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HEDONIC PRICE APPROACH: Testing Relationship between Quality Attributes of Mutton and its Prices in Faisalabad City, Pakistan

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Abstract

This paper attempts to analyze the impact of major factors affecting consumers' perception about market price of mutton employing hedonic price approach and using primary source of data. A representative sample of 80 mutton consumers was selected by using stratified random sampling technique. The impact of major factors on mutton price was analyzed by employing multiple regression analysis. The value of R^2 was 0.60 whereas the F-value was 12.78. The findings of analysis reveal that freshness, hygiene, fat contents and condition at retail level are the significant variables affecting consumers' perception about price of mutton, whereas the variable (stamp of abattoirs) shows insignificant impact. It is suggested to ensure the hygienic condition and quality of mutton by developing mutton value chains equipped with proper slaughtering and mutton management practice. It is further suggested that to enforce rules and laws to ensure fair price and quality of mutton in the city.

Key Words: Mutton, Stratified Random Sampling, Multiple Regression Analysis.
JEL Classification: D4, D40, D49 (Hedonic Price Analysis).

I. Introduction

Pakistan is a lower-middle income country which derives its strength from the agriculture sector where livestock has a significant position. It contributes 58.55 per cent to agriculture value added and 11.61 per cent to the national Gross Domestic Product (GDP). Besides its importance and share in national economy, the history of livestock raises embedded in the rural culture since inception of our civilization. Livestock provides food commodities like milk and meat which are considered essential for food security. In addition, it also provides diversification of risk in case of crop failure. Pakistan produces 3,873 thousand tones of meat out of which production of mutton is 686 thousand tones and this shares around 18 per cent of total meat production in the country [GOP (2015)]. Meat is not only one of the oldest food for human, but it is also one

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of the biologically valuables. The type of meat consumed vary widely across cultures, for example, mutton dominates meat consumption in Saudi Arabia, Australia and Kazakhstan, beef in Uruguay, Argentina and Brazil, while chicken in South Africa and various East Asian nations [WWI (1998)]. Goat is one of the most populated breeds in livestock, particularly in the lower-middle income countries with 94 per cent share of the total goat population in the world [FAO (2010)]. Pakistan is the 20th biggest producer of meat in the world [TDAP (2008)]. Target market for mutton is the medium and high income segments in big cities of Pakistan; with ten semi-automated slaughter-houses and one meat processing plan which was established in 1995 having the capacity of 50,000 kg per month [Shehzad (2005)]. The trend of meat consumption in Pakistan shows beef as major meat item (53 per cent) followed by poultry meat (29 per cent) and mutton meat (18 per cent), [GOP (2016)]. However, mutton is consumed more in large cities and urban areas as compared to beef.

Marketing of mutton in Pakistan, generally starts from selling of small ruminants (sheep and goats) and terminates at retailing of the fresh meat. These small ruminants are generally reared in traditional backyard system allowing them to graze mainly surrounding homestead or open fields. Besides, leaves of different trees, rice polish and wheat bran are also given to goats as feed [Hoque (1995)]. Both the formal and informal channels of meat marketing exist in many lower-middle income countries, including Pakistan. Mostly in Pakistan, mutton is sold through informal marketing system where butchers purchase animals from the wholesale markets or directly from farmers, slaughter them in slaughter houses and then sell meat at their privately owned retail shops. Retail prices are charged by butchers considering the purchase price of animals, geographical location of butchers, market situation and breed of the animals. However, the government also intervenes in the price settlement criteria but butchers generally try to set prices in their favor according to their business operations equating the demand and supply of mutton. In the recent past, mutton prices have shown a consistent upward trend. The increasing trend of mutton price is due to increasing demand and supply gap which mainly occurs due to formal or informal outflow of animals to the other countries. A large number of live animals are exported to countries, especially the Gulf countries; whereas illegal smuggling of animals is also reported to Afghanistan [Shah (2015)].

