Evaluation of Consumers' Online Buying Behaviour of Home Appliances in the Novel Coronavirus Era

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ABSTRACT

The unforeseen worldwideoutbreak of the novel coronavirus is the prime human disaster that has affected the lives of millions of people thereby devastating the global economy as a whole. Each and every sphere of the global market has been distressed since March 2020 causing a long term impact due to this pandemic situation irrespective of its nature of operation. But in spite of all these adversities the one and only sector that showed the silver lining is the virtual mode of shopping. There has been a revolution in the field of online communication and enormous e-commerce usage by traders which has resulted a colossal growth of online shopping in the recent years. Online shopping has an edge over "brick and mortar shopping" environmentas it provides access to anabundance of information from any place at any time about products and services, customer reviews, variety of products and all these at a blink of an eye. In this backdrop the researcher has performed a Multiple Discriminant Analysis on primary data with an attempt to develop a score of the customers regarding purchase of home appliances through internet in and around Kolkata based on five demographic attributes namely- monthly income, location,occupation, pre pandemic online purchase behaviour, and education. The paper also focuses to optimise the parameters of the proposed Discriminant Model and test the efficiency of the constructed model and compare the result by reviewing the existing literatures on the related topic.

Keywords: *Coronavirus, Online Shopping, E-commerce, Technology, Home Appliances, Consumer Behaviour, Discriminant Analysis.*

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I. INTRODUCTION

The sudden eruption of the novel coronavirus has taught the world citizens to think aggressively. The fetish for online shopping is growing at an exponential rate since the internet revolution during the last two decades according to Saha (2015). The customers use Internet not only to conduct online purchase of their desired products, but also to differentiate prices of the available options, product features and post sales service facilities they would receive if they purchase the product from a particular store as noticed by Kinker and Shukla (2016). In this phase of evolution, various companies have started using the Internet with the aim of cutting down marketing costs, thereby slashing down the price of their products and services in order to have an edge in this highly competitive market as observed by Gupta and Jain (2017). According to Lahiri and Ghosh Sarkar (2018) the consumer's behaviour towards the purchase of Home Appliances has undergone through a huge transformation tokeep up with the growing trend. During the pandemic, it was observed by Debnath (2020) that high price rise of the products and delayed online service has highly influenced the consumer purchase behaviour. Nowadays, the online vendors use Internet to transmit, communicate and diffuse information, to sell their products, to take feedback and also to manage satisfactory surveys with customers. Since, this is a beneficial situation for both the ends that is the sellers and the buyers, so many experts are buoyant about the possibility of online marketing. According to a recent survey, India is expected to have the fastest growth in retail e-commerce from 2018-2022 and by 2040, 95% of all purchases are predicted to be via ecommerce.

This global revolution of online marketing is also reflected in case of online purchase of Home Appliances. Lahiri and Ghosh Sarkar (2018) stated that Home Appliances are actually the electrical or mechanical acoustics which are mainly used to perform various household functions like cooling, cooking, heating or cleaning. Home Appliances are predominantlyclassified into Major Appliances (White Goods), Small Appliances and Consumer Electronics (Brown Goods).

In India also, the internet and mobile perforation has created a huge impact over the last two decades in the field of e-commerce.

This paper mainly highlights to develop a score of the customers who are more likely to purchase home appliances through internet and vice versa through Multiple Discriminant Analysis based on five demographic profiles namely- monthly income, location,occupation, pre coronavirusonline purchase, and education.To conduct the research work, the famous metropolitan city of India- Kolkata and outskirts is chosen. Kolkata being a metropolitan city with numerous uninterrupted facilities like transport facility, potential market, innumerable shopping malls to confuse the potential customers, etc. is chosen as the research destination. But in spite of all these facilities why the consumers of Kolkata and outskirts are getting addicted to online shopping was the main reason to zero down on the abovementioned area to conduct research. Awan and Abbas (2015) stated the five demographic factors namely- age, gender, place of residence, occupation and income make a huge impact on the impulsive buying behaviour of the consumers, as a result of which income, location,occupation, previous purchase, and education are chosen as the basis of classification of the online consumers of Home Appliances.

