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Forecasting and firm performance

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Abstract
In today's context people's needs has become complicated along with the introduction of new technology brands and availability of products and services. Therefore selection of product and services has become complex along with the competition build up in the market. This is further explained in situation where you are planning to purchase. In which you require to get the best out of what is available for money in hand. Other than monetary terms one may look at its features, size, technology, colour, brand, etc. Today's society is dependent on the technology and the entertainment that it provides. Even after busy day they try to achieve relaxation by sitting in-front of the TV. Other than entertainment it gives day to day news and o n latest current affairs, therefore it has become the easiest and laziest way in which one can gain this relaxation. Since then it appears to be that demand for the TV remain constant over the time, even-though new appliances have been introduced in past years. Therefore, for the demand function analysis we have selected the particular product as TV. Furthermore, for this research we considered the television (TV) product of the Life Goods (LG) marketed in the Abans PLC. Since the product (Abans LG 32inch TV) had higher stable demand for significant time period in the market. Moreover, Abans PLC was one of the leading company with extensive product portfolios in the Sri Lankan Market. The Abans brand has earned and identify as reliable and high quality brand name, making it's one of the best-loved brands in the country. The company possesses an island wide chain of showrooms and authorized dealers bringing various innovative products within the reach of every family and household in the country. The company expanded their business by absorbing internationally renowned and globally acclaimed brands of household appliances. International brand of Life's Good (LG) produced different types of products in which LG televisions are popular for latest cutting-edge technology and innovations. Being the only authorized agent to sell LG products Abans has enhanced household product quality into creating innovations in home cinema/mini theatre level.

Keywords: creating, Forecasting, people's, brands

Introduction

Background information of selected product

Abans PLC is one of the market leaders in electronics and home appliances in Sri Lanka. All products in Abans carry a trusted guarantee for its quality and reliability. They link with world leading brands such as LG, Mitsubishi Electric, Lenovo, Sanyo, Panasonic etc. Our demand estimation is focused on LG brands extension in Abans PLC. LG plays an active role in world markets which control 112 operations including 81 subsidiaries worldwide, with roughly 84,000 executives and employees. Products range focused on many income levels in the communities, in which 32 inch LG TV product range capturing the buying capacity of the middle income earners. Determinants of the demand functions can be clearly identified and stated by using the particular TV product mentioned above in order to estimate demand function and forecast future sales and prices. Demand function analysis is depend on several determinants such as income level of the customer, features, desires technologies, etc. Here the main focus is to determine the effect of the determinants in order to understand the market behaviour and its impact on the product.

Specifying the Demand Function

Demand of the product is determined by several factors. Some factors affect demand function directly and indirectly. In this the selected demand determinants are quantitative. In the study done the demand is specified to be liner in form. The coefficient on each of the explanatory variables measure the rate of change in quantity demanded (dependent variable) as that explanatory variable changes, holding all other explanatory variables constant (independent variables). In our empirical demand specification quantity of the LG 32 inch TV is specified as our dependent variable, and all our independent variables are list below that have an impact on the market demand LG 32 Inch TV.

1. Selling Price of LG 32" LED TV
2. Competitor Price of Samsung 32" LED TV
3. Competitor Price of Singer 32" LED TV
4. Advertising cost
5. Number of Households
6. Mean household income
7. Consumer accounts (Electricity)
8. Average electricity selling price per unit
9. Number of outlets

Price of LG TV

Price of the product is the most important factor in determining the demand. The Law of Demand describes how price will affect the buying capacity (number of items) of the consumer when other variables held constant. Normally, consumers are willing to buy more of goods at lower price and less goods at higher price. Generally higher profits are gained at monopolistic market

whereas normal profits are gained at competitive markets. Price of LG 32 Inch TV is set by Abans PLC is determined by various factors such as market demand, price of the competitors, house hold income, and advertising cost etc.

Price of competitive products- Samsung/Singer

The cost of the competitive products may create a substantial impact on the demand of LG TV 32 Inch. As per the discussion had with Business Development Manager, pointed out that the main competitors for the Abans LG TV are Samsung and Singer.

