A PROPOSAL FOR THE PRODUCTION OF PAINT

WRITTEN BY

PROJECT GROUP

SUBMITTED TO

THE OVERSEEING OFFICER

PROTOTYPE ENGINEERING DEVELOPMENT INSTITUTE (PEDI), ILESA

15TH SEPTEMBER, 2025

The Project Team
PEDI, Ilesa
15th Sept, 2025

The Overseeing Officer,
PEDI, Ilesa.

Sir,

LETTER OF TRANSMITTAL

I forward herewith a proposal for the production of paint. The importance of which is to foster innovation, supports industries, creates eco-friendly solutions, train small scale industries, and boosts local economies while ensuring environmental sustainability.

Please be assured sir, that the technical knowledge, logistics, equipment and personnel required for the success of the project are available within the Institute (PEDI) and her technical partner environment.

Yours faithfully,
Engr. Archibong Folashade
(Group Leader)

Group members

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EXECUTIVE SUMMARY

This project is about paint production, it is applicable in construction, automotive, industrial, household, healthcare, marine, agriculture, energy, and defense sectors. The three main function of paints are: protection, decoration, and specialized performance (like antibacterial, fire-retardant, or self-cleaning properties). This proposal covers only two types of paint namely gloss (oil-based) and emulsion (water-based).

The proposed method for this project is Batch Process. The raw materials will be measured and process in fixed quantities. This process involves steps such as premixing, pigment, dispersion, let-down (adding binder and solvents), filtration and packaging.

A total sum of Twelve Million, Three Hundred and Two Thousand, Eight Hundred and Thirty Seven Naira (₦12,302,837.00) only is required to execute the project. The quoted sum covers materials, product tests, transportation, patenting and packaging

For the prototype production (or commercial production) of the project, the group/PEDI may collaborate with Berger paint or enter into MoU with the same.

Expected market for this project are residential, construction companies, real estate housing, educational, architecture, industries, medicals and transportation. While tangible paint product is useful in the afford mentioned sector, paint making skill can be sold or transfer in form of training to individual, organizations, small scale industries and political organization for poverty alleviation program.

This project is deemed feasible and marketable and it is therefore, recommended to the Management for funding.

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INTRODUCTION

1.1 Background Information

A Paint is essentially a coating or covering material applied on metallic or non-metallic surfaces for decorative or protective purposes. Most commonly they may be a protective as well as decorative finish. (Brian, 2018). They are also used to plaster surfaces against weathering, moistures, heats and chemicals. There are two major classifications of paints: the oil-based paint and the water-based paint. Organic solvents used in the formation of oil-based paints include thinners, denatured alcohol and petroleum products (Onoja et al, 2019). Example of oil-based paints are gloss, lacquer paints and auto paints. On application of oil-based paint, solvent evaporates concentrating the paint film as the oil reacts with oxygen in the air, forming a long chain hard film called hydroperoxides (a three-dimensional network resulting from molecules cross-link). Thus, the drying mechanism of oil-based paints is called polymerization (Olaoye and Oladeji, 2015). Oil-based paints are mostly applied on railings, cabinets, metals and the likes.

Water-based paints use water as their carrier medium, hence the name. They are subdivided into two main categories namely acrylic paints and latex paints. Water-based paints are more environmentally and user friendly when compared to oil-based paints. Water-based paint dry by evaporation, forming a solid thick film on the painted surface.

Acrylic paints are more durable than latex paints in that they contract and expand better, which makes it more durable for exterior paintings (Abdulsalam and Yahaya, 2010).

Examples of water-based paints incudes, acrylic and latex emulsion, satin, matte emulsion, textured paints and so on.

Generally, paints consist primarily of binders (resins), pigments, solvents (oil or water), and additives.

The global demand for paints is growing due to rapid industrialization, urbanization, and the expansion of the construction, automotive, and marine industries. Additionally, there is an increasing shift towards eco-friendly and sustainable paints, driven by environmental regulations that limit the use of volatile organic compounds (Nwakaudu and Oghome, 2012) (VOCs).

