
**EXPERIMENTAL STUDY OF THE EFFECT OF
DETERGENT CHARACTERISTICS VARIATION ON
USERS' BRAND LOYALTY AMONG UNDERGRADUATE
STUDENTS OF THE UNIVERSITIES IN MAKURDI
METROPOLIS**

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ABSTRACT

The study was conducted on the analysis of the effect of detergent characteristics variations on brand users' loyalty among undergraduate students of the Universities in Makurdi metropolis of Benue State. The aim was to analyze detergent characteristics variations combination that will achieve the best users' brand loyalty in the study area. The 3x3x3 factorial experimental design was used for the study. This involves three independent variables each varied in three dimensions. The population of the study comprised all users of detergents among undergraduate students of the Universities in Makurdi metropolis of Benue State. These Universities are the Federal University of Agriculture Makurdi and Benue State University Makurdi. The sample of 270 was selected from the target population: 135 students from Federal University of Agriculture Makurdi and 135 students from Benue State University Makurdi. An 18-item self-developed instrument: "Detergent Users Loyalty Inventory" (DULI) was used for data collection. Three-way Analysis of Co-variance (ANCOVA) was used to test the Hypotheses by comparing the effect of the differences in product characteristics variation on brand loyalty. Pre-manipulation scale scores were used for pre-

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test or as covariate. In particular, the independent measures (between-groups) ANCOVA was used since the study dealt with different subjects under different conditions. The main and interactional effects in ANCOVA result were all significant; the study therefore went further to make use of Fisher's Least Significant Difference (LSD) to locate the mean differences and sizes. The study found that the overall best brand loyalty level can be achieved only when there is a simultaneous increase in price, size and quality (Mean =178.01). Similarly, other economically optimal brand loyalty levels can be achieved at maintained size, price decrease and quality increase (Mean=177.80) and maintained size, maintained quality and price decrease (Mean =177.30). It was however observed that consumers of detergents in Makurdi metropolis of Benue State responses were in line with the tradition of maximum utility at lowest cost which though good for the rational users, is detrimental to the sustainability of the business. Detergent Users want both quality and size increase as prerequisite for price increase. This though quite plausible to detergent users, can only be achieved at a loss to the producers. To solve market disequilibrium problems, the study recommended mutual benefits to both the producers and users of detergent. Thus, in view of precarious economic conditions, producers should increase the quality of detergents and the decrease size as prerequisite for price increase (Mean=90.81). This, though with low loyalty level vis-à-vis the best loyalty levels, will be mutually beneficial as it will attract a significant level of loyalty from the detergent users and at the same time, provide a window for producers to achieve high level of profitability.

Keywords: *Product Characteristics, Product Characteristics Variation, Brand Loyalty, Detergents Users, Makurdi Metropolis.*

INTRODUCTION

Having emerged from economic recession, the Nigerian economy has been recuperating, but performance still at low ebb with economic hardship taking a toll on low income earners. Although the National Bureau of Statistics had since 2017 declared the economy out of recession, many indicators show the country is still struggling to cater for the well-being of its exploding populace: some State Governments still unable to pay the back-log of civil servants their salaries and pensions for several months; inflation rate still in the double-digit, unemployment level still astonishingly high and lamentable multiplicity of income taxes amidst sparingly rising rates from various organizations across the country. In fact, the Federal Government on 12th June 2019 announced the increase of value added tax (VAT) from 5% to 7.2% to enable it cushion the effect of recession. These invariably translate to lowering levels of disposable income that makes the average Nigerian unable to meet up with the many demands of daily life, especially of items needed for daily use, such as the detergent.

The poor state of the economy affects both producers and consumers negatively. Consumers are however the worst hit since producers could pass the bulk to them through cost shifting strategy. Nevertheless, in a competitive market there are many brands of the product which gives the consumers the opportunity to also shift their loyalty levels from one brand of a product to another when the cost of buying the former becomes prohibitive. To retain consumer loyalty, the producer needs to vary his product characteristics such as price, size and quality to make them attractive to the consumer or keep them in line with consumer expectations. Product variation can be used to determine what combination of product characteristics could achieve highest level of

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brand loyalty from consumers. Such product characteristics can be varied in the following directions: increase product price, maintain product price, decrease product price, increase product size, maintain product size, decrease product size, increase product quality, maintain product quality and decrease product quality. Different variations in the characteristics of a product result in varying degrees of product loyalty. Hence factors like product price, product size and product quality could be important factors that ultimately affect product brand loyalty. Brand loyalty refers to the readiness of consumers to pay more money to a particular product brand against similar brands (Eric's, Unal&Candanet, 2012). Brand loyalty is considered as the most important factor in the success of any organization (Gbosh, 1990). Enhancing loyalty behavior, therefore, will help the organization to get customers preference, buying intention and secure profitability. Product variation entails changing one or more features of a firm's product (Shugan, 2005).

One of the products commonly used in every household quite frequently is the detergent. It is the product that is used almost on a daily basis. However, the cost of living in Nigeria generally or Makurdi metropolis in particular is high. The rational expectation is that detergent users in Makurdi metropolis will to either reduce the quantity demanded of one brand of detergent or completely change their demands of such a brand for another. The alternating loyalty levels in Makurdi metropolis will affect brands such as Omo Multi-action, Ariel, SoKlin, Sunlight, Zip, Elephant, Goodmama, WAW and Tempo, among others.

