International Food and Agribusiness Management Review
Volume 15, Issue 4, 2012

Analyzing Consumers' Preferences for Apple Attributes in Tirana, Albania

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Abstract

This paper reports the findings of a study conducted on consumer preferences for apple fruits in Tirana, Albania. Consumer preferences where analyzed using a Conjoint Choice Experiment and Latent Class Analysis. For each identified consumer class, preferences for the chosen attributes and their willingness to pay for such attributes were estimated. Marketing and policy recommendations are provided for the sector stakeholders, with particular focus on producers and policy-makers.

Keywords: apples, Conjoint Choice Experiment, consumer preferences Albania

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Introduction

Apple production is an important economic activity for the Albanian agricultural sector; apples are the most commonly cultivated fruit tree in Albania which falls under the category of labor intensive activities. With a rather high labor to land ratio, as in case of Albanian agriculture, labor intensive industries are an economically justified alternative. On the demand side, Albanian consumers' expenditures on apples are ranked as the second highest for all fruits and vegetables combined, following tomatoes (USAID's AAC 2008).

The Albanian Ministry of Agriculture, Food and Consumer Protection (MAFCP) is currently supporting the fruit sector through an investment support scheme, by providing subsidies for new fruit (apple) plantations. From a policy perspective, fruit production, including apple production, is one of the four priority sectors of the new Programme for Rural Development in Albania 2012 – 2013 (MAFCP 2011a). This sector has also received attention from key donor projects operating in the agriculture and rural sector in Albania, such as USAID's AAC (Albanian Agriculture Competitiveness) Program, SNV (Netherlands Development Organisation), and MADA (Mountain Areas Development Agency).

Farmers are exploiting the economic opportunity presented by apple production. Domestic production of apples in Albania has rapidly increased in recent years (more than quadrupling between 2000 and 2010), as shown in Table 1. Production is expected to further increase in the coming years, due to new plantations, stimulated by the investment support scheme, and motivation from high domestic consumers demand. The per capita consumption of apples in Albania increased 1.5 times between 2000 and 2007, estimated currently at 18 kg per capita (FAOSTAT 2012).

Table 1. Dynamics of apple production and supply in Albania.

Category	Unit/ Year	2000	2005	2006	2007	2008	2009	2010
Production	Mt	12,000	16,000	27,566	36,000	45,000	47,202	54,604*
Import	Mt	28,163	38,417	33,723	22,516	15,641	12,928	17,702
Export	Mt	0	0	0	147	34	109	1,097
Supply[1]	Mt	40,163	54,417	61,289	58,369	60,607	60,022	71,209
Export/import	%	0.0%	0.0%	0.0%	0.7%	0.2%	0.8%	6.2%
Production/supply	%	29.9%	29.4%	45.0%	61.5%	59.1%	78.6%	76.7%
Import/supply	%	70.1%	70.6%	55.0%	38.6%	41.0%	21.5%	24.9%

Source. FAOSTAT (production), UNSTAT (import – export), *MAFCP (2011b)

Apple domestic production currently covers more than three-fourths (76.7%) of the domestic supply; its share has increased substantially as compared to the year 2000, when domestic supply was dominated by imports while domestic production covered only less than one-third of the domestic supply (Table 1). Though the share of imports to domestic supply has dramatically fallen from 70.1 percent in the year 2000 to 24.9 percent in the year 2010, it is still high based on the potential to increase production. The still high presence of imports can be partially explained by

[1] Supply = Production – Export + Import

the seasonality of domestic supply, and partially by preferences of (certain) consumers (classes) for specific apple varieties sourced by imports.

While several studies have been conducted on the apple value chain by a number of organizations (DSA (Development Solutions Associates), SNV, USAID's AAC), there is currently a need for an in depth consumer analysis to identify consumer preferences for apple attributes.

Understanding consumer preferences and behavior is important in the decision-making process of key stakeholders, including apple producers and traders, MAFCP, as well as donor agencies that operate in the sector. It is particularly important in a context where import substitution is considered more feasible than export promotion, based on the development stage of private actors and public competitiveness enhancing institutions (MAFCP 2007). Furthermore, so far, MAFPC subsidy schemes have disregarded the importance of varieties (eg. supporting apple or fruits plantation in general and not specific types of apple varieties which are mostly demanded by the market). Therefore providing information on varieties of apples which are mostly demanded by various market segments (including their size and willingness to pay) might be useful to prepare more specific and efficient support schemes.

