

Studying the Factors of Periodic Purchase, Number of Competitors and Brand Loyalty on Consumer Price Estimation Error

Mohsen Nazari, and Roshanak Rezvani

Abstract—The aim of this paper is to study purchase frequency, number of competitors and brand loyalty on consumer's price estimation error by customers of Tehran. Statistical population of this work includes Tehran citizens and data collection is performed in appropriate places such as Shahrivand department stores. Sample volume is calculated as much as 384 people according to Cochran formula which were selected using stratified sampling. Data collection tool is questionnaire prepared by researcher. Validity of questionnaire was studied by the opinion of academics and experts of this field and for determination of reliability coefficient, Cronbach alpha was used. To analyze data, methods such as mean comparison and correlation coefficient using SPSS software were used. Investigation of variables of purchase frequency, number of competitors and brand loyalty about seven selected products reveals that variable of brand loyalty has significant relationship with error in price estimation of products including Damdaran fatty milk and Sedr Sehat Shampoo. Furthermore, relationship between other variables and consumer's price estimation error for each of the products is evaluated separately.

Keywords—Purchase Frequency, Number Of Competitors, Brand Loyalty, Consumer's Price Estimation Error.

I. INTRODUCTION

TODAY price as an element of mixed marketing in commodities can play an important role. Moreover, price is one of the most important indices of the market and hence, financial costs are important in transactions. Since price of a product greatly affects purchase decision of the consumer and the issues such as when, where and how many of the products are purchased, it must be taken into consideration. So, it is important that marketers be aware of whether correct information is given to customer and they remember such information as intended by marketer [5]. In fact, generally, success of marketers depends upon permanence of their products in customers' mind and as such, the way products pricing affects customers' mind is of special significance.

Price knowledge which is measured by consumer's price estimation error has a mental structure and since it contributes customers' decision making, it is related to the

success of retailers. At the same time, through product pricing by consumer, price knowledge can lead to demotivation or motivation of purchasing from retailers and his success or failure [3]. Customer price knowledge affects purchase behavior according to consumer priorities. Product price changes if there is low price estimation error about the product, has a certain effect on consumer. Opposite is true as well and consumer may not notice the changes. Therefore, it is important to investigate whether how much consumers are sensitive to price and how much price increase will be accepted by them. Consequently, being aware of price estimation error of products is necessary for retailers so that they know how much consumers are aware of product prices and whether their prices affect their behavior [1]. Additionally, Concentration on consumer's price estimation error is of significant importance to the marketers since the results can be utilized to enhance the marketing strategies. With this brief introduction, the purpose of this work is to investigate the effect of purchase frequency, number of competitors and brand loyalty of price estimation error made by Tehran consumers.

theoretical background

A. Customer price knowledge

Price knowledge is the mental ability of consumers in keeping price in mind [3]. Price knowledge has various conceptual aspects: subjective and objective knowledge. Objective knowledge refers to correct information about a company product price stored in long-term memory and obtained through measurement of cognition and review indices. Subjective knowledge refers to understanding of a customer about the price of a product. Results of Saeid Nia show that objective knowledge has a positive effect on the mental knowledge of the consumers while this is not confirmed by the work of Meggie and Jolander [6]. Indeed, price knowledge structure consists of two parts: first, certain price knowledge including a number based and exact content. Second, price feeling from which consumer has a vague knowledge and addresses it as cheap and expensive.

In this work, consumer product knowledge is evaluated by Product Estimation Error (PEE): this index is based on Product Absolute Deviation (PAD) and is calculated as follows:

Mohsen Nazari is Associate professor of Faculty of Management, University of Tehran, Iran.

