COVER PAGE AND DECLARATION

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Executive summary

We will create a full operating zoning plan to re-ignite illustrate product demand fragmentation, manufacturing inefficiencies and speed to market. It uses lean manufacturing principles to mean automation of sustainable practices in a framework for environmental sustainability to improve competitiveness. The approach is based on DMAIC (Define, Measure, Analyze, Improve, Control). BGT SWOT analysis indicates the weaknesses being related to operations and sustainability and the strengths being in production capacity and preserved brand attractiveness. Lean manufacturing and 5S plan can be utilized to mitigate the waste. BGT will implement green manufacturing policies and establish rigorous chemical waste disposal guidelines that comply with environmental EPA, OSHA, and ISO standards. Expected Outcome : Reduce the defect rate from 15% to 5% (15% Product Increase) and reduce the Lead time by 25% from 8 weeks to 6 weeks

Introduction

Big Green Tractor will have to sustainability replenish by writing a complete operating procedure manual. Against that backdrop, our industrial excellence is now paired with a strategic advancement toward efficiency and environmental sustainability. This manual will focus on maximizing production, minimizing defects, and including sustainable production methods.

Operations management Operations management is the systematic management of industrial processes, ensuring that effective industrial production is planned and carried out. Step by Step Guide to Grasping The Big Green Tractor Age|This manual will give you Step by Step Guide for The Big Green Tractor to:

Minimization of environmental impact × Maximization of the production

Implement green and sustainable solutions.

Follows the environmental standard and waste management policy.

Explore innovative “greener” technologies.

And resource utilization efficiency, customer demand and quality control is to maximize; the control of production cycle and process optimization. It would then lead to enhanced productivity which in turn can reduce cost and lead to increased competitiveness.

We will share our operational goals, implementation plan, and risk management process to enable both our accountability and measure of our performance to enable sustainable growth.

Operational industrial streamline procedural guide

Operational Objectives

1. Reduce manufacturing lead time from eight weeks to six weeks within twelve months.

2. Decrease defect rates from 15% to 5% by implementing quality control measures.

3. Increase production output from 50 to 58 tractors per month through improved processes.

4. Achieve a 20% reduction in energy consumption per tractor unit produced.

5. Implement green manufacturing processes to reduce waste by 40% within 18 months.

6. Establish an ISO 14001-compliant environmental management system by Q4 2025.

7. Reduce carbon emissions by 25% through modernized equipment and processes.

8. Develop local supplier partnerships with 80% compliance to sustainability standards.

9. Achieve a 25% return on investment (ROI) within 36 months.

10. Reduce operational costs by 15% through efficiency improvements.

Performance Measurement and KPIs

KPIs to Measure the Success of our Operational Improvement Initiatives This table gives us a complete overview of the metrics we will track, what our targets are and which data collection we will implement to get what we need. Table 1

While all KPIs matter, however, we will take particular notice of manufacturing lead time, the defect rate, and the cost to operate. The following four metrics represent fundamentals of overall

competitiveness, and will be closely monitored by our management team. Achieving these KPIs with our target grouping numbers will be the primary metric when assessing the success of revitalization.

Table 1

Key Performance Indicator (KPI)

KPI	Current Value	Target Value	Measurement Method	Frequency	Responsibility
Efficiency & Productivity					
Manufacturing Lead Time	8 weeks	6 weeks	Track production order completion time in the ERP system	Weekly	Production Manager
Production Output (Tractors/Month)	50	60	Count finished tractors logged in the inventory system	Monthly	Production Manager
Defect Rate	15%	5%	analyse quality control reports and customer returns	Weekly	Quality Manager
Overall Equipment Effectiveness (OEE)	65%	80%	Track uptime, performance, and quality data from machines	Weekly	Maintenance Manager
Cost & Financial Performance					
Operational Costs	$500,000	$425,000	Track all manufacturing-related expenses in accounting system	Monthly	Finance Manager
Return on Investment (ROI)	10%	25%	Calculate ROI based on project costs and benefits	Annually	Finance Manager

Lean Manufacturing Strategies

Value Stream Mapping:

Value stream mapping use to visualize and analyze the entire flow of materials and information for producing tractors, from raw inputs to finished output (Sensei, 2023).

This exercise will be critical for identifying any places where you're wasting effort, or being inefficient, or where you may still be able to make further improvements as well. Mapping our processes out, we can see the waste in our current state. Though SIPOC stands for Suppliers, Inputs, Process, Outputs, and Customers, the difference here is that Value Steam Map (VSM) also provides a high-level description of how a process goes, from suppliers to end users. Figure 1

Throughput Lost by Unsolicited Transfer of Material: We feel we waste time at the time of transfer of material as per the process in the factory. So, basically, value stream mapping is our guide if we want to see how far can we decrease the transport distance with the material flow.. So one reason may be that some to-be-assembled materials are stored farther back than the line, and loading and transportation are taking too long. This waste is saved by shifting the storage area or a better thing handling system.

We suspect very long wait times between different steps of the domestication process. Value stream mapping helps us see how work moves through the process and recognize inventory or work that may be sitting on the ground not really being utilized. In one case, we might have tractors on one side of an operation waiting to be painted yet the paint booth is often at capacity. We can decrease these response times by properly modifying scheduling and/or capacity, by analysing paint booth usage.

Overproduction: As the demand for tractors is lower for the state duration than the number of tractors that can be built, as demonstrated above, it is easy to produce more tractors (currently) than what can be sold. This can result in excess stocks brooding capital and incurring storage costs. Through value stream mapping gaining insight on what the real demand of tractors is, we can see a excess of tractors being produced. We can then plan our productions at a granular level based on demand, hence optimizing the amount of inventory we stockpile. For instance, we might notice that we are making a certain kind of tractor more quickly than we are selling it.

The defect involves a material defect or a manufacturing defect leading to scrap, rework and delays. We will value stream map to our root causes around our defects and repair. So finally let's say we find that a particular welding process is responsible for a lot of bad welds. It is possible to avoid welding defects like porosity as well, through understanding the influences of the welding process, and altering the machines or welders accordingly.