Objectives

The goal of this study is to assess consumer preferences for apple fruits in Tirana, Albania. Specifically, the research objectives are:

1. Group consumers according to their preferences for the main apple attributes.
2. Assess consumer preferences of each identified class and their willingness to pay for such attributes.
3. Provide marketing and policy recommendations for the sector's stakeholders, with particular focus on producers and policy-makers. Consequently, apple producers may base their production and marketing decisions guided by consumer preferences, taking in-to consideration the respective market segment size and willingness to pay for the given attributes.

Methods and Procedures

The proposed method for this research is Conjoint Analysis (CA) which originated theoretically from Lancaster (1966) who posited that the consumer utility is based on the bundle of attributes a product represents. Later, CA has been widely used to assess consumer preferences beginning with Green and Rao (1971) and Johnson (1974). The advantage of CA, compared to other methods, stands in the fact that CA is based on different product attributes. For each attribute there are several levels which enable assessment of consumer preferences for the products through partial contribution of product features (Hauser and Rao 2003). Louviere and Woodworth (1983) improved conjoint analysis introducing choice based experiments or conjoint choice experiment (CCE). The main advantage of CCE over conventional CA is that in CCE

respondents have to choose the most preferred option out of several choice sets and thereby the trade-off can be measured in line with the respondents' weight in choosing one attribute over another (Haaijer 1999).

This approach enables us to obtain consumer classes—each class including information on the preferred product attributes and based on which *willingness to pay* can also be derived. As result, various producers and traders can identify the most suitable market niche/segment to target, given consumer preferences by classes. From a practical standpoint, if a producer cannot produce a particularly preferred product due to already planted traditional cultivars then the information from the study enables them to judge the value of trade-off between currently planted cultivars and new cultivars that could replace them, to meet consumer demand.

CCE has been used before for fruits (Barber et al. 2008, Evans 2008) and for apple specifically in other countries (Wirth et al. 2011; Novotorova and Mazzocco 2008; Sun and Wang 2002; Jerko and Kovačić 2008; Manalo 1990). CCE has also been used extensively in Albania on other food products, such as olive oil (Chan-Halbrendt et al. 2010), lamb meat (Imami et al. 2011), table olives (Zhllima et al. 2011) and wine (Zhllima et al. 2012). These studies have grouped consumers by their preferences for various product attributes and have assessed willingness to pay, thus providing important indications and recommendations to agrifood marketing enterprises and to policy-makers. Therefore we have chosen CCE with Latent Class Analysis (LCA) for studying consumer preferences for apple in Albania.

There are four stages in the designing of conjoint choice experiments resulting in a survey. Once the survey is administered to the respondents, the data are analyzed using latent class analysis to determine Tirana consumer preferences for apples.

Conjoint Choice Design

First and Second Conjoint Choice Design Stage: Selecting Product Attributes and their Levels

Product attributes and their levels have been selected based on literature review, expert assessment and focus group discussions. Two focus groups discussions were organized; one focus group with consumers and another one with agrifood marketing experts. As a result, the most important apple attributes and their respective levels were identified. The attributes identified were: color (variety), origin, price, and fruit size.

Color (variety). Color has consistently been an important attribute in previous fruit and vegetable analyses. The relative importance for color of apples was 20 percent in Manalo's study (1990) and 17.98 percent in Jerko and Kovačić study (2008). In our study we have chosen to make a linkage between color and apple variety. According to the focus group findings, most consumers in Albania do not recognize apple by variety name, but by color. Therefore we use color as an attribute instead of variety – the later is observed indirectly through color.

Origin. Origin is quite an important attribute for agrifood products. Jerko and Kovačić (2008) found that relative importance of origin for apple was 20.94 percent. Dentoni et al. (2009) found that consumers prefer local grown apple over imported ones in USA. Consumer surveys in

Albania on other agrifood products such as olive oil (Chan-Halbrendt et al. 2010), and lamb meat (Imami et al. 2011) show a preference and significant willingness to pay for locally grown products.

