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Consumer acceptability of organic household cleaners (Abrasive and Polish) made from locally available materials

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Abstract

Background: The commercial household cleaners available in the market are chemical laden and unaffordable with the possibility of putting the health of homemakers and housekeepers at risk as a result of the danger of exposure to toxic chemicals. The aim of this study therefore was to produce organic household cleaners such as abrasive and polish from locally available materials.

Method: The study was carried out in Omuku, Rivers State. The population was made up of all 182 housekeepers and working mothers across the five school of the Federal College (Technical) of Education and 15 hotels. The stratified random sampling technique was used to sample 102 working mothers and housekeepers. Household cleaners such as abrasive was produced locally and organically from the mixture of pawpaw and sand paper leaves, palm cone ash, lemon, tangerine and orange rinds and egg shell while polish was made from aloe Vera gel, coconut oil and alcohol. The household cleaners were subjected to sensory acceptability. A nine Point Hedonic Scale questionnaire was also constructed and administered to the respondents for data collection. Mean rating was used to analyze the research questions and sensory evaluation and Z-test was used to analyze the hypotheses at 0.05 level of significance.

Results: The result of the study showed that the production of locally produced polish is acceptable in terms of quality to a high extent. The locally produced abrasives were also acceptable in terms of quality but were not acceptable with respect to odour and colour. The acceptability of the locally produced abrasive and polish also relied on the quality, colour and odour of the product.

Conclusion: This study therefore contributes to knowledge by developing new recipes for the production of non-toxic and organic household cleaners using local available materials which will help in ensuring a clean and sustainable family living.

Keywords: Household cleaners, organic, polish, abrasive, acceptability

1. Introduction

Household cleaners play an essential role in the home by safely and effectively removing soil, germs, dirt from the surface of articles, items, tools, furniture and equipment, etc ^[1]. They are also those things modern homemakers/housekeepers use in keeping household articles/items clean and make them last longer. The essence of cleaning household articles/items is to make them look neat, adorable and comfortable for living. When these articles are cleaned, cleanliness is maintained in the home (Baslow, 2014) ^[6]. Clean household is important for a healthy life and quality living. A clean home also reduces exposure to allergic substances, consumer chemicals, pest droppings, urine and reduces shelter for pest. It is therefore necessary to keep the home clean to provide a healthy environment. Maintenance and care of the home involves cleaning equipment, tools and cleaning agents for cleaning different surfaces and other areas of the home.

Polish is a cleaning product that does not stick to surfaces and are easily washed off. It is a substance containing chemical agents or abrasive particles and applied to smooth or shine a surface. It is also defined as a wax or finish used to shine or to make a surface very smooth. Polishes are work-specific as there is a polish for furniture, shoe, floor and silver. Polish comes in several forms such as waxy paste, cream or liquid used to polish, shine and waterproof articles and surfaces to extend the life, and restore, maintain and improve their appearance.

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Furniture polishes are paste, cream or lotion used to clean, protect and shine furniture made of woods (Chalmers, 1979)^[9]. These products were originally made from natural waxes which were hard to apply and tend to leave heavy buildup overtime. Modern formulations of polish combine natural waxes and oils with petroleum based ingredients and synthetic polymers. They can clean the film residue and lay down new polish in a single step so periodic stripping of old polish layers is not necessary. The most popular form of polish in the United States today is aerosol furniture polish. However, these aerosol products are coming under scrutiny as new legislation regulates propellants that can be used in these products (Flexier, 1996)^[10].

