INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Application of Palm Kernel Shells in Costume Jewellery

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Abstract:
This paper aims at increasing the material base of costume jewellery. In this regard, the palm kernel shells (PKS) as a material was compared to the material prescription of costume jewellery to ascertain it applicability. This led to a stratified random sampling of palm kernel shells of specific palm fruits from an oil processing agency. The first stratum was the Dura shells (from a parent variety) and the other, tenera shell (from a hybrid variety). Analysis of the samples revealed that, the strong and durable thick wall of the Durashell has more room for creativity and reliability. For this, it was chosen over the tenera and used for the study. The Dura shells were further randomly sampled. These include whole shells with the kernels in them and empty cracked shells. Subsequently, processing approaches such as sawing, cracking, filling, abrasion, drilling and finishing were adopted to produce integral units with reference to identified methods in costume jewellery production and design concepts. These units are under three categories: full kernel shell units, cracked kernel shell units and sawn kernel shell units. Based on the concept, they were organised solely and then, in integration with seven other costume jewellery materials (stones, pearls, glass, fabric, cord, plastic and metal). These led to eight complete versions of palm kernel shell costume jewelleries. The jewellery types considered include: necklets/necklaces, bracelets and pair of earrings. With reference to the descriptions of the consequential jewelleries, the study also led to eight special names for the respective jewelleries for purposes of easy identification, records and further research.

Keywords: *Costume jewellery, palm kernel shell (PKS), dura shells, tenera shells, jewellery units*

1. Introduction

Jewellery over the years has been adored from generations to generations. Its relevance cannot be over emphasized in the society today, either for fashion or status. Its origin is somehow an unknown fact as many theories, books and researches claim different periods. Jewellery made primarily out of precious metals like gold and silver have relatively very high cost. This gave birth to another class of jewellery known as costume jewellery. Costume jewellery is any ornament of adornment be it a necklace, bracelet, earrings etc. made from all sorts of inexpensive materials such as glass, plastics, leather, horns, feathers, wood, cowries, shell, seeds, textile pieces, non-precious stones, bones, teeth and base metals like copper, brass, nickel among others.

Over time, palm kernel shells have seen an increase in usage, some of which has been utilized in the industrial and civil engineering sectors respectively for fuel and in place of granite for casting concrete. The diverse use of the kernel shell has proven its durability and strength. Domestically here in Ghana, after preparing soup with palm fruit, the residue of the kernel fruits and shells are disposed off. This residue is sometimes purchased by some kernel oil producers for further extraction, during the extraction of the oil from the palm kernel. The crashed kernel shells are left behind as by-products which are employed as fuels in other sectors. This also includes shells from the palm oil industry. Due to the fact that these by-products of more than it is demand for fuel, some are left at the mercies of the weather.

Preliminary finding reveal that, the palm kernel shell also has some admirable properties like its high carbon content which absorbs odour and moisture. Also it has been employed in jewellery in the areas of rings and pendants in early times in Ghana. Despite these, there has been little or no written documentation on the use of palm kernel shells for costume jewellery. These among others were the motivation factors to this research.

This paper advocates palm kernel as one of the cheap but viable materials employable in costume jewellery and also as a developmental addition to the array of material in the costume jewellery paradigm. This paper however answers the following questions: how can PKS be made suitable for costume jewellery? What materials can be used in conjunction with PKS for costume jewelleries? How will resultant jewelleries be described for identification purposes and consequently for easy communication?

2. Review of Literature

There is a popular misconception about materials used for jewellery. Many people believe that, jewellery fabrication should involve the use of gold, silver platinum and precious stones thereby limiting the materials spectrum of jewellers, and discouraging jewellers from exploiting the abundant and cheap materials in the environment, (Hanifah, 2008).However, the use of non-conventional materials dates back to the primitive age when jewellery was made out of bones of wild animals, shells, corals, etc., (Encarta 2006).Costume jewelleries are something considered original especially when organised with organic materials in their natural shapes. According to Tinayuan (2002), there are no duplications in the market of costume jewellery because everybody has used his/her imagination and has created individual designs. Costume jewellery styles of past years are now becoming very fashionable, and many are being reproduced in different qualities.