Multiple Discriminant Analysis Model is a set of statistical technique to distinguish or classify observationsfrom each other based on their characteristics. This model will enable usto form a linear equation based on which the score of the interested and uninterested online customers of home appliances can be done.

II.   LITERATURE REVIEW

Inspite of having abundant research papers on various aspects of online shopping, we could find very few research papers related to the objective of our paper where we have tried to develop a score of the online customers of Home Appliances. So we have lined up and presented the related papers to the best of our knowledge.

Wangl, Reesl and Liao (2002) aimed to classify online customers from the website data and predict their purchasing behaviours according to their demographics and attitudes toward online shopping. The tools used for classification were K-means clustering and multiple discriminate analysis (MDA).Shergill and Chen (2005) identified the four dominant factors as purchasing experiences. This paper stated that website security/privacy, website design and website reliability/fulfilment influences the online perception of 0nline consumers in New Zealand. Delafrooz, Paim, Haron, Sidin and Khatibi (2009) highlighted on the significance of attitude of the students towards online shopping through regression analysis. They suggested utilitarian orientations, convenience, price and wider selection as the important factors for regression analysis.Husin (2011) identified few factors like privacy, security, comfort, culture, demographics and site quality that influences the online customers in Indonesia. Among these six factors security, comfort, quality sites and similarity of attitudes of online users are the predominant factors. Privacy and demographic factors do not affect the online users of Indonesia much in case of online shopping.Sen (2014) stated that the cost factor, convenience factor, product factor andseller related factor are the four important factors influencing the online purchase of products in Kolkata.Al-Alwan M. and Al-Shirawi A. (2015) found out that security and trust are significantly related towards online shopping attitude of the consumers whereas most of the online consumers feel that they are overcharged during online transaction.Awan and Abbas (2015) observed that the demographic factors like age, gender, income and education plays a significant role in case of impulsive buying. They conducted a survey at Multan in Pakistan. Impulsive buying plays a major role in case of online marketing.Niharika & Satinder (2015) stated that post globalization, due to the closeness of various nations different sector has undergone through significant changes. These changes has resulted to the emergence of internet and e-commerce which is now one of the fastest growing technologies and are playing the main role in the day to day business activities.Indrajaya and Ali (2017) highlighted that both ease of shopping and product quality has significant relationship on online store shopping.Magesh and Balaji (2018) analysed that to extract the E-Tailer Loyalty the factors that play significant role in online retailing are- Attention, Enthusiasm, Identification, Absorption and Interaction respectively. Ghosh Sarkar, Mukherjee and Lahiri (2020) have classified the Online Customers of Home Appliances into two disjoint classes that is interested and uninterested groups using Neural Network based on five demographic attributes namely- age, gender, place of residence, occupation and income.

During this unexpected global shutdown due to the outbreak of noble coronavirus, Debnath (2020) perceived that during this pandemic period high price rise of the products and delayed online service has highly influenced the consumer purchase behaviour. The researcher also explored the awareness level of the online buyers as well as the challenges of the online buying pattern during this pandemic situation.Sharma and Jhamb (2020) aimed to reflect the various issues and perspectives of online marketing due to coronavirus. They perceived that in this pandemic situation the customers are progressively getting inclined towards this virtual mode of shopping. Many new challenges were also enforced due to this global lockdown thereby resulting in the closure of international borders.

After going through the research papers it is observed that though the online shopping as a whole along with the consumer behaviour analysis and factor analysis is mentioned but development of score of customers by usingMultiple Discriminant Analysis and optimizing the developed parameters in the sphere of home appliances and that too in Kolkata during this pandemic situation are not addressed till date.

RESEARCH GAP

While going through the rigorous procedure of literature review of the related topics both from national as well as international journals prior to coronavirus as well as during the lockdown or pandemic situation, it is observed that no such study has been carried out in Kolkata or West Bengal or even India till date where customer score is developed by using Discriminant Analysis. To the best of our knowledge, this research work is a ground breaking work in the field of Online Marketing. So, the main focus of this research paper is to develop a discriminant equation to calculate a score of the interested online customers of Home Appliances in Kolkata and suburbs using the parameters- monthly income, location,occupation, pre-coronavirus online purchase, and education and optimizethem using Discriminant Analysis, since this area of work in the field of Online Marketing is yet to be explored.

