

Demand and Supply of Quality Product

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Abstract: This study was carried out to prepare a report on the impact of the quantity demanded of chicken and its determinants. In order to identify the determinants that will impact to the quantity demand and to determine the quantity demand equation, regression analysis we used. In this analysis there are four independent variables. Therefore to incorporate all these variables multiple regression analysis adopted. To estimate the population regression function, ordinary least square method (OLS) was used. First and foremost there are 35 observations in this sample. Annual data has been collected for the quantity demand, chicken price, beef price, related good price and disposable income variables. The analysis mainly done by using Eviews statistical software and for some analysis we have used SPSS software as well. According to the correlation matrix it was found that there are strong correlations between the quantity demand and price of beef as well as the quantity demand and the disposable income. Correlation between the quantity demand and the price of chicken showed a weak correlation. Also the price of related good and quantity demand also exhibited a weak correlation.

Keywords: Quantity demanded of chicken, determinants, regression analysis, multiple regression analysis, ordinary least square method, Eviews statistical software and SPSS software.

1. INTRODUCTION

The necessity of securing the food supply in terms of quality and quantity for the increasing population, as well as the need for animal proteins, health problems due to nutrition, and consumers' awareness and tendency to maintain a healthy and balanced diet, have all made the poultry sector a significant industry throughout the world. Despite the contraction in demand and abrupt fall in prices due to reasons such as the recent economic crises, various sensational comments, and the last bird flu epidemic, the poultry sector in Sri Lanka keeps growing and maintains its development in line with the increasing export opportunities. Although the poultry sector in Sri Lanka has made progress in production, processing, productivity, use of technology, maintenance and feeding conditions, standardization, etc., a great majority of the current problems remain unsolved. These include the minimization of production costs, establishment of the equilibrium between supply and demand, efficiency in marketing, and attaining a competitive position in exporting. There are numerous factors affecting the

amount of chicken consumption, which has an important place in human nutrition. Regional development differences, consumer income level, socioeconomic and demographic factors, seasons, food safety and quality, personal tastes and habits, product price, and opinions regarding human health are generally thought to be the major factors that have an effect on the demand for chicken meat in Sri Lanka. The number of scientific studies researching the consumption structure, including consumption level of chicken meat, consumption habits, factors affecting the consumption of chicken meat, and consumer preferences on the basis of regions and cities, is not sufficient. Recently, chicken consumption in Asian countries has been changing in terms of quality and nutritional characteristics, production methods (feeding, animal welfare, etc.), country origin of the product, frozen/fresh meat preference, risk perception towards diseases (mainly bird flu), etc. Furthermore, it is reported that chicken meat consumption in Asian countries is increasing due to the timesaving features of chicken meat while preparing a meal at home and its diversified use by catering companies.

2. EMPIRICAL LITERATURE

The ingredients added to the food such as herbs and spices contribute to the food quality and varieties of ingredients are widely used by people around the world. Marinating prior to cooking has been used frequently for meat products which bring effects to sensory qualities, nutrient content of meat, yield processing and antimicrobial action (Dong, A., Lee, J. and Shin, H.S., 2011). In the context of chicken meat, it is so versatile and could easily be prepared. Chicken meat can be consumed on its own although some perceived it as tasteless without any mixture of ingredients or may be used as a base ingredient for other dishes (Kennedy et al., 2004). For instance, chicken meat can be used as a pizza topping (Singh, P. and Goyal, G. K., 2011). The convenience and versatility of chicken meat can also be enhanced by the wide range of pre-prepared sauces which enables the creation of a different chicken dish each day and this contributes to the high consumption of chicken meat. A taste evaluation is an attribute which is experienced after using the product (Ford, G. T., Darlene, B. S. and John, L. S., 1990). Consumers give priority to food taste as part of the quality (Min, H. and Min, H., 2011). (Glanz, K., Basil, M., Maibach, E., Goldberg, J. and Snyder, D., 1998) Indicate that taste is the most important influencing factor in food choices, followed by price. In the context of chicken meat, it is preferred over mutton or beef because of its great taste. Consumers look for important quality aspects of meat such as the good and tender taste, juicy, fresh, lean, healthy and nutritious (Grunert, 1997). While mutton has lesser consumption due to its strong smell and harder meat, chicken meat

