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Acceptability test of different colors of shoe polish from bee products

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Abstract

The use of organic materials as shoe polish is just within reach and is less polluting. This study investigated the sensory characteristics of shoe polish cream in different colors from bee products. It designed and tested appropriate packaging and labelling for the different formulations. Four groups of respondents evaluated the four formulations. Data were subjected to Analysis of Variance and to Least Significant Differences using Randomized Complete Block Design to test the disparity among the treatment means. Results depict that the shoe polish in different colors were not statistically different as regards odor, gloss, absorbency, consistency, color intensity, quick-dry ability, effectivity with respect to time and general acceptability. Likewise, the acceptability of the four groups of rater to product's gloss and absorbency does not significantly vary. However, the relative distinction of the achieved status of raters modifies the ranking on odor, consistency, color intensity, quick-dry ability, effectivity, and general acceptability. Unopened shoe polish can remain stable for two years at room temperature and in proper storage. In the context of product packaging and labelling characteristics, the big-sized container, substrate type, pictorial elements and verbal information of the label are the most significant attributes affecting the preference of the raters.

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Introduction

Over the years, the Cagayan State University at Sanchez Mira has emphasized conducting beekeeping activities to complement its mandate as the Regional Apiculture Satellite Center (RASC) in Region 02. Anchored on the National Apiculture Research Training and Development's (NARTDI) thrusts and goals to work on European and Philippine native bees, it is in the position to explore the opportunity of strengthening the beekeeping industry in the region as an organic and sustainable means to pursue development goals and preserve biodiversity. With the vision to be a hub for bee research and development, one of its objectives is to generate and disseminate relevant knowledge and technology that lead to improved productivity, profitability, and sustainability in the apiculture industry. The promotion of appropriate apicultural techniques could help create various types of small-scale income-generating activities to solve the unemployment situation in the region and improve the standard of living by increasing the income level of the populace.

In the past, a lot of beekeeping activities in the region focus on the production of honey, the best known main product of beekeeping. Wax is also a primary product but has rarely given consideration, and propolis is even less familiar. While these products are often wasted (Jakpa, 2016; Fearne, Martinez & Dent, 2012) and are mostly left or thrown away (Gebru, 2015; Ambaw & Teklehaimanot, 2018), they can be transformed into a wide variety of marketable products or can be added to other products to enhance their value or quality. Many of the primary products of beekeeping does not have a market until they are incorporated to more commonly used, value-added products (Krell, 2011). Value addition to processing, packaging, and branding agricultural produce would increase the benefits obtained from the beekeeping products (Berem, 2009; Hoberg & Maksimovic, 2015; Edwards, Schwab & Shevlin, 2016). Diversification with value-added products, therefore, offers an opportunity to strengthen local markets, which then permit a more solid beekeeping production and eventually increased incentives for regional and global trade (Krell, 2011; Arevalo-Gallegos, Ahmad, Asgher, Parra & Iqbal, 2017). For example, honey with royal jelly or honey mixed with pollen or propolis powder can fetch a better price than the two products marketed separately (De Figueiredo, Meuwissen, Van der Lans, Oude Lansink, 2016; Tarekegn, Girma & and Assefa, 2017).

The inclusion of "natural" bee products in cosmetics, pharmaceuticals, and foods (Premratanachai & Chanchao, 2014; Abdullah, Noordin, Ismail, & Mustapha et. al., 2018) poses new opportunities and challenges to small-scale producers, traders, and processors along with beekeeping industries. They see it as necessary in the development framework for upgrading as an instrument for promoting the products.

An initial study was conducted by Cacatian (2016) on the formulation of a black shoe polish cream highlighting the physical characteristics and shelf-life of the product using coconut and bee products. The study yielded positive results, and it offers new possibilities of using readily available low-cost and all-natural materials in the production of shoe polish. Consequently, with the investigation, it is viable to produce different colors of shoe polish like black, brown, burgundy, and neutral using beeswax and propolis.

The productive utilization of bee products could pave the way to help create small business opportunities for beekeepers, women, and entrepreneurs and improve their economic situation. The potential of this research study will motivate beekeepers and would-be beekeepers to expand their apiaries, eventually increasing the volume of bee products production and their income.

Moreover, the application of the raw materials in producing different colors of organic shoe polish cream can at least contribute to the government's advocacy of lessening the production of biodegradable garbage and squandered dirt especially the coconut and bee by products which are one of the main barriers in the continuous water system flow in the community that lead to a disastrous flooding.