Research institutes and industries have a vital role in developing innovative paints, such as antimicrobial coatings, fire-retardant paints, nanotechnology-based paints, and powder coatings, which go beyond aesthetics to serve functional roles

1.2 Aim and Objectives

The aim of this research work is to investigate and develop a research based paint that will be environmentally safe for users and also meet Nigeria economy demand. The specific objectives are to:

i. study the existing formulation of emulsion and gloss types of paints;
ii. analyze the effect of raw material composition on paint quality;
iii. evaluate the performance properties of paints (viscosity, gloss, opacity, drying time, corrosion resistance);
iv. develop water based and solvent based paint for commercialization.

1.3 Justification for Project

Paint production is a vital industrial and research-driven activity that supports diverse sectors, ranging from construction to manufacturing and creative industries. Paint production is a multi-disciplinary process that involves chemistry, polymer science, materials science, and engineering. Conducting this study within a research institute is appropriate because it provides an environment equipped with technical expertise, laboratory facilities, and resources for experimentation, quality control, and product development.

The study will contribute to the advancement of knowledge by exploring paint formulations, properties, and applications, thereby enhancing the institute's role as a hub of innovation. The research has economic relevance, as local paint production can reduce dependence on imported products, conserve foreign exchange, and promote industrial growth. Thirdly, paints are essential for protection and aesthetics in construction, automobile, furniture, and other sectors. Developing improved or specialized paints, such as eco-friendly, water-based, or corrosion-resistant coatings, aligns with global sustainability goals and addresses local industrial needs.

Furthermore, this study is justified on the basis of capacity building, as it will equip students and researchers with hands-on skills in formulation techniques, testing methods, and production processes. The outcomes can also stimulate partnerships between the institute and industries, thereby facilitating technology transfer and commercialization of research outputs.

1.4 Statement of Research/Production Problem

Despite the wide applications of paint in construction, manufacturing, and protective coatings, there are limited local research and innovation in specialized paints for industrial and protective applications. Many influential citizens and industries still depend heavily on imported paints, which are costly and often not adapted to local environmental conditions.

This has created a gap in innovation, capacity building, and sustainable alternatives. This study therefore seeks to address the problem by exploring the production of paint within a research institute, with a focus on developing affordable, durable, and eco-friendly formulations.

1.5 Scope of Research/Production

This study on the production of paint in a research institute will focus on the formulation, processing, and testing of selected types of paints using locally available raw materials. The research will cover the stages of paint production, including pigment dispersion, binder selection, solvent and additive incorporation, mixing, and quality evaluation. Special emphasis will be placed on producing water-based paints, as they are widely used for domestic and industrial purposes and are more environmentally friendly.

The study will also examine the physical and chemical properties of the produced paint, such as viscosity, opacity, drying time, adhesion, durability, and resistance to environmental factors. The research will be limited to laboratory-scale production within the institute, with findings aimed at providing baseline data and knowledge for possible pilot or large-scale production in the future.

The study does not extend to full industrial-scale commercialization, cost analysis of mass production, or the exploration of all paint types (e.g., marine coatings, automotive paints, or powder coatings). Instead, the scope is restricted to the experimental production, testing, and evaluation of selected paint samples (emulsion and gloss) within the institute's facilities.

2.0 METHODOLOGY

The purpose of this project is to develop, produce and evaluate laboratory-scale paint formulations (emulsion and gloss), establish reproducible production procedures, and generate data for scale-up and performance assessment. The project covers formulation selection, raw material handling, let-down, filtration & packaging (sample), accelerated stability and performance testing, and documentation needed in a research environment.

2.1 Materials and Equipment for Production

Paint production relies on key chemicals categorized as pigments (like titanium dioxide for opacity, carbon black, calcium carbonate, kaolin and iron oxides for color), binders (such as acrylics, styrene-acrylic, alkyd resin, epoxy resin and PVA for film formation), liquids/solvents (water for water-based paints and mineral spirits for oil-based paints), and additives (which include thickeners, dispersants, preservatives (biocides), coalescing agents, anti-skinning agents and defoamers to modify performance properties). These components determine a paint's quality and performance, influencing its color, durability, application, and longevity.

