

Sensitivity of Scale Points in Switching of Customers in Terms of Level of Impulsiveness

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Abstract

Impulsive purchases are often identified in response to incentives to buy. This move focuses on the situational factors which lead to impulse buying without regard to individual characteristics. Most of the studies focused on the impact of store environment on impulsive buying. Thus, the objective of this study is to find the most compatible scale points for the impulsive buying behavior scale by Rook and Fisher for consumers in the level of impulsiveness. From study, it is concluded that the 9-point scale is the most sensitive scale compared to other scale points in terms of the switching nature of the consumers.

Keywords: Data Envelopment Analysis (DEA), Marascuillo procedure, χ^2 – test, Normal distribution, Rook and Fisher impulsive buying scale, Kolmogorov-Smirnov (K-S) Test.

1. Introduction

Impulsive purchases are often identified in response to incentives to buy. This move focuses on the situational factors which lead to impulse buying without regard to individual characteristics. Most of the studies focused on the impact of store environment on impulsive buying. But, this effect is not a systemic and the stimuli are not responsible for all impulsive purchases. As a result, few internal mechanisms causing the impulsive behavior may be ignored (Rook, 1987). Furthermore, the precursors in the literature show the intricacy of impulsive purchase. This behavior depends on both the situation and the individual (D'Antoni and Shenson, 1973). It was observed only factors related to product and marketing were considered triggers for such purchases (Cobb and Hoyer, 1986). The motivation to focus on the variables of the sales and product environment does not seem sufficient to fully explain impulse buying. Looking at the subjects that have been studied in people with impulsive behavior, it seems that impulsivity is inherent. Because of this reality, impulsive purchases result from the interaction between the individual and the individual related to the interaction between internal and external variables. Likewise, impulse purchases may be a rewarding experience for some people because these purchases are both attractive and enjoyable but regret and dissatisfaction after an impulsive purchase for others.

For a long time, the impulsive shopper was seen as an irrational consumer who reacts uncontrollably and mercilessly to the temptation to shop at the store. In addition, the impulsive purchase decision process is strongly influenced by emotions; it is a rapid synchronous treatment that evokes emotional responses and a tendency to action, all on the basis of rapid stimulus evaluation (Puri, 1996). The term impulsivity is associated with a variety of behavioral, motivational, and emotional manifestations. Furthermore, aspects of impulsive properties are spontaneously, without thinking, related to the passion for immediate and dynamic buying (Rook and Fisher, 1995).

2. Literature Review

In the context of impulsive purchase, the decision to purchase is generally not the consequences of a systematic-analytical decision, rather a spontaneous and sudden action. The buying impulsiveness is thus, characterized by a tendency to react quickly and inconsiderately. A buyer who is impulsive is characterized by quick response times, not having prudence, and the capacity to act with no cautious preparation. People having high level of impulsiveness are carried away by their own requirements. However, it is easily seen that behavior can modify the relationship between impulsivity and buying impulsiveness behavior. Rook and Fisher (1995), suggested impulse buying as a single-dimensional parameter which measures a person's inclination to consider and behave in distinctive ways. Scales having compulsive consumptions with two-dimensions namely cognitive and emotional was developed by Youn (2000). A functional impulsivity scale developed by Giraud (2002) examined its connection with some individuality attributes. Few studies have reported a direct association between implementation of impulsive buying and buying impulsiveness (Dittmar and Bond, 2010; Jones et al., 2003; Rook and Fisher, 1995).

A study by Faber R. J. (2000) suggested that some external and internal signals affect impulsive buying. Internal cues include respondents' positive and negative emotional states. The internal signals referred to the feelings, moods and emotional state of the consumers. According to Hausman Angela (2000), impulsive buying by individual consumers is related to their desire to satisfy pleasurable needs such as novelty, surprise and pleasure. Furthermore, the study results show that consumers who were more impulsive are expected to make purchases for pleasurable reasons than those with low or moderate impulsivity score. Thomas Adellar, Susan Chang, Karen M. Lancendoref (2003) in their study observed that emotional responses had a positive relationship with their impulsive buying intention. So, the more a subject feels a positive emotion towards a stimulus, the greater the tendency to impulsive purchase.