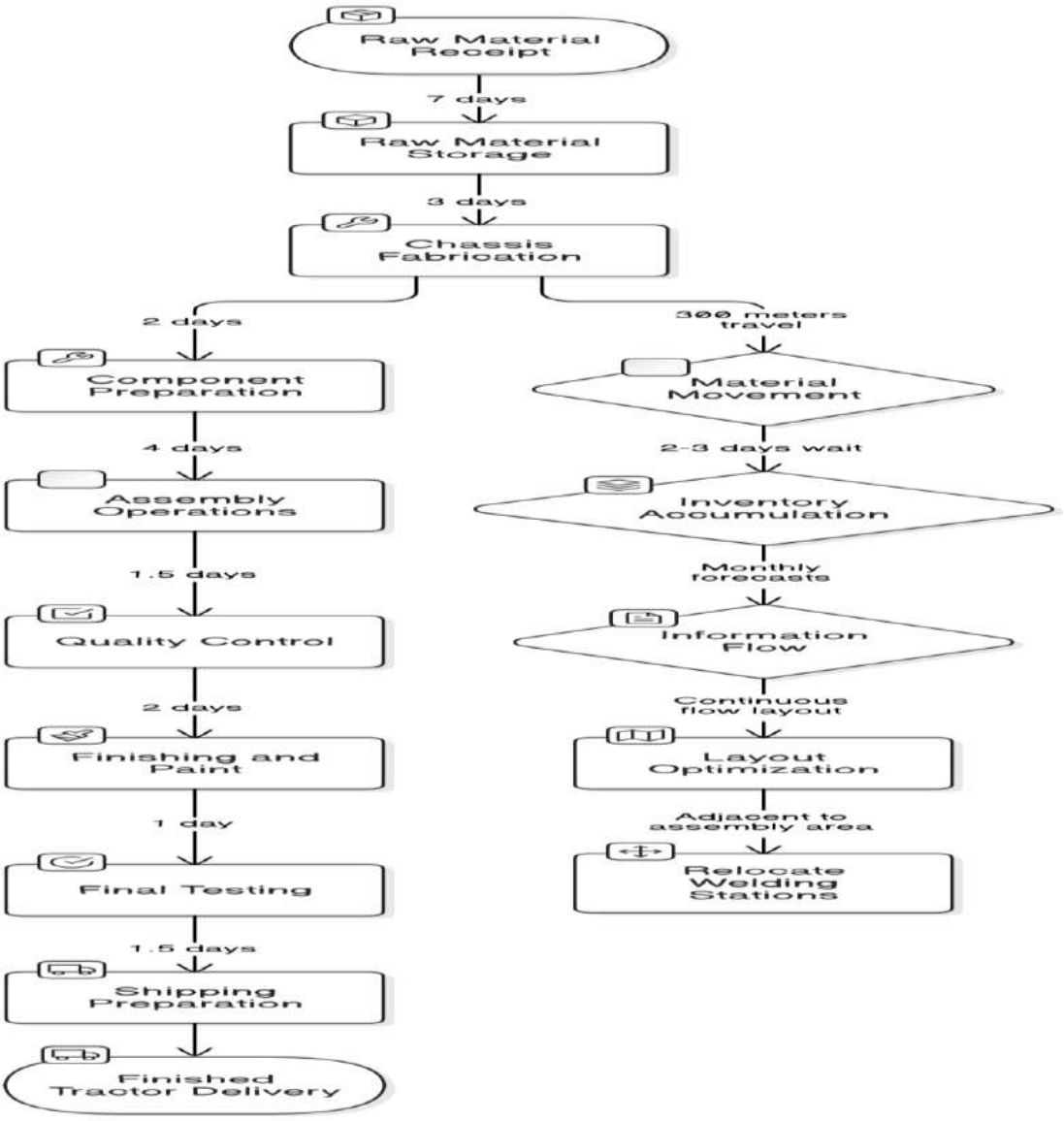
Inventory: Bound capital in excess of raw material, work-in-progress or finished goods inventory, which may become obsolete or damaged. We will use value stream mapping to get our inventory levels in line and which we can pull down without causing a production backlash. You will find that in some cases, we have a lot of stock of certain parts that we don't use very often, for example. For example, we can adopt just-in-time inventories and go to suppliers, to order smaller but more frequent orders, reducing the inventory carrying charges.

Transportation Poor transport of inputs or products may introduce costs and delays. We will not only define our process step by step but also highlight the waste/inadequacies in the customer care processes which were mapped against the same type for each step.

Therefore, creating a structured roadmap that will be part of the mapping related to our own unique value streams and actively addressing these areas of waste, is our alchemical path in creating our iterations and solutions that lead to Efficient, profitable and productive operations of BGT.

Figure 1

Tractor Manufacturing Process Overview

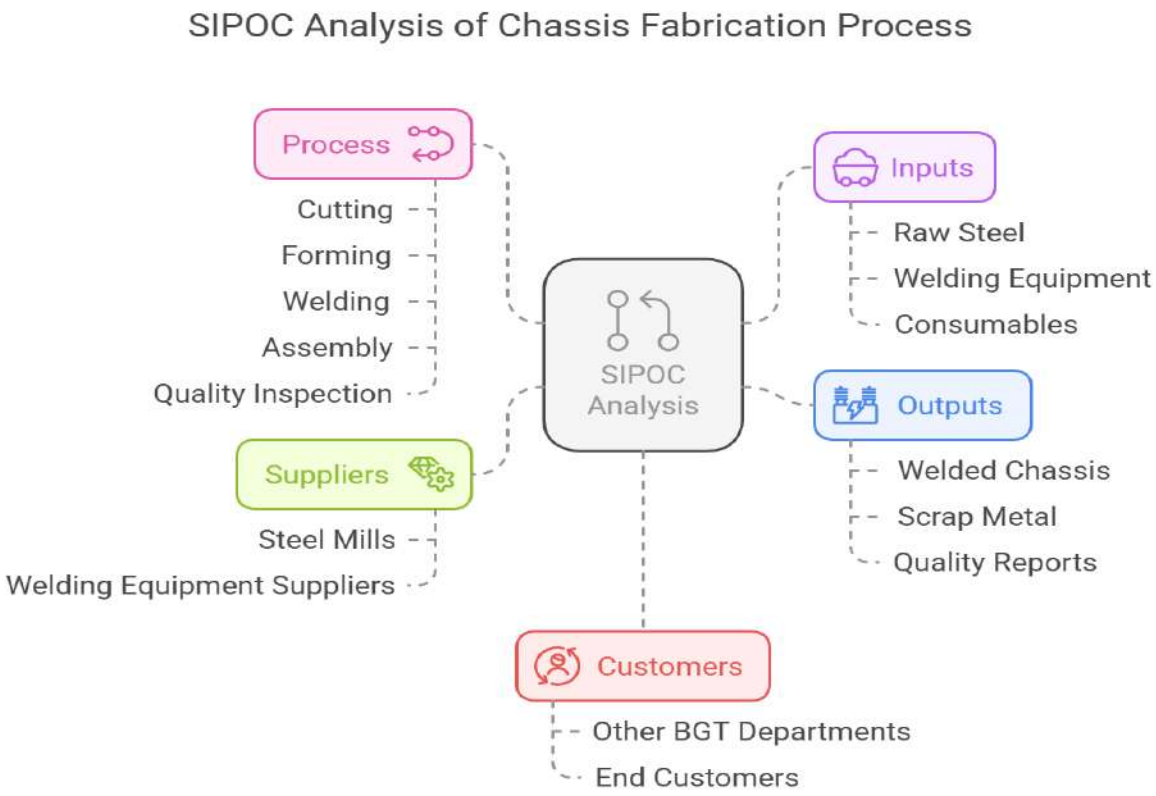


SIPCO tool

To make our process better and help guide our conversation with the team we will look towards SIPOC which stands for (Suppliers, Inputs, Process, Output and Costumers), constitute a process mapping and improvement methodology that summarizes the inputs and outputs of one or more processes, Figure 2

