THE EFFICIENCY OF SHOE POLISH OUT OF CHARCOAL AND WAX

STEAM PROJECT

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ABSTRACT

The focus of this study: Shoe Polish Made out of Charcoal and Wax is to figure out the advantages and disadvantages of our shoe polish, and discover the efficiency found from our shoe polish. Wax, mostly carnauba wax, is a usual ingredient for shoe polish as it is almost always needed to create a shoe polish meanwhile charcoal isn't usually used in shoe polish and the efficiency of the shoe polish is not much. The reason as to why charcoal is usually used in shoe polish is due to that people prefer to use other ingredients. The previous research regarding shoe polish created with charcoal mainly relied on its ingredients on how much it'll make the shoe shine and thus has only been able to do limited things with it, for example, there is no machinery to help with brushing the shoe thus limiting the possible automatic things that can be done with machinery involved.

The methods of collecting data follow the style of quantitative research, conducted an online survey to see the participants' opinion toward our product.

At the end of the research, the problem of the study has been solved that it has advantages especially on the price; affordable and cheaper, besides that, it's proven efficient as well due to the machinery used in our product. And the group has come up with several conclusions; the importance of this product is to save the environment by the use of eco-friendly ingredients. Our findings mean that charcoal is an effective ingredient for shoe polish and with the help of machinery; it can also help in making it a more efficient product. Thus, our product provides an eco-friendly ingredient in the feature of machinery.

In addition, it is also useful since it will reduce the unsafe chemicals used in life. However, the ingredients used for our product are not 100% eco-friendly, which is recommended for future researchers of the shoe polish to change the materials into something more environmentally friendly.

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INTRODUCTION

1.1 Background of the Study

The first shoe polish to resemble the modern varieties (aimed primarily at inducing shine) were the British and British Commonwealth brands like Cherry Blossom, Kiwi, and Wren's. An advertisement published in March 1947 by Wren's claimed that William Wren originated the first wax polish in 1889.

The inventor of shoe polish was William Ramsay. When William Ramsay created Kiwi Shoe Polish in 1906, he named it so because his wife was from New Zealand. The kiwi bird also fitted well as a logo on the round boot-polish tin. The Scottish ex-pat sold his boot polish around Melbourne.

Wax, mostly Carnauba wax, is a usual ingredient for shoe polish as it is almost always needed to create a shoe polish meanwhile charcoal isn't usually used. We use charcoal as a means to make the shoe polish able to polish the shoe cleaner and brighter. Here is a list of some benefits of using charcoal, which may or may not be related to shoe polishing as these are some examples of many: *(southlandssun.co.za)*

1. Whitens Teeth

It works to whiten teeth by adsorbing plaque and microscopic tidbits that stain teeth. This activated charcoal use is cost-effective and an all-natural solution for a bright smile.

2. Mold Cleansing

Charcoal helps traps the mold and cleanse the mold and dirt around.

3. Water Filtration

Activated charcoal traps impurities in water including solvents, pesticides, industrial waste and other chemicals.

4. Skin and Body Health

For external treatments, it’s effective at treating body odour and acne and relieving discomfort from insect bites, rashes from poison ivy or poison oak, and snake bites.

As it's written, charcoal's uses are many and some of it involves whitening, cleaning, and even treating external problems of the body. Shoe polish usually causes a rash onto your skin if it got to your skin, but with charcoal as one of its ingredients, it will be all right.

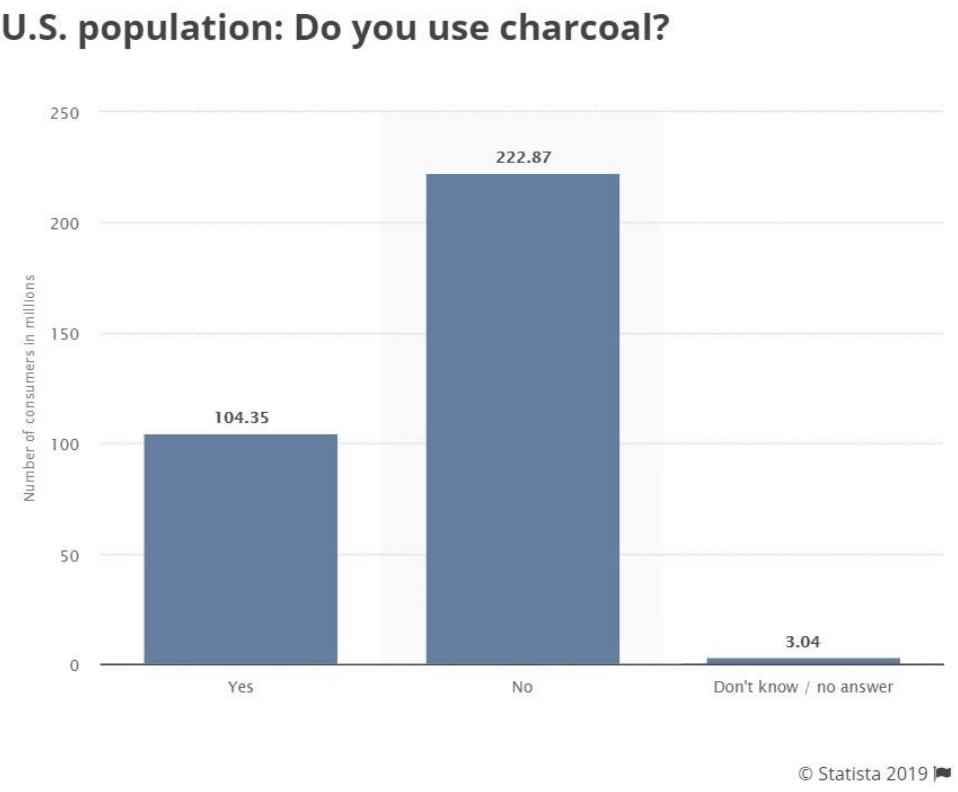

Figure 1.1 Statistics of the Use of Charcoal as of 2019 *(www.statista.com)*

Charcoal use in making of shoe polish is much more efficient because it is inexpensive. It is much more efficient as it only requires minimal ingredients too such as charcoal, wax, oil and powdered soap, comparing to the usual ingredients including some or all of naphtha, lanolin, turpentine, wax (often Carnauba wax), gum arabic, ethylene glycol, and if required a colourant, such as carbon black or an azo dye (such as aniline yellow), it is much more adequate.

1.2 Statement of the Problem

The comparison between regular shoe polish and shoe polish made out of charcoal and wax has made us come up with a few questions:

1. What are the advantages and disadvantages of using charcoal and wax instead of the usual ingredients in making a shoe polish?
2. Why is our shoe polish out of wax and charcoal more efficient than the other leading brands?