Roshanak Rezvani is Msc student at Faculty of Management, University of Tehran, Iran.

$$PEE = \frac{\text{real price} - \text{price estimation}}{\text{real price}}$$

$$PAD = \text{real price} - \text{estimated price}$$

B. Purchase frequency

Purchase frequency clearly increases the experience about prices and therefore, it has a positive effect on product price knowledge [7]. In reality, most of the purchase experiences enable customers to access more information about prices upon purchase. More exposure to prices leads to more integrated and consolidated price information storage. Customers with more purchase frequency have more and updated information about the products prices and as a result, they have less compatibility with price increases which is a reflection of their high level price knowledge. Products with high purchase frequency are often necessary ones which are frequently demanded and always a part of consumption fund of the customers is allocated to them. Hence, customers may have a strong motivation for gaining knowledge about the price of the products they purchase. According to researches, customers with higher purchase frequency, have better price knowledge. Of course, in a work performed in Chile, no significant relationship between purchase frequency and product price knowledge [8]. Moreover, Saeid Nia and Ali Nejad [7] found out that purchase period positively affects the objective and subjective knowledge of customers. Of course, this is not confirmed by the work of Meggie and Jolander [6].

C. Number of competitors

Two effective factors; i.e. lack of alternative products and little share in consumers' fund can lead to lack of intention in product demand with regard to price. Therefore, consumers become insensitive to prices increases and have less motivation for knowing and remembering prices. Dickson and Xavier [1,2] approved the hypothesis that food products consumers purchase them without trying to know about the prices and this is especially true in low inflation periods. Indeed, important variable which is less considered in the past is the sensitivity of consumer to prices and as stated, it can be affected by factors such as number of competitors and alternative products. This is clear that consumers have more sensitivity to the price of some of the products and it seems logical that such sensitivity affects collection of such information [4].

D. Brand loyalty

Customer loyalty is extensive considered as a useful index for long-term commercial success. Previous studies expressed the strong contribution of customer loyalty to company performance and that companies consider customer loyalty as an important competitive resource. Kumar et.al revealed a strong relationship between customer loyalty and company profitability. Moreover, Furnel group found no significant and positive relationship between customer loyalty and return of equity. As a result of the importance of customer loyalty in commercial success, academics and contributors intended to recognize the determinants of customers' loyalty. Marketing

literature expressed the determinants of the customer loyalty for more than two decades. Factors contributing to customer loyalty include customer value, confidence and habits. Studies investigated the effect of website design characteristics on customer loyalty [9].

Customers, who are loyal to a certain brand, have fewer tendencies toward trying other similar brands. Most of the marketing researchers recommend that loyalty to a brand is an important defensive action against price competition and losing customers. Findings of previous studies are in agreement with this general hypothesis and state that available loyal customers less consider the economic prices compared to newer customers. Of course, in the work of Nelson in Denmark and another work performed in Chile, no significant relationship between customer loyalty and price knowledge [8].

II. RESEARCH METHODOLOGY

Recent paper is an applied research with respect to nature and goals and form the method and data collection point of view, it is a descriptive – survey research. Present paper attempts to investigate factors contributing to price estimation error customers. Therefore, statistical population can include people of Tehran. According to importance of completing questionnaire by Tehran customers, appropriate place for collecting data required for research is Shahrvand department store. Due to unlimited population, lack of access to statistical framework and dispersion of subjects, stratified sampling method is used and volume of the sample was calculated as much as 384 according to Cochran formula. For data collection, two methods of library and field were used. Data collection tool is questionnaire. Questionnaire includes 11 questions prepared by researcher and is composed of letter, general and professional questions. Reliability of the questionnaire is investigated by the opinion of academics and experts of this field and is evaluated as suitable. To determine the validity of the research tool, Cronbach alpha is used whose results are summarized in table I.

TABLE I
RELIABILITY OF QUESTIONNAIRE

Variable	Cronbach ALPHA
Purchase frequency	0.62
Number of competitors	0.93
Brand loyalty	0.84

It can be said that Cronbach alpha higher than 0.6 is considered as suitable reliability. Therefore, overall reliability of the designed questionnaire can be evaluated as good. In this work, methods such as mean comparison and correlation factor are used for measuring research hypotheses and in this way, SPSS software will be used.

III. RESULTS

According to results of table II, it can be said that sample people have a good estimation about products such as 1.5L Coca Cola soft drink, 1L Damdaran fatty milk, Grinded meat (1kg), 300g Sedr Sehat Shampoo and 1L Prill liquid.