Price. Although price is not technically a product attribute, it is commonly included as an attribute in conjoint analyses because it is a major factor in product buying choice. Price is also necessary to compute willingness to pay.

Size. Expert opinions and focus groups identified size as an important attribute for apple. Large fruits may be preferred to small ones because larger sizes may imply a higher quality. On the other hand, large fruit size may also be perceived as being produced using hormones. It may be possible that small fruits are preferred to larger ones because they may be considered as organically produced or because of convenience in consumption, according to the focus group findings. Apple fruit size is considered as an important attribute in several studies conducted on apple consumer preferences (Manalo 1990; Richard and Smith 2004).

Other studies have included the method of production and environmental practices as product attributes. Novotorova and Mazzocco (2008) as well as Sun and Wang (2002) found that consumers in USA rank method of production as highly important – there is an overall preference for organically produced versus conventionally produced apples. Also Jerko and Kovačić (2008) conclude with similar finding for Croatia. In Albania, consumers largely perceive domestic agrifood products as organically produced while genetically modified (GM) apples are practically nonexistent – therefore the method of production was not included in the survey. Other important attributes like freshness, safety and quality were judged to be difficult to assign precise attribute levels. Moreover, for practical reasons, the number of attributes could not be extended beyond the four already selected, as adding more attributes makes survey implementation more complicated.

The attributes included in the study are represented by categorical variables which imply a decision to be made about the number of attribute levels. Four colors (red, yellow, green and red yellow stripped) corresponding to the four most common varieties currently in Albania (Red-chief, Golden Delicious, Grany Smith and Fuji) represent the four levels of attribute "color" Table 2). Domestic and imported are the two levels for the attribute "Origin". Including also the main regions of apple origin within Albania as attribute levels was declined in order to avoid respondents' fatigue. Two levels of fruit size – 5 and 8 cm – were selected based on consumers perception of "small" and "large" fruits" in Albania. The decision on fruit size attribute levels is based on focused group discussions and by consulting fruit wholesalers and retailers. The levels of apple price were decided by the research team given the price interval and its distribution team based on Agriculture Market Information System.

Table 2. Apple attributes and levels.

	Attributes			
	Color (Variety)	Price (ALL[2]/Kg)	Origin	Fruit size
Atribute level	Red (Starking)	50	Imported	Large (8 cm)
	Yellow (golden)	80	Local	Small (5 cm)
	Green (Granny Smith)	110		
	Red yellow striped (Fuji)	150		

Third and Fourth Conjoint Choice Design Stage: Choice of Experimental Design and Construction of Choice Sets

In this study, a Conjoint Choice Experiment (CCE) was used to design the survey and Latent Class Analysis (LCA) was used to analyze the data. Sawtooth Software SSI Web v 6.6 was used to design the survey and to prepare the data for processing, while Sawtooth Software Latent Class for CBC v 4.0.8 was used for data processing. Table 3 gives a brief description of the design stages of a CCE.

Table 3. Design stages for a CCE

Stage	Description
Selection of attributes	Selection of apple attributes has been done based on the literature review, expert interview and focus group discussions.
Assignments of attributes level	The range of attributes is also based on literature review, expert interview and market conditions. The attribute levels have been assigned such as to be reasonable and realistic.
Choice of experimental design	Fractional factorial design is used to reduce the possible combinations which combine the levels of the attributes that reduce respondents fatigue and also provide efficiency in model estimation.
Construction of choice sets	The concepts identified by the experimental design are then paired and classed into choice sets to be presented to respondents.

Source. Chan-Halbrendt et al. 2010

The idea that all goods can be described by their characteristics, also known as attributes, is the basis of CCE. For CCE, the most important attributes and their levels have to be determined when designing the study.