1.3 Objectives of the Study

The motives of performing this study are:

1. To find out the advantages and disadvantages of using charcoal and wax instead of the usual ingredients in making shoe polish.
2. To find out the efficiency of our shoe polish compared to other leading brands.

1.4 Hypothesis

H_0 = Charcoal and wax shoe polish isn't more efficient than usual commercialized shoe polish.

H_1 = Charcoal and wax shoe polish is more efficient than commercialized shoe polish.

1.5 Significance of the Study

This study may prove useful to a lot of things *(southlandssun.co.za)*, such as:

a. Students

This study can grant students to create their own shoe polish with these ingredients as this doesn't require as many ingredients as normal shoe polish does and it can help them polish their shoes better for them to go to school.

b. Our Family Members

This study can help our family members create and use this shoe polish as well to help

themselves polish their shoe as well, while they learn more about the ingredients while creating it.

c. Researchers

This study can also help researchers learn more about the uses of charcoal and how it can also be used more than cleaning and body treatment.

CHAPTER II

REVIEW OF RELATED LITERATURE

2.1 Uses of Activated Charcoal

As mentioned before, charcoal indeed has a lot of uses. Its uses for cleaning and polishing are mainly regarded. For example, hair cleansing and the like.

1. Cleanses Blood

Millions of people worldwide have experienced their health problems related to blood disorders. Though medical treatments can be administered in an attempt to return the normal balance within the bloodstream, there might be a chance of their side effects to happen; causing the development of new ones. Patients' immune system can easily have their blood cells overtaken by infection with the existence of viruses. Charcoal is useful for this case because it has several absorbent qualities to travel through the bloodstream to the brain to absorb toxins, chemicals, and compounds that can risk blood health. Besides that, charcoal also has the role of being preventative, which can be used to combat the infiltration of fungal infections. *(Britt Brandon, pg.46)*

2. Alleviates Allergies

While allergic reaction to foods, bites and stings, dust, and pollen are the most commonly reported, there are a number of environmental, situational, and physical conditions that contribute to an allergic reaction in the body. Whether the reaction is red and itchy eyes, a runny nose, congestion, difficulty breathing, coughing, or even indigestion, allergic reactions can cause serious physical reactions that can interfere with daily life. Activated charcoal can be used as a purging agent, traveling safely through the bloodstream, digestive system, and body to attract and trap the impurities, toxins, and volatile organic compounds that contribute to allergic reactions. When these allergens are removed from the body's system, the natural stability of metabolic, hormonal, and cardiovascular system functions is restored, helping resolve respiratory, cognitive, and digestive issues. *(Britt Brandon, pg.48)*

3. Cleanses Hair

Excessive product use, damaging styling regimens, consuming too many unhealthy foods, and even more common health conditions can all contribute to the buildup of excessive oils or residue

resulting in hair that appears weighted down and greasy, or dry and brittle. Implementing a hair care regimen that naturally removes residue and buildup from everyday exposure to chemicals, toxins, environmental impurities, and pollution can help your hair regain a shiny, voluminous appearance and resume normal, optimal growth *(Britt Brandon, pg. 75)*

4. Cleanses Skin

With the cleansing effect of soaps comes a common drying condition that can contribute to the cracking, irritation, and inflammation of the skin on the hands and body. *(Britt Brandon, pg. 81)*

5. Battles Body Odor

A quick perusal of any personal care aisle at the local drugstore or grocery store makes the supply and demand for body odor relieving products quite apparent. By buying soaps, lotions, deodorants, and perfumes, countless Americans contribute to the multibillion-dollar industry that promises to deliver an artificial, sweet-smelling alternative to the body's natural, sometimes not-so-sweet, scent. Body odor has many causes, including excessive sweating, stressful situations, poor dictary habits, neglectful hygiene practices, and even taking certain medications. When activated charcoal is consumed and applied topically, the benefits not only include a reduction in the toxicity of the bloodstream and digestive system, but also the removal of unhealthy bacteria and microorganisms on the skin's surface that can contribute to the development of foul-smelling body odor. By consuming 1 teaspoon of activated charcoal dissolved in ½-1 cup of water daily and using activated charcoal-infused products (such as the soaps, soaks, and lotions listed in the Beauty section of this book), anyone can combat the natural incidence of body odor simply, easily, and naturally. *(Britt Brandon, pg. 25)*

6. Beats Bad Breath

As activated charcoal is ingested, the toxin-absorbing powder cleanses the mouth of impurities that contribute to foul-smelling breath. Traveling through the digestive system, it improves the natural balance of essential nutrients, boosting the systematic functions of digestion and waste removal. All of these actions contribute to the resolution of halitosis (bad breath), with the added benefit of overall health improvement. *(Britt Brandon, pg. 24)*

7. Moistuirizes Skin

Whether the goal is to spot-treat certain areas or soothe a severe bout of dry skin, a moisturizer that includes activated charcoal, aloe vera, and shea butter can provide long-lasting moisture that meets

or exceed what's offered by over-the-counter products. Activated charcoal acts as a detoxification aid, removing the impurities of the skin that can cause dryness.

8. Prevent Skin Infections

Using activated charcoal to make your own topical skin infection treatment eliminates the need to expose your vulnerable skin to the kinds of unnatural ingredients found in standard treatments. The activated charcoal in the following recipe acts swiftly to attract and absorb toxins and impurities while soothing aloe vera penetrates deep into numerous layers of the skin. This dualaction process has a detoxifying effect on wounds, providing protection against pathogens and acting as an analgesic (relieve pain) for pain and inflammation at or beneath the skin's surface. *(Britt Brandon, pg. 99)*

2.2 Properties of Activated Charcoal

A. Composition

Activated charcoals contain constituents derived from the source material or ingredients (such as metallic chlorides) added during manufacturing. Typical compositions of activated charcoals are shown in the picture below:

Charcoal	Ash	Carbon	Hydrogen	Sulfur	Nitrogen
1	4.3	94.4	1.1	0.04	0.62
2	3.2	91.7	1.7	0.07	0.38
3	1.2	95.3	0.6	0.62	0.54
4	2.0	87.5	2.2	0.16	0.39

Table 2.2 Elemental Composition of Activated Charcoals *(David O. Cooney, pg. 11)*

* All values in percent by weight. Adapted from Hassler (1963)

The "ash" consists of the residue remaining when a sample of the charcoal, placed in a porcelain crucible, is heated in the air in a furnace at 600"C until the carbon has been entirely burned. Ashes range typically from about 1 to 5% of the original charcoal weight. It is common also to

designate the amount of ash which is water-soluble and the amount of ash which is acid-soluble. *(David O. Cooney, pg. 11)*