However, their estimation about products such as Ladan sunflower oil and 900g lentil as much as 95% higher than real price of the products.

TABLE II

Products	Significance level	t-statistic	Mean of price estimation error	Mean of estimated price	Real price
1.5L Coca Cola soft drink	0.934	-0.083	-0.0002	1949.61	1950
Ladan sunflower oil	0.017	-2.402	-0.0064	4868.75	4900
1L Damdaran fatty milk	0.493	-0.686	-0.0009	1998.24	2000
Grinded meat (1kg)	0.501	-0.674	-0.0018	24934.88	24980
900g lentil	0.028	2.208	-0.0093	5551.08	5500
300g Sedr Sehat Shampoo	0.495	0.684	-0.00176	3381.02	2340
1L Prill liquid	0.123	-1.549	-0.0066	3804.55	3830

According to results of table III, it can be said that sample people have a good estimation about products such as 1.5L Coca Cola soft drink, 1L Damdaran fatty milk, Grinded meat (1kg) and 300g Sedr Sehat Shampoo. However, their estimation about products such as Ladan sunflower oil is 95% higher and for 900g lentil and 1L Prill liquid is as much as 95% lower than real price of the products. On the other hand, for each of these products, estimation of people was correct before purchase.

TABLE III BEFORE

Products	t-statistic	Mean of price estimation error	Mean of estimated price	Real price
1.5L Coca Cola soft drink	0.717	0.364	0.0022	3838.31
Ladan sunflower oil	0.147	-1.457	-0.0046	1940.94
1L Damdaran fatty milk	0.275	-1.096	-0.0042	4879.20
Grinded meat (1kg)	0.649	-0.455	-0.0009	1998.26
900g lentil	0.499	-0.679	-0.0027	24912.57
300g Sedr Sehat Shampoo	0.917	0.104	0.0006	5503.57
1L Prill liquid	0.783	-0.276	-0.0098	2316.96

TABLE III AFTER

Products	t-statistic	Mean of price estimation error	Mean of estimated price	Real price
1.5L Coca Cola soft drink	0.027	-2.251	-0.0135	3778.28
Ladan sunflower oil	0.270	1.107	0.0039	1957.54
1L Damdaran fatty milk	0.027	-2.233	-0.0082	4860
Grinded meat (1kg)	0.609	-0.512	-0.0009	1998.22
900g lentil	0.769	-0.294	-0.0011	24953.28
300g Sedr Sehat Shampoo	0.004	2.920	0.0164	5590.20
1L Prill liquid	0.280	1.088	0.0399	2433.33

According to results of above table, it can be said that sample people have a good estimation about products such as 1.5L Coca Cola soft drink, 1L Damdaran fatty milk, Grinded meat (1kg) and 300g Sedr Sehat Shampoo. However, their estimation about products such as Ladan sunflower oil is 95% higher and for 900g lentil and 1L Prill liquid is as much as 95% lower than real price of the products. On the other hand, for each of these products, estimation of people was correct before purchase.

A. Correlation factor

According to results of above table, it can be said that sample people have a good estimation about products such as 1.5L Coca Cola soft drink, 1L Damdaran fatty milk, Grinded meat (1kg) and 300g Sedr Sehat Shampoo. However, their estimation about products such as Ladan sunflower oil is 95% higher and for 900g lentil and 1L Prill liquid is as much as 95% lower than real price of the products. On the other hand, for each of these products, estimation of people was correct before purchase.

