COVER PAGE AND DECLARATION

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Introduction

The industry is rapidly evolving, and companies are facing difficulties and pressures to balance and achieve the equation between operational efficiency and environmental sustainability. Therefore, the ability and capacity to facilitate operations and work on implementing social responsibility have become an important element in order to maintain competitiveness and achieve a top position in the future. A good example of this is Big Green Tractor, a tractor manufacturer located in Palembang, Indonesia, where its growth has declined in recent years. This has forced the company to review its operations in order to reform them and improve performance and efficiency, and seek to reduce costs and avoid environmental impact. This report seeks to provide a comprehensive operational guide that contributes to achieving the goals of Big Green Tractor.

This report aims to study and evaluate the company's existing operational processes and establish realistic, implementable recommendations that simplify production and overcome defects and problems, taking into account environmental conservation and the path of green manufacturing. This report consists of two main parts: a procedural guide to simplify industrial processes and a practical guide that bears social responsibility for pollutants. The first part aims to develop and improve the company's manufacturing processes through advanced methods and techniques to reduce costs and defects and use 21st century materials and tools to define and build a modern, advanced, environmentally friendly system. The second part focuses on the company's responsibilities towards the environment by establishing mechanisms and guidelines that contribute to the proper disposal of chemical waste, while drawing up a plan of real recommendations for green alternatives and moving away from old and traditional manufacturing methods.

The many obstacles that represent a stumbling block for Big Green Tractor, such as high production costs, weak and sometimes non-existent efficiency in manufacturing processes, in addition to the laws and regulations that burden it with pressures for environmental sustainability, all contributed to the decline in the company’s growth, and it became necessary to work on improving operational capabilities. The recommendations contained in this report remain a roadmap to enhance operational efficiency and provide appropriate solutions for Big Green Tractor to become the pinnacle of sustainable manufacturing.

This report analyzes all current operations in the company, identifies the best methods and practices in the industry, and works to implement new methods in green industry according to new theories, academic research, situation analysis, and compliance with approved standards so that they become a tangible reality when the recommendations are implemented. The main goal remains to support The Big

Green Tractor to regain its position and achieve a balance between profitability and sustainability in the coming years in the face of competition that places environmental care at the forefront.

SWOT Analysis for The Big Green Tractor

S STRENGTHS	W WEAKNESSES	O OPPORTUNITIES	T THREATS
1. Brand reputation: -Big Green Tractor's reputation stems from its long-standing presence in the industrial tractor market, which serves to build customer loyalty. **2-Skilled labor:** The company has a trained and experienced workforce in tractor manufacturing which helps in improving productivity and quality. **3-Strong Distribution network:** The company is likely to have a strong distribution network especially within Indonesia and	**1-Growth Decline:** **-**Big Green Tractor is experiencing a decline and declining growth, which indicates that it is facing several problems, which may be in the products themselves, operational inefficiency, or the inability to confront competitors. **2- Poor production processes:** The company's manufacturing processes are likely to be outdated, which will certainly lead to poor operational efficiency, higher costs, and higher defect rates in products. **3- Poor technology integration:** Depending on the situation, the company may not have kept up	**1-Fostering Lean Manufacturing:** By applying lean manufacturing's principles such as JIT inventory and using technology such as automation and robotics, Big Green Tractor will be able to control expenses and costs and improve production and operational efficiency. **2-Green Manufacturing Initiatives:** There is never a better opportunity to implement green practices that reduce carbon emissions, recycle waste and use renewable	**1-Intence Competition:** There are strong global companies in the same field of manufacturing industrial tractors, and this is what drives Big Green Tractor to be distinguished by using technology, quality, and competitive price. **2- Raw material price:** The instability of the prices of raw materials such as steel and other metals sometimes contributes to increasing production costs, which affects profitability. **3-Environmental Legislations:**

nearby places due to its long history in the market which makes it easier to serve customers in the required manner. **4- Product variety:** The company's product diversity of tractors and agricultural machinery contributes to serving different segments in the market.	with technological developments and is not using technology in manufacturing such as automation, data analysis and engaging in sustainable practices which are considered to be the most important strengths in the market to compete. **4-Environment's Relationship:** Outdated manufacturing processes can result in hazardous waste and chemical emissions, which can damage a company's reputation.	energy, which is what attracts environmentally friendly customers. **3-New markets:** New markets in Southeast Asia appear to be important opportunities for expansion, especially with the growing demand for industrial machinery in agriculture. **4- Government support:** Governments financially support companies that adopt environmentally friendly practices.	Environmental laws and regulations are a pressure factor on Big green tractor company, to combat pollution and use environmentally friendly technologies. **4-Economics Downturns:** The demand for tractors and agricultural machinery remains dependent on the pace of the global economy, especially in the agricultural and construction sectors.

