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Assessment of Consumer Awareness and Behaviour of Counterfeit Product using Statistical Techniques

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Abstract: *This research paper attempts to identify the importance of awareness among consumer counterfeit products among men and women using certain statistical techniques. In recent years consumer counterfeit is more familiar than original products. Data was collected from primary source using questionnaire method. Non-Probability sampling was used by the researcher and convenient sampling was used. The researcher has used survey method to collect information from the respondents. Data was collected from 160 respondents with 24 questions from working men, working women, home makers, retired people and businessmen. The main objective is to identify the significant difference between age group and consumer age of awareness about counterfeit products, preferences and purchase using certain statistical techniques.*

Keywords: *Consumer preferences, counterfeit products, ANOVA, Chi-square Test and Correlation.*

1. INTRODUCTION

In this paper an attempt is made to identify consumer awareness and behaviour of counterfeit products in the market and e-commerce area. Counterfeit means to imitate something authentic, with the intent to steal, destroy, or replace the original, for use in illegal transactions, or otherwise to deceive individuals into believing that the fake is of equal or greater value than the real thing. Counterfeit products are fakes or unauthorized replicas of the real product. Counterfeit products are often produced with the intent to take advantage of the superior value of the imitated product. The word counterfeit describes both the forgeries of currency and documents, as well as the imitations of items such as clothing, handbags, cosmetics, shoes, pharmaceuticals, aviation and automobile parts, watches, electronics (both parts and finished products), software, works of art, toys, and movies. Counterfeit products tend to have fake company logos and brands (resulting in patent or trademark infringement in case of goods), have a reputation for being lower quality (sometimes not working at all) and may even include toxic elements such as lead. This has resulted in the deaths of hundreds and thousands of people, due to automobile and aviation accidents, poisoning, or ceasing to take essential compounds (e.g., in the case a person takes medicine after the expiry date).

2. REVIEW OF LITERATURE

In recent years many scholars study about consumer preferences of counterfeit products, Ludovica Casareo 2015; this study examines how culture influence consumer attitudes and behaviour towards counterfeit luxury products. The research shows how consumer's attitude towards counterfeits is strong in individualist and mainly influenced by social consensus and purpose of purchase. To reduce the demand for counterfeit marketers it is must to adopt culture specific strategies to find differences among various cultural groups. Nawaz Ahmad 2016 aims to investigate the factors which affect buying behaviour of the consumers and their attitude towards counterfeit products. The study is also set out to examine the relationship of consumers buying behaviour towards counterfeit product with

purchase intention. It was discovered that there is no impact of counterfeit products on consumer buying behaviour. The author finding concludes that the buying behaviour and impact of purchasing a counterfeit product is more in the fashion industry.

Hari prasad Adhikari 2017 concentrated in the area of examining the determinants of purchase intension of Nepalese youth towards counterfeit apparels and accessories. The finding indicated that attitude of youth has significant effect on purchase intension towards counterfeit product. It concludes that study significantly determined by personal gratification perceived behaviour and subjective norms.

Vinita Bhatia 2018, studied to investigate the factors affecting consumer's attitude towards counterfeit fashion products and the relationship of consumer's attitude towards counterfeit fashion products with purchase intension. The finding of the study indicates that value consciousness, materialism and social influence positively relate to consumers attitude towards counterfeit fashion products.

Amran Harun 2019, in his research paper he found that counterfeit studies engages consumers Intension to purchase without considering their past experiences. The study aims to understand the repurchase behaviour of experienced consumers in regard to counterfeit products and their demographics. Further, the studies also investigate the mediating effect of attitude on relationship between factors and repurchase behaviour. The outcome of the study can also be used as reference and knowledge base for scholars and marketers in understanding the attitude of consumers and repurchase intension of counterfeit products.

3. DATABASE

3.1. Primary Data

Primary research consists of a collection of original primary data collected by the researcher. It is often undertaken after the researcher has gained some insight into the issue by reviewing secondary research or by analysing previously collected primary data.