OBJECTIVE OF THE STUDY

The appropriate analytical study aims to explore and develop a Discriminant Model in order to calculate a score of the customers of online shopping of home appliances in and around Kolkata during this pandemic situation to cope up with this new normal life, which is quiet lagging behind compared to other cities.

- To calculate a score of the customers with respect to their online purchase behaviour towards home appliances due to pandemic based on five independent variables of their demographic profile, such as income, location, occupation, pre coronavirus online purchase, and education.
- To framea Discriminant Model which would be used for the mentioned score calculation.
- To optimize the developed parameters.
- To test the efficiency of the newly constructed Discriminant Modelin order to judge its suitability in customer gradation.
- To review the existing literature on the aforesaid topic and to compare our results with them.

III. RESEARCH METHODOLOGY

Research Methodology is a methodical process of collecting, organising and analysing data. The studyplansto form a Linear Discriminant Analysis model to calculate a score of the interested customers based on five demographic attribute likemonthly income, location,occupation, pre coronavirusonline purchase, and education regarding their purchase of home appliances through internet in Kolkata and outskirts. It also intends to optimize the parameters and test the efficiency of the developed model. Population of the study was restricted to users as well as non-users of home appliances purchased through online shopping. In order to study the above mentioned objectives we have resorted mostly on primary data. A well-structured questionnaire was framed through which personal interview was conducted over telephone or information was gathered through Google Forms distributed through the network of friends and relatives because of the government mandates due to the pandemic situation.

The geographic territory was restricted to Kolkata and outskirts including Sreerampore, Haripal, Barasat, Barrackpore, Howrah, Liluah and Bandel.

Data collection was mainly done during the second phase of lockdown covering the timeframe of May to July 2021 in Kolkata and the mentioned outskirts. By going through 119filled up Google forms, we found out that only 111 forms completely filled up. Whereas 96 forms were found to be consistent and qualified for analysis. So, the entire data set contains entries of 96 customers as collected through convenient sampling (as per availability and willingness) without replacement which isnot purely random- since for Kolkata and outskirts due to lack of suitable options we have gone through convenient sampling.

The information collected during data collection was generated, analysed and interpreted with the help of SPSS20 software.

Table1: Sampling Summary

Data Collection Period & Region	Sampling Method	Observation Unit	Circulated and Submitted Forms	Completely Filled Up	Consistent and Qualified for Analysis
During May &July, 2021 in Kolkata and outskirts including Sreerampore, Haripal, Barasat, Barrackpore, Howrah,	Not purely random but through convenient sampling (without replacement)	Individual Investors	119	111 (93.27%)	96 (80.67%)

Liluah and Bandel.					

Table2: Descriptive Statistics for qualified respondents

Profile Attributes	Category	Count	%-age	Cumulative %	Central Tendency	Dispersion
Monthly Income	Below Rs. 10,000	10	10.5	10.5	Median= Rs.49,200	SD= Rs. 14,560
	Rs. (10,001-30,000)	25	26.3	36.8		
	Rs. (30,001-50,000)	33	34.7	71.6		
	Rs. (50,001-70,000)	18	17.9	89.5		
	Rs. (70,001-1,00,000)	6	6.3	95.8		
	Above Rs. 1,00,000	4	4.2	100		
Location	Kolkata	36	36.8	36.8	Mode= Kolkata	N.A
	Sreerampore	18	18.9	55.7		
	Haripal	13	13.7	69.4		
	Barasat	9	9.5	78.9		
	Barrackpore	5	5.3	84.2		
	Howrah	8	8.4	92.6		
	Liluah	4	4.2	96.8		
	Bandel	3	3.2	100		
Occupation	Unemployed	9	9.5	9.5	Mode= Service	N.A
	Service	38	38.9	48.4		
	Business	21	22.1	70.5		
	Self Employed	19	20.0	90.5		
	Others	9	9.5	100		
Pre-Coronavirus onlinePurchase	Yes	62	65.3	65.3	Mode= Yes	N.A
	No	34	34.7	100		
Education	Madhyamik	12	11.6	11.6	Mode= Graduate	N.A
	Higher Secondary	21	22.1	33.7		
	Graduate	32	33.7	67.4		
	Post Graduate	21	22.1	89.5		
	Above Post Graduate	10	10.5	100		

