EUROPEAN INTERNATIONAL UNIVERSITY

Paris, France

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COVER PAGE AND DECLARATION

	Master of Business Administration (M.B.A.)
Specialization:	Operations Management
Affiliated Center:	CEO Business School
Module Code & Module Title:	MGT550
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Student ID:	
Word Count:	3556
Date of Submission:	28-agu-2025

I confirm that this assignment is my own work, is not copied from any other person's work (published/unpublished), and has not been previously submitted for assessment elsewhere.

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DATE: 28-8-2025

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1. Introduction

The Big Green Tractor in an Industrial Tractor Company Based in Palembang, Indonesia. Is undergoing operational challenges marked by declining growth and efficiencies. To address those concerns, the company seeks to implement streamlined processes that enhance Production efficiency, reduce costs, and align with global environmental And social responsibility standards. My guide will present a framework to optimize manufacturing operations. And integrate sustainable practices among different production processes.

Going back to our Case Study. Big Green Tractors Company has been experiencing Declining growth and operational inefficiencies in recent years. My report provides an analysis of the company's current situation, including its financial performance and operational challenges. And environmental impacts. This report also highlights opportunities for improvement and provides recommendations to help the company again with its competitive edge.

1.2 Company Overview

- Industry: Industrial Tractor Manufacturing.
- Location: Palembang, Indonesia.
- Market Position: Historical a strong player in the Southeast Asian Market but facing increasing competition from International Brands.

1.3 Analyzing - Current Situation

1.4 Declining Growth

The Industrial Sector usually faces cyclical downturns due to economic conditions, technological shifts, and global competition. Global economic shutdown shows in weak demand, high inflation and raising cost of raw materials and energy. Labor costs. Recent data from the Federal Reserve shows that industrial production in the US “Example” grew by 1.4% year-over-year in February 2025 with monthly increase of 0.7% in February following 03% in January. Historical comparison suggests this growth rate might be lower than the prior years, indicating a potential decline in the growth rate itself. not necessarily negative growth. and all that will reduce profit margin and since it’s a vital sector for the country, it must be supported with some strategies to ensure continuity and revive growth. Such as optimization and efficiency through lean manufacturing by reducing waste and improving operational efficiency and defect-free process using six sigma or Kaizen principle. And smart factories to cut labor costs. Control the logistics cost by localizing or diversifying suppliers. Take into consideration employee upskills, train them in automation, advanced manufacturing techniques.

In conclusion, when the industrial sector faces significant challenges. Strategic interventions in workforce enhancement. Supply chain resilience, digitalize the cost management, sustainability, and competitiveness can reverse the trend of declining growth rates.

1.5 Environmental Concern

We all know that Industrial operations are a major driver of economic growth but also negatively impact the environment and affect climate change. Either through air pollution

"Respiratory disease" or water Pollution "discharge toxic chemical – ecosystem destruction" and waste generation like hazards byproducts.

It is very important to prioritize implementation of some strategies to eliminate environment negative industrial impact:

● Transition to clear energy and process. As shift from coal/oil to renewable energy like wind/ solar /hydrogen. And use carbon capture and storage (CCS) for heavy industries

● Circular economy and Sustainable manufacturing. As recycle and reuse materials like metal and plastic. And design products for longevity and recyclability (cradle-to-cradle approach).

● Pollution control technologies. install scrubbers, electrostatic precipitators, and catalytic converters to reduce emissions. Apply filtration systems to treat industrial wastewater.

● Source raw materials from sustainable suppliers (certified mining. FSC wood). Use electrical logistic vehicles.

● Regulatory Compliance, ESG (environmental, Social, Governance) practices and follow EPA, EU Green deal. Adopt ISO 14001, disclose Carbone footprint.

Eventually. Industrial must adopt cleaner technology, waste reduction strategy, and stricter environmental policies to minimize harm. The shift toward green manufacturing, circular economies and digital monitoring can help balance industrial growth with ecological preservation.