The researchers are interested to study the impulsive behavior of consumers. Thus, it is important to decide about the best possible scale point for impulsive buying behavior scale measuring the switching nature of consumers in the level of impulsiveness as there is an increment in the number of scale point. To deal with these switching natures we shall use the buying impulsiveness behavior scale by Rook and Fisher (1995)

3. Objective

In the review of literature, it has been identified the importance of studying the impulsive behavior of the consumers in the field of marketing. It is also very pertinent how the consumers show switching natures in the level of impulsiveness as the numbers of scale points are increased. Therefore, there is a gap in the literature regarding the optimal number of scale points on the mentioned buying impulsiveness scale. Thus, this chapter has been designed to find the most compatible scale point for the impulsive buying behavior scale by Rook and Fisher for consumers in the level of impulsiveness.

4. Hypotheses

In the study, the researchers are comparing the switching nature of consumers from impulsiveness to non-impulsiveness and non-impulsiveness to impulsiveness of Silchar town of Assam. To attain the objectives the major hypotheses are as follows:

- (i) H01: Proportion of consumers switching from impulsiveness to non- impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points do not differ significantly.
- (ii) H02: Proportion of consumers switching from non-impulsiveness to impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points do not differ significantly.

To test H_{01} and H_{02} we shall apply χ^2 – test for independence of attributes, which is discussed in the **Section 5**.

If the hypotheses are rejected, to find which pair of scale points caused the rejection of the hypothesis, we shall apply the Marascuillo procedure (Marascuillo and McSweeney, 1967) of simultaneously comparing all possible pairs of proportions.

5. Methodology

The selected population is an urban population of Silchar town of Assam, India. Considering the population size of Silchar (1.72 lakh as per 2011 census) a sample size of 196 consumers is selected randomly for the study and this sample size will yield results with 95% confidence level and a 7% standard error.

There are 9 statements in the Buying Impulsiveness Behavior Scale given by Rook and Fisher (1995). The researcher obtained responses on various scale points used i.e., 5- to 9-point scale from a sample of 196 respondents using Impulsive Buying Scale (Given in Appendix). The sample of size 196 was drawn by systematic random sampling and the place of study was Big Bazar of Silchar town in Assam, India. Respondents took four to five weeks time to complete the 5 set of questionnaires e.g. the researcher took one week time to collect the information with the first set of questionnaire i.e. the questionnaire with the 5-point scale. The

investigators issued the second set of questionnaire that is with 6-point scale, only after obtaining the first set of questionnaire.

The 1st round of responses was obtained in 2017 and after a gap two years, 2nd part of data collection was done in last part of 2019 on the same set of respondents. This is done to assess if the type of impulsiveness of the respondents has changed between the time periods.

The responses corresponding to each of respondent for 5-point scale are normalized using

$$S_{ij} = \frac{x_{ij} - \min_i(x_{ij})}{\max_i(x_{ij}) - \min_i(x_{ij})}$$

where S_{ij} represents the normalized value corresponding to i^{th} respondent ($i = 1, 2, \dots, 196$) and x_{ij} ($i = 1, 2, \dots, 196$; $j = 1, 2, \dots, 9$) is value of the i^{th} respondent corresponding to the j^{th} response for each statement of a particular scale point e.g., 5-point scale. The normalized value for other scale points i.e. 6, 7, 8 and 9 can be calculated using the same formula.