Using the CCE method in designing the survey with LCA to analyze the data collected, is an improvement on the traditional (i.e. one class) aggregated model analysis. The standard aggregated model has to deal with the independence of irrelevant alternatives problem, which affects the predictions of market niches. Latent classes take into consideration different segments with different utility preferences within a certain group or class (Magidson and Vermunt 2003). In LCA,

[2] Note. ALL stands for the Albanian Currency. Approximately 100 ALL = 1 USD during the time when the survey was carried out.

respondents are grouped, according to their choices in the CCE. The choices that respondents made are considered mainly based on their attribute preferences and their socio-demographics. In our study, we have not included socio-demographic variables affecting consumer choice because of software limitations.

Questionnaire Design, Sampling and Data Collection

Questionnaire Design

The questionnaire has been designed based on literature review, expert knowledge consultation, focus groups and brainstorming within the research team. The core part of the questionnaire consists of choice sets. After apple attributes have been selected and attribute levels assigned, the later have been combined into choice sets of triple concepts or profiles, as seen in Figure 1:

Apple Type		
Yellow (Golden)	Green (Granny Smith)	Red yellow striped (Fuji)
Domestic	Imported	Imported
Big (larger than 8 cm)	Small (less than 8 cm)	Small (less than 8 cm)
ALL 80 per kg	ALL 50 per kg	ALL 110 per kg
	I would choose	
↓	↓	↓
☒	☐	☐

Figure 1. Example of choice sets used in the survey.

Twelve choice sets (profiles) of triple concepts were included in each questionnaire, and each respondent was asked to choose 12 concepts, one for each triple choice sets. The minimum number of choice sets or profiles depend on the number of attributes and attributes levels (Novotorova and Mazzocco 2008) which determine the number of parameters. The number of parameters is equal to the total number of attribute levels minus the total number of attributes plus one. In our case with 12 attribute levels (2x4+2x2) and 4 attributes, the number parameters is 9 and the number of choice sets should be 13.5.

Sampling

A sample size of 250 questionnaires was deemed as an appropriate sample size to provide reliable estimates. Green and Srinavasan (1978) suggest a minimum sample of 100 respondents for conjoint analysis types of studies. Xu and Yuan (2001) suggest using the ratio of the number of respondents to the number of parameters when identifying the sample size; a ratio between 5 and 10 is a recommended ratio. In our study, the number of parameters is 9, and therefore a sample size to result in reliable results is between 45 and 90. Our sample of 250 is considered large enough to produce reliable results; similar sample size has been used in other similar surveys in Albania (Chan-Halbrendt et al. 2010; Zhllima et al. 2012).

Interviews were conducted in Tirana. We chose Tirana for three reasons: (i) purchasing power is concentrated mainly in Tirana, the country's capital; (ii) Tirana has a reasonably good demographic representation of the country as a whole (during the last twenty years, Tirana has grown from 200,000 to around 700,000 inhabitants as people from all over Albania have migrated to Tirana); and, (iii) interviews in Tirana reduce travel costs substantially. The interviews were carried out at various sites within Tirana as suggested by the focus groups. Interviews took place close to green markets and supermarkets – people were approached randomly in a face-to-face interview and after completing the interview, interviewers would approach the next closest person who walked by.

Table 4 (below) shows the gender and age structure of Tirana survey respondents. The study's population showed that older people are a bit over-represented in the survey when compared to the real population. Younger people and females are slightly under-represented in this study, as in Albania it is more common for men to do the food shopping, particularly for older generations. Such sample is in line with previous research on consumer behavior carried out in Albania (Imami et al. 2011; Zhllima et al. 2012).

Table 4. Socio- demographic comparison of survey respondents with Tirana's population.

		Survey Respondents	**Tirana Population**
		(%)	(%)
Gender	Female	46.1	50.14
	Male	53.9	49.86
Age	18-24	1.9	12.89
	25-30	3.2	7.66
	31-35	4.6	10.74
	36-40	5.1	11.40
	41-45	7.4	11.75
	46-50	14.8	10.48
	51-55	18.1	8.59
	56-60	17.1	6.67
	61-64	10.6	6.54
	65 and up	17.1	13.34

Source. INSTAT (for the Tirana population's figures)

Data Collection

Data have been collected by well trained and motivated interviewers and the process was closely monitored by the research staff. The questionnaire was properly coded in order to better manage data entering and data processing. A data entry file was prepared and entered in a SPSS database.