B. Pore Volume and Pore Size Distribution

Activated charcoals contain a complex network of pores of various shapes and sizes. The shapes are irregular, branched, and interconnected by passages that may or may not be constricting. Pore sizes range from less than O.1 millionths of a centimeter to more than one-hundredth of a centimeter. The so-called pore size distribution depends on the source materials used and on the method and extent of activation. Pores are often classified as macropores, micropores, and transitional pores. Through well-established methods, which we shall not review here, it is possible to determine the relative numbers of pores of a given size. *(David O. Cooney, pg. 12)*

2.3 Wax

Wax polishes are primarily used to bring up the shine in the leather shoe; the high concentration of hard waxes in a wax polish is what allows you to produce a high gloss shine. *(www.hangerproject.com)*

Lincoln Polish is the product that launched our company back in 1925. To this day, we hold to John Lincoln's secret formula and strict quality standards. We use more carnauba wax than any other major brand. It's why shoe care professionals prefer Lincoln: carnauba wax raises the highest shine with less effort than petroleum-based or animal-fat waxes. You'll get a hard, glossy, durable shine after just one application of Lincoln Polish.

And elaborating about the type of wax included in Lincoln Polish, the Carnauba wax, which is a natural and sustainable resource from the leaves of Brazilian palm trees, is vegetarian, sustainable, and petroleum-free. Each season, about 30% of the leaves on each tree are harvested and dried to obtain the wax, leaving the trees healthy and providing a renewable, carbon-friendly resource. Where possible, we source our carnauba wax from small growers in South America. Carnauba wax is hard, glossy, and nourishing for leather. Naturally waterproof, Carnauba Wax helps protect your shoes from mud and smudges. *(https://www.lincolnshoepolish.com/)*

2.4 Previous Research related to Shoe Polish made out of Charcoal and Wax

According to a study by Caldito, J., shoe polish is a waxy paste, cream, or liquid used to polish, shine, and waterproof leather shoes to extend the footwear's life, restore, maintain and improve their appearance which can be achieved by using the mixture of extracted lemon and olive oil.

Today, shoe polish is usually made from a mix of natural and synthetic materials, including naphtha, turpentine, dyes, and gum arabic, using straightforward chemical engineering processes.

Shoe polish consists of a waxy colloidal emulsion, a substance composed of several partially immiscible liquids and solids mixed together. It is usually made from ingredients including some or all of naphtha, lanolin, turpentine, wax (often Carnauba wax), gum arabic, ethylene glycol, and if required a colorant, such as carbon black or an azo dye (such as aniline yellow). It typically has a specific gravity of 0.8, is negligibly soluble in water, and is made of between 65 and 77% volatiles — usually naphtha. The high amount of volatile substances means that the shoe polish will dry out and harden after application while retaining its shine. *(www.cs.mcgill.ca)*

What makes our product different from the research's thesis by Caldito is that our objective is to make shoe polish more affordable and even able to be created at home by ourselves, which is similar but we plan to use much lesser ingredients yet more effective for the final product.

2.5 Chronology of Kiwi

The story of the Ramsay family, who migrated from Scotland in the late 1800s, has been chronicled in a book titled Kiwi, *The Australian Brand That Brought a Shine to the World* by author and journalist Keith Dunstan.

Forty years ago, Fergus Ramsay was on holiday in the city of Cuzco, Peru, when he spied a shopkeeper using an Australian shoe polish, Kiwi. It struck Ramsay just how far the brand- which has a family connection- had come.

In 1906, his grandfather, William Ramsay, started Kiwi in a two-roomed factory in Bouverie Street, Carlton, with business partner Hamilton McKellan. Kiwi tins, with their distinctive name and bird symbol, became staples in homes from Calcutta to Calgary. A new book about Kiwi, commissioned by Fergus and four other Ramsay grandchildren, tells how by the early 1980s, 250 million tins sold annually, in 183 countries. It had 24 factories around the world.

The book, *Kiwi: The Australian Brand That Brought a Shine to the World*, is the final work of late journalist Keith Dunstan. Dunstan wrote that Kiwi was "probably the most successful manufacturer in Australian corporate history" and "surely the first worldwide Aussie brand". The book is also a migrant success story. William Ramsay, his parents John and Margaret and three siblings, migrated from Scotland in 1878.

They made a fortune in real estate, and in 1888 built the glorious mansion, Clydebank, in Essendon, which now is a part of Ave Maria College. In the early 1900s, William was keen to make his own mark, so set up the Carlton Factory, trying to make everything from disinfectants to eczema ointments. He struck gold with boot polish: Melburnians welcomed a way to re-blacken shoes muddied on the city's dirt roads.

Dunstan notes that World War I "was the making of Kiwi"- it scored huge Australian and British military contracts, particularly with its dark tan color. William's father John headed a formidable sales force in the UK after William died of cancer in 1914. Kiwi became known for its witty poster ads, now collectors' items. In 1916, it made an early silent film ad depicting two boys shining a hotel's guests' shoes after adult staff enlisted in the war. Demand for boot polish soared again in World War II, including from US troops. A low point came when Kiwi's factory in Rouen, France, was bombed and co-opted by the Nazis for their own boots. After the war, William's son Tom traveled the world selling Kiwi, opening factories from Singapore to Kenya.

By the 1970s Kiwi had diversified into car polish, toilet cleaner, shampoo, and bleach. In 1980, it had 1475 global employees. In 1982, the company merged with pharmaceutical company Nicholas, then listed on the share market. Fergus says his father Tom was devastated in 1984 when the company was sold to multinational Consolidated Foods, but market forces were out of his control.

Kiwi's overseas operations were acquired by Sara Lee - best known for its apple pies - before being sold to its current owner, US company SC Johnson, in 2010. Kiwi is still sold in shops but is now made overseas. Tom Ramsay, who died in 1995, was a meticulous record-keeper: his children are seeking a home for his extensive Kiwi and family archive. Fergus says the book reflects the descendants' great pride in Kiwi. His brother Dougal Ramsay says the book is "a bit of a ripping yarn. It tells a very important story, of one of the few Australian companies that became an internationally known product that was sold around the world".

2.6 The Source of Shining Shoe Tradition

Someone once wrote thatshoe shining was more a sport of kings than horse racing ever was. Quips aside it is true that royalty throughout centuries has ordered the perfect shine and satiny sheen for their shoes and woe-be-tide for the cobbler who falls short of this expectation on any delivery. In today's contextshoe shiningis a chore for many. In the 18th and 19th centuries, it was considered an art that brought great pleasure for those who owned even a single pair of shoes that were polished to mirror-like perfection.