Figure 2

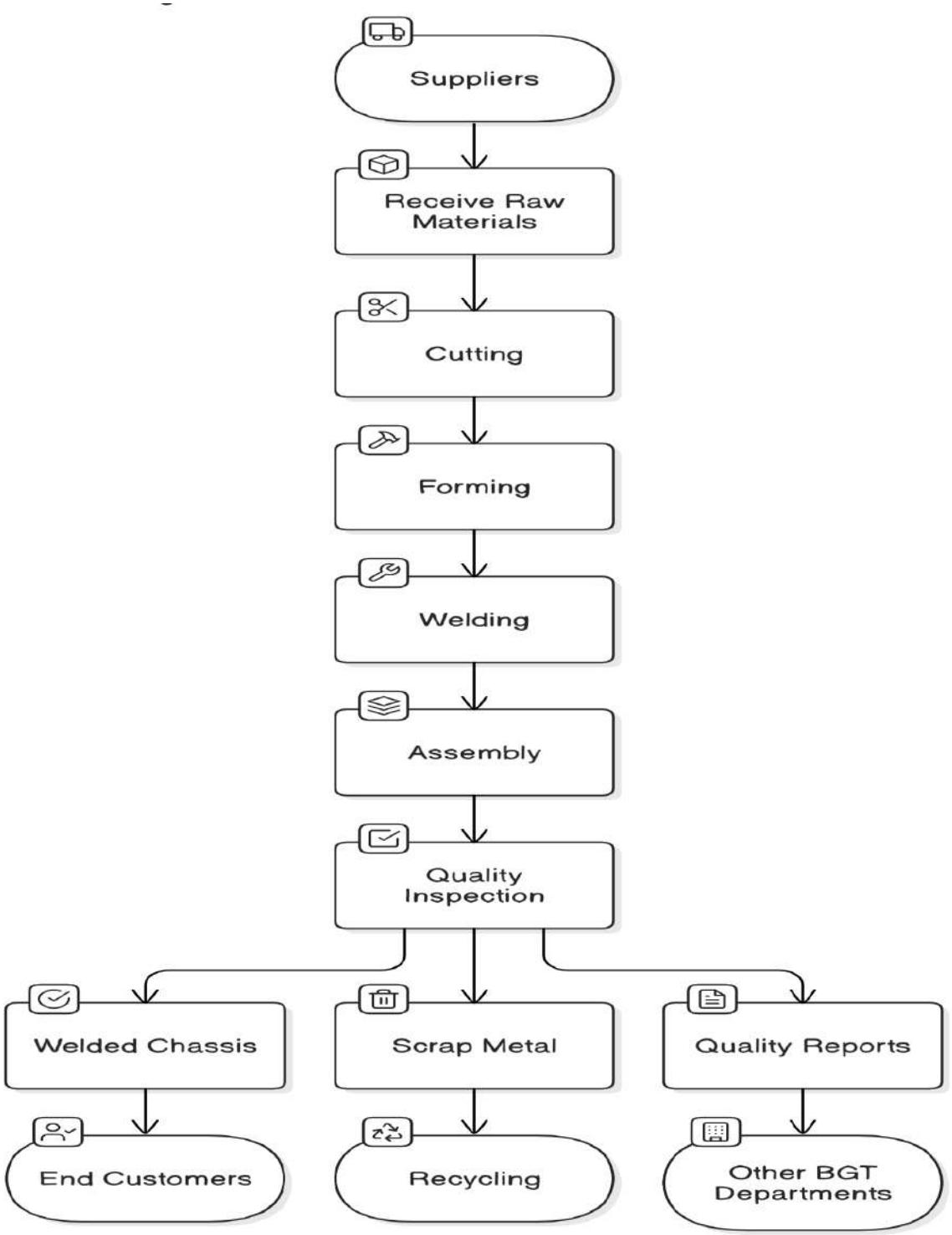
The Chassis Fabrication Process



The chassis fabrication process is illustrated in Figure 3. The process begins with the receipt of raw materials and proceeds through cutting, welding, assembly, and quality control before the finished chassis is prepared for shipping.

Figure 3

The Chassis Fabrication Process



5S Methodology (Sort, Set in Order, Shine, Standardize, Sustain)

5S are place for everything, and everything in its place (The Ultimate Guide to 5S, n.d.).

Sort: (Eliminate unnecessary items from the workplace)

Red tagging all items that are potentially unnecessary then review tagged items and decide whether to keep, relocate, or discard them.

Recycle, sell, or discard unwanted items and keep a record of red-tagged items and their disposition.

Set in Order: (Put the things we need in their proper location.)

Determine the best position for each item based on frequency of use and process.

Clearly identify each item's placement, use visual signals such as labels, outlines, and shadow boards and use proper storage options (shelves, drawers, and containers) to keep goods organized.

Shine :(Clean the workplace and equipment)

Develop a regular cleaning schedule for each area, provide appropriate cleaning tools and supplies, combine cleaning with inspection to identify potential issues, and integrate cleaning with preventive maintenance tasks.

Standardize (Maintain a consistent approach)

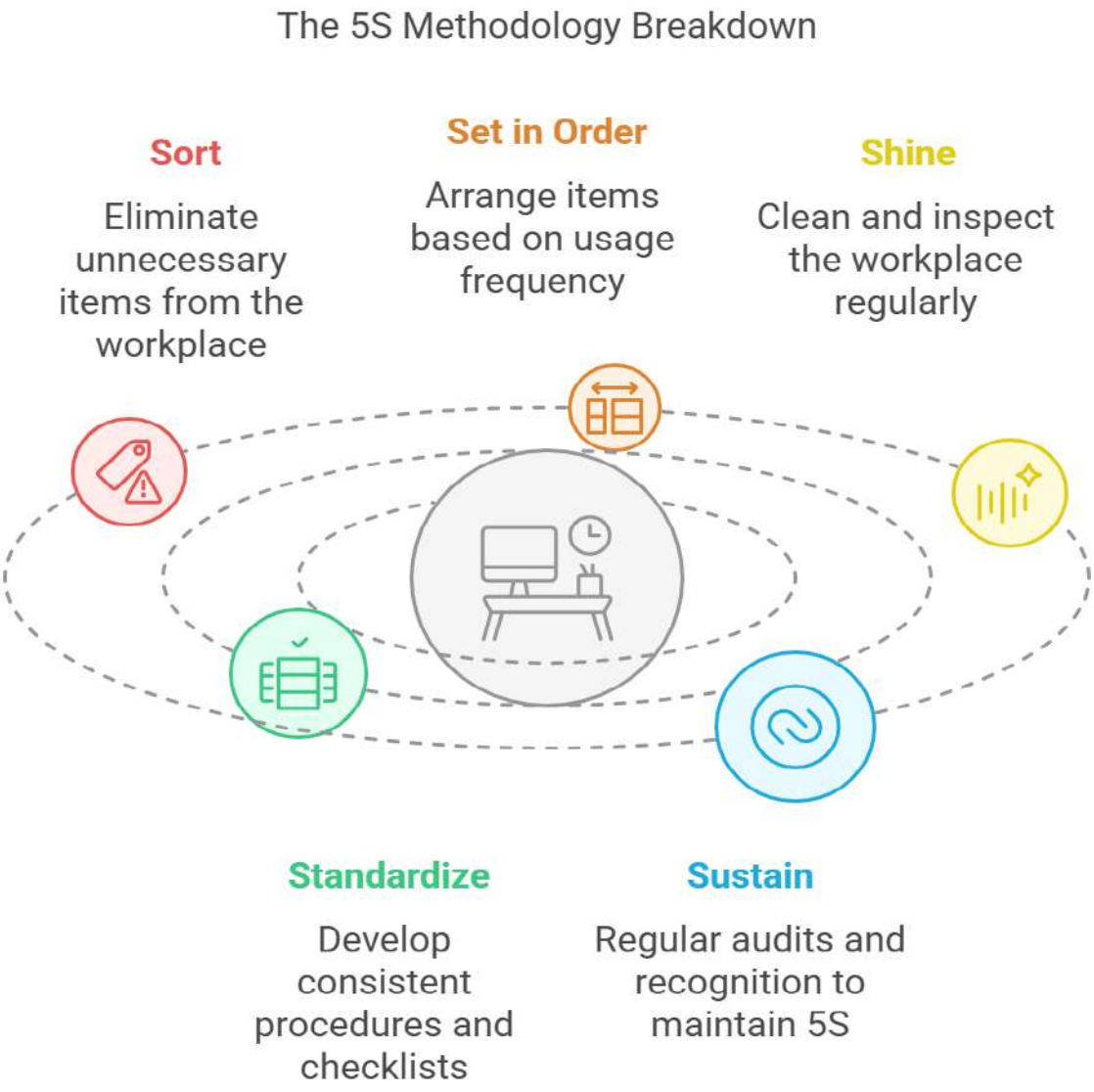
Develop checklists for consistent 5S activities, use visual management to reinforce procedures, and provide ongoing employee training on 5S principles and procedures.