Advertising cost

Consumer loyalty for a product is changed over the time due to various reasons. To get the competitive advantage and to maintain the customer loyalty advertising is very much important. In the TV market, technology has rapidly changed over the time which resulted in adding advanced features/options regularly. In order to make the consumer aware and to create the need in consumer's mind the advertisements must make an enormous impact on the consumer. Since, there is a competitive market for TV's in Sri Lanka, there is a dependency on how much supplier should spent on marketing. So, we strongly believe that there is a relationship between the demand and the advertising for the selected product.

Number of household

This variable is derived by dividing the total population from the household size (person). This will determine the number of TV to be produced based on the usage or households. Note – The above monetary variables have been deflated using Colombo Consumer Price Index (CCPI). There are many other variables we consider when developing demand function. We exclude those variables due to lack of data availability and no update for recent years such as Average electricity selling price per unit, mean household income, consumer accounts, number of outlets, technology enhancement. On the other hand we did not considered qualitative data such as technology and customer preference which are significant and can have direct impact.

Data

Table 1

Variable	Source	Unit of measurement	Sample period	Frequency
Sales quantity -SQTY	Internal sources of Abans PLC	Number of units	03 Years	Monthly
Number of Households – NHH	Economics & Social Statistics of Sri Lanka 2014 – CBSL	Number of units	03 Years	Yearly
Selling Price of LG 32" LED TV – SP	Internal sources of Abans PLC	Sri Lanka Rupee	03 Years	Monthly
Competitor Price of Samsung 32" LED TV – CPSMSG	Internal sources of Singhagiri PLC	Sri Lanka Rupee	03 Years	Monthly
Competitor Price of Singer 32" LED TV –SPSGR	Internal sources of Singer Lanka PLC	Sri Lanka Rupee	03 Years	Monthly
Advertising cost – ADC	Internal sources of Abans PLC	Sri Lanka Rupee	03 Years	Monthly

Estimation

SPSS Statistical software was used for regression analysis and demand function was derived from the results. The estimation process used is as follows.

Step 1

Statistical significance of the variables is needed to be tested as their significance is key for multiple regression models to provide a valid result. Hypothesis developed;

H_0; Price of LG 32" LED TV has no relationship the sales Quantity of LG 32" LED TV

H_1; Price of LG 32" LED TV has a relationship with the sales Quantity of LG 32" LED TV

H_0; Competitor Price of Samsung 32" LED TV has no relationship with the sales quantity of LG 32" LED TV

H_1; Competitor Price of Samsung 32" LED TV has a relationship with the sales quantity of LG 32" LED TV

H_0; Competitor Price of Singer 32" LED TV has no relationship with the sales quantity of LG 32" LED TV

H_1; Competitor Price of Singer 32" LED TV has a relationship with the sales quantity of LG 32" LED TV

H_0; Advertising Cost has no relationship with the sales quantity of LG 32" LED TV

H_1; Advertising Cost has a relationship with the sales quantity of LG 32" LED TV

H_0; Number of households has no relationship with the sales quantity of LG 32" LED TV

H_1; Number of households has a relationship with the sales quantity of LG 32" LED TV

Sales of LG 32" LED TV – {SQTY}, Number of Households – {NHH}, Selling Price of LG 32" LED TV – {SP}, Competitor Price of Samsung 32" LED TV – {CPSMSG}, Competitor Price of Singer 32" LED TV – {SPSGR}, Advertising cost – {ADC}

Step 2:

Chosen level of significance is 5% and decision is based on the p value approach.

Step 3:

A decision criterion is to reject H_0, if p value is less than the significance level of 5% (0.05). The below table obtained from SPSS output, summarizes the coefficient variables results.

Table 2

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5211.754	13689.213		.381	.706
NHH	-.001	.002	-.027	-.293	.772
SP	-.078	.018	-.537	-4.259	.000
CPSMSG	.026	.021	.163	1.209	.236
SPSGR	.024	.010	.139	2.309	.028
ADC	.000	.000	.987	54.637	.000

a. Dependent Variable: SQTY

Interpreting the parameters

Results obtained from the SSPS and the decisions are tabulated below.