The evolution of shoe polish has many interesting twists. From royalty to the gentry and now to common man, from tallow, lanolin, beeswax, and soot to technically inspired shoe polish varieties of today shoe shining is a skill that has been passed down from father to son for generations past. In the past shoe, shiners experimented with different products to soften, waterproof, and polish natural leather. Yet it is thanks to William Ramsay's history-changing invention in shoe polishing that chaps all around the world today can enjoy the highest gloss finish for shoes.

At the beginning of the 19's century, commercial shoe polishing products were basic products primarily based on tallow, sugar, black dye, and vinegar. These shoe polishes were good for blacking but did not produce the fine shine of today's caliber of shoe polish products. Polish made out of suspended solids and various liquid forms such as wax, naphtha, lanolin, carbon dye, and turpentine had one major defect.

The blacking was extended from shoes to the hem of pants even at lightest contact. Later they have evolved in greater varieties and brands incorporating many value-added benefits of waterproofing, softening, and conditioning leather.

The outbreak of WW I and II turned the art of 'spit and polishing' shoes from a mere fashion into a major skill that showcased manliness. The military guarded shoe shining tactics just as they guarded a Code 7 top secret. A cadet's arsenal invariably contained a shoe shining kit including shoe polish, leather cleaner, and shoe shine brushes. Today a chap has the advantage of shining their shoes to military perfection without the benefit of closely guarded shoe shining secrets.
Presently Walter's Shoe Care is the only shoe shine company to offer its services at Toronto's Pearson Airport and Montreal Airport. Serving an elite clientele comprising Prime Ministers, important dignitaries to hundreds of passengers daily commuting through Toronto Pearson it is the only professional family-owned shoe shine company with a long-standing commitment for proven

excellence in the region. ‘We give everyone’s shoes a great shine whether they are famous or not’. *(https://www.waltersshoecare.com)*

2.7 Terminology

The terms “activated charcoal”, “activated carbon”, and “active carbon”, all occur in the literature and are generally used interchangeably. Although some scientists prefer the adjective "active" to "activated," almost all charcoals in modern practical use have been purposely "activated" by taking the charcoal resulting from the controlled charring of the starting material and subjecting it to an oxidizing gas such as steam or air at elevated temperatures. (This enhances the adsorptive power of the charcoal by developing an extensive internal network of fine pores in the material.) Thus, the adjective "activated" is most appropriate and will be employed hereafter.Concerning the second half of the term, engineers and most manufacturers seem to prefer the term “carbon”, whereas the U.S. Pharmacopoeia, most of the medical community, and a few manufacturers prefer “charcoal”. Regardless of the starting material used, no charcoal is pure carbon, but rather a combination of carbon plus a few other elements. Thus, the term “carbon” is not strictly correct. For this reason, and because of its overwhelming traditional usage in the medical literature, we shall use the term “activated charcoal” throughout this work. It should be mentioned that prior to about 1900, charcoals were not activated (the activation process had not been invented). Hence, the proper term for such materials is simply “charcoal”. *(David O. Cooney, pg. 6)*

2.8 Early History

The use of charcoal for medicinal purposes is ancient. In an Egyptian papyrus of 1550 B.C., various kinds of charcoal are specified for medicinal use. Over succeeding centuries, those who practiced as physicians believed greatly in the healing properties and therapeutic values of wood charcoal. In the times of Hippocrates (400 B.C.) and Pliny (50 A.D.), wood charcoal was used to treat epilepsy, vertigo, chlorosis, and anthrax. These practices gradually fell into disuse but were still mentioned, often even into the nineteenth century. D. M. Kehls (1793) wrote of the external application of charcoal to gangrenous ulcers to remove bad odors. Charcoal was also recommended for internal use in the treatment of "fievre putride" at a dosage of 1.6 oz and use the charcoal six times daily.. Kehls also recommended that charcoal suspended in water be used as a mouthwash, and, additionally, at the first indications of any bilious condition (build-up of excess bile). The discovery of how charcoal really works, that is, of the phenomenon of adsorption as we presently understand it, is generally attributed to Scheele (Dietz, 1944), who in 1773 described some

experiments on gases exposed to charcoal. The charcoal was found to adsorb many types of gases to a significant extent. In the area of liquid-phase systems, the earliest notice of adsorption seems to have been in 1785, when Lowitz observed that charcoal would decolorize many liquids. Soon after, wood charcoal was used to clarify cane sugar in a sugar refinery. During the nineteenth century, many attempts were made to produce decolonizing charcoals from other sources. In 1822, Bussy found that by heating blood with potash, an effective charcoal was produced. Hunter, in1865, reported on the great capacity of a charcoal derived from coconut shells for adsorbing gases. Other charcoals were made by Lee, in 1863, from peat, and by Winser and Swindells, in 1868, from paper mill wastes. *(Hassler, 1963)*

2.9 Process on Making the Shoe Polish

There are many ways on making the Shoe Polish, and we're making two ways, one requires charcoal while another doesn't. This is used to see how clean and durable the polishness of the shoe polish. The first way doesn't require charcoal and the steps are listed below:

1. Set up a double boiler. Fill a saucepan with 1 to 2 inches (2.54 to 5.08 centimeters) of water. Place a heat-safe bowl on top. Bring the water to a simmer over medium heat.
2. Add the olive oil and white beeswax into the bowl. You will need about 2.8 ounces (79.38 grams) of olive oil and 1.1 ounces (31.18 grams) of white beeswax.
3. Stir the olive oil into the beeswax as it melts. As the beeswax heats up, it will start to melt. Once it melts completely, stir it so that it blends in with the olive oil.
4. Pour the mixture into a small container.
5. Let the mixture harden. This will take about 45 to 60 minutes. Once it hardens, it is ready to use.

As for the second way, the presence of charcoal is needed. The steps are as of below:

1. Pulverize the charcoal through a mortar (or some type of bowl) and pestle. Make sure it is grinded and smooth. Then, place it in a basin. (minimum 5 tablespoon of grinded charcoal)
2. Pre-heat a pot into a gas stove. Place a candle wax into it. When melted, mix powdered soap into the wax and stir it.
3. When both contents are already melted, remove it from the stove and pour it to the basin where the grinded charcoal is.
4. Stir it again thoroughly until the contents are all mixed up together.
5. Finally, let it cool for 15 minutes.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Research Design

In this study, we will use the quantitative research method to obtain various outcomes. Quantitative research is a method of research that relies on measuring variables using a numerical system, analyzing these measurements using any of a variety of statistical models, and reporting relationships and associations and associations among the studied variables. *(https://www.sciencedirect.com)*

Since this study will employ the quantitative method, it will make use of the survey done for the main tools. So as it is implied, this group will be conducting a survey of shoe polish made out of wax and charcoal. The survey will be done by collecting the data from people doing the questionnaire that is provided. The group will then collect the answers to the survey as a result.