Strategic Plans Based on SWOT Analysis:

1-Strenghts + Opportunities (SO Strategies)

-Work on using the company's reputation and name in the market with relying on the wide distribution network in order to expand in emerging markets and manufacture environmentally friendly products to gain customers.

-Rely on the experienced and skilled workforce in order to build lean manufacturing lines that rely on technologies to reduce costs and avoid defects.

2- Weaknesses + Opportunities (WO Strategies)

-Using modern technology and techniques to control and address old production processes such as automation, artificial intelligence and green practices to improve productivity and stop environmental impact.

-Focusing on using green manufacturing techniques to reduce pollutants and keep pace with laws and regulations and invest in sustainable product markets.

3- Strengths and Threats (ST Strategies)

- Strengthening the brand's reputation by declaring environmental responsibility and supporting sustainable production activities and initiatives and reducing environmental pollution.

- Exploiting distribution networks and skilled labor to maintain competitiveness by improving product quality and customer satisfaction.

4- Weaknesses + Threats (WT Strategies)

-Start investing in research, innovations and new services that meet customer needs to address declining growth.

-Comply with laws and standards adopted in environmental conservation in order to prevent fines and defamation to maintain the company's reputation.

»»»»» After conducting a SWOT analysis, Big Green Tractor can identify areas for improvement and exploit potential opportunities for growth, which clearly contributes to making the right decisions regarding operational efficiency and environmental responsibility.

PESTLE Analysis for BIG GREEN TRACTOR

Political Factors:

1-Government Policies: - Government regulations and laws regulate the field of manufacturing in Indonesia including taxes, subsidies and green technology incentives seem like barriers that could affect Big Gren Tractor.

- The company will begin implementing policies around environmental sustainability.

-One of the factors that positively affects Indonesia is political stability, and this supports plans for expansion and spread.

2. Trade regulations and Customs Tariffs: Changes in import and export tariffs and trade regulations are factors affecting the costs of raw materials, especially those imported from other countries, which puts pressure on the cost of production and makes it difficult to access key supplies.

Trade relations between Indonesia and other countries may change by opening new markets or by changing rules and regulations, which prevents access to new markets.

3. Agricultural Industry and Government Support: -Government subsidies target companies that work in the field of agriculture and enhance local production of machinery and tractors, and thus Big Green Tractor Company may benefit from them.

Economics Factors:

1. Economic growth in Indonesia

The growth of the economy in Indonesia and the Southeast Asian region will affect the demand for agricultural tractors, which will lead to an increase in agricultural activities and an increase in the demand for agricultural equipment.

The cost of imports can be affected by inflation and currency fluctuations, especially the cost of manufacturing and raw materials.

2. Consumer purchasing power:

-The purchasing power of the consumer, especially farmers and agricultural companies, is affected when economic contractions occur, and thus consumption decreases, and this harms BIG Green Tractor sales.

- Rural communities are affected by market fluctuations and become unable to afford expensive agricultural machinery, and this will be one of the main factors in changing the company's sales strategies.

3. Labor costs:

-This is especially evident in labor costs in Indonesia, especially minimum wage laws, and this affects the operational costs of Big Green Tractor.

-Profitability may be affected by increased labor costs unless improvements in efficiency are made.

Social Factors

1. Demographic growth:

-The motivation to continue traditional agricultural methods may be affected if the population ages and young people are reluctant to use tractors and old agricultural machinery.

-Population growth in rural areas may lead to increased demand for tractors and machinery.

2. Changing consumer habits:

-Today's consumer has become more aware of environmental sustainability and the right of future generations to a green and healthy environment. Consequently, the market demand for environmentally friendly green products has increased, and this is what drives Big Green to develop its methods and products in order to keep pace with these changes in consumer behavior.

- Knowledge of technology may lead to its opacity in rural areas when using machines that rely on automated systems and are highly energy efficient.

3. Workforce's Care:

-The company must be widely aware of social variables related to the well-being and rights of employees. Providing wages, incentives, and training opportunities can improve employee satisfaction and productivity.

Technological Factors

1. Technological development of manufacturing:

-Thanks to new manufacturing technologies, Big Green Tractor can rely on automation, robotics, and artificial intelligence to streamline production processes, reduce costs, and reduce defects.

-Predictive maintenance can be implemented through the Internet of Things so that Big Green Tractor can increase machine uptime and operational efficiency.