The question is: what combination of detergent characteristics variations can achieve the best loyalty of its users in Makurdi metropolis of Benue State? The

paper is prompted to answer this question. To achieve this aim, the following hypotheses were postulated:

- i. there will be significant effect of price variation on brand loyalty of detergents in Makurdi metropolis.
- ii. there will be significant effect of quality variation on brand loyalty of detergents in Makurdi metropolis.
- iii. there will be significant effect of size variation on brand loyalty of detergents in Makurdi metropolis.
- iv. there will be significant interactional effect of price and quality variations on brand loyalty of detergents in Makurdi metropolis.
- v. there will be significant interactional effect of price and size variations on brand loyalty of detergents in Makurdi metropolis.
- vi. there will be significant interactional effect of quality and size variations on brand loyalty of detergents in Makurdi metropolis.
- vii. there will be significant interactional effect of price, quality and size variations on brand loyalty of detergents in Makurdi metropolis.

Conceptual Clarifications

The concepts which need clarification in this study are product characteristics, product characteristics variation and brand loyalty. These concepts will be elucidated in this section. Product characteristics are the features that define its behavior. The features include the price of the product, the packaging, the size, the quality and name, among others. Babalola and Ehigie (1995) identified product price, quality and size as important product features that could influence Nigerian consumers a great deal. Product quality according to Aksu (2003), is the conformance to a set of customer requirements that, if met, result in a product or service that is fit for its intended use. Product price is that which consumers exchange with the market in order to purchase the

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product (Prensky & Wells, 1996). Consumers consider price to be an important criterion in their evaluation of alternatives. Product size is expressed as the quantity of a product per unit of price (Kahn & Lehmann, 2001).

Product characteristics variation refers to the act of changing one or more features of a firm's product (Ehigie & Babalola, 1995). The variations may include: increase, maintain and decrease. Sometimes, exact proportions are used to vary a product. For instance, product price can be increased by 10 percent, product size can be decreased by five percent, among other variations. Product loyalty is the biased, behavioral response expressed over time by some decision-making unit with respect to one or more alternative products out of a set of such brands and is a function of psychological process (Jacoby & Chestnut, 1978).

Theoretical Framework

The theoretical foundation for this study is Hypothesis Testing theory of product variation and Social Exchange theory of brand loyalty.

a. Hypothesis Testing Theory of Product Variation

Hypothesis testing theory was propounded by Deighton (1983). Deighton hypothesized that pre-purchase information plays a substantial role in creating expectations about the products which customers will acquire and use. According to the theory, customers use their experiences with the product/service to test their expectations. The theorist believes that customers will tend to attempt to confirm their expectations.

The theory therefore implies that consumers of detergents will create their expectations on each brand based on their pre-purchase information regarding such brands. This pre-purchase information could be the quality of the brand, the relative price of the brand and

the relative size of the brand. Variations in these characteristics will also form part of this pre-purchase information that is necessary to form consumer's expectations of the brand.

b. Social Exchange Theory of Brand Loyalty

Social exchange theory was developed by Thibault and Kelley (1959). The theory posits that all human relationships are formed the use of a subjective cost-benefit analysis and the comparison of alternatives that people develop in relationships, which yield the greatest profits.

The thrust of the theory is that when costs exceed rewards, people seek to dissolve relationships. This implies that consumers enter into relational exchanges with firms when they believe that the benefits derived from such relational exchanges exceed the costs. Thus, when consumers believe that any variation, be it in size, quality or price does not favour them in terms of increase, maintain or decrease, they seek to dissolve the relationship, if otherwise, the relational exchanges continue to thrive, implying the maintenance of brand loyalty.

MATERIALS AND METHOD

The study adopted the experimental research design. The 3x3x3 factorial design was particularly used. Three independent variables varied at three levels and a dependent variable were used in the study. The independent variables were product price, product quality and product size. Product price was varied as "increase price", "maintain price" and "decrease price"; product quality was varied as "increase quality", "maintain quality" and "decrease quality"; product size was varied as "increase size", "maintain size" and "decrease size".

The population of the study comprised all users of detergents among undergraduate students of the Universities in Makurdi metropolis of Benue State. These

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Universities are Federal University of Agriculture Makurdi and Benue State University Makurdi. Experience shows that undergraduate students are among the categories of high detergent users in Makurdi metropolis. Unlike other categories of detergent users, undergraduate students can be accessed in their numbers at the same time, are more convenient for experiment due to easy identification through Matriculation Numbers, and are among the few homogeneous groups of detergent users in Makurdi metropolis that can more conveniently allow for experimental control.

The sample of 270 was selected from the target population. This comprised 135 students from Federal University of Agriculture Makurdi and 135 students from Benue State University Makurdi. In each of these schools, a large Faculty was selected for the study. Thus, in Federal University of Agriculture Makurdi, College of Management Sciences was purposively selected while in Benue State University Makurdi, Faculty of Social Sciences was purposively selected.

The students used for the study cut across 100 to 400 levels in each of the selected Faculties. Classes were used as laboratories for the experiments. In each class, a slip was passed round the students on a day they had class test so as to get a large size of the students. The slip requested the students to write their Matriculation Numbers. The target was to arrive at a total of 270 participants: 135 from each school for experimental convenience.

An 18-items self-developed instrument: "Detergent Users Loyalty Inventory" (DULI) was used for data collection. It comprised pre-manipulation product loyalty scale which was designed to measure the level of loyalty to the preferred brand of detergent before the manipulation of

the independent variables (see Appendix I). The scores were used as covariate to control for pre-existing loyalty of the users of the brand. Another scale was the post-manipulation product loyalty scale which was designed to measure the level of loyalty to the preferred brand of detergent after the manipulation of the independent variables was introduced. The manipulated scale was as follows: increase product price, maintain product price, decrease product price, increase product quality, maintain product quality, decrease product quality, increase product size, maintain product size and decrease product size. In total, 27 different combinations resulted from the 3x3x3 factorial design as shown in Appendix III. The 3x3x3 factorial table used to generate the manipulated combinations is shown in Appendix III.