Putting them to good use is one way of collaborating with the government in taking actions and in creating new patterns of behavior towards the environment. It is within this premise that this study is conducted to formulate an all-natural shoe polish cream in different colors from bee products that is safe, gentle, environment-friendly and cost-effective. Specifically, the study assessed the acceptability of the shoe polish, the difference on the preference of the groups of rater on its physical characteristics, the shelf-life, as well as the design and appropriate packaging and label for the different formulations of shoe polish.

Materials and methods

Experimental Design

The experimental design that was used in the study was Randomized Complete Block Design (RCBD). Data were treated using an analysis of variance (ANOVA) to test the significance of the differences between treatments. Least significant differences (LSD) between means were used to determine further which of the treatment means vary as perceived by the respondents.

Materials of the Study

The materials and pieces of equipment that were used in the study are as follows: Virgin Coconut Oil, beeswax, carnauba wax, propolis, peppermint oil. organic colorant, electric stove, beaker, stirring rod, weighing boat, analytical balance, knives, cheese cloth, multi-purpose disintegrator, tin cans.

Respondents of the Study

The researchers chose four groups of respondent (students, shoe shiners, office workers and research/chemistry teachers) with 15 members in each group to test the characteristics of the product.

Treatments of the Study

Four treatments were investigated as follows: T_1 – black shoe polish, T_2 – brown shoe polish, T_3 – burgundy shoe polish, and T_4 – neutral shoe polish.

Standardization of the Formulation of the Treatments

The formulation of the organic shoe polish was adopted partly from the initial study of Cacatian (2016) on the the utilization of coconut and bee products in developing a black shoe polish cream highlighting on the physical characteristics of the product. The measurement of the same variables utilized in her study were followed except the amount of the thickening agent. To standardize the formulation, various concentrations of beeswax and carnauba wax were weighed using electronic digital weighing scale. The thickening agents were mixed with the other variables. The concentration which provided the best result was used in the preparation of organic shoe polish.

Data Gathering Procedure

Parameters such as odor, gloss, absorbency, consistency, color intensity, quick-dry ability, ease of application and general acceptability were the basis of the respondents in rating the acceptability of the different formulations of shoe polish using the 9-point Hedonic scale. The shelf life of the product was established by determining the maximum length of time over which the product can be expected to last.

Samples of various packaging materials were evaluated in terms of size and material. The labels were also assessed as to type, design, color, and, producer's information. The sample packaging materials and labels were rated using the 5-point scale.

Results and discussion

Acceptability of the Treatments as to Physical Characteristics

As shown in Table 1, the survey on the difference on the physical characteristics of the products indicates that all the treatments are not at a statistically significant level as regards the following parameters: odor, gloss, absorbency, consistency, color intensity, quick-dry ability, ease of application and general acceptability. The result is proven by the F value, which is less than the F critical values at 0.05 and 0.01 levels of significance, respectively. The statistical analysis suggests that the features of the products evaluated that are primarily sensory, are comparable regardless of the colorant mixed with the formulation.

Table 1. Acceptability of the treatments as to physical characteristics as perceived by the raters.

Treatment	Odor	Gloss	Absorbency	Consistency	Color Intensity	Quick-Dry Ability	Effectivity	General Acceptability
T_1-black shoe polish	8.33 (LE)	8.57 (EG)	8.54 (EA)	4.70 (NRNH)	8.32 (ED)	8.12 (DQ)	8.63 (EE)	8.72 (LE)
T_2-brown shoe polish	8.37 (LE)	8.55 (EG)	8.55 (EA)	4.72 (NRNH)	8.27 (ED)	8.17 (DQ)	8.58 (EE)	8.65 (LE)
T_3-burgundy shoe polish	8.34 (LE)	8.42 (EG)	8.49 (EA)	4.73 (NRNH)	8.22 (ED)	8.09 (DQ)	8.55 (E)	8.60 (LE)
T_4-neutral shoe polish	8.39 (LE)	8.45 (EG)	8.50 (EA)	4.73 (NRNH)	8.12 (VD)	8.10 (DQ)	8.64 (VE)	8.62 (LE)
ANOVA - ns								

Legend: LE - liked extremely; EG – extremely glossy; EA – extremely absorbent; NRNH – neither runny nor hard; VD – very deep; DQ - dries quickly; EE - extremely effective; VE – very effective; ED – extremely deep

Difference on the Preference of the Groups of Rater on the Physical Characteristics of the Products

The result from LSD, in Table 2, accounted that a significant difference exists on the acceptability of the four groups of rater in terms of odor, consistency, color intensity, quick-dry ability, ease of application, and general acceptability. The relative distinction of their status modifies their ranking only slightly.