2. Environmentally Friendly Technology:

-Waste-to-energy and sustainable production techniques such as energy-efficient machines and renewable energies can reduce Big Green Tractor's environmental impact and lower operating costs in the long term.

-It is possible to benefit from the presence of digital twins and data analysis in order to improve production processes and reduce waste to achieve the company's goals.

3. Product Innovation and the Role (R&D):

-Big Green Tractor Company must continue to invest in research and development in order to compete strongly and meet the needs of the agricultural market.

- Making and innovating more efficient, durable and environmentally friendly tractors can set Big Green Tractor apart from the rest of the competitors.

Legal Factors

1. Environmental laws and regulations:

-Big Green Tractor must modernize production facilities to comply with sustainability and waste disposal standards under laws related to waste disposal and pollution control in Indonesia.

2.Labor Law:

-The company must work in accordance with the labor law, especially achieving the minimum wages, working hours, and employee rights, to avoid legal disputes and damage to its reputation.

3.Intellectual Property:

When developing new technologies and designs for agricultural equipment and machinery, Big Green Tractor must take into account intellectual property laws in order to protect patents, trademark and innovations.

4.Health and Safety Laws:

-For a safe and sound environment for employees and to avoid accidents and legal liabilities, Big Green Tractor must adhere to health and safety laws.

Environmental Factors

1.Climate changes:

-Climate change may affect the behavior of Big Green Tractor customers, as agricultural productivity is affected by various weather patterns, and the demand for more powerful, solid, and weather-resistant tractors may increase.

-Agricultural operations may require changes to machinery design to meet the demands of new farming techniques associated with climate change.

2. Environmental sustainability and its pressures:

-Big Green Tractor Company can benefit from environmentally friendly technologies such as electric tractors or the use of renewable energies to confront pressures to reduce emissions and contribute to global sustainability.

- Activating sustainable practices to reduce harm to the environment, such as water conservation and the use of recycled materials in production.

3. Availability of Raw Materials:

-The availability of key raw materials such as steel and rubber used in tractor production is likely to be affected by storage regulations and resource depletion.

-To ensure a steady supply, Big Green Tractor must manage its supply chain while minimizing environmental damage.

Strategic Implications Based on PESTLE

1.Political and legal:

- Big Green Tractor must engage in sustainable practices to meet government expectations, secure incentives and advertising, and comply with environmental regulations to avoid violations and legal penalties and ensure long-term market presence.

2.Economic:

The company's pricing strategies remain dependent on economic conditions, including labor costs and the purchasing power of target consumers. Therefore, the correct procedures and measures through cost reduction and product differentiation will enable Big Green Tractor to maintain competitive prices even during periods of economic recession.

3.Social:

-The change in consumer behavior and its shift to preferring environmentally friendly products will push Big Green Tractor to adopting green technologies in production, in addition to understanding demographic changes in rural communities that will contribute to planning and designing strategies and sales for the company.

4. Technology:

-Increasing efficiency, reducing waste, and maintaining competitiveness, it is about investing in advanced technologies for manufacturing and sustainable practices.

5.Environmental:

Improving the brand's image and marketing premise to environmentally conscious consumers is achieved by complying with regulations, avoiding environmental sustainability pressures, and working on energy-efficient manufacturing and reducing emissions.

This **PESTLE** analysis contributes to studying the situation of **Big Green Tractor** and helps to understand the various environmental factors that could affect all its operations, strategies and position in the market, which helps in making the right decisions as it works to lean manufacturing processes and implement environmentally friendly practices.

SMART Objectives for Big Green Tractor

1. Reducing manufacturing costs within 12 months by 15%

-Specific: To reduce overall production costs, cost-effective manufacturing processes must be implemented.

-Measurable: achieving a 15% reduction in manufacturing costs.

- Attainable: This is achieved by analyzing current processes, identifying defects, and adopting modern, waste-free technologies.

-Relevant: To improve profitability and address declining growth, cost reduction is important.

-Time-bound: This goal will be achieved within 12 months.

2. Reduce defect rates by 20% within 18 months.

-Special: Improving quality control procedures to reduce defects in the manufacturing process.

-Measurable: Reduce defect rates by 20%.

-Achievable: through applying Six Sigma methodologies, training employees, and developing quality inspection tools.

-Relevant: Reducing defects equals improved product quality and customer satisfaction.

-Time-bound: This goal will be achieved within 18 months.

3. Adopt at least two green manufacturing technologies within 24 months.

- Specific: Introduce environmentally friendly technologies into production processes.