Sustain (make 5S as a routine)

Regular 5S audits make sure that requirements are met while also recognizing and rewarding people for their achievements. Figure 4

Figure 4

The 5S Methodology Breakdown



Just-in-Time (JIT)

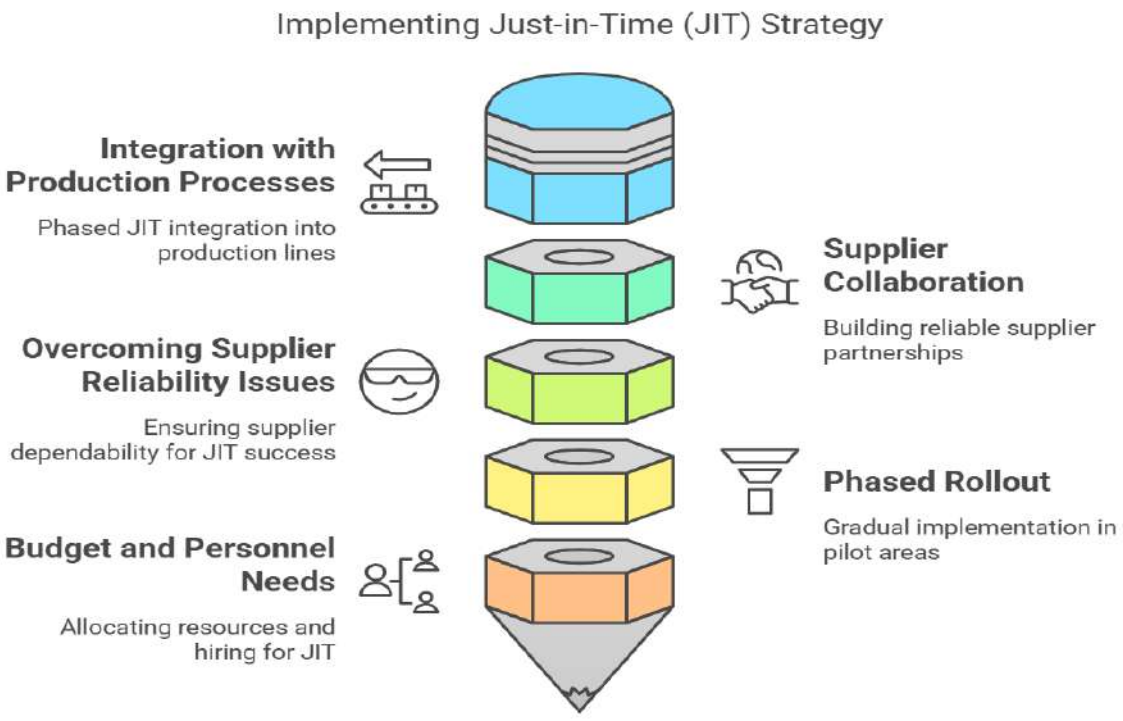
Is an inventory management philosophy that attempts to minimize inventory levels (Salesforce, 2025).by only receiving materials or producing goods when they are needed? This aims to alleviate having the unnecessary material at a particular place and time. That entails a drastic change in not only how we run our production process but also how we work with stakeholders in our supply chain.

Integration with Current Production Processes:

The implementation of JIT in our current production systems will be done in a phased manner. Figure 5

Figure 5

Implementation of JIT Strategy



In the beginning, we will target pilot regions, for example, the chassis fabrication or engine assembly lines. The two areas will be identified according to their potential for improvement and the relationship to the overall production process, considering challenges in implementation JIT. Figure 6

Integration will take place in the following manner:

Value Stream Mapping: We will identify value stream waste by documenting the current state process in the value stream for the selected pilot area. This will give a baseline for tracking the effect of JIT.

Demand Planning: We will build a demand forecasting system that is more accurate to forecast customer orders and make sure we only manufacture what is required. As an important part, we will analyse our historical sales data as well as the market trend and customer feedback.

Modify Production Schedules: We will create a new production schedule that will be consistent with the JIT philosophy. By using this approach, materials will be ordered and received only as needed for production.

We will implement a Kanban System. Kanban cards will indicate when materials are required, and materials will only be replenished when they are needed. This visual system will support preventing the surplus, reducing inventory.

Supplier Collaboration: The successful use of JIT must involve close collaboration with our suppliers. We will partner with our major suppliers to define dependable delivery schedules and ensure that they can support our just-in-time needs.

Overcoming Supplier Reliability Issues:

Supplier dependability is an important consideration for JIT success. To address the risk of unreliable suppliers, we will take the following steps:

Supplier Selection: We will thoroughly screen our suppliers for their dependability, quality of products, and capabilities. We will favour suppliers that have a history of timely delivery and quality assurance.

Dual Sourcing: We could have two suppliers for the same part for critical components. That will give a backup if one supplier has problems.

Supplier Development: We will build our suppliers' abilities to perform by tailoring training and support to increase their processes and quality control. So, they can then meet the JIT requirements for us.

Long-Term Contracts: We will develop long-term contracts with reliable suppliers to establish strong relationships and maintain the stability of material supply. These contracts should have specific performance metrics and penalties for non-compliance.

Buffer Stock (Strategic): While the JIT production is to keep inventory as low as possible, we may hold a small buffer stock of critical components to safeguard for unforeseen supply disruptions. A safety buffer will be strategically placed and managed with a low inventory holding cost.

