Analytical Methods on Factors Contributing to the Poor Patronage of Made-in-Nigeria Products: A Case of Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This paper examines the factors that contribute to the poor patronage of made-in-Nigeria products in Nigeria using the methods of log-linear analysis and relative importance index. The data for this study were collected through a survey in Anambra state, using 2224 valid questionnaires. The log-linear analysis was used to model the factors, while the relative importance index was used to select the factor that contribute highly to poor patronage of made-in-Nigeria products. The result showed that "Negative perception of Nigerians that local goods are inferior" with $RII = 0.808840$, contribute highly to poor patronage. We recommended that the Nigerian government should ban the importation of those goods that can be manufactured in Nigeria, and as well introduce a policy to curtail the importation.

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1. INTRODUCTION

One of the problems in qualitative research is to analyze the observations obtained from questionnaire contained in two or more categorical variables and to ascertain if there is a significant relationship existing between the variables. Thus, log-linear analysis is such statistical tool that will help to analyze the qualitative data. Log-linear analysis is a statistical technique used for examining the relationship between two or more categorical variables that involves an analysis of the natural logarithms of frequency counts within a contingency table [1,2,3], and it attempts to model significant association among the variables. Log-linear model is of two types: saturated and unsaturated. The saturated model fits the observed values (cell frequencies) perfectly (where all the expected frequencies are equal to the observed frequencies). But the aim of every researcher is to obtain a model which do not fit the observations perfectly, but to obtain a parsimonious model which fits the observations with lower residuals. This paper aims at analyzing the factors that contribute to the low patronage of made-in-Nigeria product in Nigeria using the methodology of Log-linear model and relative importance index.

The economy of any nation grows rapidly when locally made goods are promoted through patronage by its people and then through export. A made-in-Nigeria product (goods or services) is a product that is produced locally in Nigeria, meaning that the product is not imported, and the as well the materials used for the production of such product were obtained locally [4]. However, patronizing made-in-Nigeria products cannot be overemphasized for it is one of the major ways Nigeria can grow its economy. Perhaps, it is obvious that we have been helping other countries to grow their economies by over depending hugely on products manufactured in those countries, especially those products that have direct local substitutes. Thus this overdependence on other people's products has contributed to lack of jobs and however, increase the unemployment in the country.

The products choice by consumers in Nigeria and other developing countries centers mostly on foreign products especially those products that are manufactured from more advanced countries

with high technological know-how [5] such as China, Germany, USA etc. According to Ifediora et al. [6], the preference of Nigeria and other developing countries is a problem that is known to be on culturally, economically, technologically, politically, and grossly psychologically motivated. However, this is the reasons why the Nigerian markets are dominated by products from more technological advanced countries with cheaper production costs and more competitive prices.

Thus, when it comes to making choice of products in the market by the consumers, there is always a great tendency that the consumer is faced with certain doubts about the products of interest, especially when the price tag on that product is very high. However, the amount of perceived risk varies with the amount of money the consumer is holding, the amount of uncertainty, and the amount of consumer self-confidence at the point of purchase. According to Sunday & Alex [7], factors that affect the consumers to patronizing made-in-Nigeria products are of two types: Psychological factors (which consists of attitude, learning, perception, personality, and self-control), and Environmental factors (which consists of culture, family, social class, group influence, economic circumstances, socialization, education, promotional communication and price relationship). While Isah & Aliyu [8] posit that one of the major factors affecting the patronage of made-in-Nigeria goods is the ostentatious lifestyle of the average Nigeria, especially those in the elite class whose taste for imported goods is very high. Leon & Kanuk [9] posit that economic factors such as product quality, price, and product availability, contribute to poor patronage of made-in-Nigeria goods. While a research conducted by Agbonifoh [10] on "Consumer preference for foreign products" showed that 93% of the respondents considered locally produced textiles inferior to the imported ones.