Wood has been used for ages for making furniture such as table, bed frames and sofas. As natural material, wood is vulnerable to the effect of aging which means it can become dried out, cracked or stained. The coating of the wooden surface with oils, balms and unguents predates our time. Early historical accounts have been found with instructions for using linseed or cedar wood oil to treat wood surfaces. Other natural oils commonly used for polishing wood include Tung and perilla oils. In the twelfth century in Italy, these oils were commonly used to shine wooden floors (Stefan, 2016)^[18]. By the fourteenth century, beeswax was being used to treat inlaid wood and parquet floors in France (Beeswax, 2016)^[7]. Beeswax became a widely used polish hot iron was used to apply it. Despite this drawback, beeswax, sometimes mixed with hard animal fats, remained the predominant form of polish until the late eighteenth century (Stefan, 2016)^[18]. In 1890 a natural plant wax, called carnauba wax, was discovered on the leaves of the Brazilian cerara palm. Carnauba wax is strong, has a high melting point and, when properly mixed, gives a good shine without all the buffing required by beeswax. By the late nineteenth century, other waxes were discovered and polishes were developed that utilizes blends of carnauba with *ouricui*, *candelilla*, esparto, sugar cane, cotton fiber, flax, palm, hemp and raffia waxes (Lawrence, 1987)^[13].

Abrasive is a substance that is rough and can be used to clean a surface or make it smooth (Hornby, 2005)^[11]. It is also rough or gritty and clean surfaces by creating friction that lifts off hardened food particles, grease, and stains (Okeke, 2009; Lilly, 2016)^[16]. According to Okeke (2009)^[16], abrasive is also known as scouring powder. It is a substitute used in washing/cleaning stains, on pots vessels and tiles. Also, scouring powders clean by scrapping or scratching the surface thereby removing the dirt/stain. In the same vein, Okeke (2009)^[16] opined that abrasives are useful in removing dirt from stainless steel, aluminum vessels, iron vessels and tiles. Considering the economic relevance, abrasive is in high demand because 80% of Nigerian families either use kerosene stove or coal pot which result in regular stains on the vessels, hence the use of abrasive is inevitable. The usefulness and commercial relevance of abrasives, using bio-materials are important to minimize blockage of sink as modern kitchens are gradually replacing traditional ones. As such Okeke (2009)^[16] and Anyakoha and Eluwa (2010)^[3] noted that abrasives are found in most households and the materials for their production are common such as sand, ashes, egg shell, charcoal, pawpaw leaves and broken ceramics. In home management, nothing is wasted in the home as the slogan goes, "Waste-not-want-not". Eggshell scouring powder is becoming more preferable because the scouring powders in the market are full of toxic junks and when they are used for cleaning they are absorbed by bodies of the users through the skin and it is harmful to the body (Omeh, 2018)^[17].

There are so many home cleaners available in the market. Most of these products are chemical based containing toxic compounds which may be harmful to the body (Oguzor *et al.*, 2020)^[15]. When using chemical based products the chemical concentrate could have harmful bacteria which may not be good for the body when consumed. There is therefore the danger of exposure to toxic chemicals and fumes thereby putting the health of homemakers and housekeepers at risk. It is based on the health hazard that the researcher decided to seek alternatives using local materials to produce household cleaners and polish so as to reduce health hazards that could come from the commercial cleaning agents and polishes. The study tried to develop recipe for the production of household cleaners such as abrasives and polish based on natural products with essential ingredients. The recipes were developed based on the review of related literatures and trial tests conducted by the researcher on the production of local household cleaners and polishes.

The market is driven by 'eco-friendly', 'natural' and environmentally safe cleaning products called green washing. By standard perspective, all the ingredients used in the product would be listed to build confidence of the end-user. Also, as far as the products do not cause allergic reaction and irritation, the product would be accepted in the market because the market is receptive to natural local products in rural areas especially (Baslow, 2014, Afurobi, 2002)^[6, 1]. The study therefore aimed at producing organic and natural household cleaning products such as abrasive and polish from locally sourced materials for clean and sustainable family living and also determining the acceptability of the products.

2. Materials and methods

2.1 Design of the Study

The study was carried out using an experimental research design and survey.

2.2 Area of Study

The study was carried out in Omoku, the head quarter of Ogba, Egbema, Ndoni Local Government Area of Rivers State, Nigeria. Omoku is situated in the Northern part of the State. People from Omoku are referred to as Ogba People. Rivers State, also known simply as Rivers, is one of the 36 states of Nigeria. According to census data released in 2006, the state has a population of 5,185,400, making it the sixth-most populous state in the country. Its capital, Port Harcourt is the largest city and is economically significant as the center of Nigeria's oil industry. Omoku is home to the indigenous people of Ogba Kingdom, whose language is Ogba Language. Ogba Language is a dialect of the standard Igbo spoken by the Ogba people of Nigeria. It is generally known as one of the "Igboid" languages.

