PROPOSAL FOR THE DESIGN AND FABRICATION OF NASENI PROHATCH 300

WRITTEN BY

PROJECT GROUP

SUBMITTED TO

THE OVERSEEING OFFICER
PROTOTYPE ENGINEERING DEVELOPMENT INSTITUTE (PEDI),
ILESA

16th SEPTEMBER, 2025

The Project Team
PEDI, Ilesa

16th Sept, 2025

The Overseeing Officer,
PEDI, Ilesa.

Sir,

LETTER OF TRANSMITTAL

I hope this letter finds you well. I am excited to present to you a proposal for the development of the NASENI ProHatch 300. This project is not just another addition to our portfolio; it's a step towards revolutionizing poultry farming in Nigeria.

Our team has put together a comprehensive plan that leverages cutting-edge technology to create a hatchery that is both energy-efficient and reliable. We believe this project will significantly impact the agricultural sector by providing a sustainable solution for small and medium-scale poultry farmers.

Rest assured, we have the technical expertise, logistical support, and dedicated personnel to bring this project to fruition. Our team is ready to tackle any challenges that come our way.

Thank you for your time and consideration. We look forward to your positive response.

Yours faithfully,

Engr Olaoye Tunde
(Group Leader)

Group members

S|N	Name	Designation	Qualification	Specialization	Sign
1	Engr Olaoye Tunde	CE	M. Sc. COREN	Mechanical Engineering	
2	Engr Victor Oyatokun	CE	M. Sc. COREN	Mechanical Engineering	
3	Engr Bishi Ayodeji	CE	M,Sc COREN	Elect/ Elect Engineering	
4	Engr Akinyinka Ebenezer	CE	B Sc. COREN	Elect/ Elect Engineering	
5	Engr Joseph Ayo	ACE	M. Sc. COREN	Elect/ Elect Engineering	
6	Mr. Bamidele.A Fadara	Engr I	B.Sc	Mechanical Engineering	
7	Mrs. Abdulkareem Fatimah	Engr I	B.Sc	Mechanical Engineering	

EXECUTIVE SUMMARY

The NASENI ProHatch 300 is designed to be a game-changer in the poultry farming industry. This innovative hatchery operates on both grid electricity and solar power, ensuring uninterrupted operation even in areas with unreliable power supply. It integrates advanced technologies for temperature and humidity control, automated egg turning mechanisms, and renewable energy sources, making it a sustainable solution for poultry farming.

The project requires a total investment of Two million seven hundred seventy-eight thousand seven hundred and thirty-two Naira (₦2,778,732:00). This covers everything from materials and tests to transportation and other related costs. We plan to collaborate with local manufacturers and stakeholders for the prototype and commercial production. The potential market includes small and medium-scale poultry farmers, hatchery operators, and agricultural organizations.

This project will boost the agricultural sector by promoting sustainable poultry farming practices and improving food security. It's a feasible and marketable idea that we believe is worth investing in.

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1.0 INTRODUCTION

1.1 Background Information

The global demand for poultry products continues to rise, driven by population growth and increasing consumer preferences for protein-rich diets. Traditional hatcheries, while effective, often present challenges such as high energy consumption, limited scalability, and geographical constraints that restrict access for small-scale farmers. These constraints hinder the ability of many aspiring poultry producers to participate in the market, ultimately affecting food security and economic development in vulnerable communities (World Poultry, 2022).

1.2 Aim and Objectives

The primary aim of the NASENI ProHatch 300 project is to develop a portable, energy-efficient hatchery that addresses the challenges faced by small and medium-scale poultry farmers. The objectives include:

1. Integrate Dual Power Sources: Create a hybrid energy system that combines grid electricity and solar power to ensure continuous operation, even in areas with unreliable energy supply.
2. Optimize Incubation Conditions: Implement advanced control systems to maintain optimal temperature and humidity levels, thereby maximizing hatching success rates.
3. Promote Sustainability: Minimize the carbon footprint of poultry production by utilizing renewable energy sources and promoting energy efficiency in hatchery operations.
4. Evaluate Performance and Impact: Conduct performance assessments to compare hatching rates and energy consumption with traditional hatchery systems, and analyze the potential socio-economic benefits for smallholder farmers in rural areas.