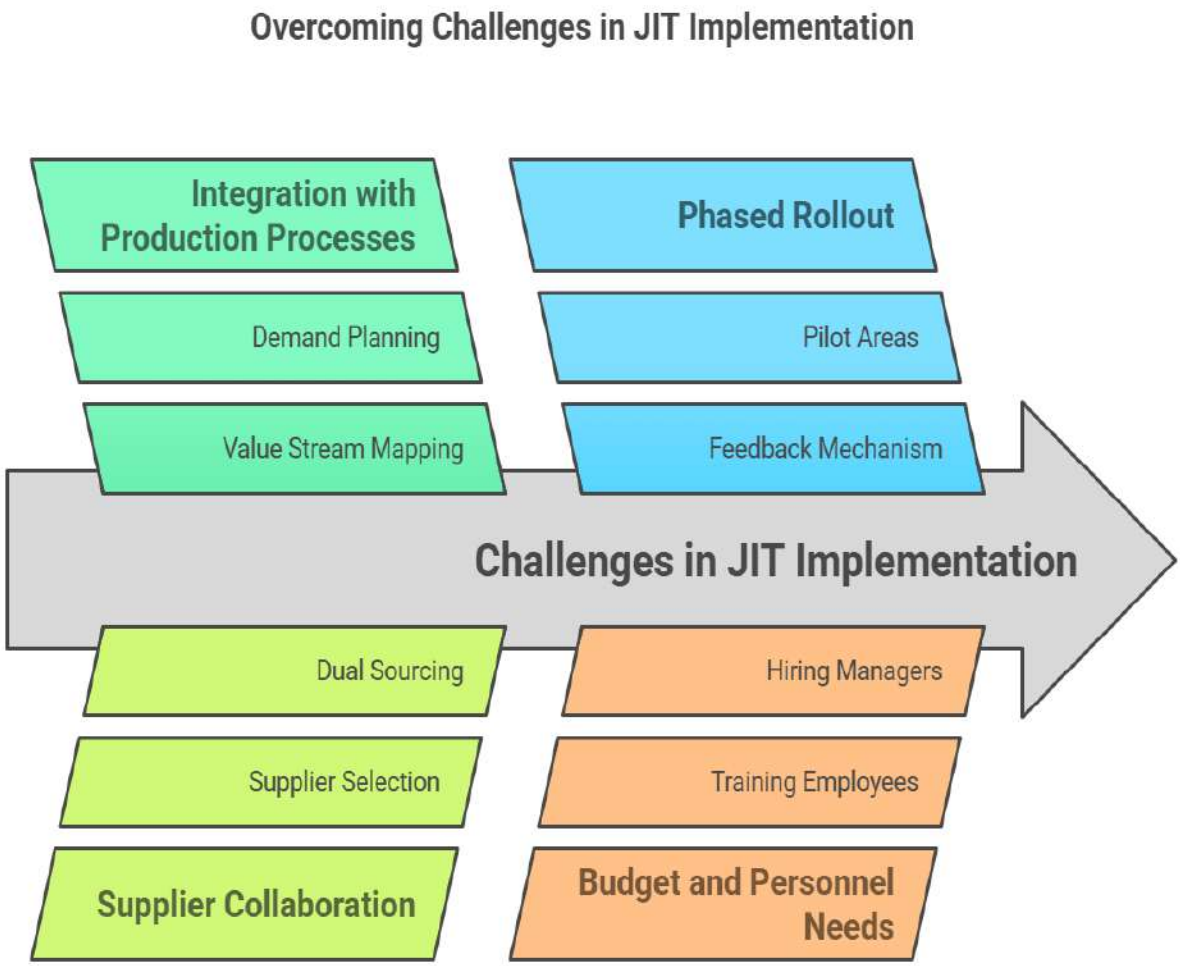
Regular Communication: We will implement regular communication with our suppliers to discuss any issues and investigate performance. This means providing suppliers with production schedules and demand forecasts to help them plan production.

Phased Rollout:

The pilot areas would roll out the phased implementation of the JIT. Now, we're not going to roll this out to other parts of the factory until we successfully implement JIT in these areas. The implementation will follow a phased approach as this will help us learn on our go and also fine-tune our implementation before we go for complete JIT implementation.

Figure 6

Overcoming Challenges in JIT Implementation



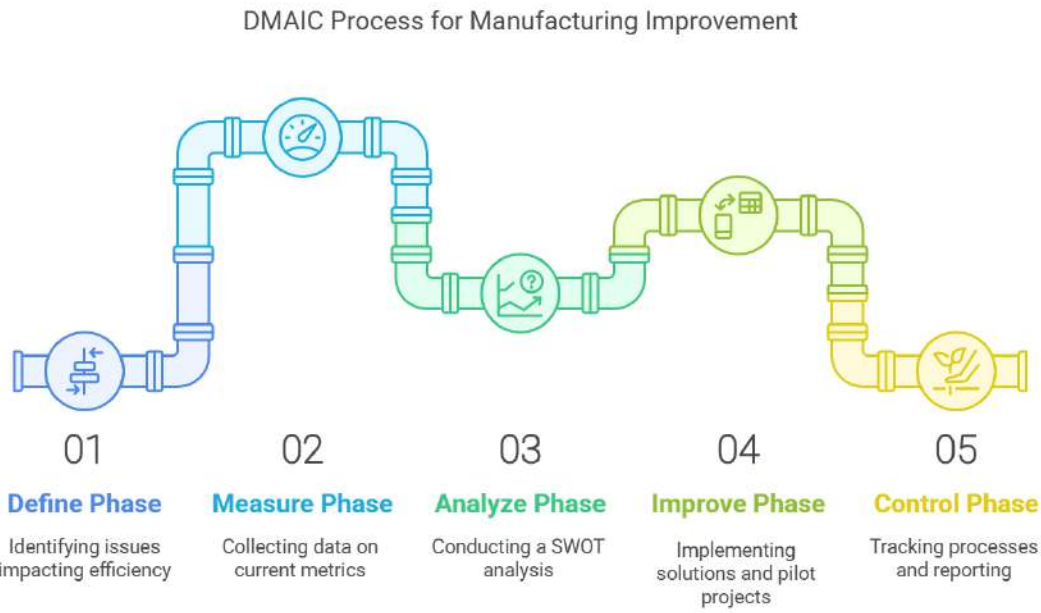
Budget and Personnel Needs:

We plan to facilitate the JIT implementation by hiring a full-time supply chain manager and training 30 employees on JIT concepts. We may also invest in tools for inventory management software and collaboration with suppliers. The budget for the pilot phase is estimated at $300,000, and the full-size rollout is expected to be $700,000.

DMAIC Process of Manufacturing Improvement

Figure 7

DMAIC Process of Manufacturing Improvement



Define

In this phase, we will clarify the specific issues impacting production efficiency

- The Company is facing declining growth due to inefficient manufacturing processes, high defect rates, and a lacking of sustainable practices and this need an operation to improve cost efficiency.
- The current manufacturing processes have a high cost, potential quality issues, and a negative environmental impact.

- Our objective is developing and implementing an operational plan that achieves significant cost reductions (65%), enhances social responsibility (35%), and improves overall efficiency within 12 months.
- The Scope of our project is focusing on the core of manufacture processes of the company, specifying the target area like chassis fabrication, assembly, painting and social responsibility practice.
- The Key Stakeholders in management are management engineer's suppliers, staff, environmental consultants and local community response.

Measure

In this section will outline how we will assess current performance metrics.

- Collecting data on our current manufacturing processes, the information needed regarding Production costs, Production time per Unit., Defect rates. Waste generation types and quantities, Energy consumption.
- Measure the energy consumption by install energy meters on equipment and in different areas of the factory to track electricity and fuel consumption.
- Implement a waste tracking system to measure the types and quantities of waste generated in different areas
- Collect data on greenhouse gas emissions from manufacturing processes, transportation, and energy generation.