Akeley (1906) describes costume jewellery in relation to Maasai bead production which is similar to the South African bead production, usually with a leather backing or an interior leather core. This suggests the fixing of the materials to the surface of the leather or the use of the leather as a cord on which the other materials with holes in them are strung.

Gaise (1989) and Appiah (2008), cite the numerous materials that could be used in making jewellery from non- metallic materials. These include materials such as bones, shells, and other organic materials. It was further stated that non- conventional materials for jewellery does not require complicated equipment, exceptional skills or expensive materials. Adjei-hene (1991) goes further to mention inorganic materials such as rock, ceramics and glass. According to Thames and Hudson (2000), beaded jewellery or shells will never get out of trend. They inspire craftsmen to materialize their imagination in the best possible way.

2.1. The Palm Kernel Shell (PKS)

Palm kernel shell is the second inner layer of the palm fruit. Palm kernel shells are carbonaceous solids, produced from the processing of palm oil fruit, (Najmi et al, 2004). Carbonaceous solids contain high volume percentage of carbon element and may be converted as heat energy source by thermal reaction of the carbon content. Palm kernel shells are generated after processing palm fruit into palm oil. Newman (1990), states that a shell is the outer hard covering of certain molluscs which is used for various purposes including decorating or making objects of jewellery. It is estimated that the palm kernel shells constitute about 34.5% of a single ripe, fresh fruit (Aragbaiye, 2007).

Though the sizes of palm kernel shells may vary depending upon the type of machinery used to crack the palm kernels. Generally, the size of shells ranges from 2-15mm. The shells are flaky, parabolic, and angular and possess smooth concave and convex surfaces. The thickness of the palm kernel shell varies from 1.5-3mm. (Najmi et al. 1989). Less than 10 per cent of this shells generated are utilized while the remaining 90 per cent are dumped as waste and most often it constitutes environmental pollution as they usually become breeding place for mosquitoes and rodents, (B++ei,2004). Excellent year-round availability, palm kernel can be said to be always available. It is easily available regardless of the season or time of the year. Palm kernel shells are derivable in large quantities and their disposal has continued to constitute major environmental problems. Untracht (1985) confirms that shells are of great value to jewellers.

2.2. Composition of Palm Kernel Shell

Palm kernel shell is believed to be the third inner layer of the palm fruit. (Najmi 2002); this statement has been confirmed by researchers in the process of experimentations with the shell. Palm kernel shell can be considered as pellets because of it nature in form, high calorific value, low ash and low sulphur content. Moisture content in kernel shells is low compared to other biomass residues with different sources suggesting values between 11% and 13%. The palm kernel shell is made up of 33% charcoal, 45%pyro ligneous liquor and 21% combustible gas, (Dagwa et al 2008). Palm kernel shells contain residues of palm oil, which accounts for its slightly higher heating value than average lignocelluloses Biomass. The kernel shell also has a high calorific value. This is the amount of heat released by a unit weight or unit volume of the palm kernel shell during complete combustion. Higher level of coalification translates to higher calorific value and lower moisture content. (Wiktionary 2012), Coalification can be defined as the formation of coal by the gradual heating and compression of organic matter. Due to its high calorific value, burning garbage to produce energy is highly efficient. The kernel shell also possesses low sulphur content. The "beauty mineral, sulphur (**S**), is necessary for healthy skin, hair and nails. Sulphur content (typical about 0.09% weight) is present in palm kernel shells. Sulphur is an essential mineral that plays an important role in the health of connective tissues, as well as skin, bones, teeth, hair and muscles, says the University of Michigan Health System.

Topical sulphur is most commonly used to treat skin-related conditions. Sulphur has several potential uses for skin health. Dermatologists sometimes recommend topical sulphur ointments for treating acne, seborrhea dermatitis, rosacea, eczema and dandruff. One might also use sulphur topically to help treat warts, pityriasisversicolour or skin discolouration, hair-follicle infections and shingles, says the University of Maryland Medical Centre. Sulphur appears to assist in shedding excessive skin and bacteria on the skin, according to the University of Pittsburgh Medical Centre (livestrong.com, 2010).