In paint production (whether in a research institute, pilot plant, or full-scale factory), different types of equipment are used for raw material handling, dispersion, mixing, testing, and packaging.

Raw Material Handling and Preparation: Weighing scales / analytical balance for accurate measurement of pigments, binders, solvents, and additives; Storage tanks / silos / containers for resins, solvents, and water

Testing and Quality Control Equipment necessary in paint production are viscometer for checking paint viscosity, pH meter for measuring and controlling the acidity or alkalinity of water-based paints, and raw material solutions, Hegman gauge for testing pigment dispersion quality; Gloss meter for surface finish measurements; Colorimeter/spectrophotometer for color matching; Film applicators and drying time recorders for testing application properties; Adhesion testers, hardness pencils, impact testers for film performance testing; Feed hoppers for powders (pigments, fillers); density meter, filter.

2.2 Methods of Production

Batch process is the most common method for paint production. Materials are added in specific proportions to mixing tanks and processed step by step to ensures high quality and flexibility, especially for specialty paints. Batch process is suitable for small to medium-scale production and involve production steps which are: premixing of binder, solvent, and dispersant; Pigment dispersion using ball milling or HSD; Let-down stage (adding binder, additives, and balance of solvent); filtration to remove agglomerates; packaging in sealed containers and Quality Tests (gloss, opacity, viscosity, drying time, adhesion, scrub resistance, corrosion resistance)

Batch process is also called mixing and blending method because resins, solvents, and additives are mixed to form the liquid base (binder + solvent system). After which pigments and fillers are incorporated into this base and then blend thoroughly. This method is achieved by the use of equipment like high-speed mixers, paddle mixers, or planetary mixers.

Final paint is filter through suitable mesh or filter to remove oversized particles/agglomerates. After which it will be filled into labeled sample containers for testing and batch data can then be recorded.

2.2.1 Method of production for Emulsion Paint

i. Measure water into the container/mixer, the add a measured quantity of Calgon (dispersing agent). This aids the dissolution of other chemical components.

ii. Measure an appropriate quantity of titanium dioxide and dissolve it in a small container and add it into previous resulting mixture or add it directly and mix thoroughly.

iii. Measure an appropriate quantity of calcium carbonate into the water mixture, blending them to ensure they are evenly dispersed.

iv. Add appropriate quantity of thickeners like nitrosol, dispersing agents, and defoamers. This is done to obtain paint of desired consistency and eliminate unwanted foaming.

v. Add appropriate quantity of the acrylic or PVA binder. This acts as a glue / bond to hold the paint components together and adhere it to surfaces.

vi. Add appropriate concentration and quantity of ammonia and formalin solution to the resulting mixture. This serves as stabilizers and preservatives and it controls the pH while formalin to prevent bacterial growth and extend the paint shelf-life.

vii. Mix thoroughly to obtain a smooth, consistent texture.

viii. Add more pigment for colour adjustment especially for coloured paints. This is done to achieve the desired hue.

ix. Subject the mixture to physical and chemical tests ascertain its quality, coverage, and consistency.

2.2.2 Method of production for Gloss Paint

i. Weigh the appropriate quantity of alkyd resin and heat it in a mixing tank to allow it to melt.

ii. Combine Resin and appropriate quantity of Solvent: Gradually add the solvent such as kerosene to the melted resin and stir until it dissolves. This is to maintain shine.
iii. Add pigment: weigh an appropriate quantity of pigment like titanium dioxide and continuously mixing to ensure it dissolves into the mixture.
iv. Add other additives/components such as thickeners, defoamers, and preservatives in the correct sequence and quantity.
v. Add Dryer: This is a catalyst, which is essential for the paint to dry properly.
vi. Adjust Viscosity (Optional): If the paint is too thick, add a bit more solvent to reduce its viscosity.
vii. Mix thoroughly until a smooth mixture, consistent, high-quality gloss paint is obtained and it is then subject to both physical and chemical tests.
viii. Package: Packed into sealed container for storage, used or sale.

2.4 Collaborations for Production

The institute propose a collaboration with Berger paint.