Considering the nutritional aspects of mutton consumers are willing to purchase and consume it, but the ever increasing price of mutton is the major limiting factor [Admassu (2007)]. Therefore, consumer pay attention in making careful and wise shopping decisions [Siddiqui (2009)] and try to evaluate quality of mutton based upon its quality attributes like freshness, hygiene, location and condition at retail shops, stamp of the abattoirs and fat contents in mutton [Admassu (2007)]. Their attitude towards particular attributes of mutton also shows their dietary preference and as such, is useful for business persons and policy makers engaged in mutton business activities. Consumers are ready to pay different prices for the same product based on key attrib-

utes and the hedonic price technique used to analyze the impact of these key attributes as independent variables on prices of commodities.

Unlike general price level models of an agricultural commodity determined by supply and demand variables, hedonic models determine implicit prices of specific attributes embodied in a product on the basis of value (utility or productivity) end-users ascribe to these attributes. A hedonic price function relates the price of a product (good or service) to various attributes or characteristics embodied in it [Hudson, et al. (1995), Bowman, (1989)]. Therefore, the hedonic price analysis extracts information from markets and provides these information back to the market participants. The observed price of product is therefore a composite of implicit values of the product's attributes. More simply, hedonic price function assumes that commodity price is a function of good and its quality characteristics are at the heart of the hedonic price analysis. In this background, the present study aims at analyze the impact of major quality attributes on price of mutton using the hedonic prices analysis. After the introduction in Section I; an overview of literature is given in Section II. Section III is about the material and method; and provides theoretical model and the empirical model. Results of the study are presented in Section IV, while it ends with the concluding remarks in Section V.

II. An Overview of the Literature

Hedonic price analysis is relatively a new area of price investigation in Pakistan. As such, limited and scanty literature is available for hedonic price analysis of agricultural commodities in general, and for mutton in particular. The studies which focus on hedonic price estimation for agricultural crops includes Zilberman (1993) for peaches, Dalton (2003) for rice, Carew (2005) for apple, Huang and Lin Lin (2004) for fresh tomato, Cho (2006) for cotton, Edmeades (2006) for banana, Aslam, et al. (2012) for seed cotton, etc.

Griffith (1974) examined that consumers compared prices of mutton between outlets on the basis of fixed quality characteristics; and this gave them more confidence to shop around the best buys. Retailers operated under such a system which might have to set competitive prices for cuts of a given quality of meat but that could also diminish the gains that can be created from premium quality differences. For this a better option is to handle this situation with improved system of market information. Another reason for price difference may be the variation in consumer demand for mutton, from season to season. Demand of mutton, normally goes up in winter season and comes down in summer; as such the overall trend of prices is found as an increase in winters and decrease in the summers. Eid festivals also increase the demand for goats and goat meat [Miah, et al. (2003)]. Consumers are generally willing to pay higher price if meat quality is improved. Therefore, different quality and safety criteria are used by consumers to refine their purchase decision for mutton shopping. These attributes include abattoir stamp, hygiene of premise and personnel, fat contents, freshness and price

[Admassu (2007)]. The case of mutton in Pakistan is not very different. Siddiqui (2009) examined that due to increase in the price of mutton, it has become a luxury item in the consumption bundle of consumers in Pakistan; affordability to consume such luxury item is extremely difficult among the low income people and so consumers pay much attention in their shopping decision of mutton.

III. Material and Methods

1. Theoretical Model

Prices of the products are at the core of rational economic decisions taken for purchases. Generally, in addition to the other economic indicators, price paid by consumers reflect their willingness to pay for certain level of quality. Rani, et al. (2013) found price as the most important factor in mutton purchasing decisions at the retail stores, followed by quality which stands as second, and the food safety measures as third. Some other studies shows that consumers are willing to pay higher price if they are offered good attributes in mutton, viz., freshness, amount of fat contents in available meat, stamp of the authorized abattoir, sanitation and cleanliness situation at the purchase point, etc., [Faustman and Cassens (1990), Admassu (2007)]. Therefore, among these parameters this study has taken five important attributes which the consumers keep in their mind while purchasing mutton at retail stores.