Comparatively, both shoe shiners and office workers have the same recognition as to odor, color intensity, and general acceptability of the shoe polish cream in different colors. Their occupational exposure to the product could have possibly generated the same notion. The gradual replacement of formal footwear with sneakers for everyday use (Essays, UK, 2013) by the students and some research/chemistry teachers might have affected the perception of these groups of respondents making their assessment different from the shoe shiners and office workers.

The association of consistency with achieved status is such that the shoe shiners turn their attention to an easy-spreading viscous polish that restores shine which is more convenient for the shoe shiners to use (Essays, UK, 2013) to expedite the work. The slightly thick consistency is too busy for a shoe shiner routine. The office workers look at the ability of the shoe polish to dry differently as opposed to the other groups of respondents. They perceive the shoe polish to dry very quickly. This finding justifies the statement of Pater (2016) that office workers have the mindset of rushing most of the time. They want things to get as much done as possible. Hence there is a close link between rushing a job and the perception of getting things done quickly.

The students like the effectivity of the products better than the office workers, yet, the shoe shiners and research/chemistry teachers, who have a comparable mark, have lower discernment than the former two groups of respondents. Millennials (the current generation of students) see things differently from the previous generations (in this case, the shoe shiner, research/chemistry teachers and other professionals). Previous generations, first try to understand how a new thing works. Millennials, on the other hand, do not marvel at it; they accept it, adapt to it, and use it (International Education Advisory Board, 2014; Boholano, 2017; Cash, 2017). Conceivably, this justifies the higher rating of the students on the effectiveness of the product. The acceptability of the four groups of rater as regards gloss and absorbency of the products do not significantly vary ($F < 0.05$ and 0.01). The rating means that their achieved status does not influence their acceptability in terms of the gloss of the product.

Shelf Life of the Product

The shelf life of the organic shoe polish cream was observed for two years. Unopened shoe polish can remain stable for a couple of years at room temperature and in proper storage. It can be kept within the period without any change in terms of odor, gloss, absorbency, consistency, color intensity, quick-dry ability, effectivity concerning time and general acceptability. Possibly, beeswax, which is one of the significant parts of the organic shoe polish

cream, is a very stable substance (Singh, 2012; Refaa, Boutaous, Xin & Siginer, 2017). Its properties change little over time. It is resistive to hydrolysis and natural oxidation (Bradbear, 2009; Minja & Nkumilwa, 2016). Coconut oil, which is another ingredient of the polish, has a high content of saturated fatty acids. Because of its high concentration of saturated fatty acids, it is highly resistant to oxidative rancidity. Coconut oil has an extended shelf life and is used in baking industries, processed foods, infant formulas, pharmaceuticals, and cosmetics (Krishna, Raj, Ajit, Prasanth & Chandrashekar, 2010; Habibi & Khosravi-Darani, 2017).

Table 2. Difference on the acceptability of the groups of rater on the physical characteristics of the products.

Raters	Odor	Gloss	Absorbency	Consistency	Color Intensity	Quick-Dry Ability	Effectivity	General Acceptability
Students	8.12^{b}	8.57	8.47	4.53^{c}	8.08^{b}	8.12^{b}	8.83^{a}	8.55^{b}
Shoe Shiners	8.55^{a}	5.53	8.45	5.30^{a}	8.47^{a}	8.00^{b}	8.44^{c}	8.73^{a}
Office Workers	8.57^{a}	8.38	8.60	4.72^{b}	8.62^{a}	8.35^{a}	8.62^{b}	8.75^{a}
Res/Chem Teachers	8.18^{b}	8.50	8.55	4.33^{d}	8.00^{b}	8.00^{b}	8.52^{c}	8.55^{b}
ANOVA	**	ns	ns	**	**	**	**	**

Note: Treatments with the same letter are not significantly different.

Preferences on Product Packaging

Package Size

One of the most critical attributes that affect the preference of raters regarding shoe polish is container size. Table 3 reveals that sample 1 obtained the highest mean of 4.47 or "excellent," as opposed to the other two samples. Multiple comparisons among the treatment means of the samples reveal that a significant difference exists in the rates given. The capacity of the aluminum metal tin can of 30 grams (S_1) and the polypropylene (PP) packaging of 15 grams (S_2), respectively, seem to be, in overall, more preferred because they hold up a lot better than the 10-gram capacity acrylic container (S_3). The raters favor the bigger packages because they do their weekly and monthly shopping to save on time. The finding confirms the finding of (Draskovic, Temperley & Pavicic, 2009) that large package sizes encourage better use than smaller ones.

However, an insignificant difference exists between the four groups of rater and package size. Irrespective of position, the result depicts that they have the same preference when it comes to the size of the container. The F value of 1.66, which is less than the F critical values of 4.76 and 9.79 at 0.05 and 0.01 levels of significance, respectively proves the consistency.