The socio-cultural situation in Omoku could be described as homogenous: it is mostly populated by the Ogba People, who can be found literally in all part of Omoku. Ogba people have continued to maintain ethnic identity. Christianity is a long history with Ogba people and inter-marriages have continued to bind them together.

The Economy of the Ogba people is largely characterized by formal sector activities with oil Production, mining, drilling and hotel management and services as the major economy activity, over 70% of the population are engaged in farming, fishing, trading, hunting and production of household items (i.e. native baskets (ekite) and native soap (ncha ogba)). Ogba people are one of the highest producers and users of Native soap in Rivers state, Nigeria (Awari, 2016)^[5]. This led to the study being conducted in the above area.

2.3 Population of the study

The population was made up of all 182 housekeepers and working mothers in Ogba/Egbema/Ndoni Local Government Area of Rivers State. The study spanned across the five (5) schools that made up Federal College of Education (Technical) Omoku and fifteen (15) hotels in Omoku (Hotels.com, 2017) [12]. The population consist of hundred and thirty seven (137) working mothers in the five schools that made up Federal College of Education (Technical) Omoku, and forty five (45) housekeepers in the 15 hotels in Omoku.

2.4 Sample and Sampling Techniques

The sample size of the study was made up of hundred and forty two (142) working mothers and Housekeepers. The Sample size was derived using Taro Yamane formula (1973) [19]. The sample technique used for the study was stratified random sampling technique. This technique was employed to select 102 panelists of working mothers from the 5 schools of Federal College of Education (Technical) Omoku (Business Education, Vocational Education, Primary Education, Science Education and Technical Education). These mothers were chosen because they are homemakers and they utilize household cleaners mostly. Also 40 housekeepers from the fifteen (15) various hotels were also selected; the total sample size was 142 panelists from both FCE (T) and the hotels in Omoku.

2.5 Preparation of Locally made Abrasive

Materials/Equipments: Weighing machine, mixing bowl, wooden spatula, sieve, gloves, 6 big stainless trays, 6 big perforated plastic basket, kitchen knife and electric blender.

Procedure

This method involved washing 700 g each of paw-paw and sand paper leaves and drying for about 2 weeks until they were well dried. Lemon, orange and tangerine of 100 g each were washed and cleaned with a clean kitchen towel. The fruits were then peeled and the rinds collected and sun-dried for about two weeks until they are well dried. The egg shell (300 g) was washed and the embryo removed and dry for about 2 weeks until it was well dried. All the items were milled and sieved separately to remove seed or any item that are not properly milled. They were then mixed together and the cone ash added to the items and rind all together to obtain a uniform mixture. The locally made abrasive was packaged and ready for use.

Table 1: Recipe for the production of locally made household abrasive

Ingredient	Quantity (g)
Pawpaw leaf	700
Sand paper leaf	700
Palm cone ash	250
Lemon rind	100
Tangerine rind	100
Orange rind	100
Egg shell	300

All the above itemized ingredients/ materials listed above were used in the production of local house hold abrasive.

2.6 Production of Polish

Materials/equipments: Aloe Vera, coconut and alcohol, manual grinding machine, cooking pot, wooden spatula, stove, knives, machete, 10 well matured coconuts and cooking spoon.

Procedure

Method 1: Extraction of Coconut Oil

The coconuts were cracked and the shell pulled out. The brownish part was peeled off and cut into pieces, grinded with the aid of a blender and poured into a pot. The pot was placed on the fire at low heat. This was boiled gently and stirred to avoid burning. Boiling continued until there was appearance of oil. The pot was brought down, allowed to cool and the oil scooped into a bottle using a funnel.