5. Facilitate Training and Support: Develop training materials and support systems for users to ensure effective utilization of the portable hatchery and promote best practices in poultry management.
6. Design a Portable Hatchery: Develop a compact and mobile hatchery capable of accommodating up to 300 eggs, ensuring ease of transport and setup in various environments.
7. Enhance User Accessibility: Design user-friendly interfaces and automated features, such as egg turning mechanisms, to simplify operation for small-scale farmers with varying levels of technical expertise.

1.3 Justification for Project

The increasing demand for poultry products necessitates innovative solutions that enhance accessibility and reduce dependency on conventional energy sources. Traditional hatcheries often face significant challenges, including high energy consumption, geographical limitations, and the need for substantial capital investment, making them inaccessible to small-scale farmers, particularly in rural areas. The NASENI ProHatch 300 addresses these challenges by offering a sustainable, energy-efficient, and portable solution.

1.4 Statement of Research/Production Problem

The current poultry farming landscape is plagued by several issues, including:

1. High energy consumption and costs associated with traditional hatcheries.
2. Limited access to reliable power supply in rural and remote areas.
3. The need for scalable and portable solutions to cater to small and medium-scale farmers.
4. The environmental impact of traditional hatcheries due to high energy consumption.

2.0 METHODOLOGY

2.1 Materials and Equipment for Production

The materials and equipment required for the production of the NASENI ProHatch 300 include:

1. Egg Incubation Chamber: Lightweight, durable materials (primarily plastic and metal) designed to house 300 eggs.
2. Power Supply Systems: Grid power input (220-240V AC, 150W) and solar power system (12V DC input, 1000W solar panels).
3. Temperature Control System: Digital automatic thermostat to maintain a temperature of approximately 37.5°C (99.5°F).
4. Humidity Control System: Integrated humidity regulation system to maintain relative humidity at 55-65% during the initial incubation period, rising to 70-75% in the final stages.
5. Backup Power System: 12V deep-cycle battery to provide power during grid outages or low sunlight conditions.
6. Automated Egg Turning Mechanism: To ensure even embryo development and improve hatch rates.

2.2 Methods of Production

1. The production process will involve the following steps:
2. Literature Review: Conduct a comprehensive review of existing hatchery designs, technologies, and energy-efficient practices.
3. Design Phase: Develop initial design concepts and specify materials, components, and technologies to be used.

4. Prototyping: Build a prototype of the NASENI ProHatch 300 based on the final design specifications.
5. Integration of Power Systems: Install both grid and solar power systems, ensuring a seamless transition between energy sources.
6. Testing of Components: Test individual components (e.g., heating, humidity, egg turning) to ensure functionality and reliability.
7. Initial Testing: Conduct preliminary tests to evaluate the performance of the hatchery under controlled conditions.
8. Hatching Trials: Perform hatching trials using a sample batch of eggs to record hatching success rates.
9. Performance Comparison: Compare the results of the NASENI ProHatch 300 with traditional hatchery systems.
10. Field Testing: Deploy the hatchery in selected rural communities for real-world testing.
11. User Feedback: Collect feedback from users regarding ease of use, functionality, and any challenges encountered.
12. Iteration: Make necessary adjustments to improve the design and functionality based on user feedback and performance data.