Analyze

In this phase we will conduct a SWOT analysis to identify strengths, weaknesses, opportunities, and threats. Figure 8, Figure 9

Figure 8

Green Transformation through SWAT Analysis

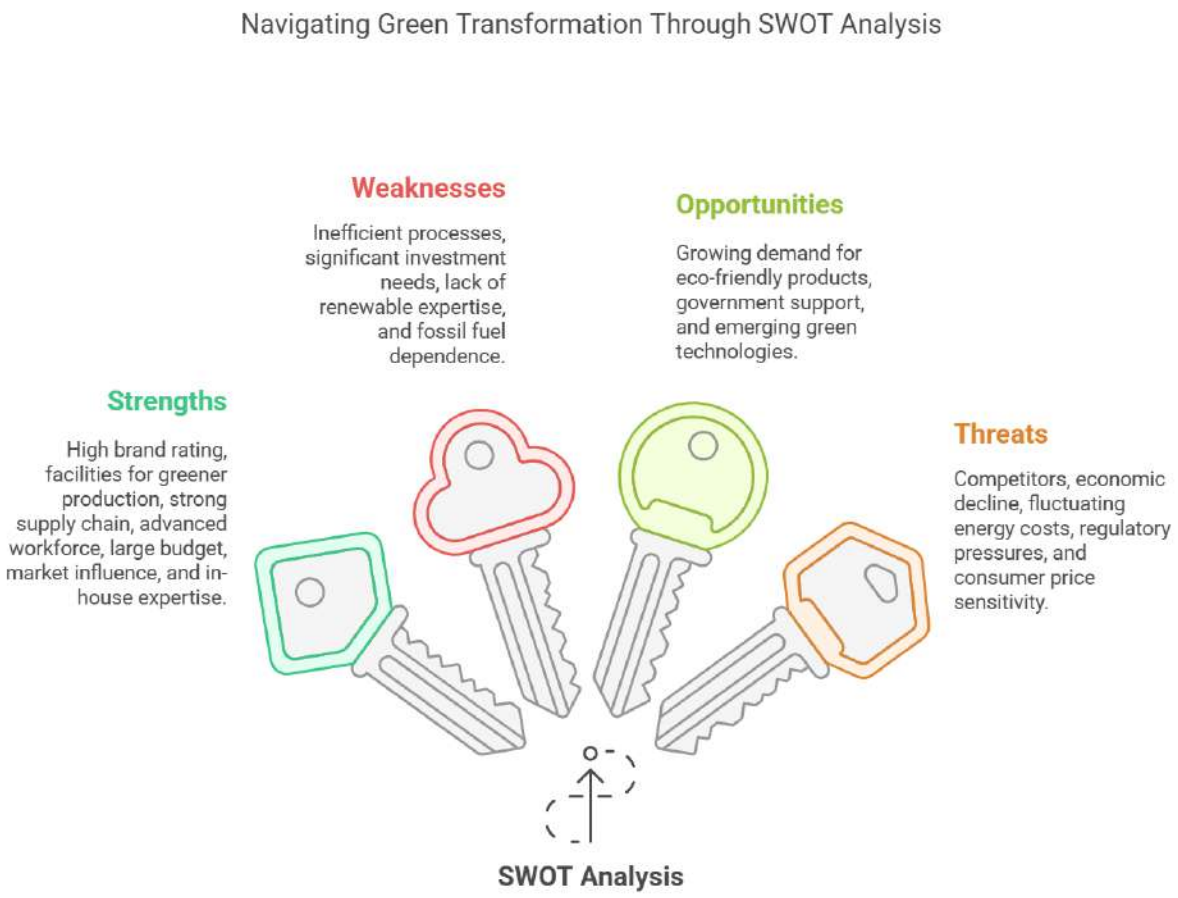
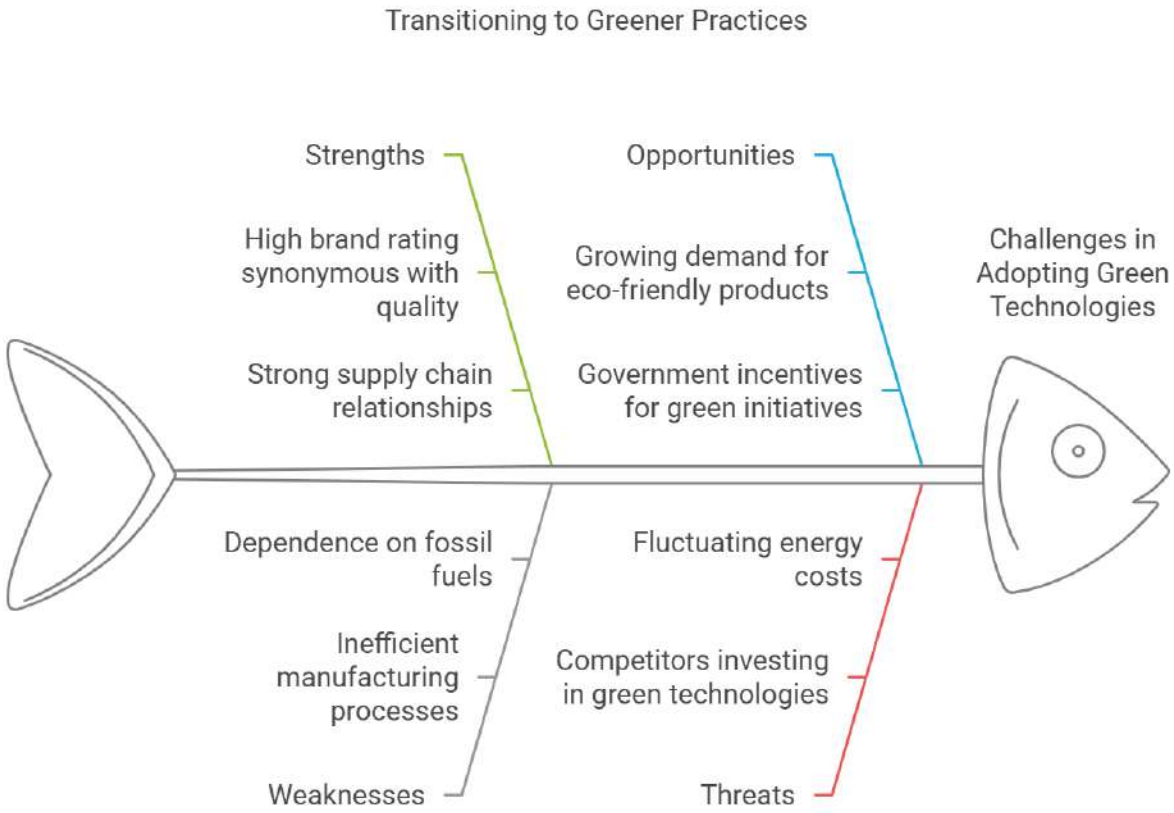


Figure 9

Transitioning To Green Practices



Improve

• Based on the evaluation, we must find answers to tackle the discovered problems of Cost-efficient industrial processes, Create common work processes, employee training, renewable energy and waste recycling.

• To validate the proposed solutions, we will use a small-scale pilot project to assess their success and scale accordingly.

• We will create and finalize the plan to implement these improved processes throughout the manufacturing operation.

Control

• Once steps were taken to implement the above changes, track the processes that were implemented and the performance metrics after implementing these processes to ensure that they are achieving the desired outcomes in terms of project goals.

• Continuously report over progress of project in front of relevant stakeholders and take corrective actions accordingly.

• After all improvements have been made, record processes and procedures in order to sustain them.

