Research Article

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A Hedonic Price Analysis of Consumer's Preferences and Willingness to Pay for Quality Attributes of Apple

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Abstract | This study investigates consumers' preferences and estimate willingness to pay for different quality attributes of apple in Peshawar district of Khyber Pakhtunkhwa. A sample 150 apple consumers were interviewed at different fruits retail shops to collect data on apple varieties, prices and quality attributes, such as color, size, shape, freshness and external defect. The data were analyzed using hedonic pricing model. Results show that Consumers have strong preferences for apple freshness, size, color and juiciness and their willingness to pay for these attributes are significantly greater than zero. On the basis of these findings the study recommends that apple growers should focus on best quality apple varieties and should maintain post harvest quality of their product.

Introduction

Food quality means characteristics of food a consumer looks for while making a decision to purchase it. This includes external appearance, such as size, shape, color, firmness and consistency, and internal factors, such as juiciness, pulpiness and sweetness etc. These characteristics bear ability to satisfy a human desire. The quality attributes of a product are important in determining the degree of acceptability in consumers. The acceptance of a product depends on whether it responds to consumer preferences for quality attributes and on the degree of satisfaction that it is able to provide (Heldman, 2004).

The appearance of a fruit, such as its structure, weight, shine and color, draw consumers' attention and their first time purchasing decision. Once they are attracted by the appearance of a fruit, the internal characteristics, such as aroma and taste of freshness, spiciness and sweetness are critical to continuous and consistent choice for the fruits. Nutritional value of a fruit is another quality factor which affects a consumer's choice. Nutritional value is impossible to see, taste, or feel, and critical for the growth and long-term development of our bodies.

Apple is an important and popular temperate climate fruit. It is a highly nutritive fruit containing essential food elements such as sugar (11%), fat (0.4%), protein (0.3%), carbohydrates (14.9%) and vitamins C, A and B in a balanced form. In Pakistan, apples average production is 540.9 (000) tons per year (Table 1). It increased from 441.0 (000) tons in 2008-09 to 616.0 (000) tons in 2015-16, with an annual growth rate of 6.3 percent per year.

Table 1: *Apple production and export of Pakistan.*

Year	Production ('000' tons)	% Increase in production (000 tons)
2008-2009	441.0	-
2009-2010	366.0	-17.0
2010-2011	526.0	43.7
2011-2012	599.0	13.9
2012-2013	556.0	-7.2
2013-2014	606.0	9.0
2014-2015	617.0	1.8
2015-2016	616.0	-0.2
Average	540.9	6.3

Source: *Pakistan Economic Survey (2015-16).*

This study is designed to achieve the following objectives:
1. Investigate consumers' preferences for quality attributes of apple in local market of district Peshawar (Pakistan)
2. Estimate willingness to pay for different quality attributes of apple.

The understanding consumers' preferences and willingness to pay for different quality attributes is important in the decision making process for producers and traders. Therefore, providing information on apples quality attributes which are mostly demanded by various consumers might be useful for producers and other agencies.

Materials and Methods

Sampling and data collection
This study was conducted in Peshawar district of Khyber Pakhtunkhwa, Pakistan. To achieve the aforesaid objectives of the study, 150 apple consumers were interviewed at different fruits retail shops located in eastern Peshawar city. They were interviewed during apple harvest season (September–October) and off-season (February-April) of 2017-18. Data were collected on apple varieties, their prices and quality attributes, such as color, size, shape, freshness and external defect.

Willingness to pay estimation mechanism
A number of research studies have utilized the hedonic technique for pricing agriculture commodities (Lima et al. (2009); Hahn et al. (2007); Carew et al. (2000); Combris et al. (1997); Oczkowski (1994); Wough, (1928) are few of them). Lima et al. (2009) developed

a hedonic price model for assessing fresh peach quality attributes and prices at producer sale point in the state of Sao Paulo. Carew et al. (2000) studied apple quality and prices by applying hedonic price model in British Columbia. Results revealed that apple quality had an effect on marketing strategies of packers and marketers. Quality attributes such as (grading, cultivar, storage time and marketing season had an influenced over apple prices.

The following two steps procedure was followed to estimate household's WTP for different quality attributes of Apple. In the first step the following linear Hedonic Pricing Model was estimated for apple fruits using its quality attributes as explanatory variables:

$$P_j = \alpha_0 + \sum_{i=1}^{n=5} \alpha i . X_{ij} + \varepsilon \quad ....(1)$$

Where;
P_j= The price per unit paid by J^{th} household; J = (1,2,3……..n) Total households; X= (X1, X2, X3 …….X5) five different attributes of apple such as freshness, Juice, size, color and firmness; ε_i= Error term.