3.2. Survey Method

A statistical survey is undertaken with a view towards making statistical inferences about the population being studied and depends strongly on survey questions used. Polls about public opinion, public health surveys, market research surveys, government surveys and censuses are all examples of quantitative research that use contemporary survey methodology to answer questions about a population. Although censuses do not include a "sample", they do include other aspects of survey methodology, like questionnaires, interviewers, and non-response follow-up techniques. Surveys provide important information for all kinds of public information and research fields, e.g., marketing research, psychology, health professionals and sociology.

3.3.Population and Sample Size

Non-Probability sampling was used by the researcher and in that convenient sampling was used. The researcher has used survey method to collect information from the respondents. Some questionnaire was distributed through Google doc. Information is collected from 160 respondents There were about 24 questions and information was collected from Students, Working men and women, Home makers, Retired people and businessmen and convenient sampling was followed where sample size consists of 48 Male and 112 Female. The questionnaires were distributed to them and primary data was collected accordingly. Respondents were divided on the basis of their age starting from twenty.

4. RESEARCH METHODOLOGY

4.1. Chi-Square

A chi-square test in any statistical hypothesis test wherein the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true Chi-square tests are often constructed from a sum of squared errors, or through the sample variance. Test statistics that follow a chi-square distribution arise from an assumption of independent normally distributed data, which is valid in many cases due to the central limit theorem. A chi-square test can be used to attempt rejection of null hypothesis that the data are independent. Also considered a chi-square test is a test in which this is asymptotically true, meaning that sampling distribution (if the null hypothesis is true) can be made to approximate a chi-square distribution as closely as desired by making the sample size large enough.

Chi-square test is used to determine whether there is a significant difference between expected frequencies and observed frequencies in one or more categories.

4.1.1. Pearson's Chi-Square Test

Pearson's chi-square test is also known as chi-square goodness-of-fit test or chi-square test for independence. It was developed in the year 1900. When the chi-square test is mentioned without any modifiers or other precluding contexts, this test is often meant.

4.2. ANOVA

Analysis of Variance (ANOVA) is a collection of statistical models used to analyse the differences among group means and their associated procedures, developed by statistician and evolutionary biologist Ronald Fisher. In the ANOVA setting, the observed variance in a particular variable is partitioned into components attributable to different sources of variation. In its simplest form, ANOVA provides a statistical test of whether or not the means of several groups are equal, and therefore generalizes the t-test to more than two groups. ANOVAs are useful for comparing (testing) three or more means (groups or variables) for statistical significance. It is conceptually similar to multiple two-sample t-tests, but is more conservative (results in less type I error) and is therefore suited to a wide range of practical problems.

4.3. Correlation

Correlation is a bivariate analysis that measures the strength of association between two variables and the direction of the relationship. In terms of the strength of relationship, the value of the correlation coefficient varies between +1 and -1. When the value of the correlation coefficient lies around ± 1, then it is said to be a perfect degree of association between the two variables. As the correlation coefficient value goes towards 0, the relationship between the two variables will be weaker. The direction of the relationship is simply the + (indicating a positive relationship between the variables) or - (indicating a negative relationship between the variables) sign of the correlation. Usually, in statistics, we measure four types of correlations. They are Pearson correlation, Kendall rank correlation, Spearman correlation, and the Point-Biserial correlation. This research paper focuses on analysis and interpretation of the sample data collected through questionnaire from 160 respondents and statistical tools like frequency table, Chi-square, ANOVA, and Correlation have been applied.

5. ANALYSIS AND DISCUSSION

The researcher has given all the findings from the survey. The questionnaire was circulated to both male and female respondents and female respondents are 70 in numbers and male respondents 30 in numbers. From the analysis and interpretation of the study it is understood that majority of respondents are between the age group of 18 to 25 (68.8%). 51.9% of the respondents are private employees, student (18.8%) and business people (10.6%). Majority of the respondents are salaried person and receive salary between 10000 to 30000. Majority of the respondents level of education is undergraduate. UG (44.5%) and (34.4%) of the respondents are post graduate (PG).