In this paper, the model suggested by Hudson, et al. (1995) and Bowman (1989) is adopted and the notation given by Rosen (1974) is used. Hedonic models can be setup in different ways, such as the simple linear hedonic regression model, non-linear hedonic regression models (exponential and quadratic) and the double log form of hedonic regression models. Due to the nature of collected data the simple linear form of hedonic model is adopted in this study. The scatter plot between the price of mutton and its independent variables suggest such relationship.

Continuous variables are commonly used in hedonic regression models, whereas discrete variables are also used in some cases; and the interaction of different variables are used as well. The economic logic of using these different forms of variables is embedded in the availability of data and has economic implications as well. In case the continuous variable is used in the analysis, it will give the implicit marginal price of product attributes; whereas in case of discrete variables, coefficients would show the presence of a product attributes; and with implicit price it would not be possible to work out further calculations [Jabbar (1997)]. First, the hedonic prices approach was used by Waugh (1928) for evaluating the impact of quality attribute on price of price of vegetables. Later, in (1951) Houthakker and Theil refined the concept and worked onconsumers demand for different products and their relation with quality attributes. Gorman (1956) empirically analyzed the relationship between different quality attributes of eggs and linked them with consumer demand. Lancaster

(1966) took it further and said that consumer utility could be taken as a function of different quality characteristics. Hedonic price models can be estimated using qualitative data as well. This is particularly adopted in situations where quantitative data is difficult to obtain. Major studies which estimated hedonic price regression models using qualitative data are Deodhar and Intodia (2001) for ghee, Knights, et al. (2005) for sheep and goat, and Corsi and Strom (2008) for organic wine, Aslam, et al. (2012) for seed cotton, etc.

2. Empirical Model

This study applied the hedonic price technique which shows relative preference of consumers for specific product's attributes. Eighty consumers of mutton were selected from different areas of the Faisalabad city, using stratified random sampling technique in which 20 respondents were selected randomly from each of the four towns: Laylpur town, Madina town, Jinnah town and Iqbal town. Faisalabad is the third largest city of Pakistan, as such it represents socio-economic dimensions of the country. During the data collection the researchers noted some confusion in consumers regarding understanding the nature of questions (rating on five point likert scale); and so, an orientation of consumers was conducted before each meeting to make them aware about the type of information needed. After data collection the interviews schedule was properly checked to make sure that all responses were recorded accurately.

Hudson, et al. (1995) estimated the parameters which were further used to compute the effect of various quality traits on prices, influenced by Bowman's (1989) conceptual framework to a large extent. This conceptualization requires viewing a commodity as a bundle of characteristics rather than a homogenous product. Basics the hedonic price theory takes demand of a commodity as demand for different characteristics or attributes of that commodity. Following the above mentioned framework, particular combination of mutton quality characteristics Z's can be expressed as a function of individual mutton quality characteristics, as:

$$P_m = f(Z_i) \tag{1}$$

where,

P_m = Consumers' perceptions about market prices, viz, whether they are satisfied with the price they pay for given level of mutton quality.

Z_i = Vector of Qualitative Variables.

Categorical data of dependent and independent variables was collected by using five point Likert scale (strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1). In more specific form Equation (1) can be written as;

$$P_m = \gamma_0 + \gamma_1 Z_1 + \gamma_2 Z_2 + \gamma_3 Z_3 + \gamma_4 Z_4 + \gamma_5 Z_5 + \mu \quad (2)$$

where; P is the dependent variable used to capture perceptions of consumers about prices they pay for purchasing mutton. *Zs* are the independent variables which show consumers perception regarding importance of given attributes for prices of mutton, these attributes include;

Z_1 = Fat Contents: Amount of fat contents present in the available mutton at retail level.

Z_2 = Freshness: It deals with physical appearance of meat including absence of blood in the meat, pleasant smell, color and freshness of the mutton.

Z_3 = Stamp of the Abattoir: Proper labeling or stamp of the authorized abattoir, which is generally present on the carcass.

Z_4 = Hygiene: All physical food safety measures adopted by retailers.

Z_5 = Condition at retail level: It deals with the sanitation and cleanliness situation at retail shop.