TABLE IV

	Purchase frequency	Number of competitors	Brand loyalty
Soft drink	Lack of N relationship	Lack of N relationship	Lack of N relationship
Sunflower oil	Lack of N relationship	Lack of N relationship	Lack of N relationship*
Fatty milk	Lack of N relationship	Lack of P relationship	Lack of P relationship
Grinded milk	Lack of N relationship	Lack of N relationship	Lack of N relationship
Lintel	Lack of N relationship	Lack of N relationship	Lack of N relationship**
Shampoo	Lack of N relationship	Lack of N relationship	Lack of N relationship
liquid oil	Lack of N relationship	Lack of N relationship	Lack of P relationship

** Significance in 0.01 level

* Significance in 0.05 level

Coca Cola soft drink: according to table 4.4, correlation factor for PEE of soft drink and research variables demonstrate that there is a negative and non-significant relationship between PEE of soft drink and purchase frequency. Indeed, this issue states that relatively, by increasing purchase frequency, error in price estimation reduces. In other words, it can be said that people with higher purchase frequency estimate its price with lower error.

Sunflower oil: correlation factor for PEE of oil and research variables reveal that there is a negative and non-significant relationship between PEE of oil and purchase frequency which demonstrates that there is a relatively an inverse relationship between these two variables.

Fatty milk: correlation factor for PEE of milk and research variables reveal that there is a negative and significant relationship between PEE of oil and brand loyalty which demonstrates that with higher loyalty to the brand, error in estimation of price of the product reduces accordingly. Furthermore, there is a negative and significant relationship between purchase frequency and PEE with a correlation

factor as much as -0.304. In other words, PEE decreases with increasing purchase frequency.

Grinded meat: correlation factor for PEE of meat and research variables reveal that there is a negative and non-significant relationship between PEE of meat and purchase frequency. Despite of non-significant and negative relationship, it seems that more purchase frequency leads to lower PEE. Furthermore, there is a positive and significant relationship between purchase frequency and PEE and it can be said that people with lower purchase frequency, estimate the price of meat with lower error.

Lentil: correlation factor of PEE of lentil and research variables reveal that there is no relationship between PEE of lentil and research variables.

Shampoo: correlation factor for PEE of shampoo and research variables shows that there is a negative and significant relationship between PEE of shampoo and brand loyalty and by increasing loyalty, error in estimating product price decreases.

Liquid: correlation factor of PEE of liquid and research variables reveal that there is no relationship between PEE of liquid and research variables.

Comparison of variables according to demographic factors

In this section, it is attempted to determine whether there is a significant difference between variables with respect to demographic factors.

B. Comparison based on gender

According to table V, there is only a significant difference among men and women in the variable of purchase frequency in which the score of women is higher.

TABLE V
T-TEST FOR COMPARISON OF MEAN OF MEN AND WOMEN IN RESEARCH VARIABLES

Variables	Significance level	t-test	Mean values	
Purchase frequency	0.000**	-3.793	4.57	Male
			4.86	Female
Number of competitors	0.601	-1.325	2.13	Male
			2.31	Female
Brand loyalty	0.151	-0.523	2.34	Male
			2.37	Female

C. Comparison based on marital status

According to table VI, there is only a significant difference among singles and marrieds in the variable of number of competitors in which the score of singles and marrieds are 2.73 and 2.13, respectively. This means that married people are more affected by the variable of number of competitors.

TABLE VI
T-TEST FOR COMPARISON OF MEAN OF SINGLES AND MARRIEDS IN RESEARCH VARIABLES

Variables	Significance level	t-test	Mean values	
Purchase frequency	0.00**	-3.793	4.57	Male
			4.86	Female
Number of competitors	0.601	-1.325	2.13	Male
			2.31	Female
Brand loyalty	0.151	-0.523	2.34	Male
			2.37	Female

D. Comparison of variable with respect to educational level

There is no significant relationship between mean of purchase frequency, brand loyalty and number of competitors based on educational level of people since the significance level is obtained as much as 0.05. (table VII).

TABLE VII
VARIANCE ANALYSIS TEST FOR COMPARISON OF EDUCATIONAL LEVEL FOR RESEARCH VARIABLES

	Number of competitors	Brand loyalty	Purchase frequency
f-statistic	2.229	0.45	0.882
Significance level	0.084	0.718	0.45

E. Comparison of variables with respect to people job

According to table VIII, there is no significant relationship between mean of purchase frequency, number of competitors and brand loyalty based on people job since the level of significance is 0.05.