Data Analysis: Conjoint Choice Model Using LCA Approach

This is the final stage of the research design. As discussed in the literature review, conjoint choice method using LCA is an improvement on the traditional aggregated or one class model. In latent class analysis, the different segments that have different utility preferences are accounted for and hence better market predictions can be made.

The Latent Class Model is a random utility model. Building on the seminal work of McFadden (1973), consumer utility can be represented as follows:

$$U_{ijt} = \beta X_{ijt} + \varepsilon_{ijt} \quad (1)$$

where the subscript *i* refers to individual *i*, *j* refers to concept *j* and *t* refers to choice set *t*. The utility level U_{ijt} is a linear function of observable vector of attributes $\mathbf{x}_{ijt}$ and its coefficient to be estimated, $\boldsymbol{\beta}$. ε_{ijt} is a random error term, which captures all unobservable attributes and factors that influence the choice process.

McFadden (1974) showed that the probability that concept *j* in choice set *t* is chosen by individual *i* is given as:

$$P_{ijt} = \frac{\exp(X_{ijt}\beta)}{\sum_{k=1}^{J} \exp(X_{ikt}\beta)} \quad (2)$$

The numerator is the exponent of the observable utility of concept *j* in choice set *t*, and the denominator is simply a collection of observable utility from all available concepts.
In our study, only product attributes (color/variety, origin, size and price) have been considered, therefore an individual's probability of choosing concept *j* was considered as a function of apple attributes. The socio-demographic variables have not been considered, due to software limitations, as abovementioned.

Results and Discussions

Selection of the Model with Optimal Number of Distinct Classes

Consistent Akaike Info Criterion (CAIC) was used to determine the best model. Based on CAIC, the *four class model* was chosen over the three class and five class models. CAIC decreases substantially when passing from three class model to four class model, showing that four class model matches better the data, as shown in Table 5. CAIC is also smaller in the five class model compared to the four class model, but the rate of decrease is less significant. Additionally, the five class model contains two quite small classes of consumers, as shown in Annex 2. These criteria suggest that the four class model is the best model.

Table 5. Summary criteria of best replications.

Classes	Replication	Pct Cert	CAIC	Chi Sq	Rel Chi Sq
2	4	16.25	4907.22	929.6	71.51
3	3	19.94	4757.95	1140.92	57.05
4	5	22.4	4679.37	1281.56	47.47
5	5	24.51	4620.59	1402.39	41.25

Class Sizes and Importance of Attributes

The Class 1 represents almost half of the respondents (namely 44.7 percent) while the Class 2 represents 30.5 percent – these are the two largest classes and together make up more than ¾ of the total number of respondents. The Class 3 and 4 represent respectively 14.3 and 10.6 percent of the respondents. Details on respondents' class sizes and the importance of attributes for the four class model are described below in Table 6.

Table 6. Class sizes and importance of attributes.

	Class 1	Class 2	Class 3	Class 4
Share of each class	*44.70%*	*30.50%*	*14.30%*	*10.60%*
Importance of attributes (%)				
Variety	**44.5**	3.6	**52.9**	**83.9**
Origin	35.2	10.2	4.1	5.3
Size	12.0	6.1	22.6	1.8
Price	8.3	**80.1**	20.4	8.9

Variety and origin are the most important attributes for *Class 1*; the level of importance for these attributes is 44.5 and 33.2 percent respectively. Based on too low importance attached to price, one may infer that this class of consumers is composed of healthier consumers. Though we have not included consumers income in our analysis, based on micro-economic theory (higher consumers' income lead to higher prices), we interpret the too low importance attached to price as a tolerance to pay higher prices for preferred attribute. Therefore one can support that that Class 1 is composed of rather healthier and/or wealthier consumers.

Price is the most important attribute for *Class 2* – level of importance for this attributes is 80 percent. One may argue that Class 2 is made up by less wealthy or lower income consumers (high importance attached to price and low important attached to other attributes). Origin is also rather important for members of this class.