Compared to other residues from the industry, it is a good quality Biomass fuel with uniform size distribution, easy handling, easy crushing, and limited biological activity due to low moisture content. Because the kernel contains residues of palm oil, it is considered advantageous to the skin because it has been claimed to have anti-inflammatory properties emollient and humectants. Furthermore, it has been claimed to be effective for treatment of the following conditions: fading scars, eczema, burns, rashes, severely dry skin, dark spots, skin discolorations, chapped lips, stretch marks, wrinkles, and in lessening the irritation of psoriasis. These and the other benefits of PKS such as: the fact that it does not rot (tested in the use in road maintenance); can be kept for a long time; prevents or retains odour; and also its ability to be rendered smooth when rubbed very hard against abrasives with just a few strokes, are enough to endorse PKS as a viable material for costume jewellery.

3. Materials and Methods

3.1. Materials

Apart for the principal material: PKS (dura shells), other direct and indirect materials were employed. Direct materials include *stones, pearls, glass, fabric, cord, plastic and metal*. Indirect materials on the other hand were water, wax, abrasives and petroleum jelly.

3.2. Methods

Since the Dura shell walls are thicker, stranger and have more room for creativity it was adopted for this study. The Dura shells were randomly sampled. These include whole shells with the kernels in them and empty cracked shells.

Based on the realisation that, the PKS could either be cracked or adopted as a whole shell, design concepts were developed regarding how the PKS would be prepared and composed into jewelleries with reference to identified methods in costume jewellery production. These concepts apart from adopting solely the PKS, itis also integrated with seven other prevailing costume jewellery materials. The materials adopted are stone beads, pearls, glass beads, fabric, cords, plastic beats and metal findings.

The concept development started with preliminary sketches (figure 1) to final drawings as shown in figures 2 to 9. Due to the fact that there are different findings of jewellery notwithstanding several means of linking and connecting jewellery units, the concentration regarding the conceptualisation is in the form of the PKS, the materials in integration and their arrangement. The idea in figure 2 is an integration of both the cracked shell and the full shells with polished stones. This is followed by an application of halve PKS as ends in a macramé jewellery technique, as shown in figure 3. Also is a linkage of all PKS with a transparent nylon cord in figure 4. In figure 5, is an idea of a cluster of cracked shell with plastic beads. Furthermore, cracked PKS interchanging with pearls in figures 6. In figure 7 and 8 are cracked and sawn PKS with glass beads respectively. The final, is a concept of a full PKS's wrapped and knotted in translucent fabric.

Figure 1: Some preliminary sketches made during the idea development

Figure 2: A concept of cracked shells and Full shell integrated with polished stones