1.6 Financial Performance

● **Revenue:** IDR 500 billion (down from 590 billion three years ago)

- **Profit Margin:** 5% (down from 10% Three years ago)
- **Operating Cost:** IDR 475 billion (up to IDR 450 billion three years ago)
- **Net Profit:** IDR 25 billion (down from IDR 59 billion three years ago)

1.7 Market Analysis:

- **Competitors:** John Deere, Kubota, Mahindra.
- **Customer Base:** Primarily small to medium-sized farms and construction Companies in Southeast Asia.
- **Trends:** Increasing demand for Eco-Friendly and Efficient Tractors.

2. Operational Industrial Streamline Procedural Guide.

2.1 Cost-Efficient Manufacturing Process:

Operational procedures are matter. For consistency that ensure the tasks are performed in same way every time this will create reliable outcomes and minimize errors and efficiency since well-designed procedures eliminate wasted steps and helping team to complete work faster with fewer resources. And we must take knowledge retention into consideration because documented procedures preserve institutional knowledge. Sensitive information remains safe with the Big Green Tractor Company when employees leave.

The required procedure must be with clear goal and manageable steps for everyone to understand its existence regardless of the expertise level and supported with simple language and flowchart, diagrams and images that will improve comprehensive and

retention of this procedure. While implementing this procedure and during the following up to ensure accountability ownership assignment must be there like who does what. And it's very important to categorize the critical processes as well into high-impact processes which are directly related to customer experience and cross functional workflows which are going on among departments and the compliance requirements and eventually to repeated tasks (daily operations with high volume) and it is necessary to document the process which provides a greatest ROI (return on investment).

Step 1: Mapping Current Workflow

- Through observing the current process in action collect all details- notes on each step and decision point.
- Interview process participants and talk to all people who perform the work their insights reveal nuances not visible through observation alone.
- start with documenting variations like noting different approaches for the same task. Since variations reveal valuable process improvements.
- initiate visual process map and diagram the workflow with standard symbols that usually make process with self-explanation.

Step 2: Analyzing Process Efficiency

- Once I mapped the current state. As a consultant for operation management hired by Big Green Tractor Company, I should start with my analysis of the process efficiency Like examples in average (35% of waste reductions,25% of time saving per process

Cycle, 40% errors decrease) then will recognize the bottlenecks, redundancies, and Unnecessary approved steps that slow down the process.

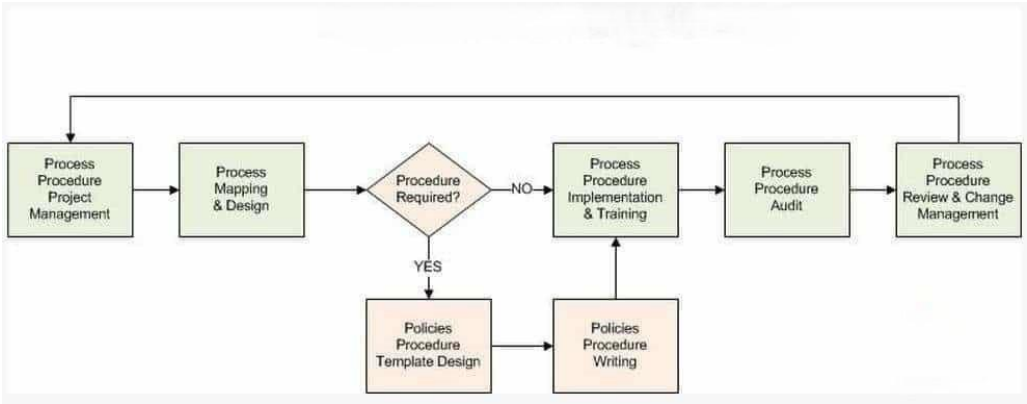
Step 3: Standardizing Best Practices

After identifying the variations in the process, I will document different approaches for the same task. And compare performance to recognize which method generates the best Results. And select those methods which achieve balances among quality-speed and Cost. Then start with the documentation and create the official procedure based on the Perfect approach.

