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## Qualitative Factors Affecting the Price and Demand of Honey in Saudi Arabia

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### ABSTRACT

This study was conducted to analyze the impact of quality factors on the price of honey in the Kingdom of Saudi Arabia. The data were collected from 343 retailers in addition to 331 consumers of seven major cities of Saudi Arabia; and analyzed using descriptive statistics, ANOVA and HPM. The result of the study revealed that locally produced honey such as Sidr, Sumra and Talh were preferable due to its quality. The most important quality characteristics of locally produced varieties of honey are good flora and attractive packaging, as they add a significant retail price premium to the base price. The premium is estimated to be SR11/kg. and SR8.5 kg. respectively. However, purity add insignificant price premium amounted to be SR 5.13/kg. Beekeeper are advised to carefully chose the type of flowers where their honeybees feed on, as it influences honey preference of the consumers. Marketing services, especially packaging is essential for honey marketing. Moreover, attractive packages is highly recommended as it increase honey retail price significantly. Beekeeper are advised to carefully chose the type of flowers where their bee hives feed on, this affect resultant honey variety with good smell. Marketing services, especially packaging is essential for honey marketing. Moreover, attractive packages is highly recommended as it increase honey retail price significantly

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## INTRODUCTION

Honey consists wide range of sugars, minerals and vitamins and their proportions are varying from honey to honey depending on their quality and botanical origins (Saadatmand, 1999). Types and quality attributes of honey are the most essential factors explaining honey price variations. Consumer tastes and their abilities to differentiate between type and quality characteristics are the bases of prices they pay for honey. Relative importance of each quality characteristic is represented in scores given from consumers point of view in light of their ability to distinguish the product type and qualitative characteristics.

Honey quality attributes are the characteristics, which relate to consumer's expectations and complements the determination of botanical origin and physicochemical characteristics. Honey properties may be scored and described using the senses of human beings as an analytical tool. Sensory analysis of honey has been practiced since many years back in different countries like in France, Italy and Spain (Gonnet and Vache, 1998; Estupinan *et al.*, 1999; Piana *et al.*, 2004; Galán-Sodevilla *et al.*, 2005; Gonzalez *et al.*, 2010). Moreover the International Honey Commission (IHC, 2001), and the United State National Honey Board (2002), have published extensive work on the sensory attributes of honey. Moreover, many studies used analytical methodology and descriptions of honey attributes (Aparna and ajalakshmi, 1999; Ciappini, 2002; Anupama *et al.*, 2003; Garitta and Rodriguez, 2006; Montenegro *et al.*, 2008 and Sabag *et al.*, 2009).

Literatures indicated that many economic studies analyzed the impact of different explanatory factors (product type and quality attributes) on the price of honey through a standard econometric model (Hedonic Pricing model (HPM)). Hedonic pricing model was specified as the price of un homogeneous commodity which is a function of the quality characteristics and marketing services of such commodity. HPM, has been utilized by Haas and Court (Goodman, 1998 and Colwell and Dilmore, 1999). HPM has been utilized in a wide range of commodities, like the impact of the type of marketing services and quality characteristics of fruit on their prices in Saudi Arabia (Esa, 1998), and the impact of several factors on changes in housing prices in China (Wen *et al.*, 2005) using various functional forms to express the relationship between the price, as the dependent variable,

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and the variables causing the variation in price, as explanatory variables. Moreover, HPM has also been used to analyze the relative importance of the influence of quality factors on rice price (Ghorbani, 1996). Moreover, Horbani and Mirbemani (2005) utilized HPM to explain factors influencing changes in prices of beans as a result of the changes in the color, purity, cooking and the level of packaging. HPM was also used to investigate the impact of environmental changes on food expenditure and housing for a family in the city of Riyadh (Rejaib, 2009). Latinopoulos *et al.* (2004) used HPM to detect the implicit value of irrigation water through the analysis of the value of agricultural land in a typical rural area in Greece and he found the high impact of irrigation water on the price variations of agricultural land. Also, Batalhone *et al.* (2002) used Hedonic Pricing model to estimate the economic impact of the strong smell that arise from sewage water treatment plants, on the values of properties, which lies around the plant and the study indicated the presence of a significant decline in the value of the property because of the pollution in the environment. These generally indicate that HPM is very important tool to determine the price of wide range of commodities.