A manipulative check was conducted to find out if the manipulations were reflective of respondents' perceptions in line with the study's a-priori expectations. The One-way Analysis of Variance (ANOVA) statistic was used to ascertain the validity of manipulations. Results indicated that there were significant differences in the respondents' perception of the manipulation in price ($F, 2,270 = 0.005, p \leq 0.05$), quality ($F, 2,270 = 0.005, p \leq 0.05$) and size ($F, 2,270 = 0.005, p \leq 0.05$) (Using Section 'C' of the Questionnaire). The option in the study instrument (DCLI) "Maintain" was used as a control variable to find out the effect of product variation on detergent brands loyalty when none of the characteristics were varied.

Three-way Analysis of Co-variance (ANCOVA) was used to test the Hypotheses used in the study so as to compare the effect of the differences in product characteristics variation on brand loyalty. Pre-manipulation scale scores were used for pre-test or as covariate. Since the study dealt with different subjects under different conditions, independent measures

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(between-groups) ANCOVA was used. The main and interactional effects in ANCOVA result were significant, the study therefore made use of Fisher's Least Significant Difference (LSD) to locate the differences and their mean sizes.

RESULTS

Descriptive statistics, ANCOVA and LSD results are presented and discussed in this section.

Table 1: Responses to Brands of Detergent from Participants

Brand Name	Frequency/Percentage
Omo Multi-action	74 (27.4%)
SoKlin	119 (44.1%)
Ariel	236 (87.4%)
Sunlight	139 (51.5%)
Zip	124 (45.9%)
Goodmama	96 (35.6%)
Elephant	14 (5.2%)
Tempo	38 (14.1%)
WAW	54 (20.0%)
Total	270(100%)

Source: *Field Survey, 2019.*

Table 1 shows that 74 (27.4%) respondents are frequent users of Omo Multi-action detergent, 119 (44.1%) respondents use SoKlin more frequently, 236(87.4%) respondents are frequent users of Ariel while 139 (51.5%) respondents are frequent users of Sunlight detergent. The table also shows that 124(45.9%) respondents make use of Zip detergent more frequently, 96 (35.6%) of the respondents prefer Goodmama detergent, 14(5.2%) respondents are frequent users of Elephant detergent while 38(14.4%) respondents use Tempo detergent more frequently. Also, 54 (20%) respondents use WAW detergents more frequently. Thus,

the most preferred brands of detergents were Ariel, Sunlight and SoKlin while the least were Elephant, Tempo and Goodmama.

Table 2: Analysis of Co-variance Results showing the effect of product variation on brand loyalty of Detergents in Makurdi metropolis

Results presented in Table 2 showed that there was no significant effect of the covariate on the dependent variable. This means that the pre-manipulation scale has no effect on brand loyalty of detergents among undergraduate students of the Universities in Makurdi metropolis. Thus, the level of brand loyalty for detergents was not significant before the manipulations were made ($F, 2,270 = 3.701, p=0.056 \leq 0.001$). The scores of the estimated marginal means were therefore same as those from the manipulated scale.

Results revealed a significant main effect of price variation on brand loyalty of detergents in Makurdi metropolis ($F, (2), 270 = 109.345, p=0.000 \leq 0.001$). This means that change in product price significantly affects brand loyalty of the detergents among undergraduate students of the Universities in Makurdi metropolis. The eta-squared coefficient was 0.475 which implies that the effect size of price on brand loyalty was large and explains 47.5 percent of variations in the dependent variable. This is based on the criteria given by Cohen (1988) as cited in Pallant (2001) as follows: eta-squared value of 0.01= small effect size; 0.06= moderate effect size and 0.14= large effect size. The result of Least Significant Difference between price Levels depicting the mean differences in brand loyalty when the price of detergents was increased, maintained and decreased.

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Table 3: LSD Results of Product Price Levels

Price Level	1	2	3	Mean	S.E	N
1.IP	-	-	-	122.646	5.945	90
2.MP	6.01	-	-	116.653	2.754	90
3.DP	60.05*	54.04*	-	62.597	4.471	90

Key:

IP = Increase Price

MP = Maintain Price

DP = Decrease Price

The result of LSD multiple comparison test presented in Table 3 shows that brand loyalty was best at increase product price (mean =122.464) compared to maintain product price (mean = 116.653) and decrease product price (mean =62.597). Also, loyalty was higher for maintain product price (Mean=116.653) than decrease product price (Mean = 62.97).

Results presented in Table 1 also revealed a significant main effect of quality variation on brand loyalty of detergents in Makurdi metropolis ($F, (2), 270 = 56.537, p=0.000 \leq 0.001$). This means that a change in product quality significantly affects brand loyalty of the detergents in Makurdi metropolis. The eta-squared coefficient was 0.461 which implies that the effect size of price on brand loyalty was large and explains 46.1 percent of variations in the dependent variable. The result of Least Significant Difference between quality levels depicting the mean differences in brand loyalty when the quality of detergents was increased maintained and decreases.