The total dataset consists of 96 entries, to obtain the score of the customers to test the proposed Discriminant Model.

The dependent variable was Score (Y) and the independent variables are Constant, Monthly Income (X_1), Location (X_2), Occupation (X_3), Pre Coronavirusonline Purchase (X_4) and Education (X_5).

Table 3 : Group Statistics

Score	Mean	Standard Deviation	Valid N (listwise)	
			Unweighted	Weighted
.00 Monthly Income (X_1)	2.632	.3396	27	27.000
Location (X_2)	525.556	41.4913	27	27.000
Occupation (X_3)	511.444	17.8543	27	27.000
Pre-Coronavirus online Purchase (X_4)	60.667	9.6954	27	27.000
Education (X_5)	2.733	4.387	27	27.000
1.00 Monthly Income (X_1)	3.443	.5115	69	69.000
Location (X_2)	575.217	46.5266	69	69.000
Occupation (X_3)	594.783	85.3799	69	69.000
Pre-Coronavirusonline Purchase (X_4)	68.043	9.2612	69	69.000
Education (X_5)	3.761	.8617	69	69.000
Total Monthly Income (X_1)	3.215	.5940	96	96.000
Location (X_2)	561.250	49.9516	96	96.000
Occupation (X3)	571.344	81.8833	96	96.000
Pre-Coronavirus online Purchase (X_4)	65.969	9.8226	96	96.000
Education (X_5)	3.472	.8927	96	96.000

In Table 3- Group Statistics, it shows the descriptives (mean and standard deviation), for each group along with the respective predictive variables (X_1, X_2.....X_5). Here, the score 0 indicates the customers who are unlikely to purchase home appliances using internet and score 1 indicates the more likely online customers of home appliances. The table also reflects that the mean and standard deviation figures of the respective parameters are better for the more likely online customers compared to the unlikely online customers of home appliances.

Table 4 : Tests of Equality of Group Means

Independent Variables	Wilks' Lambda	F	df1	df2	Sig
Monthly Income (X₁)	.611	19.122	1	94	.000
Location (X₂)	.794	7.796	1	94	.009
Occupation (X₃)	.784	8.273	1	94	.007
Pre Coronavirus online Purchase (X₄)	.882	4.002	1	94	.055
Education (X₅).	.724	11.463	1	94	.002

In Table 4, the Significance column plays an important role to have an idea about how significantly different the predictive variables are from unlikely and likely online customers of home appliances. It is observed that the predictive variable Pre Coronavirus online Purchase (X_4) plays the most discriminant role for rating the customers since it has the highest significance value of .055 compared to the other predictors.

Table 5 : Test Results

Box's M		42.952
F	Approx	2.120
	df1	15
	df2	947.126
	Sig.	.008

In Table 5, the Box's Test Result gives us an idea whether we have equal variables among the groups. It is a very sensitive test to detect a small departure from homogeneity in large data files. It also enables us to check the equality of multiple variance- covariance matrices. If the significance value > .001it means that the group variance is equal and are good predictors, in the study the sig=.008.

Table 6 : Summary of Canonical Discriminant Function

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.828	100.0	100.0	.673

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.547	16.591	5	.005

The summary of Canonical Discriminant Function shows the strength of relationship between the predictive variables and the outcome variables at the time of prediction.
Here the Eigen value is noted as .828 and the canonical correlation is 0.673. r^2 is $(.673)^2$ which indicates the percentage of variation explained in the regression line out of the total variation.
Wilks' Lambda gives us an idea about the statistical significance of the predicted value. Here the Significance is .005 which is quite less than the benchmark of .05 to indicate that the group of predictors can make prediction statistically significant in terms of accuracy. The predictive variables taken into consideration for this research work can yield accuracy in the field of prediction.