Variety is the most important attribute for *Class 3* whose level of importance is 53 percent. Class 3 members attach a high importance to fruit size; this is the class with the highest importance attached to fruit size. It is argued that Class 3 is composed of medium income consumers (rather significant importance attached to price).

Variety is by far the most important attribute for *Class 4* – level of importance for this attributes is 84 percent. As in case of Class 1, this class is composed of healthier consumers (less importance attached to price).

Origin is very important for the two largest classes (Class 1 and Class 2) which actually make up ¾ of consumers. There is currently an overall preference for Albanian products. Recent studies confirm the overall preference of Albanian consumers for domestic products such as lamb, olive oil, table olives, and wine (Imami et al. 2011; Chan-Halbrendt et al. 2010; Zhllima et al. 2011, Zhllima et al. 2012).

Consumer Preferences

Members of *Class 1* prefer green apple (Granny Smith variety) to yellow (Golden) and red yellow striped apples (Fuji variety). Additionally, they prefer domestic apples to imported ones, and bigger size apples to smaller ones (Table 7). We name this class as "*Local green*".

Table 7. Parameter estimates

	Class 1		**Class 2**		**Class 3**		**Class 4**	
Variety	Utility(β)	t	Utility(β)	t	Utility(β)	t	Utility(β)	t
Red (Starking)	-0.01	-0.12	-0.08	-0.78	-0.01	-0.13	**2.09****	12.61
Yellow (Golden)	**-0.30****	-4.88	-0.11	-1.11	**1.37****	11.90	0.05	0.35
Green (Granny Smith)	**0.57****	10.89	0.09	0.83	**-0.76****	-5.61	**-1.22****	-6.03
Red Yellow Striped	**-0.27**	-4.48**	0.10	0.97	**-0.60****	-4.69	**-0.92****	-5.08
Origin								
Domestic	**0.34**	10.22**	**0.30****	4.67	0.08	1.20	-0.11	-1.11
Imported	**-0.34**	-10.22**	**-0.30****	-4.67	-0.08	-1.20	0.11	1.11
Size								
Big (8 cm)	**0.12**	3.58**	**0.18****	3.18	**-0.46****	-6.51	0.04	0.39
Small (5 cm)	**-0.12**	-3.58**	**-0.18****	-3.18	**0.46****	6.51	-0.04	-0.39
Price								
Price	-0.05	-1.83	**-1.58****	-20.47	**-0.27****	-4.28	0.12	1.37

** Significance at 0.01 levels

Members of Class 1 are not price sensitive and prefer less sugar content apples. It can be can inferred that Class 1 is composed of healthier consumers (not price sensitive) whose choice is affected by their health concerns (they prefer less sugar content apples). The recent data from Albanian Ministry of Health (MoH) support that 3 in four deaths are caused by cardio-vascular and tumor diseases and three in five deaths are caused by cardio-vascular diseases alone (MoH 2012); both kinds of diseases are also associated with eating habits.

Price is the most important attribute for *Class 2*, a reason for us to name it as "*Price sensitive*" class. Price has significant negative value. Consumers in this class are oriented primarily towards lower price (cheaper) apple. This class is composed most probably of less healthy consumers.

Similar to Class 1, domestic apples are preferred to imported ones, and bigger size apples to smaller ones.

Variety is the most important attribute for *Class 3*. Members of Class 3 prefer yellow to green and red-yellow apples (we name it "*Yellow Class*"). Additionally, they prefer small size to large size apples, while show no significant preference to the attribute of origin.

Variety is by far the most important attribute also for *Class 4*. Consumers in Class 4 prefer red apple (we name it "*Red Class*") to green and red-yellow apple in comparison to other varieties. Consumers in this class show no significant preference for the attributes of the origin and size.

Utilities and Consumers' Willingness to Pay

Table 7 summarizes part worth utilities (parameters) and their significance. Based on these estimates, one may compute consumers' willingness to pay for each attribute level and calculate premium for choosing one attribute level over another.