on the other hand has tender and a soft texture. It is also known that consumers prefer food which is tastier and easily available. Freshness also plays an important role in determining consumers' selection of meat. Chicken meat is the most common dish served during the festive season. For as examples, among the famous chicken dish served during the Eid Festival is serenading which is the desiccated meat, chicken or fish fried with chili (Anon, 1995). While the Chinese celebrate the Chinese New Year festival, duck or chicken is served during these festive celebrations (Lee, 1986). A wide variety of traditional spicy foods are served such as chicken tandoori during the Deepavali festival (Shari et al., 2005). The rise in the habit of purchasing and cooking chicken meat is not only observed in Sri Lanka, but it is true in other countries. In Ethiopia, the religious festivals periodically shifted local demand and prices of poultry (Aklilu, H. A., Almekinders, C. J. and Udo, H. M., 2007). Chicken meat is also served during Christmas festival and one of the unique dishes served in India during this season is chicken Manchuria (Rao, P., Ramesh, B. V., Sudershan, R. V. and Krishna, P. T., 2005). The rise in chicken meat demand is also observed in Myanmar during festive seasons. According to (Henning, J., Khin, A., Hla, T. and Meers, J., 2006) at the time of major festivals, chickens are in demand, hence higher prices have to be paid by the middlemen to the farmers in Myanmar in order to fulfill the demand. According to (Guerrero-Legarreta, I. and Hui, Y. H., 2010), chicken meat remains as the most available and cheapest source of animal protein as compared with beef, pork and mutton. Demand for chicken meat is also increasing especially for the food-service industry, institutional and fast-food sectors. These demands are not only for fresh chicken meat but also for products such as frozen chicken meals, precooked meals and chicken burgers. Besides, poultry cuts are sold directly to markets, hotels, restaurants and supermarkets as it is the cheapest protein source. Yeung, R. M. and Morris, J., 2001, indicated that chicken meat has been the most popular meat in the UK partly because it has become relatively inexpensive. Thus, easy to cook is predicted to influence chicken lovers in Sri Lanka. Maintaining good health throughout the entire Lifecycle of human being is partly driven by healthy diet and nutrition. Both (Bansback, 1995) and (Becker, T., Benner, E. and Glitsch, K, 2000) have noted that reducing the impact of price on meat consumption behavior and suggested that health, convenience and quality issues are more important and influencing on behavior. However, not the entire world population is fortunate to be consuming healthy food. Poverty and injustice are the root causes of malnutrition (WHO, 2003). The food consumption of higher income population varies in animal proteins and fats, which include poultry, meat and dairy products. Poultry

consumption is the fastest to grow. According to (FAS, 2001), poultry meats increasingly in demand in developing countries because of its lower price and consumer's perception of healthy and safe as compared to other meat. Consumers in developed countries such as America are consuming a lesser amount of red meat such as beef and more non-red meats such as poultry meat (Rimal, A. P. and Fletcher, S. M., 2003). According to (Slattery, 1998), consumer replaced red meat with poultry to reduce risk for colon cancer aside from other food substitutions. A preference study for different items of meat among university students in northern Poland proven that chicken ranked as the highest since young adults preferred low-fat meat (Babic-Zielinska, 1999). However, there are side effects of consuming too much chicken and chicken is already known to have its own diseases such as Avian Coccidiosis, Marek's disease, fowl typhoid, Newcastle disease and fowl coryz (Mwale, M., Bhebhe, E., Chimonyo, M. and Halimani, T. E., 2005). The usage of antibiotic in food-producing animals contributes to human drug resistance and this caused mixture responds from the scientific community, animal health experts and consumer advocates as to whether it brings benefits to the human society (FMI, 2011). The chicken meat's vulnerability to bacterial infections such as Salmonella enteric could cause Gastroenteritis or gastric flu to human. (Fearnley, E., Raupach, J., Lagala, F. and Cameron, S., 2011) Conducted a study in South Australia on 94 human cases which resulted in the Salmonella infection outbreak is linked to food containing chicken meat and eggs. Preserving chicken meat for long days would lead to health issues as well. It could destroy the natural nutrients of the food and would provide negative flavors to the food which in turn will create health hazards. Race is a cultural characteristic which may influence people in their food selection or nutrition consideration (Rimal, A. P. and Fletcher, S. M., 2003). The taste and smell of food prepared by different races as well as the judgment on sentiment and taste would represent the racial identities (Slocum, 2010). The study conducted by (Morland, K. and Filomena, S, 2007) in Brooklyn, New York indicated that the availability and variety of fresh produce is associated with a neighborhood racial composition which contributed to differences in intake among residents. In Sri Lanka, food consumption and restrictions on food items are guided through race, culture and most importantly religion. Religion influences consumer attitude and behavior in general (Musaiger, 1993), (Delener, 1994), (Pettinger, C., holdsworth, M. and Gerber, M., 2004) and food purchasing decisions and eating habits in particular (Mennell, Murcott, A. and Van Ootterloo, A. H., 1992). However, the chicken meat is deemed acceptable by all races in Sri Lanaka with Muslims consume the halal chicken meat. Other populations consume chicken meat in their