Majority of the respondents are aware about the counterfeit cosmetic products (93.1%). Almost 88.8% of the respondents are unknowingly purchasing counterfeit cosmetic products. Majority of the respondents purchase different types of cosmetic products like Conditioner, Kajal, Body lotion, hair care, Eye shadow, Lakme, Shampoo and Fairness cream. Majority of the respondents said that the most common place for consumer to shop the cosmetic product at strip centre (46.3%) and Street market (37.5%). Majority of the respondents said that online shopping (65.6%) and local shop (25.6%) have more duplicate cosmetic products. 86.3% of the respondents are not able to distinguish the counterfeit cosmetic product from the original product. 65.6% of respondents said that counterfeit cosmetic product looks brighter that the original product. 65.0% of the respondents agreed that counterfeit cosmetic product is better quality and long-life than the original cosmetic product. The researcher represent here some of the original and counterfeit products (Fig1.).

71.9% of the respondents agreed that counterfeit cosmetic products are cheaper than the original product. The study shows that majority of the respondent's highly preferred counterfeit cosmetic products as the price is less and also quality is close to original one. The study shows that respondents highly prefer the counterfeit products because of No brand loyalty, price, and standard of living of the consumer too play a role. 66.9% of the respondent feel that the consumer are cheated by the retailer

or producer because of the presence of counterfeit products and 56.3% of the respondents agree that the consumer rights are violated because of the presence of counterfeit cosmetic products.

Figure1. *Real and Fake Products*

43.8% of the respondents agree that usage of counterfeit cosmetic products creating health related problems. 40% of the respondents buy the counterfeit cosmetic product (40%) and 36.3% file a complaint in consumer court. The study reveals that 91.2% of the respondents said that action against the counterfeit product of manufacturer or retailer will stop consumer from buying these products.

5.1. Test 1: Chi-Square Test

Test1: Hypothesis:

Ho: There is no association between education of the consumer and their ability to distinguish between counterfeit cosmetic from the original product.

H_1: There is association between education of the consumer and their ability to distinguish between counterfeit cosmetic from the original product.

Table1. *Education of the respondents*

Distinguish between counterfeit cosmetic product from the original Cross tabulation		Distinguish between counterfeit cosmetic product from the original		Total
		Yes	No	
Education of the respondents	school level	20	2	22
	UG	64	7	71
	PG	42	13	55
	Professional	12	0	12
Total		138	22	160

Tanle2. *Chi-Square Tests*

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.755[a]	3	.051
Likelihood Ratio	8.849	3	.031
Linear-by-Linear Association	.800	1	.371
N of Valid Cases	160		

The above table 1 and 2 reveals that the chi square value is 7.755 and p-value is 0.051. Since p-value is greater α (0.05) level of significance. Null hypothesis is accepted. Therefore, we conclude that there is no significant relationship between the education and their ability to distinguish between counterfeit cosmetic products from the original product.

TEST:2 CHI SQUARE TEST:

HYPOTHESIS:

H_0: There is no association between gender of the respondents and standard of living towards the presence of counterfeit products.

H_1:There is association between gender of the respondents and standard of living towards the presence of counterfeit products.

Table3. *Gender of the respondents * Standard of living Cross tabulation*

		Standard of living					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Gender of the respondents	Male	0	5	10	29	4	48
	Female	6	3	18	68	17	112
Total		6	8	28	97	21	160

Table4. *Chi-Square Test*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.231[a]	4	.083
Likelihood Ratio	9.605	4	.048
Linear-by-Linear Association	.520	1	.471
N of Valid Cases	160		

The above table 3 and 4 reveals that the Chi- Square value is 8.231and P value is 0.083. Since, P value is greater than the alpha (0.05) level of significance. We accept the Null Hypothesis. Therefore, we conclude that there is no association between gender of the respondents and standard of living towards the presence of counterfeit products.