Table 3. Package size.

Sample	Students	Shoe Shiners	Office Workers	Research/ Chemistry Teachers	Total	Mean
S_1	3.73	4.87	4.53	4.73	17.87	4.47^{a}
S_2	4.07	4.07	4.20	4.13	16.47	4.12^{a}
S_3	3.27	3.27	4.13	3.53	14.20	3.55^{b}
Total	11.07	12.20	12.87	12.40	48.53	
Mean	2.77	3.05	3.22	3.10		4.04

Note: Treatments with the same letter are not significantly different.

Packaging Material

The packaging material plays a significant role in influencing the raters to stir up their choice as the package gives outs an image or idea to them and create in them an emotional attachment towards the product they perceive. Results in Table 4 exposes that the aluminum metal tin container (S_1) gained the highest mean of 4.55 or "excellent," followed by PP container (S_2) with a lower mean of 4.12 or "very good" and the acrylic container (S_3) with the least mean of 3.53 or "very good." However, the raters equally prefer the aluminum metal tin container (S_1) and the PP container (S_2) as packaging material for shoe polish because these are convenient for transportation and storage. They are light and easy to handle. These materials provide proper protection

(Draskovic, Temperley & Pavicic, 2009; Herbes, Beuthner & Ramme, 2018.).

The transparent acrylic container (S_3) is least favored because it is thin. The disadvantage of this type of packaging is its breakability. Unlike the aluminum metal tin and the PP container, when used as returnable or refillable, scuffing marks could be sometimes visible. This visual imperfection is affecting packaging attractiveness.

The perceptions of the different groups of rater were statistically analyzed to determine whether a significant difference exists. The test leads to the non-rejection of the null hypothesis. They comparably respond as regards the packaging material.

Table 4. Packaging material.

Sample	Students	Shoe Shiners	Office Workers	Res/Chem Teachers	Total	Mean
S_1	3.93	4.93	4.60	4.73	18.20	4.55[a]
S_2	4.00	4.07	4.33	4.07	16.47	4.12[a]
S_3	3.40	3.27	3.93	3.53	14.13	3.53[b]
Total	11.33	12.27	12.87	12.33	48.80	
Mean	2.83	3.07	3.22	3.08		4.07

Note: Treatments with the same letter are not significantly different.

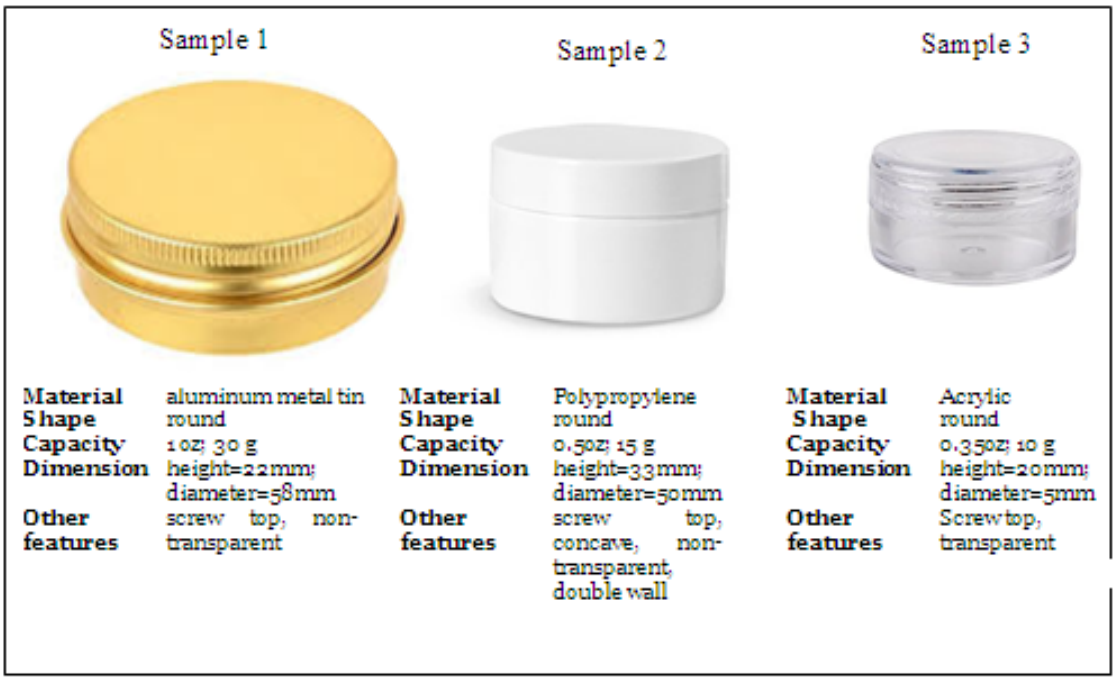

Fig. 2. Product packaging.