The Nigerian government has put more effort to address the issue of poor patronage of made-in-Nigeria products (which is one of the major problems that has bedeviled the effort of Nigeria towards developing her industrial sector). However, statistics showed that the gross domestic product (GDP) generated from locally made products decrease very rapidly. The low patronage of locally made products has shattered the hope of the common and average

sized production companies locally. Nigerians engage more on imported goods and services more than locally made ones. Though, the Nigerian government has used some medium to check the discrimination against locally made goods, such as imposing a ban on indiscriminate importation of consumer goods, the problem has remained unsolved [11] and the consequence had been declined in many local industries (both common and averaged sized).

In November 2021, the federal government flagged-off campaign in the southwest region of the country towards addressing the patronage of made-in-Nigeria products and services as part of activities marking the 13th National Council of Industry, Trade and Investment meeting in Ekiti state. According to the Minister for Industry, Trade and Investment, Adeniyi Adebayo, the campaign was a part of the Economic Recovery and Growth Plan (ERGP) strategy and National Economic Sustainability Programme (NESP) of the Federal Government to reposition the country's economy [12].

2. MATERIALS AND METHODS

This paper focuses on the log-linear analysis of two-way contingency table (where we have two categorical variables of interest: Causes of poor patronage of made-in-Nigeria products in Nigeria and Responses) and also the application of Relative Importance Index.

2.1 Part A: Statistical Independence for 2-Way Contingency Table

In the two-way contingency table, we have two categorical variables X and Y, with respective levels (values) indexed as i and j. The independence takes into account possible row and column effects, but assumes that there no interaction. The joint probability π_{ij} of observations falling into a cell equal the product of the of the marginal probabilities $\pi_{ij} = \pi_{i+}\pi_{+j}$ for all $i = 1, \cdots, I$ and $j = 1, \cdots, J$

The frequency in the cell ij is given as μ_{ij} and is defined as

$$\mu_{ij} = n\pi_{ij} = n\pi_{i+}\pi_{+j} \tag{1}$$

However, we also have that

$$\sum_i \sum_j \mu_{ij} = n \; ; \; \sum_j \mu_{ij} = \mu_{i+} = n_{i+}; \; \sum_i \mu_{ij} = \mu_{+j} = n_{+j} \tag{2}$$

where n is the sum of all the frequencies (counts), and each cell count (frequency) n_{ij} is assumed to be Poisson distributed, i.e., $n_{ij} \sim Pois(\mu_{ij})$

2.2 Log-Linear Model of Independence for 2-Way Contingency Table

In log-linear model, the response variable equals the counts and expected cell counts μ_{ij}, rather than cell probabilities π_{ij}. The log of the frequency (count) is in a linear relationship of X and Y in a finite number of ways, which can be obtained using log-linear modeling defined as

$$log(\mu_{ij}) = \lambda + \lambda_i^X + \lambda_j^Y \tag{3}$$

where λ is the overall effect; λ_i^X is the main or marginal effect of the row variable X, and λ_j^Y is the main or marginal effect of the column variable Y

The estimated fitted values for the independence log-linear model is defined as

$$\hat{\mu}_{ij} = \frac{n_{i+}n_{+j}}{n} \tag{4}$$

2.3 The Goodness-of-fit Test of the Selected Log-Linear Model

This is done by either testing the model using the Likelihood ratio statistic or the Pearson Chi-square test statistic. The Likelihood ratio statistic is defined as

$$G^2 = 2\sum_i \sum_j n_{ij} log\left(\frac{n_{ij}}{\hat{\mu}_{ij}}\right) \tag{5}$$

The Pearson Chi-square test statistic is defined as

$$\chi^2 = \sum_i \sum_j \frac{(n_{ij} - \hat{\mu}_{ij})^2}{\hat{\mu}_{ij}} \tag{6}$$

The null hypothesis of independence: The model $log(\mu_{ij}) = \lambda + \lambda_i^X + \lambda_j^Y$ holds.

The Likelihood ratio statistic G^2 is also distributed approximately as Chi-square test statistic under the same conditions needed for Pearson's statistic. As the expected frequencies approach infinity, G^2 and Pearson's statistic converge on each other and on the parametric Chi-square distribution.