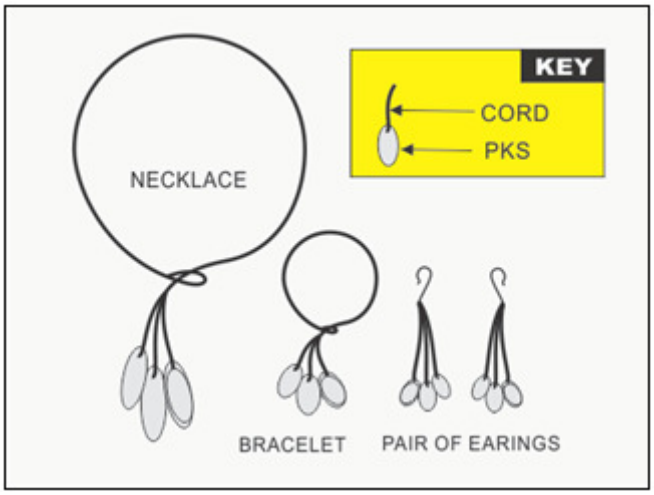

Figure 3: A concept of halve PKS integrated with fibre cords

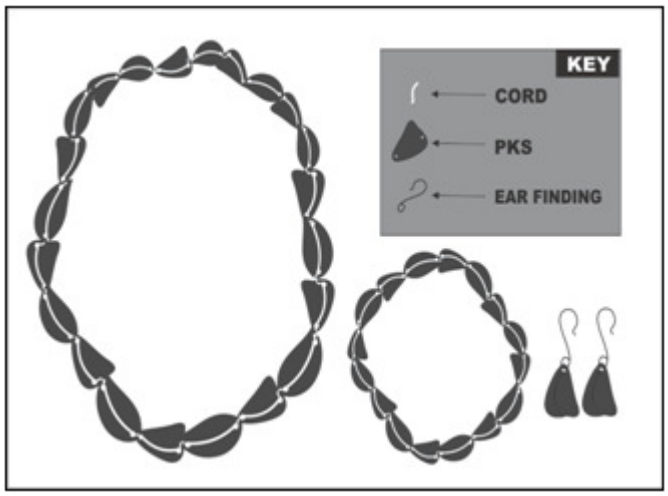

Figure 4: A concept of cracked shell linked with nylon cords

Figure 5: A concept of cracked PKS with plastic beads

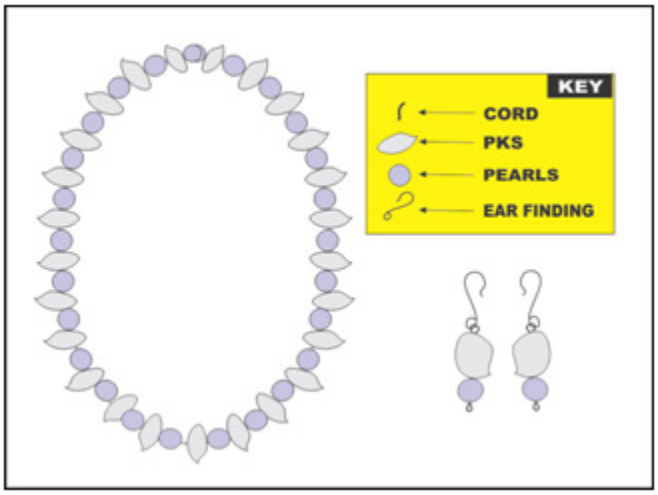

Figure 6: A concept of cracked PKS integrated with pearls

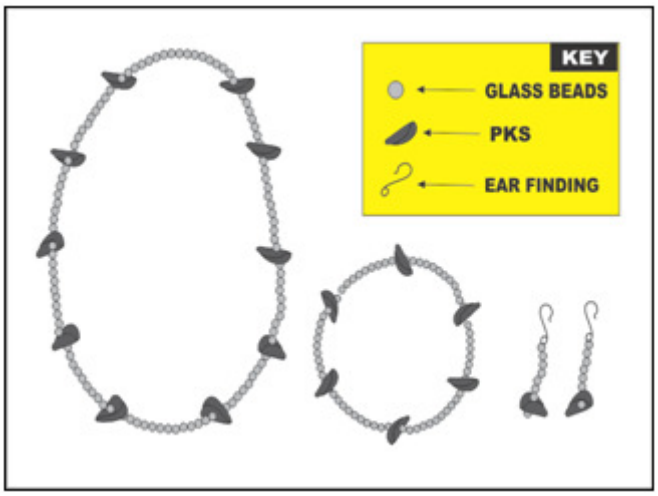

Figure 7: A concept of cracked PKS with glass beads

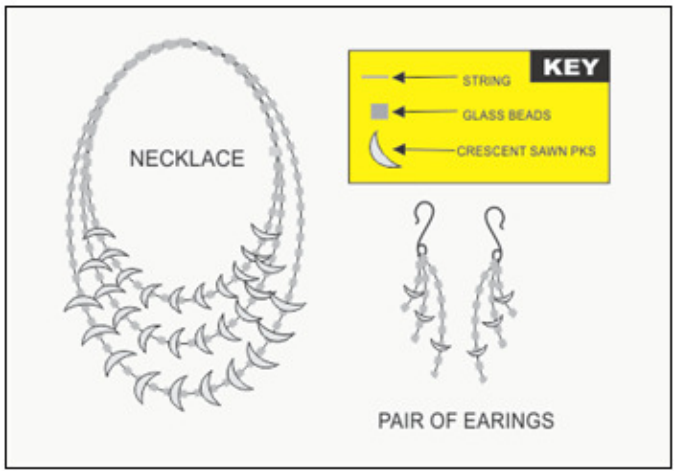

Figure 8: A concept of sawn PKS with glass beads

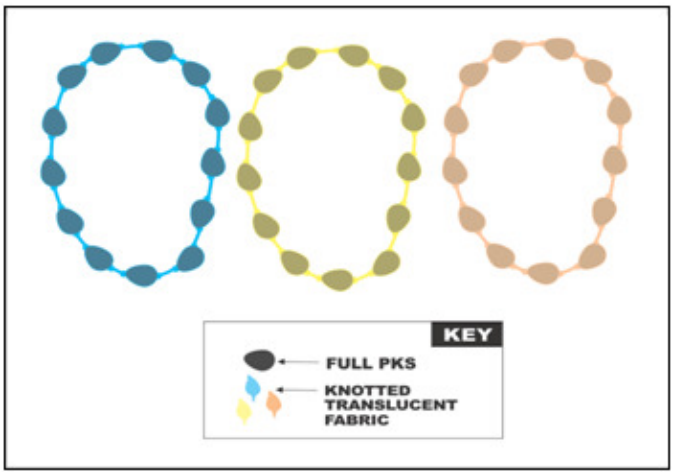

Figure 9: A concept of full PKS rapped in translucent fabric

Based on the concepts, sampled PKS (full and cracked shells) were adopted, others were sawn and some further cracked into different shapes and forms as units according to the dictates of the design concepts. The sawn and cracked PKS were filed to precision and further abraded with abrasives to render the surfaces smoother. Based on the design concepts, some of these were carefully drilled and others left the same. Some were left natural while others went through scorching and burnishing to make them up to look different and also enhance their looks respectively. This was intended to render variety in terms of finish. These units are under three categories: full PKSunits, cracked PKS units and sawn PKS units.

3.2.1. The Jewellery Production Process

The jewellery production process was categorized into three according to the form variations of the PKS. These are: cracked PKS jewellery production process; sawn PKS jewellery production process; and full PKS jewellery production process. These notwithstanding, it was also realised that an integration of categories two and three is another possibility.

3.2.2. Cracked PKS Jewellery Production Process

This process is applicable to

1. Sampled PKS were washed in kaolin solution to remove oil residue.
2. Abrasion was done to the units to fillet and smoothen edges using abrasive papers
3. Holes were drilled through the shells with grilling machine.
4. They were then polished, some with hot bee wax