Table 4: LSD Results of Product Quality Levels

Quality Level	1	2	3	Mean	S.E	N
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1.IQ	-	-	-	138.050	2.222	90
2.MQ	37.162*	-	-	100.882	2.227	90
3.DQ	75.104*	37.936	-	62.946	2.245	90

Key:**IQ**= Increase Quality**MQ** = Maintain Quality**DQ** = Decrease Quality

LSD multiple comparison results presented in Table 4 show that brand loyalty was best at increase product quality (mean =138.050) compared to maintain product quality (mean = 100.882) and decrease product quality (mean =62.946). Also, loyalty was higher for maintain product quality (Mean=100.882) than decrease product quality (Mean = 62.946).

Similarly, results as presented in Table 1 revealed a significant main effect of size variation on brand loyalty of detergents in Makurdi metropolis ($F, (2), 270 = 279.892, p=0.000 \leq 0.001$). This means that change in product size significantly affects brand loyalty of the detergents in Makurdi metropolis. The eta-squared coefficient was 0.318 which implies that the effect of size on brand loyalty was large and explains 31.8 percent of variations in the dependent variable.

Table 4: LSD Results of Product Size Levels

Size Level	1	2	3	Mean	S.E	N
1.IS	-	-	-	84.529	2.344	90
2.MS	-12.26*	-	-	96.790	2.218	90
3.DS	-36.03*	-23.77*	-	120.559	2.330	90

Key:**IQ**= Increase Size**MQ** = Maintain Size**DQ** = Decrease Size

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LSD multiple comparison results presented in Table 4 show that brand loyalty was best at decrease product size (mean =54.59) compared to maintain product maintain (mean = 96.790) and increase product size (mean =120.559). Also, loyalty was higher for decrease product size (Mean=96.790) than maintain product size (Mean = 120.559).

Results earlier presented in Table 1 revealed a significant interactional effect of price variation and quality variation on brand loyalty of detergents among undergraduate students of the Universities in Makurdi metropolis (F, (4), 270 = 36.998, $p=0.000 \leq 0.001$). This means that change in product price and quality significantly affects brand loyalty of the detergents users among undergraduate students of the Universities in Makurdi metropolis. The eta-squared coefficient was 0.379 which implies that the effect of size on brand loyalty was large and explains 37.9 percent of variations in the dependent variable.

Table 5: LSD Results of the interactional effect between Product Price and Quality Levels

Price/Quality Level	1	2	3	4	5	6	7	8	Mean	S.E	N
1.IP/IQ	-								141.864	3.970	30
2.IP/MQ	82.23*	-							58.637	3.942	30
3.IP/DQ	88.78*	5.55	-						53.085	3.861	30
4.MP/IQ	13.46*	69.77*	75.32*	-					128.404	3.847	30
5.MP/MQ	44.51*	38.72*	44.27*	31.05*	-				97.359	3.873	30
6.MP/DQ	77.26*	77.26*	11.52	63.79*	32.75*	-			64.607	3.933	30
7.DP/IQ	2.02	85.24*	90.79*	15.47	46.52*	79.27*	-		143.881	3.921	30
8.DP/MQ	4.79	88.02*	93.58*	18.26*	49.30*	82.05*	2.77	-	146.650	3.914	30
9.DP/DQ	70.72*	12.51	18.06*	57.25*	26.21*	6.54	72.73*	75.50*	71.146	3.887	30

$p \leq 0.000$

The result of LSD multiple comparison test presented in Table 5 reveals that if producers of detergents choose to maximize profit through price increase, the effective strategy to attain the best level of loyalty for their brand is to combine such price increase with quality increase

(mean =159.247) since the mean value is higher than the decision to combine price increase with maintained quality (mean =58.637) and quality decrease (mean =53.085). If producers of detergents decide to maintain the prices of their brand however, the best brand loyalty attainment strategy is to increase quality (mean =128.404) as this is better than the decision to maintain both price and quality (mean =97.359), and decreasing quality (mean =64.607). The decision of detergent producers to choose price decrease for any reason should have quality maintained (mean =146.650) to attain the best loyalty level for their brands as this strategy is slightly better than combining price decrease with quality increase (mean =143.881) while decreasing quality will achieve low level of brand loyalty (mean =71.146). The best of all the strategies is to combine price decrease with maintained quality (mean =146.650). The problem however is that while this best strategy can achieve high loyalty level for detergent users, it will be difficult to achieve profit maximization to detergent producers. In the view of this the producers can adopt price increase with quality increase strategy since this also has high mean loyalty value (mean =141.864).

Referencing Table 1 revealed a significant interactional effect of price variation and size variation on brand loyalty of detergents users among undergraduate students of the Universities in Makurdi metropolis ($F, (4), 270 = 6.500, p=0.000 \leq 0.001$). This means that change in product price and size significantly affects brand loyalty of the detergents users among undergraduate students of the Universities in Makurdi metropolis. The eta-squared coefficient was 0.097 which implies that the effect of size on brand loyalty was moderate and explains 9.7 percent of variations in the dependent variable.