Here we shall use Data Envelopment Analysis (DEA) to compute the weights for constructing the weighted average for combining the values of S_{ij} (for $j = 1, 2, \dots, 9$) for each of the i^{th} respondent ($i = 1, 2, \dots, 196$) into one single value. Precisely, speaking we shall use the DEA to find w_{ij} in the expression $Z_i = \sum_j S_{ij} w_{ij}$; $i = 1, 2, \dots, 196$; $j = 1, 2, \dots, 9$. The main target of DEA here shall be to determine values of $(w_{i1}, w_{i2}, \dots, w_{i9})$ for each of the i^{th} individual, in such a way that the value of Z_i is maximized, under some constraints. The values of Z_i here represent the composite index for impulsive buying behavior scale. The entire exercise is repeated for each of the questionnaire with different scale points viz. 6-point to 9-point scale.

To calculate the efficiency of any scale point e.g., say 5-point scale, the objective function and the constraints are as follows:

$$Z_i = \sum_j S_{ij} w_{ij}; i = 1, 2, \dots, 196; j = 1, 2, \dots, 9$$

Subject to the constraints

$$0.05 \leq w_{ij} \leq 0.1; j = 1, 2, \dots, 9$$

(to ensure that weight of the nine items lies between 3% to 15%) and $\sum_j w_{ij} = 1; i = 1, 2, \dots, 196$ (to ensure that the total weight of the nine items is equal to 1).

After calculating Z_i for each of the respondents of a particular scale point, say 5-point scale, we identify the probability distribution of the average using the Kolmogorov-Smirnov (K-S) Test. The same procedure is repeated for other scale points viz. 6, 7, 8 and 9.

Now for the 5-point scale say, the researchers test the distributional patterns of the values of Z_i across all individuals. The values of Z_i are continuous in nature and Kolmogorov-Smirnov (K-S) test statistic can be applied to check the goodness of fit (Keeping, 1962; Pal, 1998) of the data to appropriate continuous distribution.

The Kolmogorov-Smirnov (K-S) statistic is

$$D_n = \text{Max} |S_n(x) - F(x)|$$

where $S_n(x)$ and $F(x)$ are the empirical and theoretical distribution functions respectively. To perform K-S statistic, it is required to specify theoretical distribution completely, that is, the parameter values must be known. In this case, the estimations of the parameter values are obtained from the data. For the significance level α , the critical value of D_n , depends on n , the number of observations and can be denoted by $D_{\alpha, n}$. For observations greater than 35, as is the case here, the critical value at the 5% significance level ($D_{0.05, n}$) is $1.36 / \sqrt{n}$. Therefore, a D_n value more than $1.36 / \sqrt{n}$ will indicate that the fitted distribution is significantly different from the theoretical distribution

If the distribution is normal then we compute mean of the impulsive score (mean of Z_i across all individuals) so that we can classify the consumers into two levels of impulsive buying viz., “Impulsive” and “Non-impulsive” respectively based on the values of the composite index for impulsive buying. Depending on the values of the average impulsive score we can classify each respondent into two levels of impulsiveness for 5-point scale; the same procedure is repeated for other scale points viz. 6, 7, 8 and 9. The number of respondents who switched from impulsive to non-impulsive between the two different time periods i.e. 2017 and 2019 can be seen in **Table 1**.

5.1 χ^2 - Test for Independence of Attributes for Impulsive Scale

If the classifications of items are done for two or more criteria then it is interesting to assess whether these criteria act independent of each other. Here the researchers want to classify the responses obtained, according to the switching nature of the impulsiveness corresponding to different scale points. When examining whether one classification method is dependent on another classification method, the cross-classification in an array of r -rows and s -columns is called a contingency table. The contingency table consists of cells $r \times s$ cells that represent $r \times s$ possible results in the classification process. The test statistic for $r \times s$ contingency table is as follows:

$$\chi^2 = \sum_{\text{overall cells}} \frac{(o_{ij} - e_{ij})^2}{e_{ij}} \sim \chi^2_{(r-1)(s-1)}, \text{ where}$$

o_{ij} = obseved frequency for the i^{th} row and j^{th} column

e_{ij} = expected frequency for the i^{th} row and j^{th} column

and $e_{ij} = \frac{i^{th} \text{ row total} \times j^{th} \text{ column total}}{\text{Grand Total}}$