Step 4: Documenting Procedures

After Collecting all consistent procedures, I will design a template and draft the content with step-by-step instructions and add visual elements that will help everyone to Understand it (diagram, screenshots) and finally review with all stakeholders and Validate accuracy with process participants. As below:

Big Green Tractor Operational Guide “Sample”



Step 5: Training and Implementation

Once comprehensive operational guide is ready. I will create videos, hands-on exercises That teaches new procedures. And conduct training sessions through group workshop and one-on-one coaching for different learning styles. Assuring that implementation Will take place gradually avoiding quick and sudden impact to ongoing operations. And provide continuous support during the transition period and offer readily available.

Step 6: Monitoring and Evaluation

Starting with performance metrics and track key indicators like cycle time. Error rates, And resources utilizations. User feedback is very important also, like collecting insights from people following the procedures to identify improvement opportunities. Detect gaps and note down the situations where procedures couldn't be followed to. Along with Regular Audit and conduct periodic reviews to ensure procedures remain current and

Effective.

Ultimately. Designing a new procedure guide is not that simple. Especially in implementation stage. Common challenges in development are there as time constraints when people struggle to prioritize documentation during busy periods. and involving staff in the early stages helps to minimize resistance to change. Focusing on clarity and simplicity of the information. As we know, documents become outdated quickly. It's mandatory to establish regular review cycles to keep content fresh.

► Cost-Efficient Manufacturing Process focuses on minimizing production expenses while maintaining (or improving) product quality, output speed and flexibility. According to my research in similar businesses. Strategies below can be used to achieve cost efficiency:

2.1.1 : **Lean Manufacturing**.

- Eliminate of waste (time-materials- energy…etc.) without sacrificing productivity.
- Just in Time (JIT) Production. Reduce inventory costs by producing only what is needed When it's needed.
- Kaizen (Continuous Improvement) small, incremental changes to improve efficiency.
- 5S Methodology. Organize the workplace (sort, set in order, shine, standardize, sustain)

2.1.2 : Automation and Smart Manufacturing.

- Robotics & AI: Automate repetitive tasks to reduce labor costs and errors.
- IoT & Predictive Maintenance: Sensors monitor equipment health to prevent costly Breakdowns.

- Computer-Aided Manufacturing (CAM): Optimizes machining processes for material Saving.

2.1.3 : **Design for Manufacturing (DFM).**

- Simplify product design to reduce material waste, assembly time, and complexity.
- Use standardized parts to lower procurement costs.

2.1.4 : **Economies of Scale.**

- Bulk Purchasing**.** control the price of raw materials bought in bulk quantity**.**
- MASS Production**.** Higher output reduces per-unit costs (fixed costs spread over More units)

2.1.5 : **Energy and Resources Efficiency**.

- Use energy-efficient machinery and renewable energy sources.
- Recycle scrap material (e.g., metal, plastic) back into production.

2.1.6 : **Outsource and Vertical Integration.**

- Outsource non-core processes (e.g., logistics, component manufacturing) to cheaper Suppliers.
- Vertical Integration: Control the supply chain (e.g., make components in-house) to Cut Supplier Costs.

2.1.7 : **Flexible Manufacturing System (FMS).**

- Use modular equipment that can quickly switch between products, reducing downtime.

2.1.8 : Total Quality Management.

- Reduce defects and rework costs by ensuring high-quality standards at every stage.

Combinations of the above. (Process Optimizations, smart technology. Waste reduction and strategic sourcing) in the said company “Big Green Tractor” will guaranty the concurrence.

2.2 Minimizing Defects:

Controlling and minimizing defects in industrial products is essential for maintaining Quality and it’s not just a quality goal. It’s a strategic necessity waste reduction and improve customer satisfaction. And to understanding

How well the process is performing. After process control and standardization has Completed. And training and engagement of employees done as encourage a culture of Continuous improvement. Establish clear tolerance for the product. I need to collect Information prior to implementing any quality enhancing tools.

