overview.pdf>, (Access Date: 01.06.2017).
- Saaty TL, (2007). The analytic hierarchy and analytic network measurement processes: applications to decisions under risk. *European Journal of Pure and Applied Mathematics*, 1(1): 122-196.
- Seyfang G (2004). Consuming values and contested cultures: A critical analysis of the UK strategy for sustainable consumption and production. *Review of Social Economy*, 62(3): 323-338.
- Şahin AN, Miran B (2014). İzmir ilinde Yerel Tarımsal Ürünler İlişkin Tüketici Tercihlerinin Analizi: Bir Analitik Ağ Süreci Uygulaması. *XI. Ulusal Tarım Ekonomisi Kongresi*, 3-5 Eylül, Samsun.
- Şahin AN, Miran B, Çiftçi K, (2016). Yerel Ürün Tüketimini Arttırmaya Dönük En İyi Alternatif Modellerin Belirlenmesi. *Uluslararası Katılımlı 12. Ulusal Tarım Ekonomisi Kongresi*, Cilt 1: 653-662.
- Weatherell C, Tregear A, Allinson J (2003). In search of the concerned consumer: UK public perceptions of food, farming and buying local. *Journal of Rural Studies*, 19(2): 233-244.