TEST 3: CHI SQUARE TEST

HYPOTHESIS:

H_0: There is no association between Income of the respondents and consumer preferring counterfeit products for cheaper price.

H_1: There is association between Income of the respondents and consumer preferring counterfeit products for cheaper price.

Table5. *Income of the respondents * Counterfeit cosmetic products are cheaper than the original product Cross tabulation*

		Counterfeit cosmetic products are cheaper than the original product					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Income of the respondents	10000-30000	3	6	14	95	15	133
	30000-50000	0	0	1	15	3	19
	above 50000	0	1	0	5	2	8
Total		3	7	15	115	20	160

Table6. *Chi-Square Tests*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.491[a]	8	.704
Likelihood Ratio	6.988	8	.538
Linear-by-Linear Association	1.470	1	.225
N of Valid Cases	160		

The above table 5 and 6 reveals that the Chi-Square value is 5.491 and P value is 0.704. Since, P value is greater than α (0.05) level of significance. Null Hypothesis is accepted. Therefore, we conclude that there is no significant relationship between Income and Consumer preferring counterfeit products for cheaper price.

TEST: 4 CHI- SQUARE TEST:

HYPOTHESIS:

H_0: There is no association between Occupation and the Purchase of counterfeit products if the quality is close to the original.

H_1: There is association between Occupation and the Purchase of counterfeit products if the quality is close to the original.

Table7. *Occupation of the respondents * The quality is close to the original Cross tabulation*

		The quality is close to the original					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Occupation of the respondents	Government employee	0	0	2	5	0	7
	Private employee	3	2	9	52	17	83
	Business	0	1	5	10	1	17
	Self employee	0	2	4	4	2	12
	House wife	2	0	4	5	0	11
	Student	3	4	7	11	5	30
Total		8	9	31	87	25	160

Table8. *Chi –Square test*

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	32.624[a]	20	.037
Likelihood Ratio	35.395	20	.018
Linear-by-Linear Association	10.673	1	.001
N of Valid Cases	160		

The above table 7 and 8 reveals that the Chi-Square value is 32.624 and P value is 0.037. Since, P value is lesser than α (0.05) level of significance. Null Hypothesis is rejected. Therefore, we conclude that there is significant relationship between the Occupation and the purchase of counterfeit products if the quality is close to the original.

TEST: 5 CHI SQUARE TEST

HYPOTHESIS:

H_0: There is no association between purchase of counterfeit cosmetic product and the reason for people have No brand loyalty for buying counterfeit cosmetic product.

H_1: There is association between purchase of counterfeit cosmetic product and the reason for people have No brand loyalty for buying counterfeit cosmetic product.

Table9. *Purchase counterfeit cosmetic product * No brand loyalty Cross tabulation*

		No brand loyalty					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
Purchase counterfeit cosmetic product	Yes	4	7	29	71	31	142
	No	0	1	5	10	2	18
Total		4	8	34	81	33	160

Table10. *Chi –Square test*

	Value	df	Asymp. Sig. (2-sided)
Likelihood Ratio	2.486	4	.647
Linear-by-Linear Association	.232	1	.630
N of Valid Cases	160		

The above table 9 and 10 reveals that the Chi square value is 1.914 and P value is 0.752. Since P value is greater than α (0.05) level of significance. Null Hypothesis is accepted. Therefore, we conclude that there is no association between Purchase of counterfeit cosmetic product and the reason for people have any brand loyalty for buying fake cosmetic products.

The above table 9 and 10 reveals that the Chi square value is 1.914 and P value is 0.752. Since P value is greater than α (0.05) level of significance. Null Hypothesis is accepted.

Therefore, we conclude that there is no association between Purchase of counterfeit cosmetic product and the reason for people have any brand loyalty for buying fake cosmetic products.