As discussed by Lusk and Schroder (2004) and Colombo (2008), *willingness to pay (WTP)* is derived by the price difference necessary to invoke indifference between two alternatives. Total WTP for attribute o_n (in case of origin attribute, n takes the values of 1 for domestic and 2 for imported) versus "none" option is simply calculated as the ratio of the attribute specific constant (part worth utilities) to the price coefficient: β_{on}/α. Marginal WTP for attribute level 1 versus attribute level 2 can be calculated as a ratio of the difference between total WTP for attribute level 1 and total WTP for attribute level 2 and the price coefficient, or as the ratio of the difference between alternative specific constant (part worth utilities) of attribute *level 1* and *2* and the price coefficient: $(\beta_{o1}-\beta_{o2})/\alpha$; as explained, *o* stands for product origin.

The consumers in the *first class are* willing to pay ALL 13.6 more for each kg of domestic apple as compared to imported apple ((0.34-(-0.34))/(-0.05). Additionally, they are willing to pay ALL 17.4 per green apple versus yellow apples and 4.8 ALL per kg of big apples versus small apples. The *third class* of consumers is quite the opposite of the first class; consumers in this class are willing to pay ALL 7.9 more for yellow apples versus green apples, and 3.4 ALL for small apples versus big apples. The consumers of the *fourth class* show a strong preference for red apples, since they are ready to pay ALL 27.6 more per kg of red apples versus green apple.

Conclusions

This study aims to identify consumer classes and their preferences for main apple attributes, such as variety, origin, size and price in order to provide marketing and policy recommendations.

Findings on consumer preferences are essential for private actors throughout the apple value chain and policy-makers. Information on market segmentation and segments' sizes, benefits private actors in terms of learning about apple attributes (varieties, fruit sizes) preferred by consumers; it benefits also policy-makers, particularly MAFCP, in terms of better orienting its current investment support scheme toward varieties that have higher demand.

Study results reveal that origin, variety, and size are quite important attributes. *Variety/color* is so important that the first class can be named "green class", the third class can be named "yellow class" and the forth class is named "red class". Class 1 (which is also the largest) is willing to pay more than 17 ALL per kg of green apple versus yellow apple. Apple color is found to be important by Jerko and Kovačić (2008).

There is a clear preference for *domestic versus imported* apples in three out of four classes. For the first (largest) class of consumers, there is a clear preference for domestic versus imported apple, and willingness to pay a premium of ALL 13.6 for each kg of domestic apple as compared to imported apple. The preference for domestic apples is supported by other studies conducted in Albania (USAID'AAC 2010). Jerko and Kovačić (2008) as well as Novotorova and Mazzocco (2008) have also found that consumers rank origin among the most important attributes, preferring locally produced apples, respectively in Croatia and USA.

The distinction between domestic and imported apples does not seem to be very objective however. While more than 1/3 of consumers (35.5 percent) believe to be able to distinguish domestic from imported apple by themselves, and 41.5 percent make the decision on origin by asking the trader, a related in-depth survey (USAID'AAC 2010) has found that there is a preference for domestic apples before testing and lack of recognition for imported and domestic apples after testing.

Our study finds that fruit *size* comes out to be important in three out of four classes. It is important to emphasize that the preference for large size apples (the first and second class of consumers) and for small size apples (third class of consumers) implies consumers' willingness to pay for that attribute. Manalo (1990), using a CCE and Richard and Smith (2004) using a hedonic pricing model found willingness to pay for large apples. Apple size is associated with either apple quality or production method. According to the focus groups, larger size, when preferred, implies better quality phrased as "better appearance" or "better taste", and smaller size, when preferred, implies a "more naturally" grown fruit or more convenience in consumption.

Thus, our study findings are in line with previous apple consumer studies conducted elsewhere. On the other hand, our study adds new knowledge on apple consumer preferences compared to existing studies (Wirth et al. 2011; Jerko and Kovačić 2008; Manalo 1990), and goes one step further by analyzing consumer preferences for each of the identified consumer classes. This study provides detailed information for preferred product attributes to agrifood value-chain stakeholders. Additionally, the WTP was calculated for each of the main attributes, which was not done in the abovementioned studies, provides useful information to the apple sector decision-makers.