3.2 Data and Data Source

The data gained from this study will be in numerical numbers, which are reliable and able to be counted. There'll also be sentences to give more explanation and altogether a conclusion of the survey done. The data originated will, of course, be obtained from the results of the survey written later, from the questionnaire.

3.3 Technique of Collecting Data

As for the data, we will conduct a survey. The survey intends to regard what will people mainly think about using charcoal as an alternative use to shoe polish and whether or not most will use it.

Here are the questions of the survey that are going to be asked by the group:

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**

2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	_____ _____

Table 3.3 Questionnaire of the Survey

3.4 Technique of Data Analysis

Descriptive statistics will be used for the technique of data analysis. Descriptive Text is a text which says what a person or a thing is like. Its purpose is to describe and reveal a particular person, place, or thing. *(https://www.britishcourse.com)*

The survey opinions and answers will then be collected and be inputted into a table form, divided into two different genders to differ between the boys' and girls' choices. The following table on the next page is an example of how we will compute the answers into the form of a table with the answers collected.

3.4.1 The Advantages and Disadvantages of Our Shoe Polish

Question Number	"Yes" Answers		"No" Answers	
	Male	Female	Male	Female
1	18	35	3	7
3	19	33	2	9
4	17	34	4	8
9	20	39	1	3

Table 3.4.1 Example of the Table of Survey's Answers A

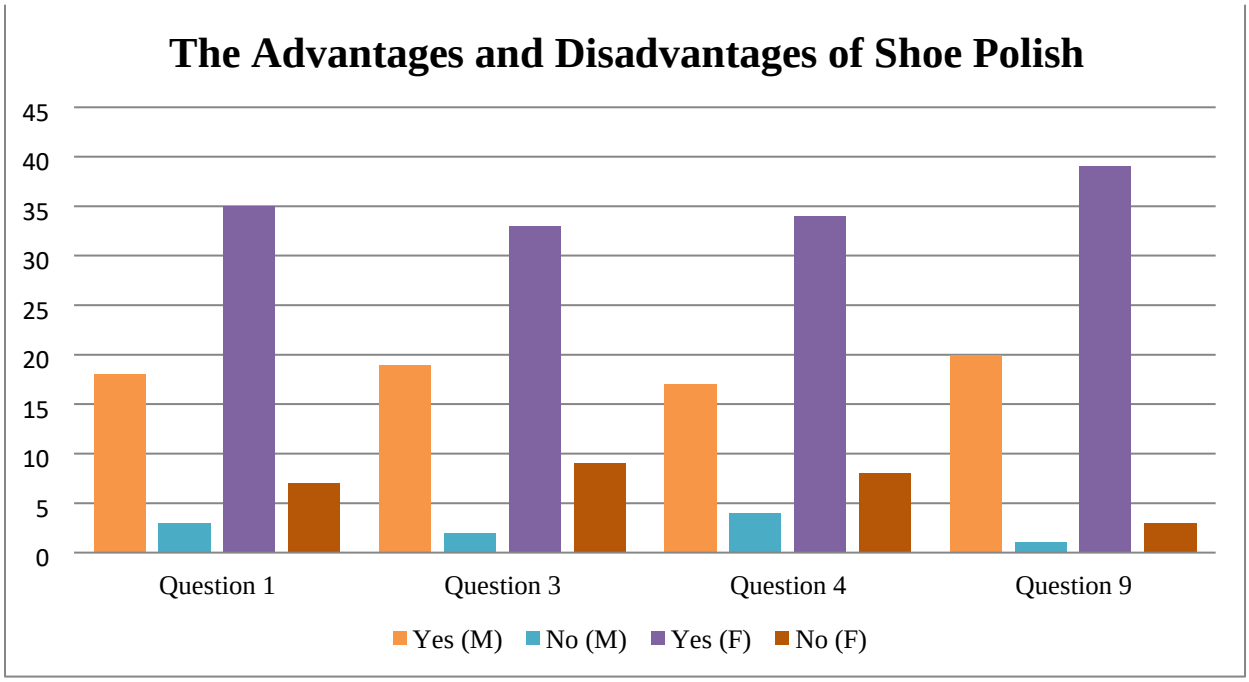

Figure 3.4.1 Example of the Figure of the Survey's Answers A

3.4.2 The Efficiency of Our Shoe Polish

Question Number	"Yes" Answers		"No" Answers	
	Male	**Female**	**Male**	**Female**
2	17	37	4	5
5	18	37	3	5
6	18	37	3	5
7	15	28	6	14
8	19	36	2	6