everyday routine life whereas there are some religious norms on other meats such as pork and beef. Globally, minimal number of studies have been undertaken to identify the factors influencing the preference and consumption of chicken meat. The purpose of this study is to examine how the variety of factors including, ingredients, taste, easy to cook, price and health concern affect consumers' food choices.

3. MODEL AND METHODOLOGY

In order to identify the determinants that will impact to the quantity demand and to determine the quantity demand equation, regression analysis will be used. Regression analysis enablesto determine the mathematical relationship between the dependent variable and the independent variables. Regression form that will be used in this analysis is linear regression form. The model comprises of dependent variable, independent variables and relevant parameters (coefficients) of the independent variables. Regression analysis mainly can be divided into two; simple regression and multiple regression. In simple regression there is only one independent variable and in multiple regressions there will be two or more independent variables. In this analysis there are four independent variables. Therefore to incorporate all these variables multiple regression analysis will need to be adopted. Multiple regression model can be constructed as follows for this analysis. This is known as the population regression function (PRF).

$$Y = \beta_0 + \beta_1 * pc + \beta_2 * pb + \beta_3 * pr + \beta_4 * yd + \varepsilon_i$$

Where

β_0 = Intercept

β_1 = Coefficient of price of chicken variable

β_2 = Coefficient of price of beef variable

β_3 = Coefficient of Price of related good variable

β_4 = Coefficient of disposable income variable

ε_i = Random error term

Then the next step is to estimate the population regression function using sample regression function. In order to estimate that there will be two methods. (Gujarati, 1995)

1. Ordinary least square method (OLS)
2. Maximum likelihood method (ML)

In this analysis Ordinary Least Square method (OLS) will be used.

(a) Data

Quantity demand for chicken, price of chicken, price of beef, Price of related good and annual disposable income for the period of 1982 – 2016 are collected to decide determinants of quantity demand and to analyze the impact to quantity demanded of chicken. Annual data for these variables are collected over 35 years.

4. ANALYSIS AND DISCUSSION**(a) Descriptive Statistics**

Descriptive statistics shows the summary of each variable. In descriptive statistics measures of central tendency, variation and shape of the distribution values will be discussed. Mean, median and mode are the measure of the central tendency.

Table 4.1
Descriptive statistics of the variables

Sample: 1 35

	<i>Y</i>	<i>PC</i>	<i>PB</i>	<i>PR</i>	<i>YD</i>
Mean	84.72943	10.23429	45.89543	10.67429	44.25143
Median	65.17000	9.500000	40.71000	10.00000	42.80000
Maximum	195.5500	15.70000	78.61000	15.90000	74.60000
Minimum	20.22000	6.800000	23.25000	7.100000	18.00000
Std. Dev.	58.63205	2.335398	16.04145	2.314957	19.68755
Skewness	0.540880	0.682859	0.597490	0.638247	0.102659
Kurtosis	1.853406	2.580588	2.261922	2.560097	1.454048
Jarque-Bera	3.623786	2.976593	2.876910	2.658473	3.546845
Probability	0.163345	0.225757	0.237294	0.264679	0.169751
Sum	2965.530	358.2000	1606.340	373.6000	1548.800
Sum Sq. Dev.	116882.4	185.4389	8749.154	182.2069	13178.39
Observations	35	35	35	35	35

Source: Author's own construction using Eviews software

First and foremost there are 35 observations in this sample. Annual data has been collected for the quantity demand, chicken price, beef price, related good price and disposable income variables. As exhibit in table 4.1 the average quantity demand for the chicken meat is 84 units per year and the average price for chicken, beef and related goods are 10.23, 45.89 and 10.67 respectively. Annual disposable income is Rs 44.25. If data are

symmetric, then the mean and the median value should be equal. Each variable appear to be skewed to the right since all median value is greater than mean value. (Mean > median = right skewed). Demand for chicken variable exhibits a high spread in data since it has a high standard deviation (65.17). Price of the chicken and price of related goods shows the lowest spread in data since their standard deviations are 2.33 and 2.31 respectively. Price of beef and disposable income also exhibits high spread in data since their standard deviations are 16.04 and 19.68 respectively.