5.2 The Marascuillo Procedure for Impulsive Scale

Let us suppose that from k populations, samples of size n_i ($i = 1, 2, \dots, k$) is selected. Here as a 1st step, the difference $p_i - p_j$ (where p_i is the proportion of consumers whose impulsivity has changed on the i^{th} scale point) is calculated. Therefore, there will be $k(k-1)/2$ difference values of proportions, i.e. $p_i - p_j$. Then the required test statistics will be the absolute differences of $p_i - p_j$ for $i \neq j$ i.e. $|p_i - p_j|$; $i \neq j$.

The 2nd step consists of selecting the level of significance α and corresponding critical values calculated for the Marascuilo process using

$$r_{ij} = \sqrt{\chi^2_{\alpha; k-1}} \sqrt{\frac{p_i(1-p_i)}{n_i} + \frac{p_j(1-p_j)}{n_j}}$$

In 3rd and final step, the researchers compare each test statistic $k(k-1)/2$ with its respective critical value r_{ij} . The pairs whose test statistic greater than critical value, are significant at the level $\square$.

5.3 Results and Findings

Based on the methodology for Impulsive scale discussed in the **Section 5**, the computations are done and are placed in the tables.

Table 1. Number of respondents (out of 196) who showed switching in the level of Impulsiveness and Non-impulsiveness

	Scale Points					
	5-point	6-point	7-point	8-point	9-point	Total
Impulsiveness to Non-impulsiveness	25	31	18	22	12	108
Impulsiveness to Impulsiveness	73	78	82	82	98	413
Non-impulsiveness to Impulsiveness	31	22	22	16	12	103

Non-impulsiveness to Non-impulsiveness	67	65	74	76	74	356
Total	196	196	196	196	196	980

Table 1, indicates that the number of respondents who have switched over from impulsiveness to non-impulsiveness and non-impulsiveness to impulsiveness. Thus, it can be seen that the 6-point scale has identified the maximum number of respondents who have switched over from Impulsiveness to Non-impulsiveness, followed by 5-point scale. Thus, the 6-point scale is most sensitive in measuring the switching over of the customers in terms of impulsiveness.

Also it is observed that, the 5-point scale has identified the maximum number of respondents who have switched over from Non-impulsiveness to Impulsiveness, followed by 6-point scale. Thus, the 5-point scale is most sensitive in measuring the switching over of the customers in terms of non-impulsiveness.

Let P_k denotes the proportion of individuals who has switched over from impulsiveness to non-impulsiveness during the period of study as identified when the k -point Rook and Fisher impulsive scale is used, where, k goes from 5 to 9. Here, we would be interested to test if the proportions of consumers switching over from impulsiveness to non-impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points differ significantly or not. Thus, the null hypothesis to test is,

$$H_{01}: P_5 = P_6 = P_7 = P_8 = P_9, \text{ where } k=5, 6, 7, 8, 9.$$

i.e., proportion of consumers switching over from impulsiveness to non-impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points do not differ significantly. The test is performed against the alternative hypothesis

$$H_{11}: \text{Not all proportions are equal.}$$

i.e., there exists difference among proportion of consumers switching over from impulsiveness to non-impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points. To test H_{01} , we shall apply χ^2 – test for independence of attributes described in the **Section 5.1**.

Table 2 Observed and expected responses for (2×5) Contingency Table on Impulsive Nature and Scale Points

	Scale Points					
	5- Point	6- Point	7- Point	8- Point	9- Point	Total
Impulsive to Non- impulsive	25 (20.31)	31 (22.60)	18 (20.73)	22 (21.56)	12 (22.80)	108
Impulsive to Impulsive	73 (77.69)	78 (86.40)	82 (79.27)	82 (82.440)	98 (87.19)	413
Total	98	109	100	104	110	521

Note: The figures in brackets are the expected frequencies of the corresponding cells

From **Table 2**, we find the following:

Test-statistic (Calculated χ^2): $\sum_{\text{overall cells}} \frac{(o_{ij} - e_{ij})^2}{e_{ij}} = 12.2277$, degrees of freedom $(r-1) \times (s-1) = 4$ with respective p -value 0.016 (< 0.05) indicating rejection of the null hypothesis H_{01} .