HPM model was also employed by different investigators to determine the influence of the type and quality characteristics of honey on its price (Becker, 1965; Lancaster, 1966; Rosen, 1974 and Lucas, 1975). To explain the reasons of variations in honey price Abebini and Asgari (2005) analyzed the effect of the destination of import and export market on the price of honey in Iran. Moreover, Ghorbani and Khajehroshanaee (2009) analyzed qualitative factors that affect consumers demand for honey, using Hedonic Pricing Model in province of Khorasan Razavi Republic of Iran. Moreover, the authors reported that type, with beeswax (as with comb), packaging, color, aroma, sweetness, and purity were the most important factors that have a direct impact on the variation of honey prices.

Ciappini *et al.* (2013) indicated that sensory analysis of honey is an important tool for determining its floral origin, for subsequent quality control practices and which ultimately will determine consumer preferences towards the product. The sensory quality characteristics include color, floral flavor, intense flavors, tendency to quick crystallization, intensities of sweetness and aroma. These indicators of quality provide a differentiating tool to determine the value of honeys and their prices.

With this background the study was focused to analyze the impact of quality factors on the price of honey in the Kingdom of Saudi Arabia. The study specifically focused on the descriptive analysis of the most important varieties and quality characteristics of honey; honey price variation according to honey variety and quality attributes and finally the study tried to specify and econometrically estimate the parameters Hedonic Pricing Model of honey in Saudi market.

### **Research Methodology:**

The study was mainly based on primary data, generated from sampled retailers and consumers of honey. The data collection was carried out using direct contact with targeted retailers and consumers. The study covered seven major cities of Saudi Arabia (Riyadh, Jeddah, Taif, Tabuk, Dammam, Asir and Jizan. For this questionnaire were developed and have been used after being tested, and revised. The questionnaire was designed to accommodate both quantitative and qualitative data. The questionnaires related to retailers include: nationality, educational level, profession, proportion of the annual income from honey trading, quality attributes, and outlets to procure the honey, honey marketing problems and retail prices of honey. For honey consumers in addition to the above information; their annual income, occupation of the head of the household and the motives for honey consumption were included. For both categories the quality attributes like: origin of the honey, Comb honey, degree of sweetness, color, degree of purity, physical state (liquid or crystalized), viscosity and packaging status were considered. The data were collected through personal interviewing of a total of 674 (343 retailer and 331 consumers) households. Both retailers and consumers households were interviewed in retail outlets selling and buying honey in the above mentioned seven cities. Descriptive statistical, analysis of Variance and HPM were utilized to analyze data using SPSS version 15.

### **Honey HPM specification:**

Honey hedonic pricing model was specified according to economic theory, previous studies and accurate knowledge about Saudi market based on field observation and interviewing of stakeholders in honey system in Saudi market. Dummy variables (Ismaiel,1990; Philips, 1975) were utilized as instrumental variable representing honey varieties and quality attributes that case additional price premium over the honey price base Regular Kashmiri honey with no favorable quality attributes

$$P = a + b_1 S_0 + b_2 W_x + b_3 S_w + b_4 C_o + b_5 S_c + b_6 P_r + b_7 P_u + b_8 P_a + b_9 S_{id_r} + b_{10} S_{um_r} + b_{11} T_{al_h} + b_{12} O_{th_e_r_s} + U$$

Where:

P : honey price (Riyal/kg.)

So : honey source (imported =0 and local =1)

Wx: Comb honey (without = 0 and with =1)

Sw: natural sweetness (high sweet=0 and natural sweetness=1)

Co: color (dark=0 and light= 1)

Sc; flora or scent (no scent=0 and intense scent=1)

Pr: viscosity (low=0 and high =1)

Pu: purity (low=0 and high=1)

Pa: packaging (regular=0 and attractive=1)

Sidr: Sidr (*Zisiphus spina-christii*) honey variety (=1 and otherwise =0)

Sumra: Sumra (*Acacia tortilis*) honey variety (=1 and otherwise =0)

Talh: Talh (*Acacia origina*) honey variety (=1 and otherwise =0)

Others: Other honey varieties (=1 and otherwise =0)

U: Residuals

a: Basic honey price (SR/kg.) the price of regular kashmeri honey of low quality characteristics.

b: honey price premium for favorable hone variety or quality attributes.