Table 3.4.2 Example of the Table of Survey's Answers B

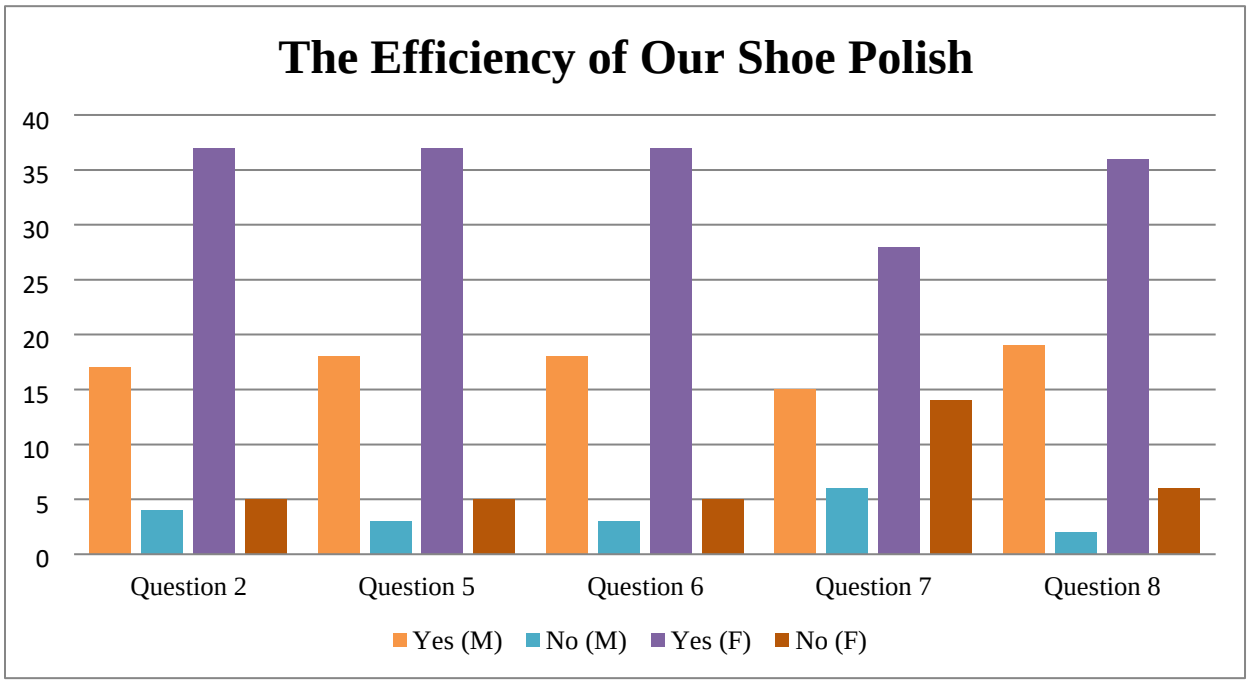

Figure 3.4.2 Example of the Figure of Survey's Answers B

3.5 Instruments of the Research

The tools that are needed to do the survey are:

- Paper/Notebook
- Printer
- Writing utensils (pen, pencil, etc.)

- Typing devices (laptop, computer, phone, etc.)

3.6 Research Procedure

The following steps given below are required for this research: *(https://www.dataquest.io)*

- **Step 1:** Determine your objectives. The main objective is to create a more effective shoe polish and people's thoughts on it.
- **Step 2:** Select respondents. The respondents for this survey are the students of Prime One School. The more respondents, the more reliable the result will be.
- **Step 3:** Create a data analysis plan. Before designing our survey, we need an analysis plan. This will ensure we think about everything we want to analyze, and how we can get statistically representative results that will let us make that analysis.
- **Step 4:** Develop the survey. Our questions should be informed by our objectives and analysis plan.
- **Step 5:** Distribute and conduct the survey. Use an appealing invitation to (or advertisement of) the survey.
- **Step 6:** Analyse the data. We'll want to download the data and conduct our analysis, as this provides us with more possibilities.
- **Step 7:** Report the results. If we write a report, we'll want to define its audience beforehand and write the report with them in mind.

CHAPTER IV

RESEARCH RESULTS AND ANALYSIS

4.1 Introduction

We created the product named Shoe Polish Made out of Charcoal and Wax to facilitate people with our machinery feature. Besides that, our product is mostly made from eco-friendly materials, which reduce dangerous chemicals as well. Here we made an online survey via Google Forms.

The purpose of this survey is to find people's impression towards our product. By doing this, we can get more inspiration from other people's opinions. That's how we can improve to be better in the future. By getting their opinions for us to improve, our group made a survey with a target of 50 people online. It was held on the period 1st April 2020-15th April 2020. In this chapter, we are categorizing our survey questions into two parts. The first part is the advantages and disadvantages of our shoe polish and followed by the efficiency of our product. And as a result, our survey is responded by 42 females and 21 males, which totaled 63 participants.

4.2 The Advantages and Disadvantages of Our Shoe Polish

Through the data collected, the group found out that most of the participants prefer more on our products than the commercialized one. Besides that, they would like to try purchasing our shoe polish if it's sold in a store or shop. The results of the answered survey question are shown below in the form of table and figure.

Question Number	**"Yes" Answers**		**"No" Answers**	
	Male	Female	Male	Female
1	18	35	3	7
3	19	33	2	9
4	17	34	4	8
9	20	39	1	3

Table 4.2.1 Table of Survey's Answers A

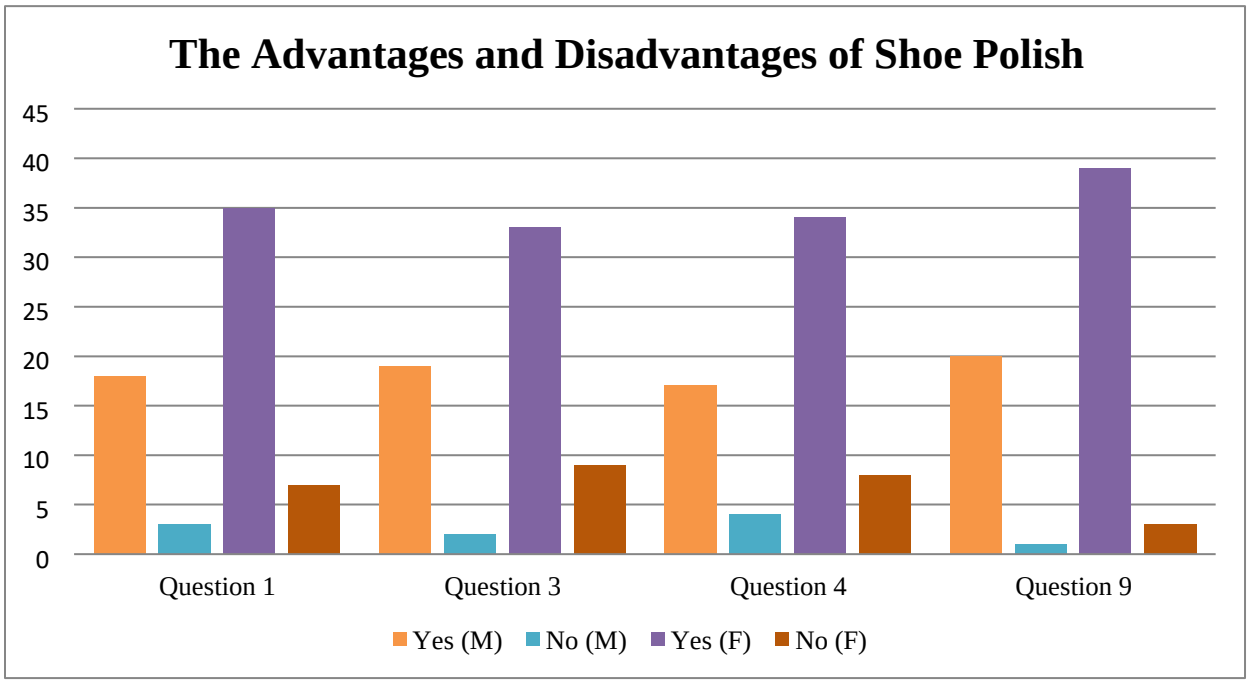

Figure 4.2.1 Figure of Survey's Answers A

The table and graph included above shows that:

- Question 1: Around 84% of the participants prefer to use our shoe polish than the commercialized one.
- Question 3: A lot of participants were sure that our product could rival the commercialized one.
- Question 4: Many participants would consider buying our product if it is sold in a store or shop.
- Question 9: The majority of the participants think that more people would buy our shoe polish if it were to be official.