Method 2: The coconut was cracked while the flesh was cut into tiny little pieces. 100 ml of water was poured into the blender and the coconut crunch was blended. The juice was sieved from the chaff while the juice was placed in the freezer for a day to get frozen (24 hrs). The frozen juice was removed from the freezer after 24 hrs. A saucepan was placed on the fire and 20 ml of groundnut oil added so it will not stick to the saucepan. The frozen juice was poured into the saucepan and heated until it became golden brown. It was removed from heat and allowed to cool. The oil was sieved from the fried crunch to get clear oil and then poured into a jar and store at room temperature for further use.

Procedure for polish production

The greenish part of aloe Vera was peeled off and 480 g of aloe Vera gel obtained. The quantity extracted was 850ml of gel. 90 ml of coconut oil was added into the gel extracted followed by the addition of 10 ml of alcohol. All the ingredients were blended together to obtain a smooth paste. The mixture was poured into a spray bottle and ready for use.



Fig 1: Locally produced abrasive (A), locally produced polish (B)

2.7 Instrument for data collection

A nine Point Hedonic Scale questionnaire was constructed by the researcher for data collection. The questionnaire was used to obtain data on the effectiveness of recipe used in the production of household cleaners and polish etc. The questionnaire was titled “Acceptability of Organic Household Cleaners (Abrasive and Polish) made from locally available materials Questionnaire”. The questionnaire was divided into two sections, namely A and B; Section A is the socio economic characteristics of the respondents such as gender and occupation. Section B comprised of items used in the production of abrasive and Polish. The questionnaire contained 20 items, which measured the independent variable.

- The data were assessed using nine point hedonic scale of
- 9 - - - Extremely High extent (EHE)
 - 8 - - - Very High Extent (VHE)
 - 7 - - - High Extent (HE)
 - 6 - - - Slightly High Extent (SHE)
 - 5 - - - Slight Low Extent (SLE)
 - 4 - - - Moderately Low Extent (MLE)
 - 3 - - - Low Extent (LE)
 - 2 - - - Very Low Extent (VLE)
 - 1 - - - Extremely Low Extent (ELE)

2.8 Validation of the Instrument

The instrument was face validated by three experts in Home Science/Hospitality Management and Tourism in Michael Okpara University of Agriculture Umudike and two lecturers at Federal College of Education (Technical) Omoku.

2.9 Reliability of Instrument

The instrument was tested with five (5) house keepers from hotels in, Obio Akpor Local Government Area, Port Harcourt, Rivers State, Nigeria and fifteen (15) working mothers from University of Port Harcourt, Rivers State, Nigeria which were not part of the study in order to determine the internal consistency of the instrument. Cronbach Alpha method was used to analyze the reliability of the instrument and the reliability coefficient of .831 was achieved. Which shows the instrument was very reliable.

2.10 Administration of Data Instrument

The researcher administered the instrument with the help of two (2) research assistants. The products formulated were given to panelists to use at home to see if they like it while they respond to the instrument and returned within (3) three days to the researcher.

2.11 Sensory Evaluation

Twenty panelists consisting of male and female students of Federal College of Education (Technical) Omoku were used for the sensory evaluation of the attributes quality, color, odour and general acceptability to assess the samples. Mean rating was used to analyze the sensory evaluation.

2.12 Method of Data Analysis

Data collected from questionnaire were subjected to statistical analysis using Starta. Data collected were edited, coded and then entered into STARTA data editor. STARTA was used to make summaries of data in a way that provided answers to research questions. The software also provided assistance in the generation of tables, and pool mean. Analysis of data from the questionnaire responses involved the process of restructuring data into a form that allowed patterns to be identified. This was done by using content analysis in excel. This strategy (content analysis) involved grouping the respondent's answers into related themes. Mean rating was used to analyze the research questions and sensory evaluation and Z-test was used to analyze the hypotheses at 0.05 level of significance. The findings from the analysis helped to draw conclusions on the subject matter.

2.13 Decision rule for accepting or rejecting the above stated hypotheses, and research questions

Any mean rating greater than 5.0 was accepted whereas any mean rating equal to or less than 5.0 was rejected for the research question and sensory evaluation. For the hypotheses any z value ≤ 1.68 was accepted whereas any z value greater than >1.68 was rejected. The bench mark to decide the wideness of disparity in agreement of responses was 1.50. If S.D <1.5 disparity is not wide, but if S.D ≥ 1.5 then disparity is wide.