Table 6: LSD Results of the interactional effect between Product Price and Size Levels

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Price/Quality Level	1	2	3	4	5	6	7	8	Mean	S.E	N
1.IP/IS	-								114.877	6.622	30
2.IP/MS	6.293*	-							121.170	6.576	30
3.IP/DS	17.01*	10.72*	-						131.891	6.971	30
4.MP/IS	24.92*	91.21*	4.193						89.961	3.961	30
5.MP/MS	38.18*	2.48	13.19*	28.73*	-				118.695	4.207	30
6.MP/DS	26.37*	20.1*	9.357*	51.29*	22.55*	-			141.248	5.655	30
7.DP/IS	66.13*	72.42*	83.14*	41.21*	69.19*	92.5*	-		48.748	5.605	30
8.DP/MS	64.37*	70.67*	81.39*	39.46*	68.19*	90.74*	1.757	-	50.505	5.373	30
9.DP/DS	26.34*	32.63*	43.35*	1.42	30.16*	52.71*	39.79*	38.03*	88.538	5.410	30

$p \leq 0.001$

Results presented in Table 6 show that if producers of detergents decide to adopt price increase due to the increasing cost of production in Nigeria generally, the most preferred strategy that can enhance the best loyalty level to their brands is to combine it with size increase (mean =114.877) because the mean loyalty value is higher when compared to maintained size (mean =89.961) and size decrease (mean =48.748). To maintain price, producers will achieve the best loyalty level if combined with size increase (mean =121.170) which is better than maintained size (mean =118.659) and size increase (mean =50.505). Producers of detergents ought to maintain the size of detergents to attain the best loyalty level if they choose to adopt price decrease (mean =141.248) as this is better than size increase (mean =131.891) and size decrease (mean = 88.538).

Table 1 revealed a significant interactional effect of size variation and quality variation on brand loyalty of detergents in Makurdi metropolis ($F, (4),270 = 24.558, p=0.000 \leq 0.001$). This means that change in product size and quality significantly affects brand loyalty of the detergents users among undergraduate students of the Universities in Makurdi metropolis. The eta-squared coefficient was 0.289 which implies that the effect of size

on brand loyalty was large and explains 28.9 percent of variations in the dependent variable.

Table 7: LSD Results of the interactional effect between Product Quality and Size Levels

Price/Quality Level	1	2	3	4	5	6	7	8	Mean	S.E	N
1.IQ/IS	-								159.247	6.694	30
2.IQ/MS	52.30*	-							106.946	6.851	30
3.IQ/DS	57.50*	5.20	-						101.744	6.622	30
4.MQ/IS	6.26	58.55*	63.76*	-					165.502	4.033	30
5.MQ/MS	30.94*	21.36*	26.56*	37.19*	-				128.306	4.007	30
6.MQ/DS	103.1*	50.84*	45.65*	109.4*	72.21*	-			56.098	4.600	30
7.DQ/IS	69.85*	17.54*	12.34	76.10*	38.91*	33.30*	-		89.400	5.424	30
8.DQ/MS	91.85*	39.55*	34.35*	98.11*	60.91*	11.29	22.01*	-	67.394	5475	30
9.DQ/DS	128.3*	75.95*	70.75*	134.5*	97.31*	25.10*	58.40*	36.3*	30.996	5486o	30

$p \leq 0.001$

Results earlier presented in Table 1 revealed a significant interactional effect of price, quality and size variations on brand loyalty of detergents users in Makurdi metropolis ($F, (6), 270 = 36.998, p = 0.000 \leq 0.001$). This means that change in product price and quality significantly affects brand loyalty of the detergents users among undergraduate students of the Universities in Makurdi metropolis. The eta-squared coefficient was 0.289 which implies that the effect of size on brand loyalty was large and explains 28.9 percent of variations in the dependent variable.

Table 8: LSD Results of the 3x3x3 interactional effect between Product Price, 9Quality and Size Levels

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Variation on Users' brand Loyalty among Undergraduate Students
of the Universities in Makurdi Metropolis

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Price/Quality /Size Level	1	2	3	4	5	6	7	8	Mean	S.E	N
1.IS/IP/IQ	-								178.01	6.694	30
2.IS/IP/MQ	99.3*	-							78.63	6.851	30
3.IS/IP/DQ	90.01*	9.36*	-						87.99	6.622	30
4.IP/MP/IQ	37.90*	61.52*	52.16	_					140.15	4.033	30
5.IS/MP/MQ	64.10*	34.87	25.51*	26.65*	-				113.5	4.007	30
6.IS/MP/DQ	68.37*	31.27*	21.91*	30.25*	3.60	-			109.9	4.600	30
7.IS/MP/IQ	18.13*	80.97*	71.61*	19.31*	46.10*	49.70*	-		159.6	5.424	30
8.IS/DP/MQ	49.7*	50.17*	40.81*	11.35	15.30	18.90*	30.80*	-	128.8	5.475	30
9.IS/DP/IQ	70.3*	28.67*	19.31*	32.85*	6.20	2.60	52.30*	21.50*	107.3	5.486	30
1.MS/IP/IQ	-								156.8	6.694	30
2.MS/IP/MQ	87.80*	-							68.91	6.851	30
3.MS/IP/DQ	112.61*	24.74*	-						44.19	6.622	30
4.MS/MP/IQ	5.11*	93.00*	117.72*	_					161.91	4.033	30
5.MS/MP/MQ	18.10*	69.79*	94.51*	23.21*	-				138.7	4.007	30
6.MS/MP/DQ	101.34*	13.45	11.27	106.5*	83.24*	-			55.46	4.600	30
7.MS/DP/IQ	21.00*	108.9*	133.61*	15.89*	39.10*	122.4*	-		177.8	5.424	30
8.MS/DP/MQ	20.50*	108.4*	133.11*	15.39	38.60*	121.8*	0.50	-	177.3	5475	30
9.MS/DP/DQ	65.99*	21.90*	46.62*	71.10*	47.89*	35.35*	86.99*	108.6*	68.64	5.486	30
1.DS/IP/IQ	-								90.81	3.970	30
2.DS/MP/MQ	62.44*	-							28.37	3.945	30
3.DS/DP/DQ	63.75*	1.13	-						27.06	3.861	30
4.DS/IP/IQ	7.65	54.79*	56.10*	_					83.16	3.847	30
5.DS/MP/MQ	50.92	11.52	12.83	43.27*	-				39.89	3.873	30
6.DS/DP/DQ	62.35*	0.09	1.40	54.70*	11.43*	-			28.46	3.933	30
7.DS/IP/IQ	3.45*	65.8*	67.17*	11.07	54.34*	65.77*	-		94.23	3.921	30
8.DS/MP/MQ	43.1*	105.5*	106.85*	50.75*	94.02*	105.5*	39.68*	-	133.91	3.914	30
9.DS/DP/DQ	53.4*	9.1*	10.41	45.69*	2.42	9.01	56.76*	96.44*	37.47	3.887	30