(b) Correlation Analysis

Correlation analysis is a basic approach to measure the relationship between two variables. It will display the strength of the relationship between two variables such as quantity demand of chicken and price of chicken. Even though it is a good platform to commence the analysis it has some drawbacks. The main issue is that it will show the strength of the relationship only. However in this analysis, correlation analysis will be used to identify the relationship between the variables.

Table 4.2
Correlation matrix

<i>Variables</i>	<i>PB</i>	<i>PC</i>	<i>PR</i>	<i>Y</i>	<i>YD</i>
PB	1.000000				
PC	0.059220	1.000000			
PR	0.006848	0.994424	1.000000		
Y	0.988618	0.121979	0.075585	1.000000	
YD	0.928043	0.257621	0.207086	0.932759	1.000000

Source: Author's own construction using Eviews software

According to the table 4.2 it is evident that quantity demand and price of beef has the highest relationship which is 0.988618. Therefore there will be a major impact of price of beef when estimating the quantity demand of chicken. Also annual income has a high correlation with the quantity demand which is 0.932759. Surprisingly price of chicken and quantity demand has a low correlation which is low as 0.121979. The lowest correlation with quantity demand comes from the Price of related good which is merely 0.075585. However this table provides evidence that there is a Multicollinearity issue since most of the independent variables have a high correlation between them. Price of chicken and Price of related good have a very high correlation of 0.994424 whereas income and price of beef also has a high correlation of 0.928043.

(c) Regression Analysis

To estimate the population regression function, sample regression function will be used.

$$Y = a + b * pc + c * pb + d * pr + e * yd$$

Where

- a = Intercept (Capture all other variables that will impact on the quantity demand of Chicken meat)
- b = Coefficient of price of chicken variable. It is expected to have a negative relationship between quantity demand and the price of the chicken due to the law of demand.
- c = Coefficient of price of beef variable. It is expected to have a positive relationship between quantity demand and the price of the chicken since beef is a substitute good for chicken.
- d = Coefficient of Price of related good variable. It is expected to have a positive relationship between quantities demanded.
- e = Coefficient of income variable. It is expected to have a positive relationship between quantity demand and income assuming this is a normal good. If this is an inferior good coefficient will have a negative sign.

Table 4.3
Regression output using EViews

Dependent Variable: Y				
Method: Least Squares				
Included observations: 35				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-109.4750	10.07623	-10.86467	0.0000
PC	-15.23143	6.136780	-2.481990	0.0189
PB	3.612337	0.254244	14.20814	0.0000
PR	16.84418	6.151247	2.738337	0.0103
YD	0.101642	0.212309	0.478744	0.6356
R-squared	0.985168	Mean dependent var		84.72943
Adjusted R-squared	0.983191	S.D. dependent var		58.63205
S.E. of regression	7.601625	Akaike info criterion		7.026165
Sum squared resid	1733.541	Schwarz criterion		7.248357
Log likelihood	-117.9579	Hannan-Quinn criter.		7.102866
F-statistic	498.1805	Durbin-Watson stat		1.069427
Prob (F-statistic)	0.000000			

Source: Author's own construction using Eviews software

According to the regression output generated through EViews, we can estimate the demand equation.

$$Y = -109.475 - 15.23143 * pc + 3.612337 * pb + 16.84418 * pr + 0.101642 * yd$$

(d) Interpretation of coefficients

- a* = -109.475 (impact of all other variables, which have not taken in to consideration, on the quantity demand will be represented by this figure)
- b* = Coefficient of price of chicken is -15.23143. It has a negative relationship between quantity demand and the price of the chicken due to the law of demand. It means that if the price of chicken increase by Rs 1, quantity demand of the chicken will be decreased by 15.23143 units.
- c* = Coefficient of price of beef is 3.612337. It has a positive relationship between quantity demand of chicken since beef is a substitute good for chicken. If the price of chicken increase by Rs 1, quantity demand of the chicken will be increased by 3.612337 units.
- d* = Coefficient of Price of related good is 16.84418. It has a positive relationship between quantity demand of chicken. If the price of chicken increase by Rs 1, quantity demand of the chicken will be increased by 16.84418 units.
- e* = Coefficient of disposable income is 0.101642. It has a positive relationship between quantity demand of chicken assuming this is a normal good. If the price of chicken increase by Rs 1, quantity demand of the chicken will be increased by 0.101642 units.