Preference on Labelling Characteristics

Label Type

Table 5 displays that, in terms of the type of label used, the samples gained different rates. The gloss paper material with adhesive (S_1) was rated "excellent" having a mean of 4.58 while the matte paper with adhesive (S_2) and the uncoated paper without sticking material (S_3) were both rated "very good" with means of 4.07 and 3.88, respectively. Analysis of variance shows that the gloss paper, with an adhesive applied to one side, is the best choice for a shoe polish label. Francer (2017) reported the same findings in his study on wine labels featuring the same name but printed on a different substrate. The gloss paper does not only give a mirror-like finish and a smooth surface for the ink to adhere to providing a premium look to the label, but the coating provides the label with additional tear and moisture resistance. These properties, which the consumers demanded from labels, are not manifested in the other samples.

When the data was analyzed for the differences in the perception of the groups of rater using LSD, the result showed that no significant difference transpired, which suggests the rejection of the hypothesis. Whether they are students, shoe shiners, teachers, or other professionals, there was no clear distinction on their view as regards label type of shoe polish.

Table 5. Label type.

Sample	Students	Shoe Shiners	Office Workers	Res/Chem Teachers	Total	Mean
S_1	4.20	4.80	4.53	4.80	18.33	4.58^a
S_2	3.93	4.33	4.00	4.00	16.27	4.07^b
S_3	3.67	4.20	4.20	3.47	15.53	3.88^b
Total	11.80	13.33	12.73	12.27	50.13	
Mean	2.95	3.33	3.18	3.07		4.18

Note: Treatments with the same letter are not significantly different.

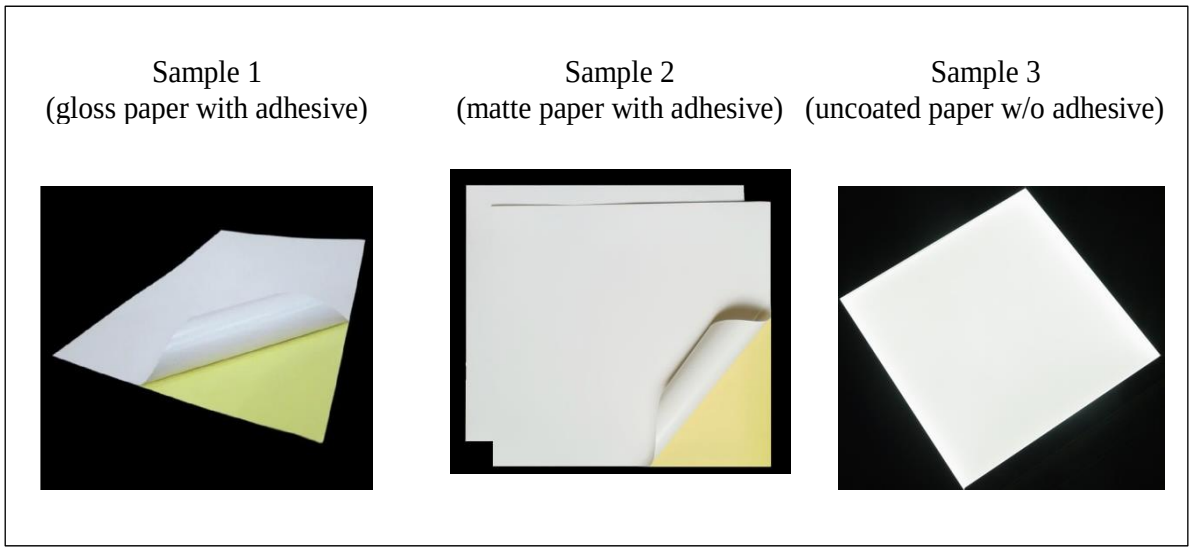

Fig. 3. Label type.

Label Design

As regards label design, Table 6 indicates that sample 1, which has a bold image of a shoe and which reveals the main ingredients, attracted the raters the fastest and it received return glances the most. It gained the highest mean of 4.67 or "excellent," while samples 2 and 3 got a lower mean of 3.73 and 3.63, respectively, with a descriptive value of "very good." The raters tend to choose a product label that is proper in design and appearance as well as striking to the consumers' perception (Harith, Ting & Zakaria,2014; Akhtar *et al.*,2016). For example, consumers generally notice elements that are bigger, bolder, or are shaped differently before smaller, lighter, and commonly formed parts (Schiffman & Kanuk, 2004; Lantos, 2015). Moreover, Laeng, Suegami & Aminihajibashi (2016) likewise reported that the graphic elements of the label make it virtually chosen than the verbal information it contains.