## RESULT AND DISCUSSION

Result of this study showed that about 64% of sampled consumers prefer to buy comb honey as strained, while about 36% of them prefer to buy comb honey. Comb honey is observed to affect the price level of honey because it reflects the natural characteristic of honey which agrees with the findings Ghorbani and Khajehroshanaee (2009) who reported the strong positive effect of comb honey on its price.

About 58% of respondents prefer honey with a moderat sweetness and 42% prefer the high sweetness honey. About 51% of the respondents preferred light colored honey, while 49% prefer dark color. About 60% prefer a honey with a characteristic aroma honey, while about 40% of them preferred honey without aroma. About 58% of the sampled respondents preferred honey with high viscosity, while 42% prefer the honey with less viscosity. About 65% of the respondents prefer pure honey, free from dead bees, beeswax residue and impurities, while 35% of respondents do not care about the purity of honey. The packaging of honey is considered essential marketing service for honey. However, 50% of the sampled respondents do not care much about the quality of the package (whether attractive or regular), but they care about the content of the package the variety and quality of honey, where the price is not affected much by the type of package, especially for locally produced honeys.

Generally, the study showed that consumer preference in the Saudi market tends to pay higher prices for the honey without wax, with natural taste, light colored, having characteristic aroma, with high viscosity, well strained. It is also concluded that consumers do not pay much attention or much concern for attractiveness of the packaging of honey in Saudi market.

### *Analysis of honey price variation:*

The field survey study showed the prevailing of a very large discrepancies in the prices of various types of honey in the Saudi market. The honey retailing prices ranged between a minimum of 20 SAR/kg (\$ 5.33/kg) to a maximum of 700 SAR/kg (\$186/kg). To understand honey consumer segments according to the prices they pay for honey, purchased honeys have been divided into four price categories: first, category was honey of low price, which ranges between SAR 20/kg to 100SAR/kg, the second category was, honeys of price in the range of 100 SAR/kg to 200SAR/kg, the third category was honeys with the price range between SAR200/kg to 300 SAR/kg, and the fourth category was those honeys with prices above SAR 300/kg. The study result showed that 42.1% of consumers are buying honey with a first category (low price), 26.6 % of the sampled consumers were buying honey with a second price category, about 22.7 % of sampled consumers were buying the third price category, while limited percentage (8.5 %) of consumers purchase honeys with fourth price category (high price honey).

These result are in agreement with some published studies such as Ghorbani and Khajehroshanaee (2009).

Table 1 shows the average retail prices for different types of honey according to quality attributes from the perspective of a sampled retailers in the Kingdom. In all cases, it was noted that the Sidr honey is highest price , followed by Sumra honey, then Talh honey and Kashmiri honey was the cheapest. In terms of quality attributes under study, result showed that the locally produced honey are higher priced than imported honey, honey sold with natural wax is higher priced than honey marketed without wax, honeys with natural taste was more expensive than high sweet honey, light colored honey is higher priced than dark colored honey (except Sumar and Talh honeys), honeys with strong aroma was higher price than honey of no aroma, and strong viscous honey is higher price than honey of low stickiness, pure honey is more expensive than non- pure honey. It is also noticed that attractive packaging make the price little bit higher.

The result showed that Sidr honey retailing price was generally high and was ranging between a minimum of SR 125/kg, to a maximum of 660 SR /kg, making an average of  $308.17 \pm 67.60.99$  SR /kg. The retail price of Sumra honey was ranged between a minimum of SR 50/kg, to a maximum of SR 500/kg, making an average of  $210.99 \pm 81.04$  SR/kg. The retail price of Talh honey ranged between a minimum of 70 SR/ kg, to a maximum of SR 500 / kg, making an average of  $208.21 \pm 71.18$  SR /kg. Finally the retail price of imported honey was ranged between a minimum of 35 SR /kg and a maximum of SR 500/kg, making an average of  $175 \pm 13.987$  riyals/kg.