Implementing **Total Quality Management (TQM)** at **Big Green Tractor (BGT)** which is an industrial manufacturing company. requires a structured approach to minimize defects, improve efficiency and enhance customer satisfaction. Below is a **step-by-step TQM implementation plan** designed specifically for Big Green Tractor Company.

Objective: Reduce defects in tractor manufacturing by 20% within 12 months (Example) While improving operational efficiency and customer satisfaction.

- **Step 1: Leadership Commitment and Vision**: clear quality goal must be set by Management. Initiatives must be in place. example (Zero Defect in 2025)
- **Step 2: Customer Centric Approach**: collecting feedback from customers on Tractor performance, maintenance, and after sale services. Categorize defects and highlight the top 5 defects compliance (Oil Leakage, Engin Heat, …etc.) by Conducting Survey with Farmers / Dealers. And Implement warranty claim analysis to track recurring defects.
- **Step 3: Employee Involvement and Training:** Train all employees in TQM Principles (PDCA, Six Sigma, Kaizen). Example – weekly quality circle collecting Suggestion and Ideas from workers about Defect-reduction.
- **Step 4: Process Optimization and standardization:** Example. will implement Standard Operating Procedures (SOPs) for welding and painting to reduce Variability.
- **Step 5: Continuous Improvement (Kaizen):** Encourage improvement daily.
- **Step 6: Supplier Quality Management:** Keep good relations with suppliers to ensure high quality raw materials. Ask for ISO 9001 for steel and hydraulic

Components suppliers. And conduct a site visit to reduce materials defects.

- **Step 7: Data driven decision Making:** I will follow some tools for monitor defects**.** Example. Using statistical tools like tracking defects per unit in one production batch.
- **Step 8: Benchmarking and Best Practices:** will compare quality metric set above with metric for companies doing same business. Looking for common positive practices.
- Sample of TQM framework for Big Green Tractor Company.

TQM Pillar	**Action Item**	**Responsible Team**
Leadership Commitment	CEO signs TQM policy & allocates budget	Top Management
Customer Focus	Monthly dealer feedback sessions	Sales & Quality
Employee Training	Six Sigma Green Belt certification program	HR & Production
Process Improvement	Kaizen events on welding defects	Engineering
Supplier Quality	Penalties for defective raw materials	Procurement
Data Analytics	Real-time SPC dashboard for assembly line	IT & Quality

Expected Outcomes:

- **20% reduction in defects** (e.g., hydraulic leaks, misaligned parts).
- **15% improvement in production efficiency** (less rework).
- **Higher customer satisfaction scores** (fewer warranty claims).

By implementing this **TQM model**, **Big Green Tractor** can achieve **higher quality standards**, **lower costs**, and a **stronger market reputation**.

The company can experience **Six Sigma** as a quality tool as well. By using data-driver approaches to reduce defects. DMAIC (Define, measure, Analyze, Improve, Control) framework can be applied to identify and eliminate defects. For instance, if a specific tractor component frequently fails. I will analyze the root cause and apply corrective measures.

Moreover. Big Green Tractor can prioritize the most common defects by applying other **Quality Control Tools**. such as Pareto Principle / chart which allows the company to focus on the most critical issues first.

2.3 21st Century Tools for Greener Processes:

Apparently. Big Green Tractor Company has an issue with the Environment. Pollutants come out from the production process. 21st Century Tools for Greener Processes is mandatory to align with

sustainability goal, Eco friendly Manufacturing, to reduce waste, energy consumption and environmental impact while maintaining high quality production. Here's how:

■ **Smart Manufacturing & Automation:**

Smart Manufacturing and Automation is a green tool that makes BGT companies control production process effectively through using IOT sensors and Predictive maintenance on Tractors and production lines may reduce downtime by predictive maintenance. Automate Assembly lines and AI driver quality control can enhance precision and speed while reducing Waste. Trying virtual simulation of manufacturing process optimize production efficiency Before going to live implementation.