Although all the four groups of respondents placed Sample 1 as the most preferred design, the shoe shiners, research/chemistry teachers, and other professionals tend to choose the same product label as opposed to the students. The test on the equality of the treatment means among the groups of the respondent proves the finding of the study. It is indicative, therefore that certain factors like age moderate the preference of a particular label design over another. Results of the study of Muhammad (2014) and Djekic & Smigic (2016) has unfolded the similar fact that age influences the labeling of the packaged item.

Table 6. Label design.

Sample	Students	Shoe Shiners	Office Workers	Research/Chemistry Teachers	Total	Mean
S_1	4.20	4.80	4.80	4.87	18.67	4.67[a]
S_2	3.47	3.73	3.87	3.87	14.93	3.73[b]
S_3	3.20	3.80	4.07	3.47	14.53	3.63[b]
Total	10.87	12.33	12.73	12.20	48.13	
Mean	2.72[b]	3.08[a]	3.18[a]	3.05[a]		4.01

Note: Treatments with the same letter are not significantly different.

Color of the Label

Color is also an indispensable element of labeling perception (Rocchi & Stefani, 2006) in the case of the shoe polish. Results in Table 7 show that the rates given to all the samples vary. Sample 1 obtained the highest mean of 4.52 with a descriptive value of "excellent." Samples 2 and 3 gained a corresponding mean of 3.77 and 3.88, both of which are rated "very good." Sample 1 is significantly different from the other samples, which means that it carries good contrast necessary with shoe polish containers forming a visible background. In other words, the color of the label conveys a specific message to the raters. The finding confirms the report of Schiffman and Kanuk (2004) that product labels that have more color contrast with the space around them are more attractive to the raters' perception than those with subtle elements. The analysis of the color preferences of the different groups of rater does not differ. Their status as raters does not affect their decision to choose the color of a label, which means that the color bears the same message for the assessors.

Table 7. Label color.

Sample	Students	Shoe Shiners	Office Workers	Research/Chemistry Teachers	Total	Mean
S_1	3.87	4.73	4.67	4.80	18.07	4.52[a]
S_2	3.67	3.67	4.00	3.73	15.07	3.77[b]
S_3	3.73	4.07	4.33	3.40	15.53	3.88[b]
Total	11.27	12.47	13.00	11.93	48.67	
Mean	2.82	3.12	3.25	2.98		4.06

Note: Treatments with the same letter are not significantly different.

Producer's Information

Table 8 reflects that sample 1, with a mean of 4.65 or "excellent", is more favored than Samples 2 and 3, which are equally preferred by the respondents. Consideration may be because the label in Sample 1 contains multiple items like text, color, shapes, and image. These elements, according to Harith, Ting & Zakaria (2014), are essential to change the perception of the raters towards the product. Draskovic, Temperley & Pavicic (2009) are likewise supportive of this finding by stating that the communicational dimensions of the label are a factor affecting consumers' choice.

Analysis of variance discloses that there is a noticeable difference in the perception of the groups of the rater. Both students and research/chemistry teachers have a higher degree of shared opinions as regards producer's information. The shoe shiners and other professionals likewise perceive very similarly but in contrary with the former groups. The finding illustrates that research/chemistry teachers and students look at the outstanding features of the product in terms of communicational dimension in a similar fashion. This is due to the social context (Leng *et al.*, 2017). The same behavior developed because of frequent interaction with others.

Table 8. Producer's Information.

Sample	Students	Shoe Shiners	Office Workers	Research/Chemistry Teachers	Total	Mean
S_1	4.13	4.87	4.80	4.80	18.60	4.65[a]
S_2	3.87	4.27	4.33	4.00	16.47	4.12[b]
S_3	3.73	4.33	4.27	3.53	15.87	3.97[b]
Total	11.73	13.47	13.40	12.33	50.93	
Mean	2.93[b]	3.37[a]	3.35[a]	3.08b		4.24

Note: Treatments with the same letter are not significantly different.

Fig. 4. Labelling characteristics.

Conclusions

This research manifested that the organic colorant is not a necessary means of shaping the raters' way of quality perceiving the sensory characteristics of the shoe polish. However, achieved status appeared to have some influence on these physical characteristics of the shoe polish cream: odor, consistency, color intensity, quick-dry ability, and effectivity concerning time and general acceptability, whereas gloss and absorbency seemed not to affect the achieved status of the raters. The product can remain stable for a couple of years at room temperature and in proper storage without any change in its quality parameters.