Generally, the retail price of honey is very high in the country which could be many associated factors like high living standard (level of household income), cultural and religious reasons believing more in medicinal and nutritional value of honey.

It was also noticed the convergence of the maximum retail price for all honey types, this could be interpreted by various several reasons, including the possibility of the existence of some commercial fraud because of the inability of the consumer to distinguish between types of honey.

**Table 1:** Average retail price of honey (SR/kg) according to type and quality characteristics in the Saudi market, 2012.

Quality Characteristic	Rank	Sidr	Sumr	Talh	Kashmeri	Others
Originality	Imported	287.6	181.28	160.9	76.6	99.8
	Local	328.8	254.52	238.5	-	410.2
Comb honey	Without	326.4	250.73	235.6	76.6	373.3
	With	369.6	285.79	270.9	85.1	420.3
Sweetness	normal or law	328.4	250.12	236.9	76.6	369.5
	High	263.6	200.28	183.5	63.9	309.95
Color	Dark	283.9	248.59	230.8	66.0	331.3
	Light	328.4	204.27	193.7	76.6	373
Scent	Without	229.3	171.83	155.6	54.9	262.5
	With	328.7	250.73	234.0	76.7	372.6
Protraction	Low	255.3	193.96	176.3	58.8	294.3
	High	328.8	251.65	234.4	76.6	372.6
Purity	Low	233.9	171.00	153.8	54.4	235
	High	328.8	250.12	235.5	76.6	372.68
Backing	Normal	313.4	242.88	224.0	66.30	370.5
	Attractive	329.1	250.74	234.8	77.19	372.2

Source: calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

To test the effect of quality on honey price, one way analysis of variance was utilized to test the significance of price differences among quality characteristics.

The study clearly indicated the presence of significant ( $P < 0.01$ ) price variations as a result of quality attributes of different honeys (Sidr, Sumra, Talh, Kashmiri) in aggregate manner (Table 2).

**Table 2:** Analysis of variance for retail price of honey according to quality characteristics in Saudi market, 2012.

Quality Characteristic	Rank	Average price (SR/kg)	F	P (value)
Originality	Imported	235.9872	222.143**	.000
	Local	132.9030		
Comb honey	Without	216.5263	29.108**	.000
	With	160.4839		
Sweetness	low	185.7623	62.512**	.000
	High	132.1847		
Color	Dark	139.6076	37.838**	.000
	Light	182.6731		
Aroma	Without	167.9429	3.025**	.000
	With	155.4743		
Viscosity	Low	184.8083	42.956**	.000
	High	139.1222		
Purity	Low	184.5276	67.247**	.000
	High	125.7467		
Packing	Normal	167.4160	9.666**	.002
	Attractive	143.4979		

\*\* Significant at 0.01 significance level. \* Significant at 0.05 significance level

Source: calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

#### **Types of honey prevailing in the Saudi market and it's quality attributes:**

Saudi market has many types of locally produced as well as imported honey. And the honeys are mainly categorized according to the source of the botanical origin used by honey bees to collect nectar which is the major raw material of honey. Moreover, different honeys by country of origin are also very common. According to this study in current Saudi markets 8 and 10 major types of honeys are traded as locally produced and imported honeys respectively indicating very diverse honeys are being used.

As many countries in the world here locally produced honeys are favored by consumers in the Saudi honey market in spite of their high price, especially Sidr, Sumra and Talh honey. The preferences of locally produced honeys may associated with long time familiarization of local consumers of the taste of local honeys. The quality of honey from the consumer's perspective is determined based on several characteristics, the most important quality characteristics are purity (free from any foreign objects) the higher the degree of purity of honey, the higher consumer willingness to pay a higher price, and this encourages beekeepers and honey traders to display pure honey.

The aroma of honey is also one of the most important attributes of quality for the consumer, as the aroma of honey depends on the type of flower honeybee fed on, so beekeepers carefully choose places where there are adequate flowers. Some beekeepers feed their bees on sugar, so honey gain more sweetness than of natural sweetness of honey, and consumers generally prefer the natural taste of the honey, and therefore high sweetness is considered a sign of sugar for honey bees.