2.3 Graphics/Drawings of Product

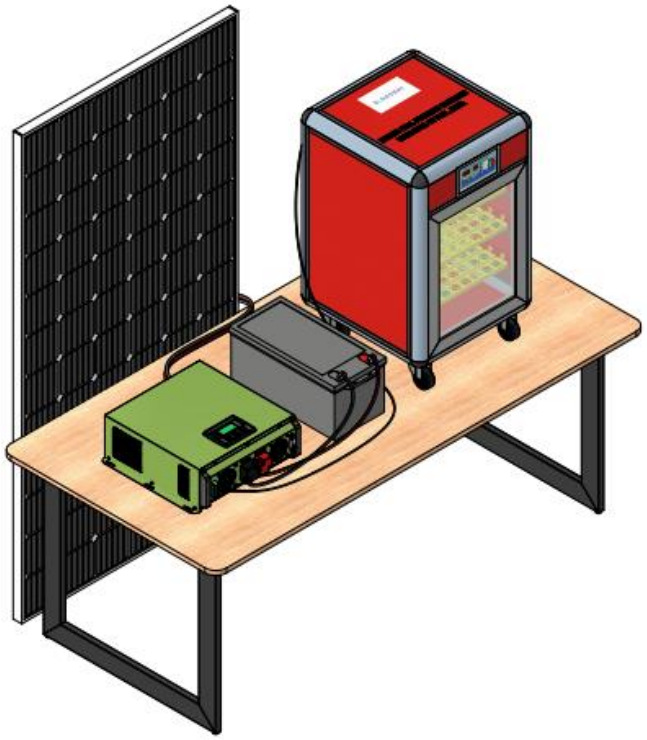
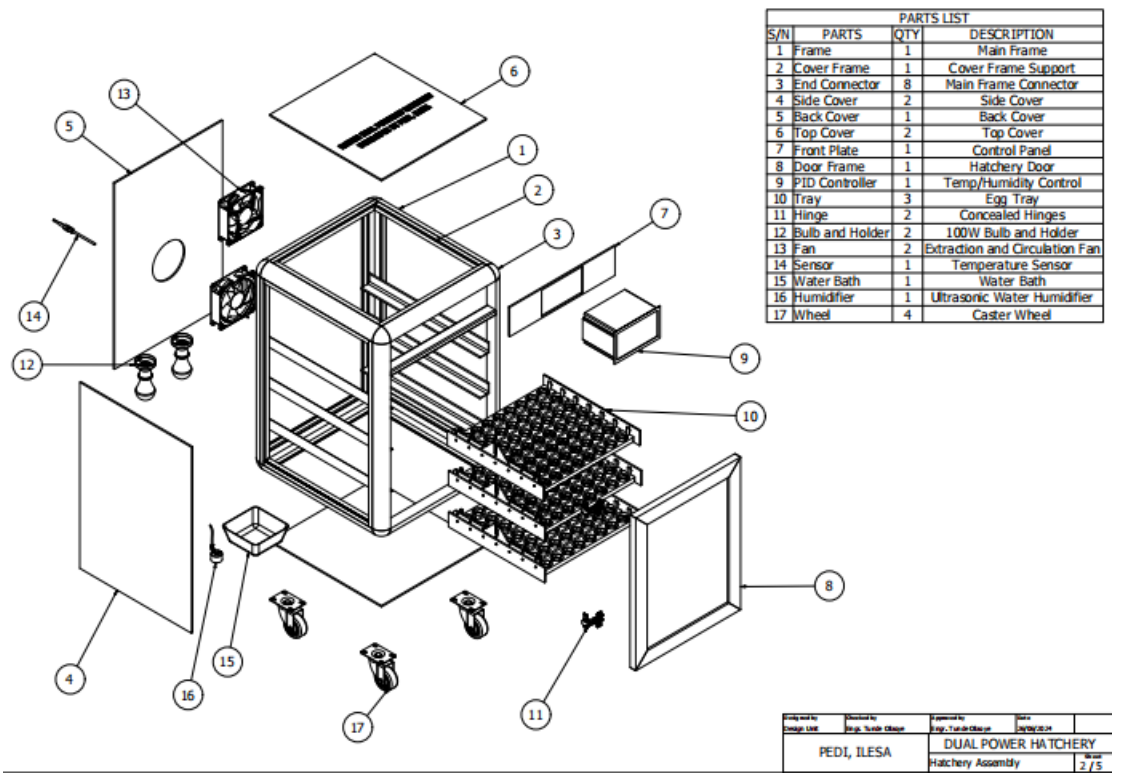