■ **Energy-Efficient Production:** Control carbon print by integration with renewable energy. Wind / Solar powered factories reduce environmental impact. AI optimize energy use in real Time. Cutting costs and emissions. Recover waste heat by capture and reuse that will improve Energy efficiency.

■ **Sustainable Materials & Circular Economy:** Big Green Tractor manufacturing Industrial Tractors Using Metals. By using recycled metals and biodegradable components that will Reduce environmental impacts. And using 3D printing and additive manufacturing minimize Material waste in parts production. Set an end-of-life recycling program by designing tractors For easy disassembly and materials recovery. Closed-loop recycling of tractors tires.

■ **Precision Agriculture & Smart Tractors:** I recommend producing self-driving with

GPS-guided tractors that will reduce labor cost and optimize fuel. Transitioning to Electric-Hybrid tractors will reduce emissions and operating costs. Making BGTC generate tractors can leverage data for optimal planting, irrigation, and sustainably boosting yield.

■ **Supply Chain Optimization:** I'm always preferring to localize productions and minimize logistics fuel consumption**.** Modular manufacturing can cut transportations emissions. Ensure ethical sourcing of materials and track carbon footprints.

■ **Water & Resource Conservation:** recycling water in manufacturing reduces waste by Closing -looping water system. Applying smart irrigation systems will avoid overwatering.

■ **Employee & Community Engagement:** continuous training will reduce resources used in workforce. Example VR training. Achieving IOS 14001 or LEED certification boost brand reputation.

► **Sample Green Process Implementation at Big Green Tractor Company:**

Tool	**Application**	**Expected Impact**
IIoT Sensors	Monitor paint booth emissions	**20% lower VOC emissions**
AI Defect Detection	Reduce engine assembly defects	**15% fewer rejected units**
3D Printing	Lightweight brackets	**10% fuel efficiency gain**

Tool	Application	Expected Impact
Solar Energy	Power 30% of factory operations	**$50K/year energy savings**
Blockchain Sourcing	Track steel carbon footprint	**Certified low-CO_2 materials**

Easily we can recognize the benefits for Big Green Tractors Company:

- **Lower operational costs** (energy, waste and disposal).
- **Compliance with EPA/ISO 14001** environmental standards.
- **Enhanced brand reputation** as a **green manufacturer**.
- **Long-term sustainability** in a competitive market.

By integrating these **21st-century green tools**, Big Green Tractor can achieve eco-efficient production without sacrificing quality or profitability.

3. Socially Responsible Operational Guide:

Seemingly. Big Green Tractor has its production process with a pollutant and huge Environmental impacts. Nowadays we must think in different ways. What I mean is We need to use the power of the operation itself in a smart way not only to shape the market and economies. We need to be active and to contribute to keeping the environment healthy. And build stronger brand trust. When Big Green Tractor leads in green manufacturing and fair practices will not only future-proof their business but also contribute to a more sustainable and

equitable industrial ecosystem. I will try in this guide to explain social responsibility in Big Green Tractor Company Daily Practices.

And outline the principles, polices, and actionable strategies. By involving all parties, employees, Suppliers, customers …etc.

3.1 Industrial Standards on Disposal of Chemical Waste:

The Big Green Tractor Company must adhere to both National and Regional Standards Concerning the disposal of chemical waste. Adopting **ISO 14001** standards for environmental Management will ensure compliance and establish a framework for continual improvement. Bog Green Tractor also must comply with Indonesia's Ministry of Environment. And forestry regulation and participate in the proper program for the environmental performance assessment.