(e) 4.5 Coefficient of Determination (R²)

Dependent variable is the quantity demanded (Y) and the independent variables are the price of chicken (PC), price of beef (PB), Price of related good (PR) and disposable income (YD). It is important to see whether independent variables as a whole explain the dependent variable to a satisfactory level and it is determined by the R-squared value (coefficient of determination). If R squared value is more than 80%, it is said to be a good model where the independent variables explain more than 80% of variation in dependent variable. It can be calculated by dividing total sum of square from regression sum of square. In Eviews results output it presents the final value for the r square. But in ANOVA table in SPSS gives you the detailed view of deriving that. The table will be shown in the below.

Table 4.4
Regression output using SPSS

ANOVA						
<i>Model</i>		<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
1	Regression	115,148.848	4	28,787.212	498.180	.000
	Residual	1,733.541	30	57.785		
	Total	116,882.389	34			

Source: Author's own construction using SPSS software

$$R - Squared = \frac{SSR}{SST} = \frac{115,148.848}{116,882.389} = 0.9851$$

This indicates that 98.51% of variation in dependent variable is explained by the independent variables together.

However it is also important to calculate the adjusted R-Square as well. When independent variables are added to the regression model R square value will not decrease but that independent variable may not necessarily add explanatory power to the model. By computing R-squared value will be adjusted this issue and therefore it is important to incorporate adjusted r squared measurement as well. According to the table 4.3, adjusted r squared value is 0.983191 indicating the characteristics of a good model.

(f) 4.6 F-Test

To measure the overall significance of the model, F test can be used. There are mainly two methods to test the significance of F statistics. If the F statistics is higher than the F table value it is said to be significance. The other way is if the probability of F statistics is less than 5% then it is significance. It means that at least there one independent variable that affects the dependent variable. According to the Table 4.3 Probability of (F-statistic) is 0 which indicates the model is highly significance. Therefore we can conclude that there at least one independent variable affects the dependent variable in the model.

(g) Multicollinearity problem

Multicollinearity problem is the situation where the independent variables are closely correlated with each other. It can be identified if the R-Squared value is very high. To identify whether there is a Multicollinearity issue, Variance inflation factor(VIF) can be used. Generally if the VIF is greater than 10, then there is a Multicollinearity issue (Gujarati,1995).

Table 4.5
Variance Inflation Factors using EViews

Variance Inflation Factors			
Sample: 1 35			
Included observations: 35			
<i>Variable</i>	<i>Coefficient Variance</i>	<i>Uncentered VIF</i>	<i>Centered VIF</i>
C	101.5305	61.49667	NA
PC	37.66007	2510.050	120.8562
PB	0.064640	92.25710	9.787123
PR	37.83784	2730.624	119.3103
YD	0.045075	63.74216	10.27986

Source: Author's own construction using Eviews software

In the above table 4.5 it is visible that price of chicken variable and Price of related good variable have high VIF value which is more than 100. Also income variable shows the VIF value of more than 10 and it clearly indicates that there is a Multicollinearity issue.

(h) Autocorrelation issue

(i) Durbin-Watson Test

When the data collected over period of time there will be autocorrelation issue. In this analysis data has been collected for the period of 1982 to 2016. Simply it means that the error terms are correlated each other over time. In classical liner model it is assumed that there is no covariance between the error terms. If there is a correlation between error terms this assumption is violated. It can happen due to the omission of variables or due to misspecification of the functional form or due to measurement errors.