Fig 1: Detailed diagrams and illustrations of the NASENI ProHatch 300


PARTS LIST
S/N | PARTS | QTY | DESCRIPTION
1 | Frame | 1 | Main Frame
2 | Cover Frame | 1 | Cover Frame Support
3 | End Connector | 8 | Main Frame Connector
4 | Side Cover | 2 | Side Cover
5 | Back Cover | 1 | Back Cover
6 | Top Cover | 2 | Top Cover
7 | Front Plate | 1 | Control Panel
8 | Door Frame | 1 | Hatchery Door
9 | PID Controller | 1 | Temp/Humidity Control
10 | Tray | 3 | Egg Tray
11 | Hinge | 2 | Concealed Hinges
12 | Bulb and Holder | 2 | 100W Bulb and Holder
13 | Fan | 2 | Extraction and Circulation Fan
14 | Sensor | 1 | Temperature Sensor
15 | Water Bath | 1 | Water Bath
16 | Humidifier | 1 | Ultrasonic Water Humidifier
17 | Wheel | 4 | Caster Wheel
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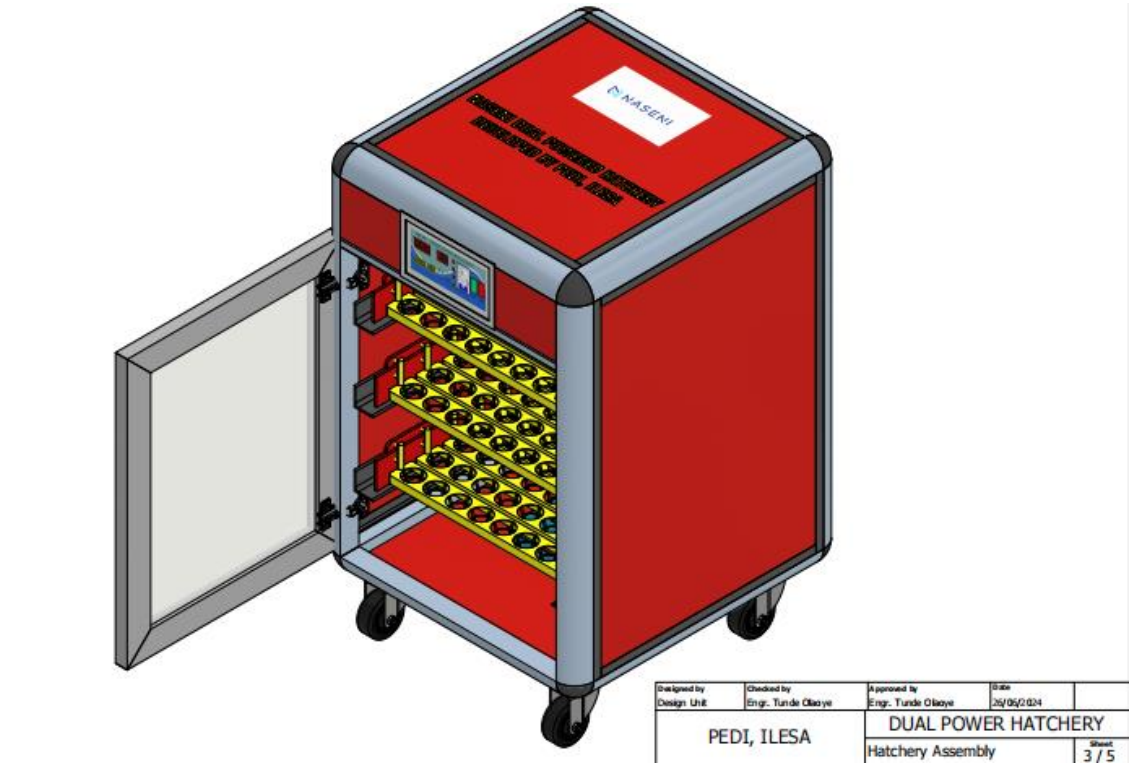
DUAL POWER HATCHERY
Hatchery Assembly
2 / 5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DUAL POWER HATCHERY
Hatchery Assembly
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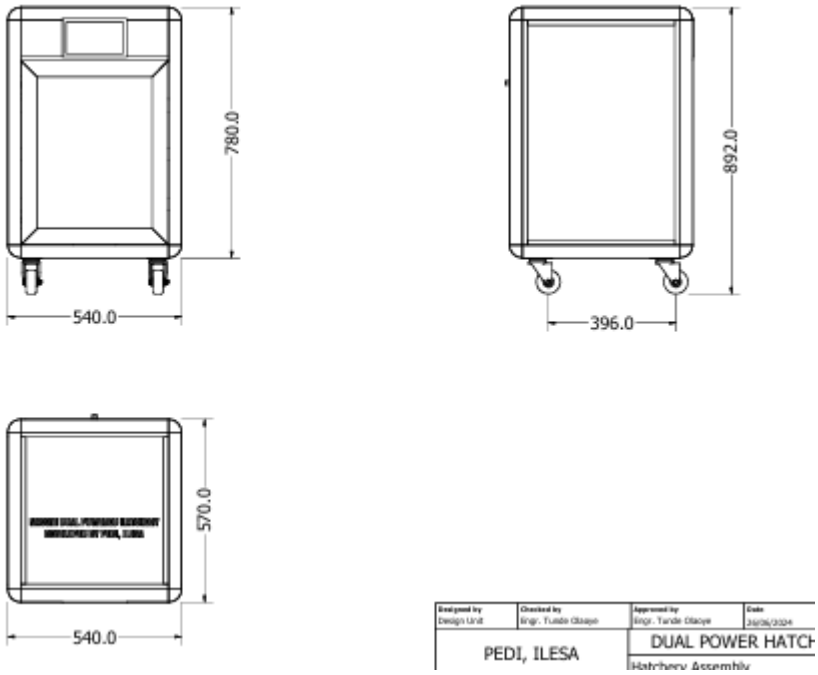
Fig 2 and 3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PEDI, ILESA
DUAL POWER HATCH