From the data we have collected, we found out that the average of positive answers from our survey can be calculated by adding up the number of positive answers from both males and females' answers and then divide it by the total statement listed above. Our group found out that the average of the "Yes" answers is 53.75. Next thing, we counted the standard deviation by using the following formula:

$$SD=\sqrt{\frac{\sum(x-\bar{x})^2}{n}}$$

And, the calculation will be elaborated in Table 4.2.2

Question Number	x_i	$x_i - x$	$(x_i - x)^2$	$\sigma^2 = \frac{\sum (x-\bar{x})^2}{n}$	$SD = \sqrt{\frac{\sum (x-\bar{x})^2}{n}}$
1	53	-0.75	0.5625		
3	52	-1.75	3.0625	Variance	SD
4	51	-2.75	7.5625	9.6875	3.1125
9	59	5.25	27.5625		
x= 53.75		$\sum (x_i - \bar{x})^2 = 38.75$			

Table 4.2.2 Table for Standard Deviation Calculation of the Positive Answers A

As for the negative answers, we found out that the average is 9.25. Besides that, we calculated the standard deviation from the "No" answers and it has the same result as the standard deviation of the "Yes" answers.

Therefore, we can conclude that there are more "Yes" answers than the "No" answers, which could be defined as more people prefer our product than the commercialized one. And they're sure at the part our shoe polish could rival the commercialized shoe polish. Lastly, if it's sold in a store or shop, people would consider buying it. And more people would like to buy our product if it were to be official.

4.3 The Efficiency of Our Shoe Polish

From the data we have collected, we found out that many of the participants think our product's price will be affordable and could help the environment. The results of the answered survey question are shown below in the form of tables and figure:

Question Number	"Yes" Answers		"No" Answers	
	Male	**Female**	**Male**	**Female**
2	17	37	4	5
5	18	37	3	5
6	18	37	3	5
7	15	28	6	14

8	19	36	2	6

Table 4.3.1 Table of Survey's Answers B

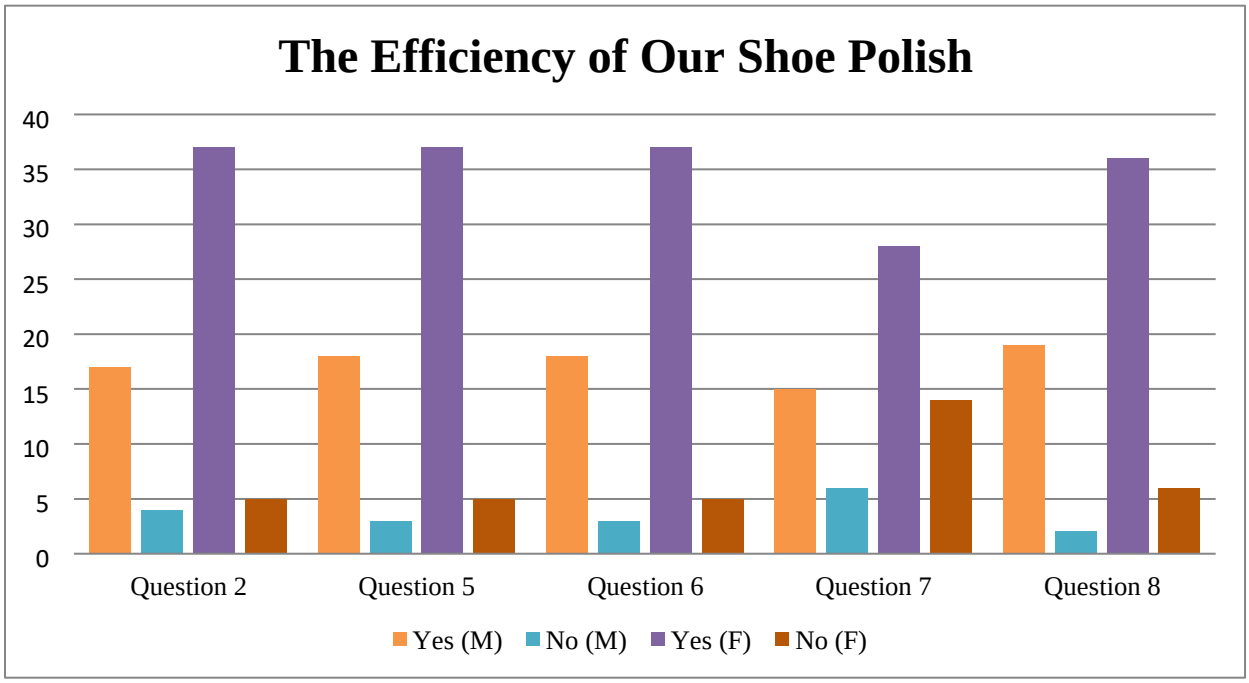

Figure 4.3.1 Figure of Survey's Answers B

The table on the previous page and the graph above shows that:

- Question 2: Most of the participants think that our product's price will be affordable and cheaper for them.
- Question 5: Over 87% of the participants agree that our shoe polish could help the environment in a way by introducing our product to the public.
- Question 6: Many of the participants are sure that our product will reduce the use of dangerous chemicals in commercialized shoe polish by using our product.
- Question 7: Over 2/3 of the participants think our product will be more efficient than the commercialized one due to the use of machinery in our product.
- Question 8: Most of the participants concurred about the changing of ingredients to something safer for the other products.

From the data we have collected, we found out that the average of positive answers from our survey can be calculated by adding up the number of positive answers from both males and females'

answers and then divide it by the total statement listed above. Our group found out that the average of the "Yes" answers is 52.4. Next thing, we counted the standard deviation by using the following formula:

$$SD=\sqrt{\frac{\sum(x-\bar{x})^2}{n}}$$

And, the calculation will be elaborated in Table 4.3.2

Question Number	x_i	x_i-x	$(x_i-x)^2$	$\sigma^2=\frac{\sum(x-\bar{x})^2}{n}$	$SD=\sqrt{\frac{\sum(x-\bar{x})^2}{n}}$
2	54	1.6	2.56		
5	55	2.6	6.76	Variance	SD
6	55	2.6	6.76	22.24	4.716
7	43	-9.4	88.36		
8	55	2.6	6.76		
x= 52.4		$\sum(x_i-\bar{x})^2=111.2$			

Table 4.3.2 Table for Standard Deviation Calculation of the Positive Answers B

As for the negative answers, we found out that the average is 10.6. Besides that, we calculated the standard deviation from the "No" answers and it has the same result as the standard deviation of the "Yes" answers.