Chemical waste should be categorized, labeled, and stored in line with regulatory protocols. Dedicated waste treatment facilities must be installed for neutralizing hazardous substances before disposal. Regular audits and documentation of waste disposal activities, alongside staff training on how to use PPE (Personal Protection Equipment) Gloves, Glasses, (**OSHA** -Occupational Safety and Health Administration) keep in hazards substance store MSDS (Material Safety Data Sheet) that will help in emergency cases. Ensure accountability and regulatory alignment. Emergency response plans should be developed to handle accidental spills and environmental hazards. Restrict High-Risk Chemical "Carcinogen"

► Example for Chemical Waste Classification and Handling:

Category	Sample	Treatment Requirement
Corrosive Waste	Acid – Alkalis	Store in Resistant Containers
Toxic Waste	Heavy Metal Pb-hg/ Pesticide	Label – Hazards Symbol
Flammable Waste	Solvent- Ethanol	Fireproof Store
Reactive Waste	Peroxides -Cyanide	Store Separately

► **Example for Treatment and Disposal Method:**

Method	Applicability	Sample
Neutralization	Acid – Alkalis	Mixing HCI and NaOH to form Salt+ water
Bioremediation	Organic Pollutants	Using Bacteria
Solidification	Heavy Metal-Sludge	Mixing with Cement
Incineration	High Toxic/ Calorific	Burning Organic Solvent

3.2 Green Alternatives to Traditional Manufacturing Process:

As I mentioned above. to minimize environmental impacts. The Big Green Tractor Company must adopt Green Alternatives to Traditional Processes. Through move to sustainable processes, materials and technologies and implementing pertaining strategies from procuring raw materials stage ending with disposal stage. That will prioritize Lower environmental impact (reducing waste, emissions), renewable and non-toxic Inputs (using biodegradable, bio-based materials), energy efficiency (using solar, wind, hydrogen), and circular economy principles (planning for re-use, recycle, zero waste).

My recommendations to BGTC management to start with green alternatives:

● **Biodegradable/recycled Materials:** Big Green Tractor can use plant-based materials. Composite materials. recycled metal. Instead of traditional manufacturing processes.

● **Digital and Smart Manufacturing:** Big Green Tractor will implement AI and IOT (Internet of Things) to optimize energy efficient automation. Predictive maintenance.

● **Waste Reduction and Circular Economy:** following just-in-time principle (Lean Manufacturing) will minimize materials storage since receiving will be in functional location directly. And applying the same principle to production process will eliminate the waste.

● **Green Manufacturing Process:** I will advise how to reduce material waste during the process of production compared with subtractive methods. Using 3D printing or using of water- based paint and coating tractors.

► Adopting Green Alternatives is crucial since its not about environmental responsibility – its strategic business decision with financial, regulatory, and competitive advantages. by avoiding fines since governments worldwide are enforcing strict environmental laws (EU Green, US. EPA Regulations). And by cost saving and efficiency gain as lean manufacturing and circular system turns waste into revenue. Renewable energy cut operational costs. Closed-looped systems reduce dependency on expensive raw materials. According to Neilsen's research 66% of global consumers paid for sustainable products. And major corporations (IKEA, Apple. etc.) prioritize Green Suppliers in their supply chain due to risk mitigation because materials provided from secure resources.

Green Alternatives unlock new markets and accelerate bank financing process as banks and investors favor ESG (Environmental, Social and Governance) Compliant Companies.

4. Conclusion

In conclusion, the Big Green Tractor can achieve operational efficiency and environmental sustainability by implementing the recommendations outlined in this report. and adopting cost-efficiency manufacturing processes. Minimizing defects. And leveraging 21st century tools. The company can streamline its operations and reduce costs. Additionally, by adhering to industrials standards related to chemical waste disposal and adopting green alternatives, the company can minimize its environmental impacts and enhance its corporate social responsibility. Ultimately, a well-structured operational plan strengthens competitiveness, boosts productivity, and supports long-term business sustainability in the industrial sector. This dual focus on operational excellence and sustainability will create a resilient, forward-thinking enterprise capable of thriving in a market that increasingly values both performance and planetary responsibility. These changes will not only improve the company's bottom line but also position it as a leader in sustainable manufacturing.

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