A well-functioned feature of a label like the design and the producer's information is closely linked to the achieved status of the raters. Students, shoe shiners, office workers, and research/chemistry teachers show rational preference to shoe packaging that is bigger and is convenient for transportation and storage. In the context of a product label, the most critical attributes that affect their preference are the type of substrate and the graphic elements and verbal information it contains.

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References

Abdullah MSP, Noordin MI, Ismail SIM, Mustapha NM. 2018. Recent advances in the use of animal-sourced gelatine as natural polymers for food, cosmetics and pharmaceutical applications. Sains Malaysiana **45(2),** 323-336. https://doi.org/10.17 576/ jsm-2018-4702-15

Akhtar N, Ahmed I, Jafar HY, Rizwan A, Nawaz JM. 2016. The Impact of packaging, price and brand awareness on brand loyalty: A reseller perspective in mobile sector of Pakistan. International Review of Management and Business Research **5(3)**, 790-807. http://www.irmbrjournal.com/papers/1467434737.pdf

Ambaw M, Teklehaimanot T. 2018. Characterization of beekeeping production and marketing system and major constraints in selected districts of Arsi and West Arsi zones of Oromia region in Ethiopia. Journal of Entomology and Zoology Studies **6(2),** 2408-2414. http://www.entomoljournal.com/archives/2018/vol6issue2/PartAA/6-1-426-598.pdf

Arevalo-Gallegos A, Ahmad Z, Asgher M, Parra R, Iqbal HM. 2017. Lignocellulose: A sustainable material to produce value-added products with a zero waste approach—A review. International Journal of Biological Macromolecules **99,** 308-318. https://doi.org/10.1016/j.ijbiomac. 2017.02.097

Berem RM. 2009. Analysis of the constraints and effects of value addition in honey among producers in Baringo District, Kenya. Published Master's Thesis. Agricultural and Applied Economics. Egerton University, Kenya. http://ir-library.egerton.ac.ke /jspui/bitstream/123456789/144/1/ANALYSIS%20OF%20THE%20CONSTRAINTS%20AND%20EFFECTS%20OF%20VALUE.pdf

Boholano H. 2017. Smart social networking: 21st century teaching and learning skills. Research in Pedagogy **7(1),** 21-29. https://doi.org/10.17810/45

Bradbear N. 2009. Bees and their role in forest livelihoods: a guide to the services provided by bees and the sustainable harvesting, processing and marketing of their products. Rome, Italy: Food and Agriculture Organization of the United Nations. ftp://ftp.fao.org/docrep/fao/012/i0842e/i0842e.pdf.

Cacatian SB. 2016. Physical characteristics and shelf life of shoe polish cream from coconut and bee products**.** Asian Intellect for Academic Organization and Development Research and Education Journal **4,** 71-76

Cash RM. 2017. Advancing differentiation: Thinking and learning for the 21st century. Free Spirit Publishing.

De Figueiredo HS, Meuwissen MP, Van der Lans IA, Oude Lansink AG. 2016. Identifying successful strategies for honey value chains in Brazil: A conjoint study. British Food Journal **118(7),** 1800-1820.

Djekic I, Smigic N. 2016. Food labels–Status and consumers' attitude on the Serbian food market. Nutrition & Food Science **46(2),** 204-216. https://doi.org/10.1108/NFS-09-2015-0102

Draskovic N, Temperley J, Pavicic J. 2009. Comparative perception(s) of consumer goods packaging: Croatian consumers' perspective(s). International Journal of Management Cases. Special Issue: CIRCLE Conference 2009 pp. 154-163(10). https://doi.org/10.5848/APBJ.2009.00028

Edwards A, Schwab C, Shevlin T. 2016. Financial constraints and cash tax savings. The Accounting Review **91(3),** 859-881. https://doi.org/10.2308/ accr-51282

Essays UK. 2013. Shine shoe polish. https://www.ukessays.com/essays/marketing/shine-shoe-polish.php?vref=1

Fearne A, Martinez MG, Dent B. 2012. Dimensions of sustainable value chains: Implications for value chain analysis. Supply Chain Management **17(6),** 575-581. https://doi.org/10.1108 /1359854 121 12 69193

Francer C. 2017. Wine label market research: The eyes have it. https://www.packagingimpressions.com /article/wine-label-market-research-the-eyes-have-t/

Gebru YG. 2015. Characterization of beekeeping systems and honey value chain, and effects of storage containers and durations on physico-chemical properties of honey in Kilte Awlaelo District, Eastern Tigray, Ethiopia. Published Dissertation. College of Veterinary Medicine and Agriculture, Addis Ababa University. http://localhost:80/xmlui/handle /12 3456789/5220