In general if the Durbin-Watson (DW) statistics is closer to two then there is no autocorrelation. If DW statistics is greater than 2 there is a negative auto correlation where if the DW statistic is less than 2 then there is a positive auto correlation. According to the Table 4.3 Durbin-Watson statistics is 1.069427. To test the autocorrelation it is required to find the upper limit and the lower limit from Durbin Watson table. Number of observations are 35 and there are four explanatory variables. Significance level will be determined as 5% and accordingly upper limit and lower limit can be derived as follows.

$$D_L = \text{Lower limit} = 1.22$$

$$D_U = \text{Upper limit} = 1.73$$

Since DW statistic is lower than the lower limit the null hypothesis should be rejected. It is evident that there is a positive autocorrelation.

(ii) Breusch-Godfrey Serial Correlation LM Test

To test the serial correlation other than Durbin-Watson test, Breusch-Godfrey Serial Correlation LM Test also can be used. First LM test statistics must be calculated and then according to the significance level the null hypothesis should be accepted or rejected. The null hypothesis and alternative hypothesis for LM test are given in the below.

$$H_0 = \text{there is no serial correlation}$$

$$H_1 = \text{there is a serial correlation}$$

We have generated Breusch-Godfrey Serial Correlation LM Test statistics and relevant probabilities of second-order serial correlation using Eviews software. The table is given below.

Table 4.6
Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	5.820262	Prob. F(2,28)	0.0077
Obs*R-squared	10.27782	Prob. Chi-Square(2)	0.0059

Source: Author's own construction using Eviews software

According to the table 4.6 the obs*R squared value is the LM test statistics and it is highly significance even under 1% significance level. Therefore the null hypothesis is rejected. It implies that there is a serial correlation in the residuals.

The serial correlation LM test results for this equation with 2 lags in the test equation strongly reject the null of no serial correlation

5. SIGNIFICANCE OF THE INDIVIDUAL VARIABLES

To test the significance of individual variables basically critical value method or P value method can be used. In this test we will measure that whether there is a significant linear relationship between that particular independent variable and the dependent variable when other variables are constant.

(a) Significance of price of chicken variable

Ho. $B=0$ (there is no relationship between the price of the chicken and the quantity demand)

H1. $B \neq 0$ (there is a relationship between the price of the chicken and the quantity demand)

- Test statistics = $\frac{b_1}{sb_1} = -2.481990$ with p value of 0.0189
- If P value of test statistics (0.0189) $< \alpha$ (0.05) the test statistics falls in the rejection region
- Therefore null hypothesis can be rejected. It means that there is a relationship between the price of the chicken and the quantity demand

(b) Significance of price of beef variable

Ho. $B=0$ (there is no relationship between the price of the Significance of price of beef variable and the quantity demand)

H1. $B \neq 0$ (there is a relationship between the price of the Significance of price of beef variable and the quantity demand)

- Test statistics = $\frac{b_2}{sb_2} = -14.20814$ with p value of 0.00
- If P value of test statistics (-14.20814) $< \alpha$ (0.05) the test statistics falls in the rejection region
- Therefore null hypothesis can be rejected. It means that there is a relationship between the price of the beef and the quantity demand

(c) Significance of Price of related good variable

Ho $B=0$ (there is no relationship between the Price of related good and the quantity demand)

H1 $B \neq 0$ (there is a relationship between the Price of related good and the quantity demand)

- Test statistics = $\frac{b_3}{sb_3} = -2.738337$ with p value of 0.0103
- If P value of test statistics (0.0103) $< \alpha$ (0.05) the test statistics falls in the rejection region

- Therefore null hypothesis can be rejected. It means that there is a relationship between the Price of related good and the quantity demand

(d) Significance of disposable income variable

Ho $B=0$ (there is no relationship between the disposable income and the quantity demand)

H1 $B \neq 0$ (there is a relationship between the disposable income and the quantity demand)

- Test statistics = $\frac{b_4}{sb_4} = 0.478744$ with p value of 0.6356
- When P value of test statistics (0.6356) $>$ α (0.05) the test statistics does not fall in the rejection region
- Therefore null hypothesis cannot be rejected. It means that there is no significant relationship between the disposable income and the quantity demand

6. ELASTICITY

Elasticity measures the percentage change of one variable due to the percentage change of another variable.

(a) Chicken price Elasticity (-15.23143)

Price elasticity or the percentage change in the quantity demand of chicken in response to 1% change in chicken price is -15.23143. Price elasticity is under normal circumstance should be negative. This is highly price elastic product ($E_D > 1$) since it gives a higher value for the price elasticity.