- Measurable: Implement at least two technologies (such as solar energy and waste recycling systems)

- Attainable: Through alignment with the company's sustainability goals and investment in advanced technologies and continuous research.

- Relevant: As a result of green technologies and compliance with environmental regulatory standards, the company's environmental footprint will be reduced.

- Time-bound: The goal will be achieved within 24 months.

4. Achieve 100% compliance with industrial waste disposal standards within 12 months.

-**Specific**: Ensure that all chemical waste is disposed of according to approved standards.

-**Measurable**: Achieve 100% of waste disposal regulations.

-**Attainable**: Based on conducting a waste audit, updating disposal methods, and preparing and training employees to deal with it.

-**Relevant**: Proper waste disposal is essential for environmental responsibility and compliance with regulations and laws.

-**Time-bound**: Within 12 months.

5. Increase energy efficiency by 10% within 18 months.

-**Specific**: Rationalize energy consumption in manufacturing processes.

-**Measurable**: Achieve a 10% reduction.

-**Attainable**: By updating machinery, improving production plans, and implementing energy saving methods.

-**Relevant**: Ensure the company's goal of reducing its environmental impact and lowering operating costs is consistent with energy efficiency.

-**Time-bound**: 12 months

How These Objectives work with Big Green Tractor

- Cost efficiency: The first objective focuses on the urgent need for efficient manufacturing processes that reduce costs.

- Improving product quality: The second objective is based on reducing defects, which is the basic requirement.

- Environmental responsibility: Adopting green technologies, proper disposal of waste, and reducing the negative impact of the company on the environment.

- Time-bound: A clear timeline for implementing recommendations and achieving goals.

The **Boston Consulting Group (BCG) Matrix** helps in analyzing **Big Green Tractor's** products and make strategic recommendations:

1.Stars (High market Growth, High market Share) **- Electric and hybrid tractors:** When manufacturing electric or hybrid tractors, demand may be higher than expected due to sustainability trends, which requires investment in R&D and production expansion.	**3. Question Marks (high market growth and low market share)** **- Automated tractors and artificial intelligence:** The company may have high potential if it develops tractors to become automated or work with artificial intelligence, and this requires a large investment and professional marketing to gain new markets.
2. Cash Cows (low market growth, high market share) **- Conventional diesel tractors**: may provide steady cash flow, but they are now in a declining market, so the company should use those profits to fund green technology, improve operational efficiency, and reduce costs.	**4. Dogs (low market growth and low market share)** **- Old machines and manufacturing methods:** They should be gradually eliminated until things become more efficient and search for environmentally friendly alternatives.

Organizational strategies aim to improve efficiency and sustainability at Big Green Tractor:

1. Strategic Planning of the workforce: Ensuring the sufficiency of the appropriate number of highly trained and experienced employees for efficient production, which helps reduce costs and reduces production stoppages.

2. Wise Management: Adopting modern, advanced and innovative manufacturing methods at a lower cost that are environmentally friendly and encourage initiatives to reduce waste and emissions.

3. Performance Measurement and Continuous Improvement: Establishing the foundations of standards to monitor efficiency, quality control and all sustainability efforts with flexibility in plans for continuous improvements in all operational processes.

Big Green Tractor must set clear goals by streamlining operations and promoting environmental responsibility to align with functional strategies:

- Operations Strategy:

- Total quality to improve product reliability.
- Improve product design to reduce time and energy consumption.
- Develop inventory control using real-time tracking technologies.

- Marketing Strategy:

- Advertising environmentally friendly manufacturing
- Organizing campaigns and advertising for less expensive and environmentally friendly tractors.
- Implementing strategic partnerships with environmentally friendly industries.

- Financial strategy:

- Investing in automation, supporting renewable energy and adopt
- Taking government support, incentives and subsidies for sustainable practices.
- Reviewing general costs and improving their management

-Human resources strategy:

- Preparing and training employees on sustainable production methods.
- Spreading the culture of innovation and assigning incentives for it.
- Working with labor laws and not violating them.

-Research and development strategy

- Innovating fuel-efficient tractors and investing in renewable energy.
- Improving product durability
- Developing technologies in line with sustainability.

Big Green Tractor Forecasting:

1- Demand Forecasting

-Working through historical sales data, analyzing it and linking it to industry trends in order to forecast future demand.

-Implementing artificial intelligence and analyzing all data to adapt to seasonal changes.

-Studying global expansion opportunities.

2-Financial Forecasting

- Revenue and cost forecasts based on efficiency improvements.
- Study and evaluate investment needs in automation and sustainability.
- Determine the return on investment in a green manufacturing initiative project.