5.2. TEST :6 Analysis of Variance (ANOVA)

HYPOTHESIS:

H_0: There is no significant difference between Age of the respondents and their health-related problem using counterfeit cosmetic products. (Hair problem.)

H_1: There is significant difference between Age of the respondents and their health-related problem using counterfeit cosmetic products. (Hair problem).

Table11. *Analysis of Variance (ANOVA)*

Age of the respondents					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	3.546	4	.887	.970	.426
Within Groups	141.697	155	.914		
Total	145.244	159			

In the above ANOVA table 11, the P value for Age group of the respondents and their health problem using counterfeit cosmetic product is 0.426. The P value is more than the significance level of 0.05. Therefore, Null Hypothesis Ho is accepted .This shows that there is no significant difference between Age group of respondents and their health related Using fake cosmetic products.

TEST: 7 Analysis of Variance (ANOVA)

HYPOTHESIS:

H_0: There is no significant difference between counterfeit products in the market and the consumer behaviour and the consumer rights are violated because of the presence of counterfeit cosmetic products.

H_1: There is significant difference between counterfeit products in the market and the consumer behaviour and the consumer rights are violated because of the presence of counterfeit cosmetic products.

Table12. *Analysis of Variance (ANOVA) Counterfeit products in the market and the consumer behaviour*

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	9.417	4	2.354	4.340	.002
Within Groups	84.083	155	.542		
Total	93.500	159			

In the above ANOVA table 12, the P value for counterfeit products in the market and the consumer behaviour and consumer rights are violated because of the presence of counterfeit cosmetic product is 0.002. The P value is lesser than the significance value of 0.05. Null Hypothesis Ho is rejected. This shows that there is significant difference between counterfeit products in the market and the consumer behaviour and consumer rights are violated because of the presence of counterfeit products.

TEST: 8 Analysis of Variance (ANOVA)

HYPOTHESIS:

H_0: There is no significant difference between Price is considerably less than the original and the reason for buying counterfeit products (Non availability of original product in the market).

H_1: There is significant difference between Price is considerably less than the original and the reason for buying counterfeit products (Non availability of original products in the market).

Analysis of Variance (ANOVA)

Table13. *The price is considerably less than the original*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.960	4	2.240	3.748	.006
Within Groups	92.640	155	.598		
Total	101.600	159			

In the above ANOVA table 13, the P value for Price is considerably less than the original and the reason for buying counterfeit products (Non availability of original product in the market) is 0.006. The P value is lesser than the significance value of 0.05. Null Hypothesis is rejected. This shows that there is significant difference between Price is considerably less than the original and the reason for buying counterfeit products (Non availability of original product in the market).

5.3. TEST: 9 CORRELATIONS

HYPOTHESIS:

H_0: There is no significant relationship between purchase of counterfeit products and the different consequences would stop from buying counterfeit products.

H_1: There is significant relationship between purchase of counterfeit products and the different consequences would stop from buying counterfeit products

TEST:9 CORRELATION

HYPOTHESIS:

Ho: There is no significant relationship between purchase of counterfeit products and the different consequences would stop from buying counterfeit products.

H_1: There is significant relationship between purchase of counterfeit products and the different consequences would stop from buying counterfeit products.

Table14. *CORRELATIONS*

		Different consequences would stop from buying counterfeit products	Purchase counterfeit cosmetic product
Different consequences would stop from buying counterfeit products	Pearson Correlation	1	.060
	Sig. (2-tailed)		.450
	N	160	160
Purchase counterfeit cosmetic product	Pearson Correlation	.060	1
	Sig. (2-tailed)	.450	
	N	160	160

Looking at the above table the P value is less than 0.05 for the correlation between purchase of counterfeit products and the different consequences would stop from buying these products. Hence the Hypothesis "There is no relationship between purchase of counterfeit products and the different consequences would stop from buying these products". is disproved. The above table shows a positive correlation between purchase of counterfeit products and the different consequences would stop from buying these products. But the correlation value is 0.06. This shows that there is a low correlation between purchase of counterfeit products and the different consequences would stop from buying these products.