5. The processed PKS were rubbed in a cotton cloth to burnish them
6. They were then composed according to their design concepts in figures 4, 5, 6, and 7 with their respective required materials.

3.2.3. Sawn PKS Jewellery Production Process And

1. The shells were purposively samples with reference to the forms required by the design concept.
2. With the jeweller's saw, the shapes were executed accordingly.
3. Abrasives were applied to the units to roundel and smoothen edges
4. Holes were drill through the shells appropriately.
5. Bee wax was applied on them and burnished
6. These were also composed according to their design concept in figures 3 and 8 with the required materials.

3.2.4. Full PKS Jewellery Production Process

1. Due to the fact that the whole PKS will be employed. The sizes were carefully analysed in order to sample shells of similar sizes.
2. Shells were cut into halves to remove kernels.
3. The halves were bonded together with a synthetic resin adhesive (under the Uhu brand) and left over night for a stronger bond.
4. Holes were drilled avoiding the glued lines.
5. Abrasion was done to achieve a smooth and slippery surface.
6. They were then polished with petroleum jelly.
7. Then rubbed in a cotton cloth to burnish.
8. They were then employed as according to the concept prescription of figures 2 and 9.

3.3. Name Formulation

To aid in the easy identification of the PKS jewellery, researchers named the produced jewellery in two general categories: "PuKernS" and "InKernelS". The "PuKernS" refers to the type of PKS jewellery with no deliberate integration of another material. The "InKernelS" on the other hand refers to any PKS jewellery made with a combination of the PKS and another material.

In the quest to aid the easy communication and identification of the produced jewellery and others that will be based on them, researchers formulated a naming technique which adds the materials' (integrants') name to the word: integrated. The materials employed included stones, pearls, glass, fabric, cord, plastic and metal. With reference to the materials used, the jewelleries were named according to the formulas shown in figure 10.