Risk Management Process

Assess or Rank the Risk: We will use a risk matrix (likelihood vs impact) to classify risks. However, we will still focus on risks based on their high risk of impacting our strategic goals. Figure 10

Manage the Risk

• Supply Chain Disruption (High Priority)

Mitigation: Create a dual sourcing plan for key engine parts. Negotiate long-term contracts with multiple suppliers and maintain a small buffer stock of engines to be less vulnerable to short-term disruption. Important to routinely evaluate financial solvency and production capacity of suppliers.

• Production Equipment Failure (Med Priority):

Mitigation: Maintain a comprehensive preventive maintenance program for all key equipment. Ensure spare parts are available; have trained technicians ready to expedite repairs. Create contingency strategies for different manufacturing processes in the event of serious equipment breakdowns.

• Market and Demand Changes (High Priority):

Mitigation: Regular market research for understanding customer preferences. Figure out the anticipated action. Establish flexible manufacturing schedules that can be rearranged rapidly to articulate evolving market conditions. Recirculate product lines to have less dependence on one product.

• Technological Implementation Challenges (Medium priority)

Mitigation: New technologies are introduced gradually, through pilot projects. Train employees extensively regarding new systems and processes. Create clear communication pathways to resolve problems as they come up.

• External Risks (High Priority):

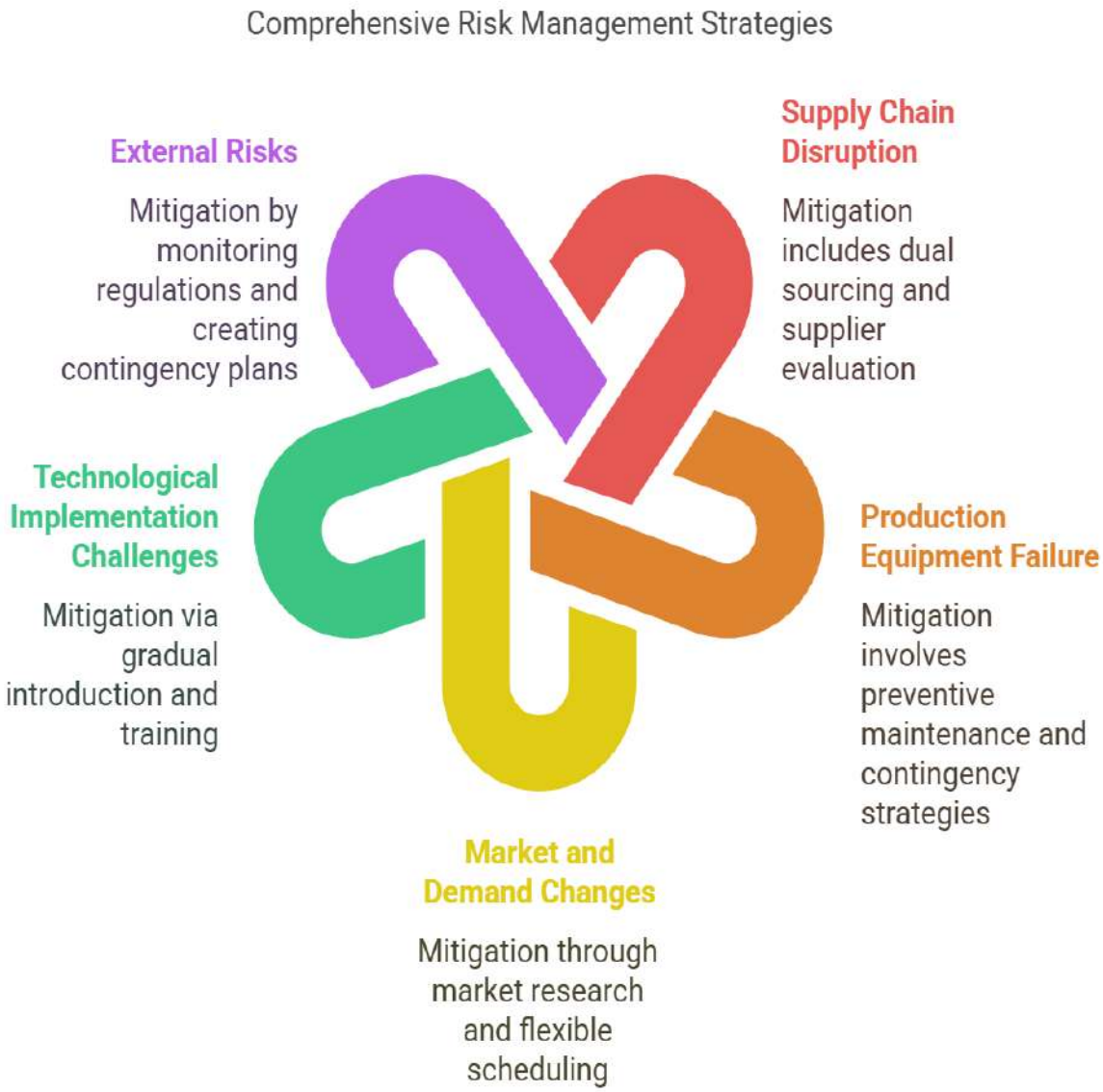
Mitigation: Keep abreast of changes in environmental regulations and safety standards. This would involve regular risk assessments to identify external threats, and create contingency plans. Project possible mistakes to Disaster Recovery Plan.

Monitor and Review the Risk

We will have a risk register that will capture all identified risk, likelihood and impact of the risk, priority and mitigation plans. This risk register will be a live document which is regularly reviewed, at least quarterly, but more often as required. We will also monitor the effectiveness of our mitigation plans and adapt as needed. A risk management specialist will be assigned to manage the risk register and coordinate risk management processes.