2.4 Saturated Log-linear Model for 2-Way Table

Saturated log-linear model denoted as $[XY]$ takes into accounts $(\lambda, X, Y \text{ and } XY)$, and it is used to test the interaction effect XY when it is added to the model $[XY]$. Saturated log-linear model fits the data perfectly, that is, it gives a situation where the fitted values are exactly equal to the observe values. It has many unique parameters, and also a degree of freedom of 0 (that is $df = 0$). The Saturated log-linear model is the most complex model possible for a 2-way table.

$$log(\mu_{ij}) = \lambda + \lambda_i^X + \lambda_j^Y + \lambda_{ij}^{XY} \tag{7}$$

where λ_{ij}^{XY} is the association between X and Y

The null hypothesis of Saturated log-linear model: $\lambda_{ij}^{XY} = 0$ for all i, j

2.5 Testing the Adequacy of the Selected Log-Linear Model

The selected log-linear model is tested for adequacy using the Pearson residuals (e_{ijk}) or standardized Pearson residuals (r_{ijk}). A good log-linear model is characterized by small residual. Pearson residuals and standardized Pearson residuals are defined as

$$e_{ij} = \frac{n_{ij} - \hat{\mu}_{ij}}{\sqrt{\hat{\mu}_{ij}}} \quad \text{and} \quad r_{ij} = \frac{e_{ij}}{\sqrt{(1 - \hat{h}_{ij})}} \tag{8}$$

where h_{ij} equals the leverage of cell (ij). An adequate log-linear model has an absolute standardized Pearson residuals $|r_{ij}|$ less than 3 (that is, $|r_{ij}| < 3$), and if the model holds, then $r_{ijk} \approx N(0,1)$.

2.6 Part B: Relative Important Index (RII)

Relative Important Index denoted as RII is used to determine the relative importance of quality factors or the variables involved. It is defined as

$$RII = \frac{\sum W}{AN} = \frac{kn_k + (k-1)n_{k-1} + \cdots + 2n_2 + 1n_1}{AN} \tag{9}$$

where W is the weighting given to each factor by the respondents ranging from 1 to k, A is the

highest weight, N is the total number of respondents. This paper adopts five (5) categories of responses by the respondents. Base on this paper, the Relative Important Index is given as

$$RII = \frac{\sum W}{AN} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5N} \tag{10}$$

Relative Important Index helps us to identify which of the categories is considered the highest cause of insurgency in Nigeria. Relative Important Index lies between 0 and 1, i.e., $(0 \le RII \le 1)$, however, closer to 1 among others, indicates the category with the highest effect on insurgency.

2.7 Data Collection and Sample Size Determination

This study adopts questionnaire method in the collecting data on the factors that contribute to the poor patronage of made-in-Nigeria products. The sample size necessary to satisfy the margin of error required in this study is determined using the following

$$n = \frac{(Z_{\alpha/2})^2 \sigma^2}{E^2} \tag{11}$$

where n is the sample size, $Z_{\alpha/2}$ is the z value providing an area of $\alpha/2$ in the upper tailed of the standard normal probability distribution, σ^2 is the variance, and E^2 is the desired margin of error

3. RESULTS AND DISCUSSION

In Table 1, the p-value of both the Likelihood ratio statistic G^2 and Pearson Chi-square test statistic χ^2 for the selected model (Independence Log-linear Model) are all less than 0.0001 (i.e., p-value < 0.0001). This implies that all the models selected are adequate for modeling the data. The unsaturated model is used to estimate the number of respondents regarding the views towards the factors that contribute to the poor patronage of made-in-Nigeria product.