Table 7: Standardized Canonical Discriminant Function Coefficients

Independent Variables	Function
	1
Monthly Income (X₁)	.875
Location (X₂)	-.115
Occupation (X₃)	.340
Pre Coronavirus online Purchase (X₄)	-.464
Education (X₅).	.423

The Standardized Canonical Discriminant Function table highlights on the loadings of the Predictive Variables. In the above table, we can observe that the parameters - Monthly Income (X_1), Pre Coronavirus online Purchase (X_4), Education (X_5) have fairly high loading compared to Occupation (X_3) and Location (X_2). So, the effect on prediction of X_1, X_4 and X_5 is higher since they have higher individual correlation coefficient individual value compared to X_3 and X_2.

Table 8: Classification of Results

Score			Predicted Group Members		Total
			.00	1.00	
Original	Count	.00	24	13	27
		1.00	6	63	69
	%	.00	88.9	11.1	100.0
		1.00	8.7	91.3	100.0
Cross-validated	Count	.00	21	6	27
		1.00	9	60	69
	%	.00	**77.8**	22.2	100.0
		1.00	13.0	**87.0**	100.0

This table indicates that the prediction regarding the online consumers' of home appliances who are not likely to purchase (0) is 77.8% success and the prediction regarding more likely to purchase home appliances through online mode (1) is 87.0% success. This implies that the developed prediction model using Multiple Discriminant Analysis through SPSS resulted a good level of accuracy in terms of statistical prediction.

Managerial Implications

This study intends to analyse and rate the customer satisfaction and loyalty of online consumers of Home Appliances in Kolkata and suburbs keeping in mind the global pandemic caused due to outbreak of the noble coronavirus. Based on this rating of the customers the online vendors are expected to focus on the mentioned attributes (Monthly Income, Location of Residence, Occupation, Pre-coronavirus online Purchase record and Education) to retain and expand their customer database. The e- retailers with the help of internet can reach out more customers accelerate the distribution channels by optimising their resources. In this marketing platform customer experience has become a source of competitive advantage in the new normal era in the field of the Online Shopping. To cope up with the technological advancement as well as the current global lockdown scenario an uninterrupted research and development practiseis needed to put an end to various unethical practises.

SCOPE OF FURTHER STUDY

The study has discussed a discriminant based rating of the online customers of Home Appliances in Kolkata and suburbs during this pandemic situation, optimised the parameters developed through the proposed discriminant model. This paper also tests the efficiency of the newly constructed model to find out and judge its score amongst the customers. However there can be few more aspects that might be considered for critically analysing the impediments in the growth of online shopping of home appliances in Kolkata and outskirts. The parameters that are taken into consideration in this model for setting up the score for the online customers of Home Appliances are monthly income, location, occupation, pre coronavirus online purchase and education. If required future research work may be conducted to highlight on few more parameters.

IV. CONCLUSION

Online shopping of Home Appliances in Kolkata and outskirts is still at its inception stage though it is trying hard to gear up with the global mode of shopping during this pandemic situation. As per the conducted pilot survey we have developed customer rating based on five attributes. As already stated in the research gap, to the best of our knowledge, this research work is the trendsetter in the field of developing score of online consumers of Home Appliancesusing Multiple Discriminant Analysis. While going through the structured questionnaire we observed that though the major bulk of the customers have never conducted online shopping of Home Appliances but maximum of the probable customers are interested to buy all the three mentioned categories of home appliances through internet to cope up with this new normal mode of life caused due to the outbreak of noble coronavirus, in spite of having manifold facilities of 'brick and mortar" shopping. From which we can conclude that online purchase of home appliances is the phenomenon form of shopping due to its multiple variations. This score development of online customers of home appliances can be considered as a first step in the way of conducting a research to rate the customers for online shopping of home appliances in Kolkata and suburbs.

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