Therefore, we can conclude that our shoe polish is efficient to be used. It has affordable and cheaper prices. Besides that, it could also help the environment by using this product that will reduce the dangerous chemicals used from commercialized shoe polish.

From the data we have obtained, the majority of the participants believe that our product could help the environment to better due to the use of eco-friendly materials in our product. By this, we can reduce the use of dangerous chemicals as well. And lastly, our product saves time through the use of our machinery.

CHAPTER V

CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions

In conclusion of our study, our group made two conclusions, which summarize everything we have done in this research:

1.) Our shoe polish that is made out of charcoal is much cheaper because it is affordable. Not only is it affordable, but it is also much cheaper than the commercialized shoe polish.
2.) The machinery helps with making the shoe polish much more efficient.

5.2 Suggestions

Through this survey, our group found many recommendations that might be useful for future researchers, for instance, our juniors, who would like to use a similar concept as our research:

1.) From the suggestions we have gathered from the participants, there was a participant who recommended promoting the product better to the consumers and customers.
2.) Make the product 100% eco-friendly, and change the ingredients to something much safer, such as pollution-free ingredients.
3.) Promoting the product better in the future for a more convinced audience and consumers regarding the shoe polish, like telling them more about what's in the shoe polish and what do the ingredients do.

And lastly, our group would like to give some recommendations for the future researches as well:

1.) It is recommended for the next researcher to do more research and further study to improve the quality of the shoe polish into the better one.
2.) Make sure that the coal used was pulverized, so it'll have a smoother texture.

REFERENCES

Brandon, B. 2017. *Activated Charcoal for Health: 100 Amazing and Unexpected Uses for Activated Charcoal.* Adams Media. https://books.google.co.id/books?id=69euDgAAQBAJ.

Cooney, D. 1995. *Activated Charcoal: Antidote, Remedy and Health Aid.* TEACH Services, Inc. https://books.google.co.id/books?id=vh81DQAAQBAJ.

Fairfax Media Australia. 2017. Ignore the Kiwi on the Tin: World-famous Kiwi Shoe Polish is 100 Percent Australian. https://www.stuff.co.nz/business/world/93059812/ignore-the-kiwion-the-tin-worldfamous-kiwi-shoe-polish-is-100-per-cent-australian (Access on November 15th 2019)

Natural Health Corner. 1963. History of Charcoal. http://actcharcoal.com/history.php (Access on November 17th 2019)

Lincoln Polish. 1925. Original Stain Wax Shoe Polish. https://www.lincolnshoepolish.com/products/original-stain-wax-shoe-polish (Access on October 28th 2019)

Shoe Polish. 2007. Schools Wikipedia Selection. https://www.cs.mcgill.ca/~rwest/wikispeedia/wpcd/wp/s/Shoe_polish.htm (Access on October 14th 2019)

Walter's Shoe Care Inc. 2019. Where does the Shoe Shining Tradition Come From?. https://www.waltersshoecare.com/blog/shoe-shining-tradition-came/ (Access on November 12th 2019)

ATTACHMENTS

Email: **aidaradifa9@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/<u>No</u>**
2	Do you think the price will be affordable and cheaper for you?	**<u>Yes</u>/No**
3	Do you think that this can rival the commercialized shoe polish?	**<u>Yes</u>/No**
4	If this is sold in a store or shop, would you consider buying it?	**<u>Yes</u>/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**<u>Yes</u>/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**<u>Yes</u>/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**<u>Yes</u>/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**<u>Yes</u>/No**
9	If this product were to be official, do you think more people would buy it?	**<u>Yes</u>/No**
10	Suggestion and feedback for us to be better in the future.	**This is actually a great innovation, but it takes time to gain costumers trust. You should promote better on this product if you want this to compete with other famous product. You should tell people the making process and what's the plus point of this product.**

Email: **altair679@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**The idea is good on how you guys change the original shoe polish ingredients. A good initiative to do changes toward the composition of shoes nowadays. Maybe improve more from the marketing section to rival other shoe polish.**

Email: **ericshichen@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Make it 100% eco friendly (No CFCs or something related) and mass produce it to make the overall price cheaper.**

Email: **gabisolano234@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Include more information on how the charcoal shoe polish is more safer than other shoe polishes with chemical on them.**

Email: **jeniferyang17@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Sorry but you can't just use soap powder, chorcoal and wax for reduce dangerous chemicals, more strongest ingredient should be add inside.** **And make sure that this product can made the consumer shoe become shine which is the main function of shoe polish.**

Email: **jesslyn.wijaya29@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Do tell the strengths of your product to your consumers and the public in comparison to conventional shoe polish. Why it is cheaper, better for the shoes, for the environment, more efficient and clean to use, more eco friendly and clean. Thus convincing the public its a product worth buying.** 😄

Email: **katanagrace03@yahoo.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Maybe you should explain more that the result will be more pleasable if people use this charcoal shoe polish than the commercialized one.**

Email: **mayangmaisarahk@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Maybe it'll be good if you add on fragrance and good packaging.**

Email: **novelynkinantix@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**Increasing the total costs as it's too cheap in order to make soms nice profits.**

Email: **winterloopie@gmail.com**

No.	Questions	Answer Choices
1	Would you prefer using this product than the commercialized shoe polish?	**Yes/No**
2	Do you think the price will be affordable and cheaper for you?	**Yes/No**
3	Do you think that this can rival the commercialized shoe polish?	**Yes/No**
4	If this is sold in a store or shop, would you consider buying it?	**Yes/No**
5	By introducing this product to the public, do you think that it could help the environment in a way?	**Yes/No**
6	Do you think by using this product, it will reduce the use of dangerous chemicals in commercialized shoe polish?	**Yes/No**
7	Do you think this product will be more efficient than the commercialized one (with the use of machinery)?	**Yes/No**
8	Do you think other products should change their shoe polish ingredients to something safer?	**Yes/No**
9	If this product were to be official, do you think more people would buy it?	**Yes/No**
10	Suggestion and feedback for us to be better in the future.	**If you are going to sell shoe polish, then i guess your target market mostly will be man with age 30 & up. And usually people will prefer to buy the brand that they already know, so to sell this new product, you really need to be good at the marketing and show people why your products are better than others.**

Process of Making Shoe Polish

Pouring the cooking oil

Mixing both the oil and charcoal

Final Product