This means that there exists difference among proportion of consumers switching over from impulsiveness to non-impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points.

Now, to find which pair of scale points caused the rejection of the hypothesis, we apply the Marascuillo procedure of comparing multiple proportions. To apply Marascuillo procedure we calculate the five sample proportions corresponding to the 5 scales and are $p_1 = 25/98 = 0.255102$, $p_2 = 31/109 = 0.284404$, $p_3 = 18/100 = 0.18$, $p_4 = 22/104 = 0.211538$ and $p_5 = 12/110 = 0.109091$

Table 3 Calculated values of r_{ij} in the Level of Impulsiveness

Scale Points	(i,j)	$ p_i - p_j $	r_{ij}	Comment
5 Vs 6	1, 2	0.029302	0.190031	Not Significant
5 Vs 7	1, 3	0.075102	0.180002	Not Significant
5 Vs 8	1, 4	0.043564	0.183338	Not Significant

5 Vs 9	1, 5	0.146011	0.163645	Not Significant
6 Vs 7	2, 3	0.104404	0.178098	Not Significant
6 Vs 8	2, 4	0.072865	0.181469	Not Significant
6 Vs 9	2, 5	0.175313	0.161548	Significant
7 Vs 8	3, 4	0.031538	0.170938	Not Significant
7 Vs 9	3, 5	0.070909	0.149622	Not Significant
8 Vs 9	4, 5	0.102448	0.153619	Not Significant

Note: 1:5-Point Scale, 2: 6-Point Scale, 3:7-Point Scale, 4:8-Point Scale, 5:9 Point Scale

The result of the Marascuilo procedure highlights that there exists a significant difference between 6-point and the 9-point scale with regard to the proportion of consumers switching over from impulsiveness to non-impulsiveness as identified by the Rook and Fisher impulsive scale but other scale points pairs do not differ significantly.

By repeating the above procedure we can have the result for switching nature of consumers in the level of Non-impulsiveness. Here our null hypothesis would be to test for proportion of consumers switching over from non-impulsiveness to impulsiveness

$$H_{02} = P'_k = P'_k = P'_k = P'_k = P'_k, \text{ where } k=5, 6, 7, 8, 9.$$

i.e., proportion of consumers switching over from non-impulsiveness to impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points do not differ significantly.

Against the alternative hypothesis

$$H_{22}: \text{Not all proportions are equal.}$$

i.e., there exists difference among proportion of consumers as regards switching over from non-impulsiveness to impulsiveness.

To test H_{02} , we shall apply χ^2 – test for independence of attributes described in the **Section 5.1**.

Table 4 Observed and expected responses for (2×5) contingency table on Non-Impulsive nature and Scale Points

	Scale Points					
	5-Point	6-Point	7-Point	8-Point	9-Point	Total

Non- impulsive to Impulsive	31 (21.99)	22 (19.52)	22 (21.54)	16 (20.65)	12 (19.30)	103
Non- impulsive to Non- impulsive	67 (76.01)	65 (67.48)	74 (74.46)	76 (71.36)	74 (66.70)	356
Total	98	87	96	92	86	459

Note: The figures in brackets are the expected frequencies of the corresponding cells

Test-statistic (Calculated χ^2): $\sum_{\text{overall cells}} \frac{(o_{ij} - e_{ij})^2}{e_{ij}} = 10.0821$, degrees of freedom $(r-1) \times (s-1) = 4$ with respective p -value $0.039 (< 0.05)$ indicating rejection of the null hypothesis H_{02} .