Table 3

Variable	P-value Vs. Significance level	Decision Taken
Number of Households {NHH}	0.772>0.05	Do not reject H0
Selling Price of LG 32" LED TV {SP}	0.000<0.05	Reject H0
Competitor Price of Samsung 32" LED TV {CPSMSG}	0.236>0.05	Do not reject H0
Competitor Price of Singer 32" LED TV {SPSGR}	0.028<0.05	Reject H0
Advertising cost – {ADC}	0.000<0.05	Reject H0

Step 4

Based on the above results it was observed that only three variables, Selling Price of LG 32" LED TV, Competitor Price of Singer 32" LED TV and Advertising Cost are significant variables and Competitor Price of Samsung 32" LED TV and Number of Households are statistically insignificant. There is no relationship between those two variables with sales quantity of LG 32" LED TV.

Interpretation of the model summary

As explained above, following determinants have been considered in deciding the best fit model for the sales of LG 32" LED TV (SQTY). Number of Households – {NHH}, Selling Price of LG 32" LED TV – {SP}, Competitor Price of Samsung 32" LED TV – {CPSMSG}, Competitor Price of Singer 32" LED TV – {SPSGR}, Advertising cost – {ADC}. The following table summarizes the results of the overall model.

Table 4

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.996[a]	.991	.990	129.3556

a. Predictors: (Constant), ADC, SPSGR, NHH, SP, CPSMSG

Table 5

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	57101364.695	5	11420272.939	682.505	.000[b]
	Residual	501986.225	30	16732.874		
	Total	57603350.920	35			
a. Dependent Variable: SQTY						
b. Predictors: (Constant), ADC, SPSGR, NHH, SP, CPSMSG						

According to the model summary table, R value shows that there is 99.6% correlation coefficient between all predictors (ADC, SPSGR, NHH, SP, CPSMSG) and the dependent variable (SQTY). R square explained that, 99.1% of the variation of sales quantity of LG 32" LED TV is explained by the variability of predictors (ADC, SPSGR, NHH, SP, CPSMSG) by the model. Adjusted R square value explained more honest answer about the relationship between dependent variables and predictors. According to the model results, 99.0% of variation in quantity demanded of LG TV LED32 is explained by the predictors. Therefore the model demonstrates a perfect fit since R-square is so closer to 100%. Using the level of significant of 0.05, the critical value of the F distribution, with 5 and 30 degrees of freedom, is 2.53. F calculated value shows in the above table is 682.50. Therefore it is greater than the F table value. The P – value. 000 is less than the 0.05. Therefore we can conclude that overall model is significant. In accordance with the above result, the regression model can be derived as follows. If, sales quantity of LG 32" LED TV = SQTY, NHH = X1, SP = X2, CPSMSG = X3, CPSGR = X4, ADC = X5, the model would be;

Table 6

SQTY = 5211.75 -0.001X1 -0.078X2 + 0.026X3+ 0.024X4 +0.00X5

As per the p-value test performed to identify the significance of each independent variables proved that, Selling Price of LG 32" LED TV (X2), Competitor Price of Singer 32" LED TV(X4) and Advertising Cost (X5) is statistically significant at 95% confidence level. Other two variables i.e. and Competitor Price of Samsung 32" LED TV(X3)and Number of Households(X1) are not statistically significant at 95% confidence level. Even though Advertising Cost is significant its coefficient is almost equal to zero. Therefore in order to estimate demand function of LG 32" LED TV insignificant variables i. e. Competitor Price of Samsung 32" LED TV and Number of Households and variable (Advertising Cost) that have no impact to the depended variable were not considered and re developed the regression model. Results are as follows:

Table 7

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.995[a]	.991	.990	129.665
a. Predictors: (Constant), ADC, CPSGR, SP				

Table 8

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	57065332.554	3	19021777.518	1131.368	.000[b]
	Residual	538018.366	32	16813.074		
	Total	57603350.920	35			
a. Dependent Variable: SQTY						
b. Predictors: (Constant), ADC, CPSGR, SP						

Table 9

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1222.297	158.919		7.691	.000
	SP	-.055	.008	-.377	-6.963	.000
	CPSGR	.029	.009	.167	3.091	.004
	ADC	.000	.000	.992	56.525	.000
a. Dependent Variable: SQTY						

Thus, final demand equation is as follows.