TEST: 10 CORRELATIONS

HYPOTHESIS:

H_0: There is no significant relationship between age of the respondents and The awareness of the counterfeit product.

H_1: There is significant relationship between age of the respondents and The awareness of the counterfeit product.

Table15. *CORRELATIONS*

		Age of the respondents	awareness of the counterfeit cosmetic product
Age of the respondents	Pearson Correlation	1	.019
	Sig. (2-tailed)		.809
	N	160	160
awareness of the counterfeit cosmetic product	Pearson Correlation	.019	1
	Sig. (2-tailed)	.809	
	N	160	160

Looking at the above table the P value is less than 0.05 for the correlation between Age of the respondents and the awareness of the counterfeit product. Hence the Hypothesis "There is no

relationship between Age of the respondents and the awareness of the counterfeit product" is proved. The above table shows a positive correlation between Age of the respondents and the awareness of the counterfeit product. But the correlation value is 0.019. This shows that there is a correlation between Age of the respondents and the awareness of the counterfeit product.

6. CONCLUSION

The cosmetics industry is booming and expected to keep growing in 2022. Looking ahead the challenges faced by the cosmetics industry and its trade groups in combating counterfeits will likely be fourfold: Around 43% of the respondents agree that usage of counterfeit cosmetic products creates health related issues. Respondents agree highly that it is harmful for eyes, allergies and also chance for skin problems. 40% of the respondents would buy the counterfeit cosmetic product and 36.3% file a complaint in consumer court. The study shows that 91.2% of the respondents said that action against the counterfeit product of manufacturer or retailer will stop consumer from buying these products. Chi square, ANOVA, and Correlation were used to interpret the analysis of the various tables. From these interpretations the researcher has elaborated the findings in conclusion of the study.

There is no significant relationship between the education and their ability to distinguish between the counterfeit cosmetic products from the original product. There is no significant relationship between the Gender and standard of living towards the preference of counterfeit cosmetic products. There is no significant relationship between Income and consumer preferring counterfeit products for cheaper price.

There is significant relationship between the occupation and the purchase of counterfeit products that the quality close to the original. There is no association between purchase of counterfeit cosmetic products and the reason for people have no brand loyalty for buying these cosmetic products. There is no significant difference between age group of respondents and their health-related problem using fake cosmetic products. There is significant difference between counterfeit products in the market and the consumer behaviour and consumer rights are violated because of the presence of counterfeit products. There is significant difference between Price is the considerably less than the original and the reason for buying counterfeit products (Non-availability of original product in the market). There is a positive correlation between purchase of counterfeit products and the different consequences would stop from buying these products.

There is a positive correlation between the Age of the respondents and the awareness of the counterfeit products. Consumers are concerned about fake cosmetics. Many have seen horror stories of people who have been fooled by counterfeits or have bought them knowingly and simply thought that it was a cheap, but safe version of a real brand. Pictures of inflamed lips, rashes across the skin and other bodily harm caused by counterfeit makeup are common and shoppers pushes the responsibility of solving this problem on authentic brands.

REFERENCES

[1] LudovicaCasareo 2015, Consumer attitudes towards counterfeit products. "Journal of marketing trends" 2015/01/01.

[2] Nawaz Ahmad 2016, 6Impact of counterfeit products on consumer buying behaviour Jan 2016 Grass root Vol. 50 No 1.

[3] Hari prasad Adhikari 2017 Determinants of purchase intension towards counterfeit apparels in Nepalese consumer". 'International journal of research in business studies and management'. Vol:4, issue:10, pp: - 10-17.

[4] Vinita Bhatia2018, Examining consumer's attitude towards purchase of counterfeit fashion product. "Journal of Indian business research".

[5] Amran Harun 2019, Understanding experienced consumers towards repeat purchase of counterfeit products. Aug 2019. "Journal of Management Science letters". Vol 10 issues 1 pp: - 13-28 DOI.10.5267.

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