3-Operational Forecasting

- Develop and improve inventory levels using predictive analytics.
- Predict manpower needs based on production schedules.
- Ensure ease and flexibility in supply after analyzing the availability of raw materials.

4-Sustainability Forecasting

- Monitor and measure carbon emissions reduction from green initiatives.
- Record the impact of waste reduction and recycling.
- Energy savings forecasts after using renewable energies.

Category	S Suppliers	I Input	P Process	O Output	C Customer
	-Raw materials -Energy providers -Technology vendors -Waste management companies	-Raw materials -Labor -Energy -machinery and equipment	**1-Design and prototyping:** designing new tractor (CAD Software) **2-material Sourcing:** procure	-Ready to use tractors. -packaging materials. -chemical waste and emissions.	-Agricultural business -Distributers and dealers -local communities

Details			raw materials from suppliers. **3-Manufacturing:** Assemble tractors using automated machineries. **4-Quality Control:** Inspect the operation using the 6 Sigma methodologies. **5-Pachaging and Shipping:** Preparing tractors to be delivered to customers. **6-Waste Management:** Handling chemical waste and recycling materials.	-operational data	

How SIPOC helps Big Green Tractor?

By applying **SIPOC,** you can deduce a whole approach to improve Big Green Tractor's operations and environment performance.

How to apply DMAIC Model on Big Green Tractor?

1-Define:

-Problem: inefficiencies in production, growth decline, and environmental emissions.

-**Goals**: Reducing the cost according to streamline process.

-Manufacturing process to minimize defects.

-Reducing pollution by implementing greener processes.

-**Stakeholders**: suppliers, employees, customers, regulations bodies, and local communities.

2-Measure:

-Objective: Study the current situation after collecting the suitable data.

-Key Metrics: Defect rate, production cycle time, energy consumption and waste, and consumer satisfaction level.

Methods to collect data:

-Monitoring machine performance and energy usage by loT sensors.

-Customers feedback.

-Identifying trends by analyzing historical production data.

-Deliverables: Current process performance's measurement.

3-Analyse:

Objective: Recognize the defects and inefficiencies' causes.

Techniques & Tools:

-Root Causes Analysis (RCA): use the 5 whys or Fishbone diagram to recognize the causes.

-Mapping Process: Identifying the bottlenecks and inefficiencies by visualizing the whole production.

-Data Analysis

-Deliverables: The causes and their impact on the process.

4-Improve:

Objective: Address the causes and finding appropriate solutions.

-Cost Efficiency: automate repetitive tasks.

-Defect Reduction: Provide employee training and use 6 sigma control measures.

-Sustainability: -Eco-friendly chemicals.

-Solar panels, water recycling systems.

-Deliverables: Detailed plan with precise time, responsibilities, and outcomes.

5-Control:

-Objective: Keep up with improvements when monitoring the process.

-Control Measure: Quality control and waste management by establishing Standard Operating procedures (SOPs)

-**Sustainability**: Tools and process training (Employees)

-Deliverables: Control plan

How POKE-YOKE can help Big Green Tractor?

It can help by : -Reducing defects

-improving efficiency

-Enhancing quality

Ex: -**Stopping Assembly Errors:**

Problem: Installing incorrect parts.

Poke-Yoke solution: using distinguished colors.

Ex: **Missing components in tractors**

Problem: Tractors shipped or stored missing components.

Poke Yoke Solution: Automated vision system to scan missing parts.

Ex: Facing over-production

Problem: Excess in inventory and waste caused by over-production

Poke-Yoke Solution: stop production by using sensors when inventory reaches the limit.

Conclusion:

Big Green Tractor faces major challenges, especially in maintaining operational efficiency and reducing defects, in addition to environmental challenges. This report is a roadmap to help and support the company in streamlining production processes and working on environmentally friendly policies. The recommendations remain a comprehensive guide for implementing them to achieve leadership in the field of manufacturing in a sustainable environment that carries a reputation for a socially responsible company.

Key Recommendations

1- **Streamline operations:** Implement lean manufacturing aiming at reducing costs and realizing efficiency.

-Implement 6 Sigma methodologies and Poke-Yoke to reduce defects and gain time.

-Usage of 21st century tools like IoT, AI,3D printing to enhance eco-friendly processes.

2-Sustainability:

-Working on industrial standards for chemicals waste and pollution.

-Using green alternatives such as renewable resources, and water recycling systems.

3-Social Responsibilities:

-The company corporate social responsibility goals should be realized.

-Gaining local communities trust to sustainability.

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