Habibi H, Khosravi-Darani K. 2017. Effective variables on production and structure of xanthan gum and its food applications: A review. Biocatalysis and Agricultural Biotechnology **10,** 130-140. https://doi. org/ 10.1016/j.bcab.2017.02.013

Harith ZT, Ting CH, Zakaria NNA. 2014. Coffee packaging: Consumer perception on appearance, branding and pricing. International Food Research Journal **21(3),** 849-853. https://www.researchgate .net/publication/272477828_Coffee_packaging_Consumer_perception_on_appearance_branding_and_p

Herbes C, Beuthner C, Ramme I. 2018. Consumer attitudes towards biobased packaging–A cross-cultural comparative study. Journal of Cleaner Production **194,** 203-218. https://doi.org/10.1016 j.jcl epro. 2018.05.106

Hoberg G, Maksimovic V. 2015. Redefining financial constraints: A text-based analysis. The Review of Financial Studies **28(5),** 1312-1352. https://doi.org/10.1093/rfs/hhu089

International Education Advisory Board. 2014. Learning in the 21st century: Teaching today's students on their terms. file:///C:/Users/User/Downloads/Documents/IEAB_Whitepaper040808.p

Jakpa MM. 2016. Value chain and economic analysis of honey production in Nkwanta North and South Districts of the Volta Region. Published Master's Thesis. Department of Agricultural Economics, Agribusiness and Extension, College of Agriculture and Natural Resources. Kwame Nkrumah University of Science and Technology. http://hdl.handle.net/123456789/8463

Krell R. 2011. Value-added products from beekeeping. FAO Agricultural Services Bulletin No. 124. http://www.fao.org/3/w0076e/w0076e00.htm.

Krishna GAG, Raj GB, Ajit SK, Prasanth PK, Chandrashekar P. 2010. Coconut oil: chemistry, production and its applications - A review**.** Indian Coconut Journal. https://www.researchgate.net/publication/235780162_Coconut_Oil_Chemistry_Production_and_Its_Applications_-_A_Review

Laeng B, Suegami T, Aminihajibashi S. 2016. Wine labels: An eye-tracking and pupillometry study. International Journal of Wine Business Research **28(4),** 327-348. from https://doi.org/10.1108/IJWBR-03-2016-0009

Lantos GP. 2015. Consumer behavior in action: Real-life applications for marketing managers. United Kingdom: Taylor and Francis.

Leng G, Adan RAH, Belot M, Brunstrom JM, de Graaf K, Dickson SL, Hare T, Maier S, Menzies J, Preissl H, Reisch LA, Rogers PJ, Smeets PAM. 2017. The determinants of food choice. Proceedings of the Nutrition Society **76(3),** 316-327.

Minja GS, Nkumilwa TJ. 2016. The role of beekeeping on forest conservation and poverty alleviation in Moshi Rural District, Tanzania. European Scientific Journal **12(23)**. https://doi.org/10.19044/esj.2016.v12n23p366

Muhammad Zeeshan Z. 2014. Consumer age influence on food label reading habit. Management Strategies Journal, Constantin Brancoveanu University **25(3),** 26-30. https://ideas.repec.org/a/brc /journl /v25y2014i3p26-30.html

Pater R. 2016. Overcoming limiting safety leadership mindsets. Occupational Health & Safety **85(5),** 66-66. https://www.ncbi.nlm.nih. gov/

Premratanachai P, Chanchao C. 2014. Review of the anticancer activities of bee products. Asian Pacific Journal of Tropical Biomedicine **4(5),** 337-44. https://doi.org/10.12980/APJTB.4.2014C1262.

Refaa Z, Boutaous MH, Xin S, Siginer DA. 2017. Thermophysical analysis and modeling of the crystallization and melting behavior of PLA with talc. Journal of Thermal Analysis and Calorimetry **128(2),** 687-698.

Rocchi B, Stefani G. 2006. Consumers' perception of wine packaging: A case study. International Journal of Wine Marketing **18(1),** 33-44.

Schiffman LG, Kanuk LL. 2004. Consumer behavior, 10th International edition. Upper Saddle River, New Jersey: Pearson Education, Inc.

Singh R. 2012. Formulation & thermophysical analysis of a beeswax microemulsion & the experimental calculation of its heat transfer coefficient. Published Master's Thesis. City University of New York, Energy Institute.

Tarekegn K, Girma G, Assefa A. 2017. Value chain analysis of honey in Kaffa and Sheka Zones of SNNPR, Ethiopia. International Journal of Research in Agricultural Sciences **4(3),** 142-148.