Fig 4


DUAL POWER HATCHE

Fig 5

Fig 6

2.4 Collaborations for Production

2.4.1 Prototype Production

The prototype of the NASENI ProHatch 300 will be developed in collaboration with local manufacturers and technical partners who have expertise in poultry farming equipment and renewable energy systems. This collaboration will ensure that the prototype meets the highest standards of quality and performance.

2.4.2 Commercial Production

For commercial production, we plan to enter into Memoranda of Understanding (MoUs) with established manufacturers and distributors in the poultry farming industry. These partnerships will facilitate the mass production and distribution of the NASENI ProHatch 300, making it accessible to a wider audience.

2.4.3 Timeline for Production

Step	Activity	Duration
1	Background Studies	1days
2	Purchase of Raw and Standard Parts	2 days
3	Engineering Design and Modification	4 days
4	Manufacturing of Parts	7 days
5	Assembly of Parts into Sub-assemblies and Final Assembly	1 day
6	No Load Testing of Machine	1 day
7	Modification Where Necessary	1 day
8	On-load Testing of Machine	1 day
9	Modification Where Necessary	1 day
10	Final Testing of the Machine	1 day
11	Documentation	1 day
12	Delivery	1 day
Total		22 days

3.0 COST ANALYSIS

3.1 Cost Estimate Proposal

S/N	Item	Units	Units Cost (₦)	Cost (₦)	Remark
1	Procurement of raw materials;				
	1. Aluminum composite board (1200 x 2400 x 3)	1	30000:00	30000:00	
	2. Aluminum frames (40 x 40 curve)	1	13500:00	13500:00	
	3. Angle Iron (40x 40)	1	21500:00	21500:00	
	4. Reinforced glass door (450 x 500)	1	7,000:00	7000:00	
	5. Corner cap	8	1,000:00	1000:00	
	6. Lock style	1	11500:00	11500:00	
	7. 40 x 40 bead	1	7500:00	7500:00	
	8. 01 Rubber	4	9000:00	36000:00	
	9. Casement handle	1	2200:00	2200:00	
	10. 4mm screw	1pack	2700:00	2700:00	
	11. Hinges	2	2500:00	5000:00	
	12. Castor wheel	4	6000:00	24000:00	
2	Purchase of standard parts				