$SQTY = a + bX_2 + cX_4$

$$SQTY = 1222.297 - 0.055X_2 + 0.029X_4$$

a b c

Table 10

Parameter	Value	Interpretation
A	1222.297	Number of quantity demand, when other two factors are zero.
B	- 0.055	Holding other factors constant, as the selling price of LG TV increased by one unit on average the quantity demand of LG TV will decreased by 0.055 unit.
C	+0.029	Holding other factors constant, as the selling price of Singer TV increased by one unit on average the quantity demand of LG TV will increased by 0.029 unit.

Elasticity

Price Elasticity

Price elasticity can be defined as percentage change in quantity demanded of LG 32" LED TV divided by a percentage in its price. In this case, price elasticity among most of the data points is negative due to negative relationship between price and quantity demanded. However, there are positive price elasticity example change among May 2012 and June 2012, April 2013 and May 2013 (Refer Annexure Table 3).

Cross Price Elasticity

Cross price elasticity can be identified as responsiveness of quantity demanded of LG 32" LED TV to change in prices of Singer TV. In this case, cross price elasticity among most of data points are negative. Even though the negative cross price elasticity stands for complementary goods, LG and Singer TV are more towards substitute. This actual situation cannot be seen from this data. (Refer Annexure Table 4)

Forecasting

Since it is comprised of historical values, quantitative forecasting approaches need to be considered.

Application of techniques for Averaging

Moving Average

By using moving average method, number of sales units can be forecasted as 4,108. This is taken by averaging sales units of latest 3 months. Refer annexures table – 2.

Exponential Smoothing

Under exponential smoothing techniques, following forecasted values can be taken based on three smoothing constant.

Table 11

	0.3	0.5	0.7
Sales units for January,2015	3,560	4,265	4,961

Table 12

	0.3	0.5	0.7
Root Mean Square Error	1,385	1,394	1,417

Smoothing constant of 0.3 gives the lowest root mean squared error. Therefore 0.3 smoothing constant value give a more accurate forecast. However moving averages will not provide an accurate forecast due to its weakness. In this case, it can be observed that there are a quite high number of sales in months such as November, December. Refer annexure table 2. Forecasting helps to predict the performance of firms (Nwokwu, Dharmadasa, & Rathnasingha, 2018; Nwokwu, Atapattu, & Azeez, 2019; Nwokwu, 2018; Nwokwu, Rathnasingha & Pradeep, 2019) [13, 11, 12, 10].

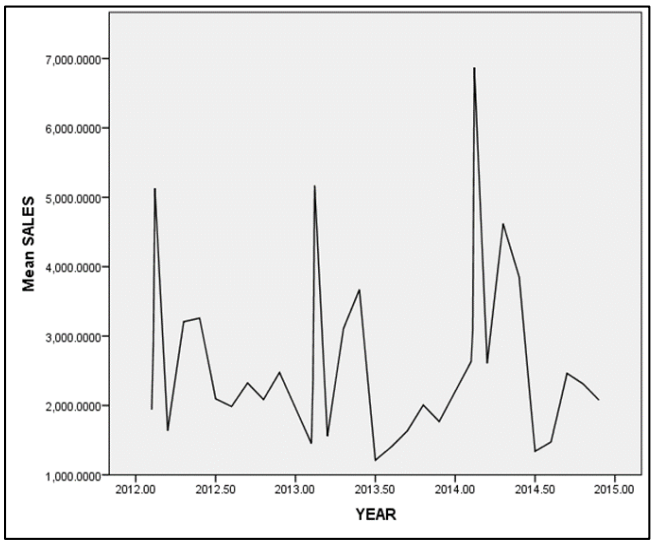

Fig 1: Therefore most suitable method of forecasting is trend projection.

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