$p \leq 0.05$

The results of LSD multiple comparison tests presented in Table 8 show that the simplest way to maximize profit for

all brands of detergents is the usual price increase strategy. However, price increase must be accompanied by changes in the quality and size for product loyalty to be retained. The best loyalty level was achieved when price increase was combined with size increase and quality increase (mean =178.01). But when price increase was combined with quality increase and an unchanged size, loyalty level was low (mean=156.80) or when it was combined with size decrease and quality decrease (mean =90.81). Loyalty level was even lower when price increase was combined with size increase and quality decrease (mean =87.99), size increase and maintained quality (mean =78.63), when increase in price was combined with unchanged price and quality (mean =68.91) or when combined with size decrease and an unchanged quality (mean =28.37). The worst scenarios are: combining price increase with maintained size and quality decrease (*mean* =44.19) and combining in with decrease in both size and quality (mean = 27.06).

In a situation where the producers of detergent brands have no interest in price increase and decide to maintain the prevailing price level for whatsoever reason, to achieve the best loyalty level for their brands, they must combine such maintained price with a maintained size and quality increase (mean =161.91) since it is better than combining it with maintained size and quality (mean =138.7), with size increase and quality decrease (mean =109.9) or with size increase and quality increase (mean =140.15) or size increase and maintained quality (mean =113.5), size decrease and quality increase (mean =83.16). Lower levels of brand loyalty will be achieved when maintained price is accompanied a maintained size and a decreased quality (mean =55.46), a decreased size and a maintained quality (mean =39.89) and a decrease in both size and quality (mean =28.46).

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Yet detergent producers may decide to adopt the price decrease option to penetrate the market. If this is the strategy adopted, the best brand loyalty level will be achieved when such price decrease is combined with maintained size and quality increase (mean =177.80) or maintaining both size and quality (mean = 177.30), although a high level of brand loyalty can also be achieved by combining price decrease with and increase in both size and quality (mean =159.60) and size increase and maintained quality (mean =128.80). Placed at the lower rungs are: combining price decrease with size increase and quality decrease (mean =107.3), size decrease and quality increase (mean =94.23), maintained size and quality decrease (mean =68.64) and maintaining both size and quality (mean =37.47).

The overall best brand loyalty level will be achieved when there is a simultaneous increase in price, size and quality (mean =178.01). Placed immediately below the best brand loyalty level are the loyalty levels for maintained size, price decrease and quality increase (mean=177.80) and maintained size, maintained quality and price decrease (mean =177.30). These combinations for best brand loyalty suggest that users of detergents are not particularly sensitive to hardships faced by producers in terms of production costs.

DISCUSSION

Detergent characteristics in form of price, size and quality have significant maintain and interactional effects on users' brand loyalty among undergraduate students of the Universities in Makurdi metropolis of Benue State. The result of significant effect of product characteristics variations on users' brand loyalty is consistent with users' natural affinity to attain the highest possible consumption at lowest pose cost as a basis for maximum loyalty. This puts consumers at conflict of interest against producers

who on the other hand, crave to make the highest level of profit from the goods they produce. As can be seen among undergraduate students of the Universities in Makurdi metropolis, detergent users want both quality and size increase as prerequisite for price increase to retain their loyalty to any brand of detergent, with the aim to maximize utility, the cost implication to the producers notwithstanding. If producers of detergents decide to satisfy consumers by implementing what consumers want so as to attract the best loyalty to their brands, they will not be able to make profit. The drive for business sustenance is profit making. For the detergent business to be sustained there is need for what can be regarded as an optimum strategy that can attract brand loyalty and also allow producers the leverage to maximize profit. In view of this, the study recommends that for both the producer and the consumer to benefit from detergent characteristics variations, producers should adopt size decrease, price increase and quality increase (mean = 90.81). This strategy will be able to attract significant level of brand loyalty with room for profit maximization. That is if they should maximize profit and still maintain a good hold on users' loyalty, they are to adopt the first strategy in the third section of the 3x3x3 factorial presented in Table 8 (mean =90.81). This means producers should increase the quality of detergents and decrease size as prerequisite for price increase.

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QUESTIONNAIRE, EXPERIMENTAL FORMATS AND RESULT PRINT-OUTS

SECTION 'A': PRE-MANIPULATION SCALE

Instruments: Please indicate the brand of detergent you use more frequently by selecting from the options provided in a continuum of 11 points as from Highly Infrequent (1) to Highly Frequent (11) by ticking the most applicable option.

S/No	Statements	1	2	3	4	5	6	7	8	9	10	11
1	How frequent do you buy the brand of detergent you prefer?											
2	How frequent do recommend the brand of detergent to your neighbours ?											
3	How often do you insist on buying your preferred brand of detergent?											
4	How often do you convince your friends to buy that brand of detergent?											
5	How frequent think of your preferred brand of detergent?											