3. Results

3.1 Acceptability of Polish produced from locally available materials

Table 2 shows the mean sensory scores of organic household polish produced from locally available materials. From the

table above, it was observed that the pooled mean of respondents was 6.9 which exceeded the decision rule of 5.00 indicating that the respondents liked the locally produced polish to a slightly high extent. The standard deviation of 1.45 which is lower than the bench mark of 1.50 showed that the disparity in agreement was not wide, which simply means majority of the respondents accepted the characteristic of the polish which was made up of the colour, odour and quality.

Table 2: Sensory evaluation for polish

Items	X	SD	Remark
Colour	6.90	1.50	Slightly high extent
Odour	6.00	1.75	Slightly High extent
Quality	7.15	1.42	High extent
Acceptability	7.55	1.14	High extent
Pooled Mean	6.90	1.45	Slightly high extent

Keys: X = Mean Response of respondents SD= Standard Deviation

3.2 Acceptability of Abrasive produced from locally available materials

Table 3 shows the mean sensory scores of organic household abrasive produced from locally available materials. From the table above, it was observed that the pooled mean of respondents was 6.4 which exceeded the decision rule of 5.00 indicating that the respondents liked the locally produced abrasive to a slightly high extent. The standard deviation of 1.79 which is higher than the bench mark of 1.50 showed that the disparity in agreement was wide, which simply means majority of the respondents accepted some of the characteristic of the abrasive to a high extent such as odour and quality. Colour was accepted to a slightly low extent.

Table 3: Sensory Evaluation for Abrasive

Items	X	SD	Remark
Colour	5.65	2.10	Slightly low extent
Odour	6.95	1.53	Slightly high extent
Quality	5.70	2.55	High extent
Acceptability	7.30	0.92	High extent
Pooled Mean	6.40	1.79	Slightly high extent

Keys: X=Mean Response of respondents SD= Standard Deviation

3.3 Mean rating for the research question

Research question one

To what extent do you rate the locally produced polish?

Table 4 shows the rating of the locally produced polish. The table showed that the pooled mean of respondents were as follows working mothers=7.57, housekeepers=7.4 which exceeded the decision rule of 5.00 indicating that the respondents liked the locally produced polish. The standard deviation of 0.93 showed that the disparity in agreement was not wide. There was a close harmonious agreement among the respondents on the extent they rated the locally produced polish.

Table 4: Rating of the locally produced household polish

Items	X ₁	X ₂	X _G	SD	Remark
Acceptance	8.20	7.60	7.90	0.42	High extent
Quality	7.30	8.60	7.95	0.92	High extent
Colour	8.70	6.30	7.50	1.69	High extent
Odour	6.10	7.10	6.60	0.70	Slightly high extent
Pooled Mean	7.57	7.40	7.48	0.93	High extent

Keys: X₁=Mean Response of working Mothers, X₂= Mean Response of House Keepers, X_G= Average Mean rating of Both Respondents, SD= Standard Deviation

Research Question Two

To what extent do you rate the locally produced abrasive? Table 5 shows the rating of the locally produced abrasive. From the table, it was observed that the calculated pooled mean of working mothers was 6.10 and housekeepers were 6.77 which is above the decision rule of 5.00. This means that the respondents accepted the locally produced abrasives. The standard deviation of 0.47 shows that the disparity in agreement was not wide. There was a harmonious agreement among the respondents on the extent to which they rated locally produced abrasives.

Table 4: Rating of the locally produced abrasive

Items	X ₁	X ₂	X _G	SD	Remark
Acceptance	6.50	6.60	6.55	0.07	Slightly high extent
Quality	6.50	7.20	6.85	0.56	Slightly high extent
Colour	6.10	7.10	6.60	0.70	Slightly high extent
Odour	5.30	6.20	5.75	0.63	Slightly low extent
Pooled Mean	6.10	6.77	6.43	0.47	Slightly high extent

Keys: X₁=Mean Response of working Mothers, X₂= Mean Response of House Keepers, X_G= Average Mean rating of Both Respondents, SD= Standard Deviation

Research question three

To what extent is locally produced polish acceptable in terms of quality?