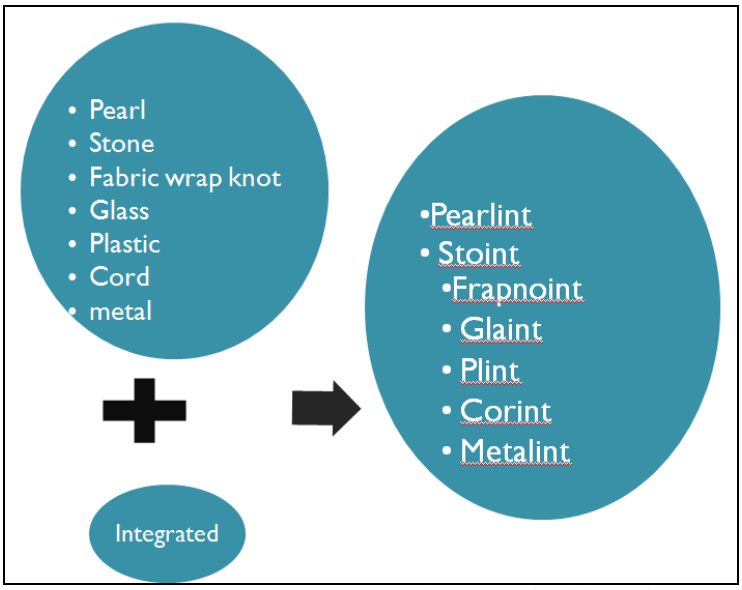

Figure 10: TheInKernelS name formulation methodology diagram

4. Discussion

The material base in costume jewellery cannot be limited regarding the countless organic and inorganic materials in the natural environment. It could only be so if because producers cease exploration. The palm kernel shell is a non-conventional but viable material for costume jewellery. Furthermore, it has remarkable characteristics which make it easily workable and suitable for the production of costume jewellery.

The study revealed that PKS can be made suitable for costume jewellery by cleaning the shell of all oil residue; then, conversion of the clean shells into desire units according to design concepts and then the composition of the PKS with the integrants according the same concept. With this study, it was realised that the PKS in costume jewellery is either a main material or an auxiliary material. Unlike the other figures in figure 3 and Figure 11: it is obvious that the cords appear as the main material with the PKS playing a supporting role.

Apart from the materials employed all other costume jewellery materials can be used in conjunction with PKS for costume jewelleries. This is because, there is no evidences of any component that will react negatively with the PKS. The results from the integration of the PKS and the seven other materials (*stones, pearls, glass, fabric, cord, plastic and metal)* are shown in Figures 11, 12, 13, 14, 15, 16, 17 and 18. The resultant jewelleries in the Figures are mounted on respective manikins.

With regards to the description of the resultant jewelleries, the jewelleries made of only PKS are referred to as "Pukern" derived from "Pure Kernel Shell". Those integrated with other materials on the other hand, are referred to as "InKernelS" derived from "Integrated Kernel Shells". However, the result in the diagram in figure 10 represents the name of jewelleries with specific material integrated with the PKS. Example, cords with PKS becomes Corint as in Figure 11. This notwithstanding the compound name becomes "InKerne9lS Corint" to refer to a PKS jewellery integrated with cords. This also applies to the rest in rest of the Figures (12, 13, 14, 15, 17 and 18)

Figure 11: CorintInKernelS(cord integrated with kernel shell)

Figure 12: GlaintInKernelS (glass integrated with kernel shell)

Figure 13: PearlintInKernelS (pearls integrated with kernel shells)

Figure 14: StointInKernelS (stones integrated with kernel shells)

Figure 15: PlintInKernelS (plastics with kernels shells)

Figure 16: Pukern [pure kernel shell jewellery0

Figure 17: FrapnointInKernelS (fabric wrap knot integrated)

Figure 18: GlaintInKernelS (glass integrated with kernel shell)

5. Conclusion

The palm kernel shell has proven to be a very resourceful material in almost all the sectors. It is a promising potential that could be explored and exploited to create employment and contribute significantly to the costume jewellery industry. It is also concluded based on the findings of the study that the palm kernel shell which is the third inner woody layer of the palm fruit contains many essential components which is advantageous to the wearer when used in jewellery. It is therefore the conviction of the researchers that, if this document is meticulously studied by other researchers, art educators, and the policy makers, the palm kernel shell jewellery could be expanded to create employment as well as help reduce the amount of palm kernel shell residue wasting in the environment.

6. Recommendation

Costume jewellery producers ought to diversify their material base to widen the market to attract prospective clients. Also, regarding the market trend, one must ensure that PKS jewellery are aesthetically good, very functional, ergonomic and affordable. Moreover, communication regarding these PKS sample must make use of their name in order to make communication and respective record keeping more definite. Lastly the use of PKS has economic viability and highly recommended

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