The honey color is always considered as one of the most important characteristics of honey quality, and it is determined by the type of flower on which bees collect the nectar, so the beekeepers do their best to intend specific places in which the appropriate flowers exist. Honey viscosity is considered as an important honey quality attributes, it has a positive impact on the price of honey, and because the viscosity depends on the maturity of the honey, so it is commonly recommended to leave the honey inside the hive for long, otherwise using artificial techniques to reduce moisture.

### **The estimation of the expected quality price premium of honey varieties and quality attributes:**

#### **Hedonic Pricing Model (1): Variety premiums:**

The equation below is the estimated HPM showing variety premiums. The retail price of Kashmiri honey is considered the base price in the model.

$$P = 48.36 + 228.3 \text{ Sidr} + 104.22 \text{ Sumra} + 127.4 \text{ Talh} + 52.30 \text{ Others} \\ (24.877)^{**} \quad (12.876)^{**} \quad (18.039)^{**} \quad (66.328)^{**} \quad \text{price} \quad (29.145)^{**} \\ R^2 = 0.57 \quad F = 1254.615$$

Where:

P : honey price of specific varieties (Riyal/kg.) in addition to the base honey price (SR 48.36 = regular Kashmiri honey retail price)

Sidr: Sidr honey variety premium price (Riyal/kg.) (=1 and otherwise = 0)

Samr: Samr honey variety premium price (Riyal/kg.) (=1 and otherwise = 0)

Talh: Tah honey variety premium price (Riyal/kg.) (=1 and otherwise = 0)

Others: Other honey varieties premium price (Riyal/kg.) (=1 and otherwise = 0)

Estimated HPM gives logic forecasting for retail prices of various varieties of honey (Kashmiri, Sidr, Sumra, Talh, Kashmiri and other honey varieties). The estimated HPM showed that honey varieties explain for 57 % of the changes in the retail price of honey. The estimated model suggested that the estimated expected retail price of Kashmiri honey was about 48 SR/kg. It also indicated the estimated expected premium price for honey varieties, were about 228 SR/kg for Sidr honey, about 104 SR/kg for Sumra honey, about 127 SR/kg for Talh honeys, and about 52 SR / kg for other varieties of honey traded in the Saudi market.

#### **Hedonic Pricing Model (1): quality characteristic premiums:**

The base retail and premium prices for quality characteristics are shown on table (3). The result indicated that the base regular average honey price of about SR 94. This base price is the expected average regular honey prices (average of all honey varieties including Sidr, Samr, Talh, Cashmiri, and other honey varieties at the minimum quality attributes prevailing in Saudi market. Locally produced, pure honeys with good aroma are the main quality characteristics which make additions to the honey base price. Honey being produced locally adds a significantly high premium to average base price, this premium amounted in average was about SR 75/kg.

Purity also add a significant premium of about SR 42/kg to average honey base price. However, good aroma adds insignificant premium price of about SR11/kg to the average retail base price of honey in the Saudi market. However in addition to sweetness, aroma is important natural characteristics of honey and each honey may have its own distinctive aroma.

**Table 3:** Estimated quantitative regression parameters showing the effects of honey quality attributes on it's retail price in Saudi market, 2012.

Base/ quality attribute	Price (base/premium) SR/kg	T	sig
Average retail price of all varieties (base)	93.810	19.553**	.000
Locally produced honey	75.049	15.140**	.000
Good aroma honey	11.342	1.315	.189
Pure honey	42.240	4.727**	.000
Determination Coefficient (R2)	.16		
F value	148.9		

\*\* Significant at 0.01 significance level.

**Source:** calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

Color, high sweetness, viscosity and wax have been excluded from this HPM because they were correlated differently with each of honey variety. Light color is directly related to high quality Sidr honey, while dark color is highly correlated with Sumra honey and Talh honey.