γ_0 is the intercept, γ_s are slope coefficients, μ is the random error.

IV. Results and Discussion

Socioeconomic profile of participants is summarized in Table 1. Among the 80 respondents, 96.3 per cent were male while only 3.8 per cent were female. Regarding their marital status 12.5 per cent were single while 87.5 per cent were married. During the survey it was observed that 41.3 per cent of total respondents fell in the age group of 31-40 years, followed by 32.5 per cent, 16.3 per cent, 8.8 per cent, 1.3 per cent in the age group of 41-50 years, up to 30 years, 51-60 years and above 60 years, respectively. The largest chunk of respondents belonged to the education group of matric which was 33.8 per cent. However, 21.3 per cent got education up to middle level, 20 per cent up to graduate, 8.8 per cent were post-graduate and 6.3 per cent were intermediate, while 10 per cent of the respondent were illiterate.

Price is the critical element in purchase decisions of mutton. However, sale price generally vary from butcher to butcher, location to location and for mutton from different types and breeds of animals. Consumers consider different characteristics of mutton in purchasing decision, which mainly include freshness, hygienic conditions, fat contents, condition at retail level and stamp of abattoirs. As a first step, data was checked for the presence of collinearity which is statistically considered undesirable. It is generally a condition where correlation between or among independent variables is found strong, and thus it affects the quality of statistical analysis. Variance Inflation Factor (VIF) is used to test the presence of multi-collinearity in the data set. If the value of VIF is greater than 10 then there exists a problem of multi-collinearity [Gujrati (2003)]. The VIF values of all variables in

this analysis were found less than 10 and showed an absence of multi-collinearity in the data set (Table 1), which allowed to proceed with the analysis.

The value of adjusted R^2 was 0.60 which is significant; and explains 60 per cent variation in the dependent variable, by the given independent variables, *cetris paribus*. The F-value was also significant which shows an overall appropriateness of the estimated model. The coefficients of estimated variables shows that the most important factor determining consumers' perception about market price of mutton was hygiene followed by conditions at retail level, freshness of mutton, fat contents in meat and stamp of abattoir. Mutton is a food commodity which has direct contact with multiple things starting from slaughtering to final consumption. Any mishandling or careless attitude may infect mutton with some undesirable content which may be injurious for the health of consumers. Theoretically, ensuring hygiene during all process seems to be an important variable which might fetch the attention of consumers. Therefore, all physical food safety measures attract consumers for

TABLE 1

Socioeconomic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage
Gender	Male	77	96.3
	Female	3	3.8
	Total	80	100
Age (Years)	Upto 30	13	16.3
	31-40	33	41.3
	41-50	26	32.5
	51-60	7	8.8
	Above 60	1	1.3
	Total	80	100
Education	Illiterate	8	10
	Middle	17	21.3
	Matric	27	33.8
	Intermediate	5	6.3
	Graduate	16	20
	Post-graduate	7	8.8
	Total	80	100
Material Status	Single	10	12.5
	Married	70	87.5
	Total	80	100

Source: Authors' own calculations.

TABLE 2

Collinearity Statistics of Variables

Variables	Tolerance	Variance Inflation Factor (VIF)
Fat contents	0.711	1.407
Freshness	0.650	1.540
Stamp of abattoir	0.823	1.215
Hygiene	0.845	1.183
Condition at retail level	0.869	1.151

Source: Authors' own calculations.

willing to pay higher prices. In this estimated model, coefficient of hygienic conditions showed positive sign with the prices of mutton. The coefficient (0.689, $p<0.05$) suggests that for every one unit improvement in the category of independent variable (hygienic condition) there might be 0.689 unit improvement in consumers' perceptions about market prices of mutton, *cetris paribus*. Alternatively, result shows that as the hygienic conditions at retail store increases, consumers are willing to pay higher prices.