Table 2 shows the expected numbers of respondents using the independence log-linear model (X, Y) model, residuals, and the standardized Pearson residuals (r_{ij}).
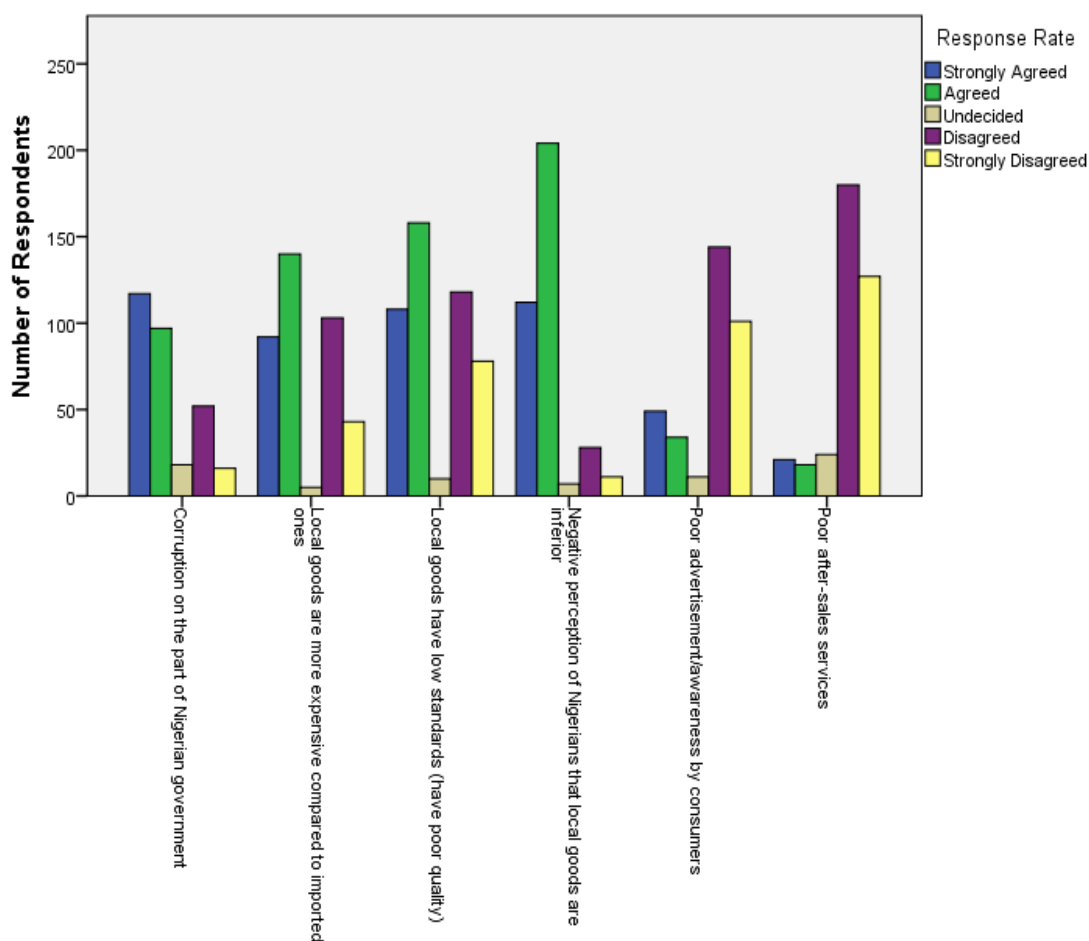
Fig. 1. Bar graph showing the factors that contribute to the poor patronage of Made-in-Nigeria products

Table 1. Goodness-of-fit test from the hierarchical log-linear model

Symbol	Model	df	G^2	p-value	χ^2	p-value
X, Y	Independence	20	737.986	< 0.0001	671.202	< 0.0001
XY	Saturated	0	0	-	0	-

X stands for "factors that contribute to the poor patronage of made-in-Nigeria product"
Y stands for "Response Rate"

Table 2. Computation of residuals and standard residuals using the independence log-linear model from hierarchical model

Cell Counts and Residuals					
Factors Contributing to Poor Patronage of Made-in-Nigeria Products	**Response Rate**	**Observed Count**	**Expected Count**	**Residuals (e_{ij})**	**Std. Residuals (r_{ij})**
Corruption on the part of Nigerian government	Strongly Agreed	117.000	67.251	49.749	6.067
	Agreed	97.000	87.736	9.264	.989
	Undecided	18.000	10.108	7.892	2.482
	Disagreed	52.000	84.232	-32.232	-3.512
	Strongly Disagreed	16.000	50.674	-34.674	-4.871