SECTION 'B': POST-MANIPULATION SCALE

Now that the costs of raw materials for the production of detergents has risen, the management is facing the

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challenge of changing the price, quality and size of their products and retaining users' loyalty to the brands at the same time. Assuming the producers of your preferred brand of detergent decided to **increase the price, decrease the quality and increase the size** of your preferred brand of detergent, indicate how you will react to such changes by responding to the following statements ranging from Strongly Disagree (1) to Strongly Agree (7).

S/No	Statements	1	2	3	4	5	6	7
1	I will still prefer the detergent							
2	I will still recommend this brand of detergent to my friends							
3	I will always use this brand of detergent							
4	I always get value from using this brand of detergent							
5	I still like this brand of detergent more than any other brand							
6	I will try other brands of detergent							
7	I will choose an alternative brand of detergent							
8	I will prefer to use other detergents if they give me more value for my money							
9	I will not feel attached to my preferred brand of detergent again							
10	I will no longer convince my neighbors about the brand of detergent.							

SECTION 'C': VALIDITY SCALE

Detergent Price

Extremely Low	Moderately Low	Low	No Opinion	Moderately High	High	Extremely High
1	2	3	4	5	6	7

Detergent Quality

Extremely Low	Moderately Low	Low	No Opinion	Moderately High	High	Extremely High
1	2	3	4	5	6	7

Detergent Size

Extremely Low	Moderately Low	Low	No Opinion	Moderately High	High	Extremely High
1	2	3	4	5	6	7

3x3x3 FACTORIAL DESIGN AND EXPERIMENTAL CONDITIONS

- A1 = Increase Size
- A2 = Maintain Size
- A3 = Decrease Size
- B1 = Increase Price
- B2 = Maintain price
- B3 = Decrease Price
- C1 = Increase Quality
- C2 = Maintain Quality
- C3 = Decrease Quality

	A1			A2			A3		
	B1	B2	B3	B1	B2	B3	B1	B2	B3
C1	1	4	7	10	13	16	19	22	25
C2	2	5	8	11	14	17	20	23	26
C3	3	6	9	12	15	18	21	24	27

MANIPULATION OF INDEPENDENT VARIABLES

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- i. Increase the size, increase the price, increase the quality
- ii. Increase the size, increase the price, maintain the quality
- iii. Increase the size, increase the size, decrease the quality
- iv. Increase the size, maintain the price, increase the quality
- v. Increase the size, maintain the price, maintain the quality
- vi. Increase the size, maintain the price, decrease the quality
- vii. Increase the size, decrease the price, increase the quality
- viii. Increase the size, decrease the price, maintain the quality
- ix. Increase the size, decrease the price, decrease the quality
- x. Maintain the size, increase the price, increase the quality
- xi. Maintain the size, increase the price, maintain the quality
- xii. Maintain the size, increase the price, decrease the quality
- xiii. Maintain the size, maintain the price, increase the quality
- xiv. Maintain the size, maintain the price, maintain the quality
- xv. Maintain the size, maintain the price, decrease the quality
- xvi. Maintain the size, decrease the price, maintain the quality
- xvii. Maintain the size, decrease the price, decrease the quality
- xviii. Maintain the size, decrease the price, decrease the quality

- xix. Decrease the size, increase the price, increase the quality
- xx. Decrease the size, increase the price, maintain the quality
- xxi. Decrease the size, increase the price, decrease the quality
- xxii. Decrease the size, maintain the price, increase the quality
- xxiii. Decrease the size, maintain the price, maintain the quality
- xxiv. Decrease the size, maintain the price, decrease the quality
- xxv. Decrease the size, decrease the price, increase the quality
- xxvi. Decrease the size, decrease the price, maintain the quality
- xxvii. Decrease the size, decrease the price, decrease the quality

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RESULTS OF ANALYSIS OF CO-VARIANCE AND LEAST SIGNIFICANT DIFFERENCE

Source	Type sum of Squares	III of	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Corrected Model	591913.694		27	21922.729	49.535	.000	.847	1337.452	1.000
Intercept	111806.362		1	111806.362	252.631	.000	.511	252.631	1.000
Covariate	1637.976		1	1637.976	3.701	.056	.015	3.701	.483
Price	48392.789		2	48392.789	109.345	.000	.475	218.691	1.000
Quality	25021.455		2	25021.455	56.537	.000	.461	113.074	1.000
Size	423871.216		2	123871.216	279.892	.000	.318	559.784	1.000
Price* Quality	2876.570		4	2876.570	6.500	.000	.698	25.999	.991
Price* Size	10868.438		4	10868.570	24.558	.000	.079	98.231	1.000
Quality *Size	16373.977		4	10868.438	36.998	.000	.289	147.991	1.000
Price* Quality* Size	2081.782		8	16373.977	4.704	.000	.379	37.631	.998
Error	442.568		242	442.568					
Total			270						
Corrected Total			269						

Estimated Marginal Means

1. Size

Estimates

Dependent Variable: Loyalty

Size	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Increase Size	122.646 ^a	5.945	110.934	134.357
Maintain Size	116.635 ^a	2.754	111.210	122.060
Decrease Size	62.597 ^a	4.471	53.789	71.405

a. Covariates appearing in the model are evaluated at the following values: covariate = 71.90.