2.4.1 Prototype Production

This project proposes prototype production of paint with emphasis on the production of emulsion (an example of water-based) and gloss (an example of oil-based). It is a process of creating an initial model of product before full-scale manufacturing begins. This step is significant because it serves as a trial version of the product that allows researchers to test, evaluate, and refine their ideas.

The individual quantity of paint component is a function of various factor. For example, water-based paints formulation depends on specific gravity, viscosity, water demand data, dispersant demand data and pigment volume concentration at flow point of pigment and extenders being used (Nwakaudu, M. S and Oghome, P., 2012). Paints Manufacturers Association of Nigeria (PMAN) has adopted the 10.0 – 30.0% for solvent, 10 – 20% for binder and 20 – 40% for extender as standard percentage constituents for water-based paints.

Formulation of 20L Gloss Paint:

Raw Materials	**Quantity**
Kerosene	10L
Alkyl resin	10kg
Calcium carbonate (CaCO3)	2kg
Pigments (e.g., red oxide)	160g
Catalyst	12.5g

Formulation of 2.5L Emulsion Paints:

Raw Materials	**Quantity**
Water	1L
Polyvinyl acetate	250g
Calcium carbonate	1.5kg
Titanium dioxide	50g
Sodium tripolyphosphate (Calgon)	8g
Pigment	2.5ml
Formalin	7.5 ml
Ammonia (28%)	7.5 ml
Thickener (Nitrosol)	18g

Quality control in paint production involve physicochemical analysis of paint product. This check for physical and chemical properties of paint such as:

i. Determination of Temperature Stability of Paint (ASPH 4500T): 50ml of paint will be measured and poured into air tight container. Then, subjected to an automated temperature probe sensor to obtain its temperature stability for 24 hours.

ii. Determination of Kinematic Viscosity of paint (ASTMD 2196): The tube reverse flow viscometer will be used for measuring kinematic viscosity. 25ml paint sample will be measured into the viscometer up to the mark, the temperature of the paint sample will then be raised to 50oC, the sample in the viscometer will be pumped up to the upper unit of the viscometer, the paint sample will be released to flow down to the lower unit, while time of flow should be taken via digital stop clock.

iii. Determination to Resistance to Wet Abrasion Paint (ASTMD 1364): Paint sample was coated on a wall with a roller and brush and allowed to dry for 5-hours. Then, water of a given flow rate was sprayed through a pumping channel directing to the paint coated wall for 30 minutes. This test was carried out after 5 hours coating to confirm resistance to the wet abrasion of the paint.

iv. Determination of pH Paint (ASTMD 1208): 100ml of the paint sample was measured into a measuring cylinder; microcomputer pH meter probe was used in determining the pH value of the paint was standardized using buffer solution. The probe was inserted into the paint sample in the measuring cylinder, the pH value displayed on the meter was recorded.

v. Determination of Specific gravity paint (ASTMD 591): The specific gravity was determined using Pygnometer method, the empty pygnometer was weighed and empty weight recorded. The pygnometer was filled to the brim with the paint sample and the weight of both the sample and the pygnometer was recorded. The mass of the sample was subtracted from the empty weight which was divided by the volume (50ml) of the bottle.

$$\rho = M/V \tag{1}$$

Where: M is the mass of pygnometer (final - initial) weight; V is the sample volume

2.4.2 Commercial production

This project will proceed to production of paint for the purpose of commercialization after the prototype product has been certified. The commercial production of paint involves the large-scale manufacture of different types of paints using standardized processes, equipment, and quality control systems to meet market demand. Unlike laboratory or prototype production, which focuses on research and testing, commercial production emphasizes efficiency, consistency, and profitability. In commercial paint production, the goal is to produce large volumes of consistent, high-quality paint efficiently. To achieve this, manufacturers use standardized processes, specialized equipment, and strict quality control systems. To ensure consistency in commercial production, every batch must follow a step-by-step, well-defined methods from weighing to packaging.