#### **Hedonic Pricing Model (2): Variety and quality characteristic premiums:**

Regular Kashmiri honey variety was considered the basis in this HPM, Also, color and viscosity characteristics were ruled out because they are associated with the varieties' of honey, and also because the light color is linked to certain types of honey, such as Sidr honey, while the dark color is associated some honey brands such as Sumra and Talh honeys. The wax has also been excluded because most of consumer respondents prefer honey without wax, while the presence of comb honey have a positive impact on the price of some honey brands. Sweetness has been also excluded from the model, because some of honey varieties has natural sweetness, and for some extend, there is misunderstanding and mixing between natural honey sweetness and sweetness resulting from added sugar.

Table (4) presents estimated parameters of HPM showing base honey retail price and estimated premiums due to both honey variety and quality characteristics. Honey bas retail price (regular Kashmiri honey of minimum quality characteristics prevailing in Saudi market) is estimated to be SR 34/kg. Additional quality characteristics would significantly cause additions to honey retail prices (being produced locally, good aroma, attractive packaging), given that good variety honey (Sidr, Sumra, and Talh) make the most additional premiums. The retail price premiums for honey good varieties and better quality characteristics was clearly presented on table (4).

**Table 4:** Estimated quantitative regression parameters showing the effects of honey variety and quality attributes on it's retail price in Saudi market, 2012.

Honey Variety and quality attributes	Base price/premium (SR/kg)	T	sig
Kashmiri regular honey (base price)	33.892	7.681**	.000
Locally produced	25.830	7.088**	.000
Good scent	10.992	1.853	.064
Pure	5.137	.792	.428
Attractive packaging	8.545	2.490*	.013
Sidr	230.008	46.517**	.000
Samr	92.397	18.669**	.000
Talh	122.712	17.021**	.000
Other varieties of honey	43.676	8.935**	.000
Determination coefficient (R2)	.64	-	-
F	461.9	-	-

\*\* Significant at 0.01 significance level. \* Significant at 0.05 significance level

**Source:** calculated from sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

Based on the result presented on table (4) the expected price for various combinations of honey varieties and quality characteristics were calculated and presented in table (5). These expected values of retail prices seems logic as they compared with average prices computed from raw data presented on table (1).

**Table 5:** Expected prices (SR/kg) of varies honey varieties with various quality attributes prevailing in Saudi market in 2012.

Quality attribute	Base (Regular Kashmiri honey)	Sidr honey	Sumra honey	Talh honey	Other honey varieties
Base	34	230	92	123	44
Locally produced	-	256	118	149	70
Of good smell	45	241	103	134	55
Pure	39	235	97	128	49
Attractive package	42	238	100	131	52
Highest quality	58	280	143	173	94

**Source:** estimated based on the estimated parameters of the regression models HPM in this study using sampled honey retailers and consumers data in the kingdom of Saudi Arabia, 2012.

The expectations presented in table (5) seems logic although its differ from the averages of calculated prices due to excluding of some characteristics that could affect the honey price.

#### **Conclusion:**

Based on the result of this study, the following are recommended:

1- Locally produced Sidr, Sumra and Talh honeys were preferred in the Saudi market the expected price representing consumer to pay for regular quality (minimum quality attributes) were SR. 230/kg., SR. 123/kg.,

SR.92/kg. and SR.44 /kg for Sidr, Talh, Sumra and other varieties of honey respectively. Kshmiri honey base retail price is expected to be SR. 34 k.g.

2- General speaking locally produced honey is superior compared to important honey in the Saudi market. Locally produced advantage make price premium of about SR 75/kg

3- The most important quality characteristics beside being locally produced varieties of honey (Sidr, Talh, Sumra, and other varieties of honey) are good smell and attractive packaging, as they add a significant retail premium price to the base price. The premium is estimated to be SR11/kg. and SR8.5 kg. respectively. However, purity of dust and insect residual add insignificant price premium amounted to be SR/kg.

4- Beekeepers are advised to carefully chose the type of flowers where their bee hives feed on, this affect resultant honey variety with good smell.

5- Marketing services, especially packaging is essential for honey marketing. Moreover, attractive packages is highly recommended as it increase honey retail price significantly.

Your conclusion is not based on your findings

It is expected that the result of this study can be used to increase the production of honey varieties suitable and high quality where it can lead to increase the price of honey and thus increase the income of beekeepers.

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