Estimated Marginal Means

2. Price

Estimates

Dependent Variable: Loyalty

Size	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Increase Price	84.529 ^a	2.344	79.911	89.146
Maintain Price	96.790 ^a	2.218	92.421	101.159
Decrease Price	120.559 ^a	2.330	115.970	125.148

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- a. Covariate appearing in the model are evaluated at the following values: covariate =71.90

Estimated Marginal Means

3. Quality Estimates

Dependent variable: Loyalty

Quality	Mean	Std. Error	95% Computations confidence Interval	
			Lower Bound	Upper Bound
Increase Quality	138.050 ^a	2.222	133.673	142.427
Maintain Quality	100.882 ^a	2.227	96.494	105.270
Decrease Quality	62.946 ^a	2.245	58.369	67.369

Estimated Marginal Means

4. Size * Price

Dependent variable: Loyalty

Size Price	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Increase Price	114.877 ^a	6.622	101.833	127.920
Increase Size	121.170 ^a	6.576	108.215	134.124
Maintain Price	131.891 ^a	6.971	118.160	145.621
Decrease Price	89.961 ^a	3.961	82.159	97.764
	118.695 ^a	4.207	110.408	126.983
Increase Price	141.248 ^a	5.655	130.109	152.388
	48.748 ^a	5.605	37.707	59.788
	50.505 ^a	5.373	39.922	61.089

Maintain size Maintain Price	88.538 ^a	5.410	77.882	99.194
Decrease Price Increase Price Decrease price Maintain Price				
Decrease Price				

a. Covariates appearing in the model are evaluated at the following values: Covariate=71.90.

Estimated Marginal Means

5. Size * Quality

Dependent Variable: Loyalty

Size Quality	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Increase Quality	159.247 ^a	6.694	146.061	172.433
Increase Size	106.946 ^a	6.851	93.452	120.441
Maintain Quality	101.744 ^a	6.622	88.700	114.787
Decrease Quality	165.502 ^a	4.033	157.558	173.446
Decrease Quality	128.306 ^a	4.007	120.413	136.198
Increase Quality	56.098 ^a	4.600	47.037	65.158
Maintain Size	89.400 ^a	5.424	78.716	100.083
Decrease Quality	67.394 ^a	5.475	56.610	78.179
Increase Quality	30.996 ^a	5.486	20.189	41.804
Decrease Price Maintain Quality				
Decrease Quality				
Increase Quality Decrease Price Maintain Quality				
Decrease Quality				

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- a. Covariates appearing in the model are evaluated at the following values: Covariate = 71.90.

Estimated Marginal Means

6. Price * Quality

Dependent Variable: Loyalty

Price Quality	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Increase Quality	141.864 ^a	3.970	134.044	149.684
Increase Price	58.637 ^a	3.942	50.873	66.401
Maintain Quality	53.085 ^a	3.861	45.480	60.689
Decrease Quality	128.404 ^a	3.847	120.827	135.982
Decrease Quality	97.359 ^a	3.873	89.730	104.989
Decrease Quality	64.607 ^a	3.933	56.860	72.354
Increase Quality	143.881 ^a	3.921	136.156	151.605
Maintain Price	146.650 ^a	3.914	138.940	154.360
Maintain Quality	71.146 ^a	3.887	63.489	78.804
Decrease Quality				
Increase Quality				
Decrease Price				
Maintain Quality				
Decrease Quality				

- a. Covariates appearing in the model are evaluated at the following values: Covariate = 71.90.

Estimated Marginal Means 7. Size* Price *Quality

Size	Price	Quality	Mean	Std. Error	95% Confidence Interval		
					Lower Bound	Upper Bound	
		Increase Quality	178.006 ^a	8.707	160.855	195.156	
Increase Size	Increase Price	Maintain Quality	78.628 ^a	8.815	61.263	95.992	
		Decrease Quality	87.997 ^a	8.192	71.860	104.135	
		Increase Quality	140.149 ^a	8.458	123.488	156.810	
	Maintain Price	Maintain Quality	113.460 ^a	8.625	96.471	130.449	
		Decrease Quality	109.900 ^a	8.507	93.143	126.658	
		Increase Quality	159.587 ^a	8.700	142.449	176.725	
	Decrease Price	Maintain Quality	128.752 ^a	8.790	111.438	146.066	
		Decrease Quality	107.333 ^a	9.025	89.555	125.111	
		Increase Quality	156.777 ^a	6.819	143.346	170.208	
	Maintain Size	Increase Price	Maintain Quality	68.912 ^a	6.726	55.662	82.162
			Decrease Quality	44.195 ^a	6.665	31.066	57.325
			Increase Quality	161.908 ^a	6.725	148.662	175.155
Maintain Price		Maintain Quality	138.720 ^a	6.653	125.615	151.824	
		Decrease Quality	55.458 ^a	7.857	39.982	70.935	
		Increase Quality	177.820 ^a	7.867	162.323	193.318	
Decrease Price		Maintain Quality	177.285 ^a	7.990	161.546	193.025	
		Decrease Quality	68.640 ^a	7.674	53.523	83.757	
		Increase Quality	90.810 ^a	7.815	75.415	106.204	

Experimental Study of the Effect of Detergent Characteristics
Variation on Users' brand Loyalty among Undergraduate Students
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Decrease Price	Increase Price	Maintain Quality	28.372 ^a	7.826	12.957	43.787
		Decrease Quality	27.061 ^a	7.774	11.747	42.375
	Maintain Price	Increase Quality	83.156 ^a	7.569	68.247	98.065
		Maintain Quality	39.899 ^a	7.764	24.605	55.193
		Decrease Quality	28.461 ^a	7.592	13.506	43.417
		Increase Quality	94.234 ^a	7.650	97.165	109.303
	Decrease Price	Maintain Quality	133.913 ^a	7.555	119.031	148.794
		Decrease Quality	37.466 ^a	7.800	22.102	52.831

a. Covariates appearing in the model are evaluated at the following values: covariate = 71.90.

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