The *implications* should be considered from both marketing and policy viewpoints. Apple variety and fruit size are quite important attributes in marketing. It is important that actors throughout the apple value chain (farmers, collectors/traders) think not in terms of producing and selling simply "apples", but producing and selling "green apples", "yellow apples" and "red" apples. This is important for targeting different consumer segments. We discussed that consumers belonging to Classes 1 and 4 are healthier consumers, and Class 3 consumers are medium income consumers. Study results show that the members of these classes are willing to pay a premium

for preferred apple attributes. The importance attached by consumers to fruit size should have an adequate response by both private actors in terms of grading policy.

In terms of policy, this study suggests that government should pay due attention to supporting domestic apple promotion and design awareness raising campaigns stressing the importance of apple consumption for healthy diet. Three-forths of the consumers represented in Classes 1 and 2 (Table 6), consider production origin a valued attribute. Regarding origin, a highly important recommendation should be considered: there is a difference between subjective preference for domestic apples and a lack of objective differentiation between domestic and imported apples. Therefore, designing a certification program for "domestically produced apples" is likely to better channel customer preferences to domestically produced apples. Regional branding coupled with producers identification information is already instituted as the most important producing apple area in Albania. The preference of consumers to less sugar content apples suggests that health concerns are important. The government may therefore need to consider designing and implementing a consumer education policy, including school curriculum improvement.

Related literature and expert opinions – as discussed in this paper – support the hypothesis that other apple attributes such as freshness, safety, quality, method of production and regional origin within Albania are also important. Additionally, socio-economic determinants of consumer choices were not fully addressed in this study. Further studies may address them. Finally, being limited only to the Tirana market— despite arguments that Tirana market is rather representative – may have somewhat biased the study results, and therefore some precaution is advised when generalizing the results at a country level.

Acknowledgment

This research work was supported by World Learning, AHEED and HED financed by USAID. Special thanks to Dr. Catherine Chan-Halbrendt, coordinator of the AHEED program for assisting us throughout the research project, and to Mr. Besart Likmeta for editing. We are thankful to Dr. Domenico Dentoni for his valued comments and to unknown reviewers for their useful analysis.

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Appendix 1. Summary of Results

Summary of Best Replications

Classes	Replication	Pct Cert	CAIC	Chi Sq	Rel Chi Sq
2	4	16.25	4,907.22	929.60	71.51
3	3	19.94	4,757.95	1,140.92	57.05
4	5	22.40	4,679.37	1,281.56	47.47
5	5	24.51	4,620.59	1,402.39	41.25

Solution for 4 Classes (Replication 5)

Percent Certainty		22.40		
Consistent Akaike Info Criterion		4,679.37		
Chi Square		1,281.56		
Relative Chi Square		47.47		
Segment Size	0.14	0.11	0.45	0.31
Part Worth Utilities				
Red (Starking)	-0.01	2.09	-0.01	-0.08
Yellow (Golden)	1.37	0.05	-0.30	-0.11
Green (Granny Smith)	-0.76	-1.22	0.57	0.09
Red Yell Strip (Fuji	-0.60	-0.92	-0.27	0.10
Local	0.08	-0.11	0.34	0.30
Imported	-0.08	0.11	-0.34	-0.30
Big (8 cm)	-0.46	0.04	0.12	0.18
Small (5 cm)	0.46	-0.04	-0.12	-0.18
Price	-0.27	0.12	-0.05	-1.58
t Ratios				
Red (Starking)	-0.13	12.61	-0.12	-0.78
Yellow (Golden)	11.90	0.35	-4.88	-1.11
Green (Granny Smith)	-5.61	-6.03	10.89	0.83
Red Yell Strip (Fuji)	-4.69	-5.08	-4.48	0.97
Local	1.20	-1.11	10.22	4.67
Imported	-1.20	-1.11	10.22	-4.67
Big (8 cm)	-6.51	0.39	3.58	3.18
Small (5 cm)	6.51	-0.39	-3.58	-3.18
Price	-4.28	1.37	-1.83	-20.47
Attribute Importance				
Variety	52.89	83.90	44.55	3.62
Origin	4.05	5.33	35.19	10.18
Size	22.64	1.84	11.99	6.14
Price	20.41	8.93	8.27	80.06

Appendix 2. Summary of Best Replications, Graphical Representation