Rejecting H_{02} means that proportions of consumers switching over in the level of non-impulsiveness with respect to 5 scale points are not all equal. This means that there exists difference among proportion of consumers switching over from non-impulsiveness to impulsiveness as identified by the Rook and Fisher impulsive scale with different scale points.

Now, to find which pair of scale points caused the rejection of the hypothesis, we shall apply the Marascuillo procedure of comparing multiple proportions described in the **Section 5.2**.

The five sample proportions (for Non-impulsiveness to impulsiveness) are, $p_1 = 31/98 = 0.31637$, $p_2 = 22/87 = 0.252874$, $p_3 = 22/98 = 0.229167$, $p_4 = 16/92 = 0.173913$ and $p_5 = 12/86 = 0.139535$.

Table 5 Table for calculation of r_{ij} in the level of Non- Impulsiveness

Scale Points	(i,j)	$ p_i - p_j $	r_{ij}	Comment
5 Vs 6	1, 2	0.063453	0.203816	Not Significant
5 Vs 7	1, 3	0.08716	0.195948	Not Significant
5 Vs 8	1, 4	0.142413	0.189086	Not Significant
5 Vs 9	1, 5	0.176792	0.164887	Significant
6 Vs 7	2, 3	0.023707	0.195094	Not Significant
6 Vs 8	2, 4	0.078961	0.188201	Not Significant
6 Vs 9	2, 5	0.113339	0.183982	Not Significant
7 Vs 8	3, 4	0.055254	0.179651	Not Significant
7 Vs 9	3, 5	0.089632	0.175226	Not Significant
8 Vs 9	4, 5	0.034378	0.167517	Not Significant

Note: 1:5-Point Scale, 2: 6-Point Scale, 3:7-Point Scale, 4:8-Point Scale, 5:9 Point Scale

From **Table 5**, it can be seen that, the Marascuilo procedure indicates that there exists a significant difference between 5-point and the 9-point scale with regard to the proportion of consumers switching from non-impulsiveness to impulsiveness as identified by the Rook and Fisher impulsive scale but other scale points pairs do not differ significantly.

6. Conclusion

The objective of this study is to find the most compatible scale point for the impulsive buying behavior scale by Rook and Fisher for measuring the switching nature of consumers in the level of impulsiveness. The study is based on 196 respondents for two rounds of data collection, the first round of responses was obtained in 2017 and after a gap two years and second part of data collection was done in last part of 2019 on the same set of respondents. Each respondent was provided with 5 sets of the impulsive scale by Rook and Fisher varying from 5-point scale to 9-point scale. Based on the score obtained by the respondents in a particular scale they are classified into any one of the two groups viz. impulsive or non-impulsive. This exercise is repeated for each of the other scale viz. 6-point to 9-point. Once the classification is done, the test for multiple proportions is done by the Marascuilo Procedure. The study shows that when the respondents switch over from impulsiveness to non-impulsiveness, the scale point pair (6, 9) differs considerably while all other scale pair points (5, 6), (5, 7), (5, 8), (5, 9), (6, 7), (6, 8), (7, 8), (7, 9) and (8, 9) do not differ among themselves. As regards, switching from non-impulsiveness to impulsiveness it is seen that the scale point pair (5, 9) differs considerably while all other scale pair points (5, 6), (5, 7), (5, 8), (6, 7), (6, 8), (6, 9), (7, 8), (7, 9) and (8, 9) do not differ among themselves. So, 9-point scale may be considered as the most sensitive scale compared to other scale points in terms of the switching behavior of the consumers.

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APPENDIX

Impulsiveness: Buying Impulsiveness Scale (Rook and Fisher, 1995)

1. I often buy things spontaneously.
2. “Just do it” describes the way I buy things.
3. I often buy things without thinking.
4. “I see it, I buy it” describes me.
5. “Buy now, think about it later” describes me.
6. Sometimes I feel like buying things on the spur of the moment.
7. I buy things according to how I feel at the moment.
8. I carefully plan most of purchases.
9. Sometimes I am a bit reckless about what I buy.