S/N	Item	Units	Units Cost (₦)	Cost (₦)	Remark
	1.XM- 18D Controller	1	150000:00	150000:00	
	2. Circulation fan (150w 12v)	1	68125: 00	68125:00	
	3. Humidity sensor	1	35150:00	35150:00	
	4. Temperature sensor	1	40000:00	40000:00	
	5. Ventilation fan blower 6” 240m^3/hr	1	30000:00	30000:00	
	6. Connection wire	1roll	65000:00	65000:00	
	7. Deep cycle Battery 12v 200AH	4	300000:00	1200000:00	
	8. Hybrid inverter 220/12 VDC, 1KVA	1	266437:00	266437:00	
	9. Solar panel 500w	1	206250:00	206250:00	
	10. Automatic tilting tray + steeper motor	4	40000:00	160000:00	
	11. Humidifier ultrasonic mist fogger	1	70125:00	70125:00	
	12. Heating element (PTC) 120w, 240v	1	20625:00	20625:00	
	13. Power pack	1	80120:00	80120:00	
3	Manufacturing of (dual automated hatchery)’		60000:00	60000:00	Cutting, fitting, painting Installation

S/N	Item	Units	Units Cost (₦)	Cost (₦)	Remark
4	No-load and On-load testing		5,000	5000	
5	Documentation		160000:00	160000:00	Engineering drawing Operational layout and Assembly
6	TOTAL		1,626,232:00	2,778,732:00	

4.0 MARKETABILITY

4.1 Importance of Project

The NASENI ProHatch 300 is designed to address the critical needs of small and medium-scale poultry farmers by providing a reliable, energy-efficient, and portable solution for hatching eggs. This project will:

1. Enhance the efficiency and sustainability of poultry farming.
2. Reduce operational costs and environmental impact.
3. Improve food security and economic opportunities in rural communities (Economic Commission for Africa, 2023).

4.2 Market Space

The potential market for the NASENI ProHatch 300 includes:

1. Small and medium-scale poultry farmers.
2. Hatchery operators.
3. Agricultural organizations and cooperatives.
4. Government and non-governmental organizations focused on rural development and food security (National Poultry Association, 2024).

4.3 Strategy and Collaborations for Marketing

To ensure the successful marketing and adoption of the NASENI ProHatch 300, we plan to:

1. Develop comprehensive training materials and support systems for users (NASENI, 2024).
2. Collaborate with local manufacturers and distributors for mass production and distribution (National Poultry Association, 2024).
3. Partner with agricultural organizations to promote the benefits of the NASENI ProHatch 300 (World Poultry, 2022).
4. Conduct field trials and gather user feedback to continuously improve the product (Agricultural Engineering Journal, 2022).

5.0 SWOT Analysis

5.1 Strengths

- Innovative Dual Power System: Ensures continuous operation even in areas with unreliable power supply.
- Energy Efficiency: Reduces operational costs and minimizes the carbon footprint.
- Portability: Easy to transport and set up, making it accessible to farmers in remote areas.

- Advanced Control Systems: Ensures optimal incubation conditions, leading to higher hatch rates.

5.2 Weaknesses

- Initial Investment: The initial cost may be high for some small-scale farmers.
- Technical Expertise: Requires technical knowledge for installation and maintenance.

5.3 Opportunities

- Growing Demand: Increasing demand for sustainable and efficient poultry farming solutions.
- Government Support: Potential for government subsidies and grants to support the adoption of renewable energy technologies.
- Market Expansion: Opportunity for expansion into international markets.

5.4 Threats

- Competition: Existing hatchery technologies may pose competition.
- Price Fluctuations: Fluctuations in the cost of raw materials and energy prices.
- Regulatory Changes: Policy changes that may impact the poultry farming industry.

6.0 CONCLUSION

The NASENI ProHatch 300 represents a significant leap forward in poultry farming technology. By integrating dual power sources, advanced control systems, and renewable energy, this hatchery offers a sustainable and efficient solution for small and medium-scale farmers. The project is feasible, marketable, and poised to make a substantial impact on the agricultural sector. We believe the NASENI ProHatch 300 is a worthy investment that will contribute to improved food security and economic development in Nigeria (Economic Commission for Africa, 2023).

7.0 REFERENCES

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