Cell Counts and Residuals					
Factors Contributing to	**Response Rate**	**Observed**	**Expected**	**Residuals**	**Std.**
Local goods are more expensive compared to imported ones	Strongly Agreed	92.000	85.857	6.143	.663
	Agreed	140.000	112.009	27.991	2.645
	Undecided	5.000	12.904	-7.904	-2.200
	Disagreed	103.000	107.536	-4.536	-.437
	Strongly Disagreed	43.000	64.694	-21.694	-2.697
Local goods have low standards (have poor quality)	Strongly Agreed	108.000	105.808	2.192	.213
	Agreed	158.000	138.038	19.962	1.699
	Undecided	10.000	15.903	-5.903	-1.480
	Disagreed	118.000	132.525	-14.525	-1.262
	Strongly Disagreed	78.000	79.727	-1.727	-.193
Negative perception of Nigerians that local goods are inferior	Strongly Agreed	112.000	81.149	30.851	3.425
	Agreed	204.000	105.868	98.132	9.537
	Undecided	7.000	12.197	-5.197	-1.488
	Disagreed	28.000	101.640	-73.640	-7.304
	Strongly Disagreed	11.000	61.146	-50.146	-6.413
Poor advertisement/awareness by consumers	Strongly Agreed	49.000	75.993	-26.993	-3.096
	Agreed	34.000	99.142	-65.142	-6.542
	Undecided	11.000	11.422	-.422	-.125
	Disagreed	144.000	95.182	48.818	5.004
	Strongly Disagreed	101.000	57.261	43.739	5.780
Poor after-sales services	Strongly Agreed	21.000	82.942	-61.942	-6.801
	Agreed	18.000	108.208	-90.208	-8.672
	Undecided	24.000	12.466	11.534	3.267
	Disagreed	180.000	103.886	76.114	7.468
	Strongly Disagreed	127.000	62.498	64.502	8.159

Table 3. Computation of relative importance index of the factors contributing to poor patronage of made-in-nigeria products

Factors Contributing to Poor Patronage of Made-in-Nigeria Products	SA	A	U	D	SD	Total	RII	Rank
Corruption on the part of Nigerian government	115	97	18	52	16	298	0.763087	2
Local goods are more expensive compared to imported ones	92	140	5	103	43	383	0.670496	3
Local goods have low standards (have poor quality)	108	158	10	118	78	472	0.642373	4
Negative perception of Nigerians that local goods are inferior	112	204	7	28	11	362	0.808840	1
Poor advertisement/awareness by consumers	49	34	11	144	101	339	0.473746	5
Poor after-sales services	21	18	24	180	127	370	0.397838	6

A stands for Agreed; SA stands for Strongly Agreed; D stands for Disagreed; SD stands for Strongly Disagreed; U stands for Undecided

Table 3 shows that "Negative perception of Nigerians that local goods are inferior" has the highest Relative Importance Index of 0.808840, implying that it contributes highly to the poor patronage of made-in-Nigeria products (goods) in Nigeria. This is followed by "Corruption on the part of Nigerian government", which has a Relative Importance Index of 0.763087. Again

another factor that contributes to poor patronage of made-in-Nigeria products is "Local goods (products) have low standard. While the factor "Poor after-sales services" has the least effect in the contribution to poor patronage of made-in-Nigeria products.

4. CONCLUSION

This paper aimed at modeling the factors that contribute to poor patronage of made-in-Nigeria products and to obtain that factor that has the highest contribution. The log-linear analysis and relative importance index were employed. The findings showed that the factor "Negative perception of Nigerians that local goods are inferior" is the major contribution to poor patronage of made-in-Nigeria products, and that despite the government's intervention, patronage is still on the low, and many local manufacturing companies are shutting down.

We recommend that the Nigerian government should ban the importation of those products that can be manufactured in Nigeria, and it should come up with a policy that checkmate the importation. The government should grant free access to local manufacturing companies to Nigerian Television Authority (NTA) for proper advert of their brands.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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