In large scale production, specialized machines handle bulk production. Equipment needed in large scale production are: High-Speed Dispersers / Mixers for blending pigments and resins; Ball Mills for fine grinding and dispersion of pigments or Attritors for producing very fine dispersions; Mixing Tanks (stainless steel or lined) for large-scale blending; Filtration units (screen filters) to remove impurities; Filling and Packaging Machines automated systems for cans, drums, and pouches.

Paint must meet national and international standards (e.g., ASTM, ISO, SON in Nigeria). In commercial production, quality checks must be carried out at each stage: purity test of raw materials, In-Process Control and finished product testing (Opacity, Gloss, Drying time, Color matching (spectrophotometer or visual comparison), Adhesion (cross-cut or pull-off tests), Durability and weather resistance (accelerated aging tests).

Documentation in large scale production ensure consistency and accountability. Every batch must have record for traceability.

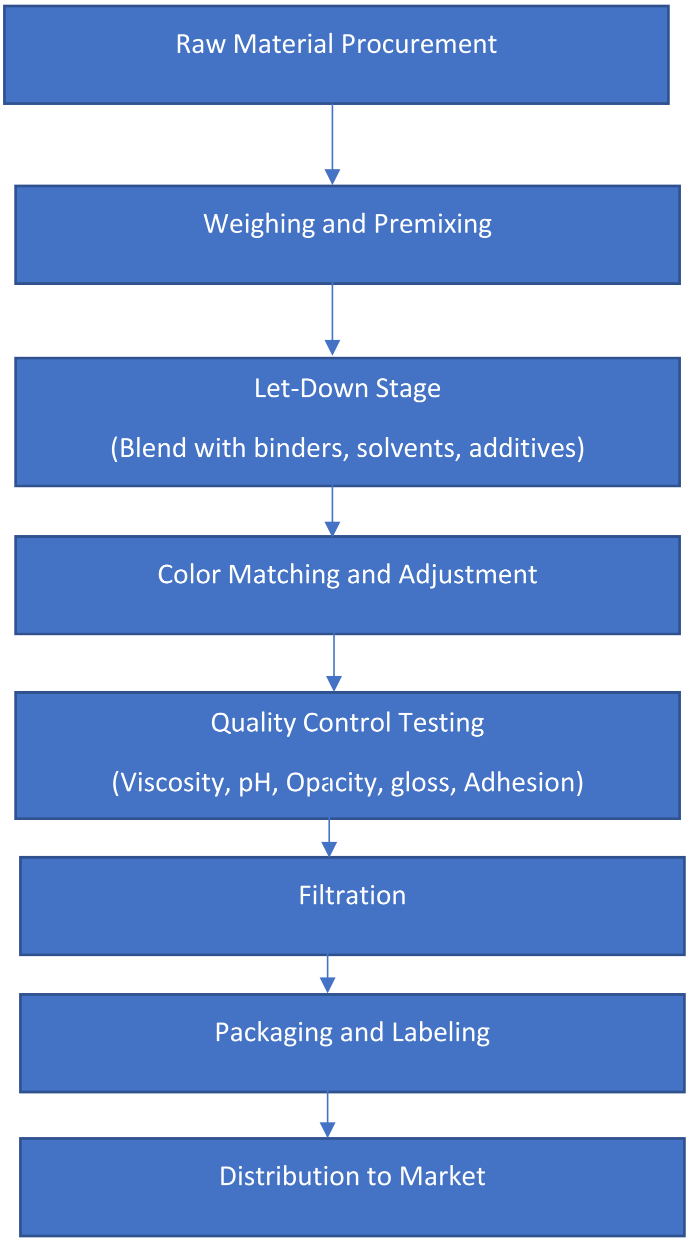

Figure 2.1: Proposed Process for Commercial Production of Paint

2.5 Timeline for Production

Instead of one-off stages, commercial production usually runs in cycles (batches or continuous processes), and the timeline must show. Table 2.1 shows the timeline for commercial production.