In the second step, the household's willingness to pay for a quality attribute was derived from the estimated HPM by differentiating it with respect to that attribute.

$$\frac{\partial P_j}{\partial X_i} = \alpha_i = WTP_i \quad ....(2)$$

Results and Discussion

Socio-economic characteristics of the respondents Table 2 present the household's socioeconomic characteristics of the respondents in the study area. All of them were headed by male individuals and their mean age and education level were 40 years and 11.38 years, respectively. The average household's size was 8 individual and the monthly income and consumption expenditures were rupees 50,600 and 40,860 respectively. The daily average per capita income is 210 rupees, which is slightly above the poverty line of 200 rupees per day. The food consumption expenditure is 30,000 rupees, out of which around 8000 rupees are spend on fruits.

Table 2: *Household characteristics of the interviewed respondents.*

Characteristics	Mean	Min	Max
Age of the Head (Years)	39.97	22	60
Household size (Individuals)	5.6	3	14
Head's Education (Years)	11.38	0	18
Monthly Income (PKR)	60,530	20,000	80,000
Monthly Consumption (PKR)	34,860	15,000	70,000

Characteristics of commercially grown apple varieties

Apple is cultivated in Northern areas such as Ghilgit, Balthistan, Kashmir, Swat, Chitral, Dir and Western agencies such as Bajawar, Waziristan and Zyarat and Qilath district of Baluchistan.

Most of the commercially grown apple cultivars in Pakistan require a cooler climate than all other fruits. Apple requires relatively less humid and too low temperature, and these conditions meet at higher altitudes. Therefore, proper selection of varieties is of major importance. Varieties grown under such conditions are Amri, Kashmiri Amri, Golden Delicious, Red Delicious and Meshaddi etc. Details on each of these commercially grown apple varieties are given in Table 3.

Table 3: *Comparison of quality attributes of different apple varieties.*

Apple varieties	Weight/ Unit (gm)	Color	Juici- ness	Pulpy	Duration (Months)
Kashmiri Amri	110	Red	Low	High	October – January (5)
Red Delicious	170	Red	High	Low	September- December (4)
Golden Delicious	190	Golden	Low	High	October- December (3)
Meshaddi	120	Yellow	Low	High	Off-Season (6)

The study further examined the physical characteristics of the given varieties. Physical parameters included fruit weight, color, juice, pulp and firmness. Fruit weight was calculated by weighing 6 apples from each variety and divided the weight by 6. For the pulp and juice these selected apples were sliced and pulp were obtained from these sliced pieces separately for each variety.

Results presented in Table 3 showed that Red delicious and Golden delicious were found better regarding the fruit weight as compared to other varieties. The most important parameter to determine the quality of apple is its juice and pulp quantity. Both these characteristics were negatively correlated to each other. High juices were found in red delicious while pulp was found in Kashmiri Amri, Golden delicious and Meshaddi.

Estimated hedonic pricing model

The estimated results for apple Hedonic Pricing Model are given in Table 4. The coefficients for most of the quality attributes are positive and statistically significant, as indicated by their t-ratios and p-values. The coefficient for freshness is 11.85 which indicate that consumers are willing to pay around 12 rupees more for fresh apple. Furthermore, their willingness to pay for juiciness, size, color and firmness of apple are Rs.10.79, Rs.9.56, Rs. 8.91 and Rs. 8.89 respectively. Season is a dummy variable and its coefficient is 30, revealing that the off-season price per kilogram of apple is greater than harvest season by 30 rupees.

Table 4: *Factors effecting consumers' willingness to pay.*

Variables	Coefficient	t-ratio	p-value
Constant	40.15	3.189	0.000
Freshness	11.85	4.017	0.000
Juiciness	10.79	3.647	0.000
Size	9.56	4.356	0.000
Color	8.91	4.237	0.000
Firmness	8.89	1.057	0.230
Season dummy	30.0	3.00	0.000

Conclusions and Recommendations

Consumers have strong preferences for quality attributes such as freshness, size, color and juiciness of apples and their willingness to pay for these attributes are significantly greater than zero. On the basis of these findings the study recommends that apple growers and people involved in its business should focus on maintaining quality of the product. Researcher should focus on developing best quality varieties for apple. Government may support growers and related individuals for providing best transportation and storage facilities.

Novelty Statement

Novelty of this study will provide valuable informa-

tion to producers regarding different apple attributes. The study further highlighted juiciness, size, color and firmness of apple which is important attributes in view of consumers.

Author's Contributions

Jahangir Khan conducted this study, collected the data and wrote the draft of the manuscript. Syed Shah helped in model specification and data analysis. Khurram Nawaz Saddozai full reviewed the paper for technical write up. Shahid Ali helped in data entry, Muhammad Fayaz helped in paper setting and Abbas Ullah Jan supervised the paper and helped in abstract.

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