(b) Beef price Elasticity (3.612337)

Beef Price elasticity or the percentage change in the quantity demand of chicken in response to 1% change in Beef Price is 3.612337. The sign is positive and it is expected since this is a substitute for the chicken meat. When the price of substitute increases the consumers will shift from that particular product and move into another products. This implies that when price of beef increases the quantity demand for the chicken also increases. This is also highly elastic since the value is greater than 1.

(c) Price of related goods elasticity (16.84418)

Price of related goods elasticity or the percentage change in the quantity demand of chicken in response to 1% change in Price of related goods is

16.84418. The sign is positive and when the Price of related goods increases quantity demand for goods will also increase. This implies that when Price of related goods increases by 1% the quantity demand for the chicken increases by 16.84418%. This is also highly elastic since the value is greater than 1.

(d) Income elasticity (0.101642)

Under normal conditions there should be a relationship between the income and the quantity demand of a particular product. But in this model it gives that there is *no relationship* between these two variables. Therefore income elasticity is 0.101642, that impact is not significant according to the test statistics. It can be said that percentage change in income has *no significant impact* to the change in the quantity demand for the chicken.

7. CONCLUSION

The purpose of the report is to analyze the impact of the quantity demanded of chicken and its determinants. Therefore we have collected data of annual quantity demand for chicken (Y), Price of chicken (PC), price of beef (PB), Price of related good (PR) and disposable income (YD) for the period of 1982 to 2016. According to the correlation matrix it was found that there are strong correlations between the quantity demand and price of beef as well as the quantity demand and the disposable income. In that analysis, correlation between the quantity demand and the price of chicken showed a weak correlation. Also the price of related good and quantity demand also exhibited a weak correlation.

Further we have taken this analysis to the next step by analyzing this using the regression. Since there are multiple independent variables it is essential to use multiple regression and we have adopted the linear regression model. The analysis mainly done by using Eviews statistical software and for some analysis we have used SPSS software as well. The model generated by Eviews exhibits a high coefficient of determination which is around 98.5%. It means that 98.5% of the variation of quantity demand for the chicken variable is explained by other independent variables altogether. Adjusted R square is also around 98.3%. When we test the significance of the overall model we used p value method. Probability value of the F test statistics is 0 therefore it is obviously less than 5% significance level that we have used as the decision criteria in this analysis. However having a very high R^2 value it can be suspected to have Multicollinearity issue. When we have derived the variance Inflation factor (VIF) it was evident that there are independent variables which have very high correlation among them.

Also we have found that there is an autocorrelation issue. To test the auto correlation we have used Durbin Watson test and Breusch-Godfrey Serial Correlation LM Test. Durbin Watson test statistics is in the rejection region therefore we had to reject the null hypotheses which stated that there is no autocorrelation. Also according to the Breusch-Godfrey Serial Correlation LM Test we have found the second order correlation problem.

Then we have tested the significance of each independent variable. Price of chicken, price of beef and price of related good variables test statistics probability value is less than 5% level of significance. Therefore we have rejected each variable's null hypothesis which stated there is no relationship. However we have found that there is no significant relationship between the disposable income and the quantity demand of the chicken. After testing the significance of p value of each variable we have analyzed the elasticity of each variable. Finally based on this comprehensive analysis we would like to give our recommendations as follows. In all these, the performance level of the firm is not left out (Nwokwu, Dharmadasa, & Rathnasingha, 2018; Nwokwu, Atapattu, & Azeez, 2019; Nwokwu, 2018; Nwokwu, Rathnasingha & Pradeep, 2019).

8. RECOMMENDATIONS

- The determinants that will impact on the quantity demand for the chicken meat are price of chicken (PC), price of beef (PB) and Price of related good (PR). In the analysis according to the test statistics test we have found that there is no significant relationship between the quantity demand for the chicken and the disposable income (YD).
- Among the independent variables, there are controllable variables and uncontrollable variables. There is only one controllable variable which is price of the chicken. Price of beef and price of related good cannot be controlled by the organization. However if the firm decrease chicken price by Rs 1 the quantity demand will increase by 15.23143 units. This is highly elastic product therefore the firm should be very cautious when changing the price; especially increasing the price.
- Beef is a substitute for the chicken therefore when price of beef increases, quantity demand for chicken will also increase by 3.612337 units. However this is beyond the control of the firm therefore the firm must be very cautious when the price of the substitutes changes. Also it is same for the price of the related good variable.

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