TABLE VIII
VARIANCE ANALYSIS FOR COMPARISON OF PEOPLE JOB IN RESEARCH VARIABLES

	Number of competitors	Brand loyalty	Purchase frequency
f-statistic	1.158	0.730	1.449
Significance level	0.324	0.626	0.195

F. Comparison of variables with respect to people age

According to table IX, there is no significant relationship between mean of purchase frequency and brand loyalty based on people age since the level of significance is 0.05. However, for the variable of number of competitors, there is difference based on people age. To determine in which age group a significant difference is present, Scheffe test is used (table X).

TABLE IX
VARIANCE ANALYSIS FOR COMPARISON OF PEOPLE AGE IN RESEARCH VARIABLES

	Number of competitors	Brand loyalty	Purchase frequency
f-statistic	4.04	0.453	1.0366
Significance level	0.001	0.811	0.379

TABLE X
SCHEFFE TEST FOR THE VARIABLE OF NUMBER OF COMPETITORS

	Mean of 2 nd group	Mean of 1 st group
Over 60		1.55
40-50		1.99
30-40	2.25	2.25
50-60	2.30	2.30
20-30	2.57	2.57
Below 20	3.66	
significance level	0.120	0.467

G. Comparison of variable with respect to people income

It is observed in table XI that there is no significant relationship between mean of purchase frequency, brand loyalty and number of competitors based on income level of people since the significance level is obtained as much as 0.05.

TABLE XI
VARIANCE ANALYSIS TEST FOR COMPARISON OF INCOME LEVEL FOR
RESEARCH VARIABLES

	Number of competitors	Brand loyalty	Purchase frequency
f-statistic	0.55	0.289	0.749
Significance level	0.577	0.749	0.453

IV. CONCLUSION

Hypothesis 1: purchase frequency affects customer price estimate error.

For the variable of purchase frequency, no significant relationship is observed for any of the products. It is observed that in all cases, calculated values are always negative and hence, it can be expected that by increasing purchase frequency, error is estimating price decreases. Among products, only fatty milk had high purchase frequency. However, for this product, there is no relationship between PEE and purchase frequency and the reason for this issue – as observed in the field – can be price diversity, type of milk and price changes.

Hypothesis 2: number of competitors affects error in price estimation by customer.

For the variable of number of competitors, for significant relationship is observed and hence, it can be concluded that customers purchase the brands to which they have confidence and therefore, they less take the quality and price of the competitors into consideration. As a result, this issue is important for retailers which persuade people through any type of advertisements such as free tests and put the product in the consumption basket of consumers so that customers become loyal to them and gain more knowledge about their products and prices. In fact, according to risk aversion of customers, role of advertisement and making loyalty to a brand is of great importance.

Hypothesis 3: loyalty to a brand affects the error in price estimation by customers.

Variable of brand loyalty has a significant relationship with PEE only in two products; fatty milk and shampoo and shows 5% level of error. This is an inverse relationship. In reality, by increasing loyalty to brand, error in estimating price of the product will reduce in both products.

Regarding shampoo, in table 4.11 we see that 37.6% never purchase the product which has the lowest level of purchase compared to other products. Moreover, this product had the monthly or once a few months. Hence, it doesn't show high purchase frequency. However, customers loyal to this product had low error in estimating the price which reveals the high level of price knowledge in customers loyal to this product.

For the case of fatty milk, highest purchase frequency can be due to satisfaction as a result of consuming the product and loyalty to the brand. Therefore, it is emphasized on the vital role of loyalty of customers to product and consequently, the price knowledge.

In addition, comparison of variables based on demographic variables illustrates that there is only difference between men and women for the variable of purchase frequency.

Further, for the variable of number of competitors, there is a significant difference between single and married people. According to the mean obtained for the number of competitors, it can be concluded that married people are more affected by the number of competitors.

However, there is no significant difference between mean of purchase frequency, brand loyalty and number of competitors based on educational level, age and job of participants. Nevertheless, for the variable of number of competitors, there is a significant difference based on age of the people.

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