Table 6 shows the rating of the locally produced polish in terms of quality. From the table, it was observed that the rating of the quality of locally produced polish was 7.3 for working mothers and 8.6 for housekeepers which is above the cutoff point of 5.00. This indicates that all the respondents were in agreement that the locally produced polish has good quality and is acceptable. The average mean rating of both respondents 7.48 which exceeds the decision rule of 5.00 implied that the respondents accepted the quality of the locally produced polish. The standard deviation of 0.92 shows that the disparity in agreement is not wide. There is a close harmonious agreement among the respondents on the extent to which locally produced polish was acceptable in terms of quality.

Table 6: Rating of the locally produced polish in terms of quality

Items	X ₁	X ₂	X _G	SD	Remark
Acceptance	8.20	7.60	7.90	0.42	High extent
Quality	7.30	8.60	7.95	0.92	High extent
Colour	8.70	6.30	7.50	1.69	High extent
Odour	6.10	7.10	6.60	0.70	Slightly high extent
Pooled Mean	7.57	7.40	7.48	0.93	High extent

Keys: X₁=Mean Response of working Mothers, X₂= Mean Response of House Keepers, X_G= Average Mean rating of Both Respondents, SD= Standard Deviation

Research Question Four

To what extent is locally produced abrasive acceptable in terms of quality?

Table 7 shows the rating of the locally produced abrasive in terms of quality. From the table, it was observed that the rating of the quality of the locally produced abrasive was 6.1 for working mothers and 7.1 for housekeepers which was above the cutoff point of 5.00. This indicates that the respondents liked the quality of the locally produced abrasive although the odour was rated low. The calculated pooled mean for quality was 6.6 which was above the decision rule of 5.00.

Table 7: Rating of the locally produced abrasive in terms of quality

Items	X ₁	X ₂	X _G	SD	Remark
Acceptance	6.50	6.60	6.55	0.07	Slightly high extent
Quality	6.10	7.10	6.60	0.70	Slightly high extent
Colour	5.00	4.20	4.66	0.56	Moderately low extent
Odour	4.30	3.20	3.75	0.77	Low extent
Pooled Mean	5.47	5.27	5.37	0.53	Slightly low extent

Keys: X₁=Mean Response of working Mothers, X₂= Mean Response of House Keepers, X_G= Average Mean rating of Both Respondents, SD= Standard Deviation

3.4 Research Hypothesis

H₀₁: There is no significant difference between the mean ratings of respondents on how locally produced polish is acceptable in terms of quality

Table 8 shows the result of analysis of z-test of the stated hypothesis that there is no significant difference between the mean ratings of respondents on how locally produced polish is acceptable in terms of quality. The table showed that the calculated Z-value of -1.681 was equal to the critical r-value of 1.68 at 141degrees of freedom and 0.05 alpha level of significance. Hence, the null hypothesis was accepted and the alternate hypothesis was rejected which simply means there was no significant difference between the mean ratings of respondents on how locally produced polish is acceptable in terms of quality.

The results in Table 4.16 revealed that the z-values of the research questions which were administered to the respondents were equal to the adopted critical value (0.05). Based on the stated decision rule above, the null hypothesis was accepted. Therefore, rejecting the alternative hypothesis which implied that there was no significant difference between the mean ratings of respondents on how locally produced toilet cleaner was acceptable in terms of quality. The inference is that the mean ratings of housekeepers and working mothers on how locally produced toilet cleaner were acceptable in terms of quality are significant to one another. The researcher can conclude that because the calculated significant value of -1.681 is higher than the critical r-value of 1.68 at 0.05 level of significance that the mean rating of working mothers and housekeepers are not likely to change.