Retailer is considered an agent of manufacturer or a representative of producer. In Pakistan, mutton is generally sold through small retail shops scattered in different areas of cities. Conditions at these shops vary according to the location but a common observation is that these shops present poor condition and careless handling of mutton. This is a first indicator which may affect the decision of consumers to purchase mutton from a shop and determine the level of price they are ready to pay for given quality of mutton. Therefore, while price setting situation of sanitation and cleanliness at retail stores is very important factor, the coefficient of condition at retail level in this model shows positive sign with the price of mutton. Coefficient of this variable is (0.265, $p<0.05$) which explains that for every one unit improvement in the category of independent variable (condition at retail level), there might be 0.265 unit increase in price of mutton, cetris paribus. Alternatively, as the condition at retail stores improves, consumers are willing to pay higher prices. According to Hui, et al. (1995) the meat marketing strategy should focus on freshness, taste, and appearance of meat. In this research, freshness of mutton was taken as another independent variable which shows physical appearance of mutton including absence of blood, taste, pleasant smell, etc. If consumer perceives that available mutton at shops is fresh, then there is a probability that he will be willing to purchase and may be ready to pay even higher prices. The estimated coefficient of freshness in the model would show similar trend, as it shows (positive sign) with the price of the mutton. This variable (0.258, $p<0.05$) explains that for every one unit improvement in the category of independent variable (freshness of mutton), there might be 0.258 unit increase in the prices of mutton, *cetris paribus*.

TABLE 3

Summary of Estimated Model

Variables	Coefficients	Std. Error	T-value	Significance (p-value)
(Constant)	-3.466	1.088	-3.186	0.003
Fat Contents	-0.176	0.099	-1.772	0.085**
Freshness	0.258	0.108	2.386	0.023*
Stamp of Abattoir	0.112	0.088	1.279	0.21^{NS}
Hygiene	0.689	0.231	2.989	0.005*
Condition at retail level	0.265	0.078	3.411	0.002*
R^2		0.653		
Adjusted R^2		0.602		
F-value		12.78		

N80 = No. of respondants, *=Significant at 5% level of confidence, **= Significant at 10% level of confidence, NS = Non Significant.
Source: Authors' own calculations.

Consumer's preferences, for variety and type of mutton they want to consume vary with their locations as different regions have their own food consumption habits and preferences; like in Pakistan, mutton is referred with more fat contents in KPK, Baluchistan and Northern areas but in big metropolitan cities mutton is preferred with minimum fat contents. Consumers are ready to consume and pay for mutton with less fat; as such boneless cuts are high priced products in these cities. The coefficient at contents in the model, shows negative sign with price of mutton, i.e., -0.176 ($p<0.1$). The coefficient of this variable suggests that for every one unit increase in the category of independent variable (fat contents) there might be 0.176 unit decrease in the price of mutton, *cetris paribus*. As the amount of fat contents increases in mutton, consumers show their unwillingness towards higher prices.

Consumers do not have knowledge about backward activities in mutton marketing chain, so they want to be sure of quality intend to purchase. For this purpose, consumers often emphasize on stamp of registered or authorized abattoirs in the city so that they can be sure that the mutton they are purchasing has passed through public regulation and checks. The coefficient of stamp of the abattoir in estimated model shows the positive sign with the prices of mutton that is 0.112 but is found insignificant ($p>0.05$). The coefficient of this variable suggests that for every one unit improvement in the category of independent variable (stamp of abattoir), there may be 0.112 unit increase in prices of the mutton, *cetris paribus*.

V. Concluding Remarks

This study estimate the impact of major quality attributes (freshness, hygiene, conditions at retail level, stamp of the abattoirs and fat contents in the mutton, etc.,) on consumers' perceptions about market prices of mutton in Faisalabad city. Findings of this study reveals that freshness, hygiene, fat contents and conditions at retail level are significant variables which shows that people are willing to pay the higher prices if they get fresh and hygienic meat. Therefore, the concerned stakeholders in mutton marketing chain should ensure these attributes in order to earn higher profit. On the other hand, the government should also ensure the hygienic conditions and quality of mutton by providing well developed slaughtering system and the mobile price control committees in the country. Therefore, the customers can buy good quality mutton at reasonable prices.

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