Table 2.1: Proposed Timeline for Commercial Production of Paint

Stage	**Duration/Timeline**
Pre-production planning and setup	2 weeks (once-off)
Procurement of raw materials	1 week (ongoing supply)
Batch production cycle	2–3 days per batch
Quality testing and adjustment	Within same 2–3-day cycle
Packaging and labeling	Same cycle (Day 3)
Distribution	Weekly or bi-weekly
Maintenance & evaluation	End of month

Steps in Prototype Paint Production Timeline are as follows:

Planning and Raw Material Preparation (1–2 days): This includes Identification of paint type, gathering of material (pigments, binders, solvents, and additives) and reviewing of safety and lab requirements.

Formulation Development (2–4 days): This involves preparation of different trial formulations, decision on pigment-to-binder ratio, solvent proportion, and additive type. Recipes are recorded for repeatability.

Laboratory Mixing and Dispersion (1–3 days): Small-scale mixing using stirrers, pigment dispersion and homogeneity.

Prototype Testing and Evaluation (3–7 days): Testing for viscosity, opacity, gloss, drying time, adhesion, stability, pH; Application of samples on test panels and observe drying, coverage, and durability.

Adjustment and Reformulation (2–5 days): Modification of recipe if results are unsatisfactory, repetition of mixing and testing until specifications are met.

Pilot Batch Production (Optional, 3–5 days): Scaling up slightly (e.g., from 1 liter → 20 liters), Simulating production conditions.

Final Documentation & Reporting (1–2 days): Recording of final formulation and preparation of technical datasheet for scale-up.

Table 2.2 Proposed Timeline for Prototype Production of Paint (for 3–4 weeks project)

Stage	Duration
Planning and Raw Material Preparation	2 days
Formulation Development	4 days
Mixing and Dispersion	3 days
Testing and Evaluation	7 days
Adjustment and Reformulation	5 days
Pilot Batch Production	4 days

Documentation and Reporting	2 days
Total	27 days (4 weeks)

3.0 COSTANALYSIS

EQUIPMENT NEEDED FOR PAINT PRODUCTION				
S/n	**Items and Specification**	**Quantity**	**Rate (₦)**	**₦ : K**
1	High Speed Disperser Dissolver 1000L Industrial Paints Mixing Machine	1	3,570,915.00	3,570,915.00
2	Digital Standing Scale - 100kg	1	200,590.00	200,590.00
3	25 Litres Plastic bowl (Mixing tank)	2	10,000.00	20,000.00
4	10 Litres Plastic bowl (Mixing tank)	4	5,000.00	20,000.00
5	Small buckets	4	2,500.00	10,000.00
6	PVC Hand Gloves	10	7,300.00	73,000.00
			TOTAL	**3,894,505.00**

CHEMICALS/CONSUMABLES FOR PAINT PRODUCTION				
S/n	**Items and Specification**	**Quantity**	**Rate (₦)**	**₦ : K**
1	$CaCO_3$ (Paint flour)	25Kg (1 bag)	6,000	6,000.00
2	Polyvinyl acetate (Binder)	5 Kg	4,500	22,500.00
3	Titanium dioxide	2 Kg	10,000	20,000.00
4	Sodium tripolyphosphate (Calgon)	4 Kg	8,000	32,000.00
5	Pigment (Powder)	1 Kg	5,000	5,000.00
6	Formalin	4 Litre	3,000	12,000.00
7	Ammonia	2 Litres	3,000	6,000.00
8	Nitrosol (Thickener)	4 Kg	21,000	84,000.00
9	Kerosene	150 Litres	1,050	157,500.00
10	Alkyl Resin	25 Kg	5,000	125,000.00
11	Red oxide (Paste)	2 Litre	4,500	9,000.00
12	Catalyst (Cobalt napthenate)	1Kg	18,000	18,000.00
			TOTAL	**497,000.00**