Table 8: Result of analysis of Z-Test of the stated hypothesis

Respondents	Mean rating	S.D	Diff	Cal z-value	Result
Working mothers	7.30				
		0.92	141	-1.681	Not significant
House keepers	8.60				

H₀₂: There is no significant difference between the mean ratings of respondents on how locally produced Abrasive is acceptable in terms of quality

Table 9 shows the result of analysis of z-test of the stated hypothesis that there is no significant difference between the mean ratings of respondents on how locally produced abrasive is acceptable in terms of quality. The table showed that the calculated Z-value of -0.693 was lesser than the critical r-value of 1.68 at 141degrees of freedom and 0.05 alpha level of significance. Hence, the null hypothesis was accepted and the alternate hypothesis was rejected which simply means there was no significant difference between the mean ratings of respondents on how locally produced abrasive is acceptable in terms of quality.

The results in Table 4.20 revealed that the z-values of the research questions which were administered to the respondents were lower than the adopted critical value (0.05). Based on the stated decision rule above, the null hypothesis was accepted. Therefore, rejecting the alternative hypothesis which implied that there was a significant difference between the mean ratings of respondents on how locally produced abrasives is acceptable in terms of quality. The inference is that the mean ratings of housekeepers and working mothers on how locally produced abrasives are acceptable in terms of quality is significant to one another. The researcher can conclude that because the calculated significant value of -0.693 was lower than the critical r-value of 1.68 at 0.05 level of significance that the mean rating of working mothers and housekeepers are not likely to change.

Table 9: Result of analysis of Z-Test of the stated hypothesis

Respondents	Mean rating	S.D	Diff	Cal z-value	Result
Working mothers	6.10				
		2.67	141	-0.692	Not significant
House keepers	7.10				

Summary of findings

1. The response of respondents to the locally produced polish was high in terms of acceptability
2. The response of respondents to the locally produced abrasive was slightly high in terms of acceptability
3. The response on the acceptability of locally produced polish in terms of quality was positive
4. The response on the acceptability of locally produced abrasive in terms of quality was positive
5. There was no significant difference between respondents on the extent to which locally produced polish were acceptable in terms of quality
6. There was no significant difference between respondents on the extent to which locally produced abrasive were acceptable in terms of quality

4. Discussion of findings

The result of the study showed that the production of locally produced polish is acceptable in terms of quality to a high extent. The correspondents' hypothesis affirmed that there was a significant relationship between the respondents on acceptability of produced polish with respect to quality. The results are in line with the views of Biesok and Wyród-Wróbel (2011)^[20] who noted that polish is often used if it has quality and if it meets the customers' satisfaction. Qualities of a polish do not only increase customers' satisfaction but also increases customer expectations. They specifically among others revealed that polish that have quality increases and boosts a craftsman handy work compared to a lesser quality polish.

The study also indicated that the locally produced abrasives were acceptable in terms of quality. The correspondent hypothesis affirmed that there was no significant difference between respondents on acceptability of locally produced abrasives with respect to quality. However, the results revealed that the locally produced abrasives were acceptable in terms of quality but were not acceptable with respect to odour and colour. This finding is similar to the finding of Amanchukwu and Nwachukwu (2015)^[2] who explained that locally produced abrasives differs from commercial one in terms of colour, odour and quality. He further opined that most locally produced abrasives are not acceptable in the market because they have bad odour, poor mixtures of colour

and cheap materials which leads to poor quality of the product. The finding is also in line with the Asaiabka (2008)^[4] who noted commercially marketed abrasives have good fragrance, colour and of better than quality than locally produced households cleaners.

5. Conclusion

This study has shown the possibility of developing acceptable and quality abrasives and polish from locally available materials. The acceptability of the locally produced abrasive and polish relied on the quality, colour and odour of the product. This study therefore contributes to knowledge by developing new recipes for the production of abrasive and polish using local available materials which will help in ensuring a clean and sustainable family living.

6. Recommendations

It is recommended that fragrance be added to the household cleaners in order to boost the colour and odour. The production of locally made abrasive and polish should be taught across Nigerian schools as to increase the productivity of locally made cleaners and polish in other to meet customers demand. There is also a need for local producers to be effectively trained on how to efficiently and effectively produce abrasive and polish with nice odour, good colour and very good quality using local materials so as to ensure proper and effective production of locally produced abrasive and polish.

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