EQUIPMENT NEEDED FOR PAINT TESTING / QUALITY CONTROL				
S/n	**Items and Specification**	**Quantity**	**Rate (₦)**	**₦ : K**
1	Gloss Meter GM-7 75 Degree Accurate Various Materials 0.1 to 200 GM-7 0.1~200GU	1	478,500.00	478,500.00
2	PH Meter High Precision Desktop PH Meter With Temperature Compensation PHS-3DW	1	385,000.00	385,000.00
3	Adhesion Tester of Paint Film Circular Trajectory Method Manual Determination	1	739,000.00	739,000.00
4	Coating Thickness Gauge	1	194,353.00	194,353.00
5	NOVOTEST SE-1520 Erichsen Cupping Tester	1	2,977,700.00	2,977,700.00
6	BAOSHISHAN NDJ-1 Rotary Viscometer | Viscosity Tester 10-100,000mPa·s	1	767,779.00	767,779.00
7	Colorimeter	1	283,500.00	283,500.00
			TOTAL	**5,825,832.00**

PATENTING			
QUANTITY	**DESCRIPTION**	**UNIT PRICE**	**AMOUNT**
1	Patent Preliminary and Documentation Fee	₦566,250.00	₦566,250.00
1	Patent Filing and Processing Fee	₦732,500.00	₦732,500.00
1	Service Charge	₦366,250.00	₦366,250.00

	VAT of 7.5%	₦135,000.00	₦135,000.00
	TOTAL		**₦1,800,000.00**

PACKAGING				
S/N	**DESCRIPTION**	**QUANTITY**	**RATE**	**AMOUNT**
1	4 Litres Plastic Bucket	12	1,750.00	₦21,000.00
2	20 Litres Plastic Bucket	2	3,500.00	₦7,000.00
3	40 Litres Can	25	1,500.00	₦37,500.00
4	Label	40	500.00	₦20,000.00
5	Transport/Logistic			₦200,000.00
		TOTAL		₦285,500.00

SUMMARY

S/n	**DESCRIPTION**	**COST**
1	EQUIPMENT NEEDED FOR PAINT PRODUCTION	₦3,894,505.00
2	CHEMICALS/CONSUMABLES FOR PAINT PRODUCTION	₦497,000.00
3	EQUIPMENT NEEDED FOR PAINT TESTING	₦5,825,832.00
4	PATENTING	₦1,800,000.00
5	PACKAGING	₦285,500.00
		₦12,302,837.00

4.0 MARKETABILITY

4.1 Importance of Project

The proposed paint has high market potential due to the increasing demand for quality, affordable, and durable coating solutions in both residential and commercial sectors. With ongoing urban development and rising housing projects, the paint industry continues to expand in Nigeria, creating a strong market opportunity.

4.2 Market Space

Paint is used in different areas and for different purposes. Since paint is not only for decoration but also for protection and functionality, its applications cut across several fields. The proposed paint will be applicable in schools (from primary to higher institution of learning), religious places or building, automotive industry, construction companies, machinery and equipment industries, machine workshop, cultural and artistic industries, educational and research, training and skill acquisition.

4.3 Strategy and Collaborations for Marketing

The proposed paint is a product which when strategically market can promote, distribute, and sell effectively. In paint production (and other industries), marketing strategies aim to reach the right customers, create demand, and build brand loyalty. The following strategies for marketing like in other industries will yield a positive result in paint in industry.

Product Strategy:

- Developing high-quality, durable, eco-friendly paints.
- Offering different product ranges: decorative paints, industrial coatings, automotive paints, powder coatings.
- Providing unique value (e.g., quick-dry, weather-resistant, antibacterial paints).

Pricing Strategy:

- Competitive pricing compared to multinational brands.
- Flexible pricing (bulk discounts for contractors, smaller packages for households).
- Value-based pricing (higher for premium paints with special features, affordable for standard products).

4.4 SWOT Analysis

The strength of this project lies in the fact that skilled engineers, chemists and technical staff are available within the institute, raw materials are locally available and there are growing demand for decorative paints. The weakness being high cost of imported additives and limited production capacity in the institute. Different opportunities, like rising construction and real estate development, Government policies supporting local industries and increasing demand for eco-friendly paints make production of paint worthwhile. Meanwhile, strong competition from multinational brands, volatile raw material prices and strict environmental regulations pose threat to paint production.

5.0 CONCLUSION(S)

This research demonstrates that paint production is not only a technological process but also a driver of industrial growth. By optimizing formulations and adopting eco-friendly materials, paint production can be made cost-effective, sustainable, and adaptable to diverse applications.

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