Figure 10

Risk Management Strategies



Stakeholder Roles and Responsibilities

For each position there are roles and responsibilities .Table 2, Figure 11

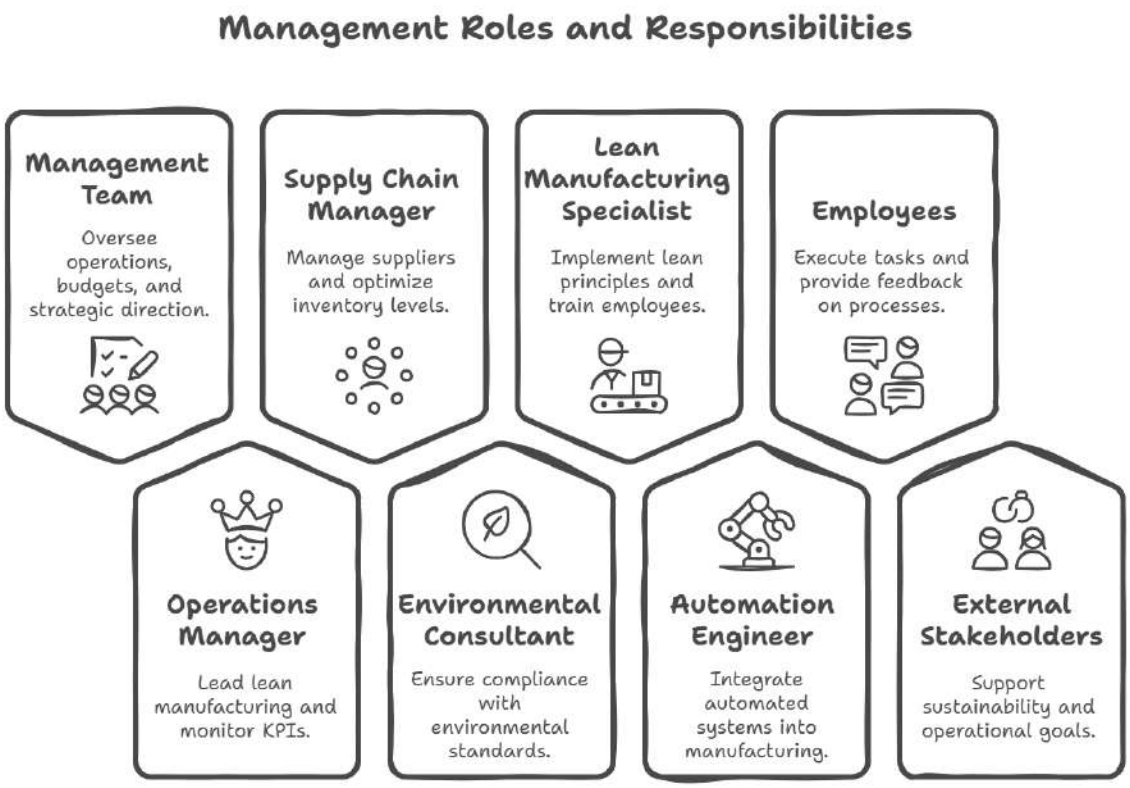
Table 2

Stakeholder Roles and Responsibilities

Position	Roles	Responsibilities
Management Team	Oversee the entire operational plan, approve budgets, and ensure alignment with company goals.	Provide strategic direction and support. Allocate resources and monitor progress. Address any roadblocks or challenges. Coordinate with department heads to ensure smooth execution.
Operations Manager	Lead the implementation of lean manufacturing, JIT, and automation initiatives.	Monitor key performance indicators (KPIs) and report progress to management. Ensure compliance with environmental and safety standards.
Supply Chain Manager	Manage supplier relationships and JIT implementation.	Develop dual sourcing strategies for critical components. Monitor supplier performance and address any disruptions. Optimize inventory levels to reduce waste and costs.
Environmental Consultant	Oversee green manufacturing and waste reduction initiatives.	Ensure compliance with EPA, OSHA, and ISO 14001 standards. Train employees on sustainable practices and waste management. Conduct regular audits to monitor progress.
Lean Manufacturing Specialist	Implement lean principles and 5S methodology.	Train employees on lean tools and techniques. Conduct regular 5S audits and provide feedback. Identify areas for continuous improvement.
Automation Engineer	Lead the integration of automated systems into manufacturing processes.	Install and configure robotic welding, painting, and inspection systems Train employees on operating and maintaining automated equipment. Monitor system performance and address any technical issues.
Employees	Execute day-to-day tasks and adopt new processes.	Participate in training programs and follow new procedures Provide feedback on process improvements. Maintain a clean and organized workspace (5S).
External Stakeholders	Support the company's sustainability and operational goals.	Suppliers: Ensure timely delivery of materials and comply with sustainability standards. Community: Engage with local stakeholders to promote social responsible.

Figure 11

Management Roles and Responsibilities



Automation in Manufacturing Processes

The specific automation technologies we intend to implement are: Figure 12

Robotic Welding Systems:

Welding operations for tractor chassis, other components, etc. They will offer:

Enhanced Speed: Robotic welds are performed at a much faster rate compared to manual welders.

Accuracy: Robotic welding continually creates tighter, more uniform welds that mean fewer defects and rework.

Lower Human Labor Cost: Automation will decrease the demand for manual welders, resulting in labor cost savings.

Automated Paint Systems:

These will be utilized for painting tractor components. They will provide:

Uniform Finish: Automated paint systems apply paint evenly and uniformly for a quality finish.

Minimized Overspray: Automation reduces paint overspray, resulting in less waste and environmental impact.

Higher Productivity: Automated systems can paint more vehicle parts in a given period than manual painters.

Ammunition Inspection Devices:

These devices will use cameras and sensors to inspect defect (after the tractor and components go through to finishing). It will offer:

Enhanced Quality Control: Automated inspection is capable of identifying the smallest of defects, which can often be overlooked during a conventional human inspection process.

Increase in Speed: Automated inspection is significantly quicker the manual inspection leading to increased throughput.

Data collection: automated inspection systems can gather data about defects, which can be processed to find areas of the manufacturing process to be improved.

Automated Guided Vehicles (AGVs)

Automated Guided Vehicles (AGVs) can improve material flow and reduce labor costs (Wolff, 2024). They will:

Enhanced Material Flow: The AGVs can efficiently convey materials between different workstations, thus minimizing the material handling time and improves overall production flow.

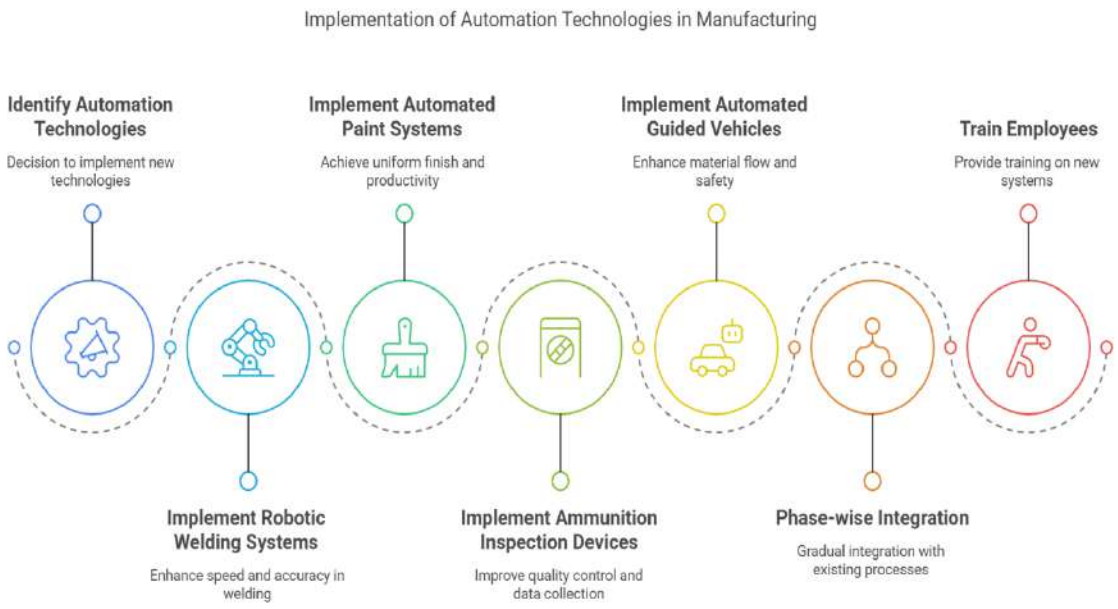
Lower Labor Costs: AGVs will minimize the need for manual material handling resulting in savings in labor costs.

Increase Safety: AGVs can do their work even the man power cannot work in certain area of the workplace at the time of earthquake or fire so AGVs safety work environment.

Phase-wise Integration with Existing Processes: These automation technologies will be integrated with our existing manufacturing processes in a phased manner. Initially, we will implement automation in selected areas of the factory (e.g. weld or paint departments). We will begin to explore automating other areas as we gain experience and continue to improve our processes. We will also train our employees on new automated systems and their respective operation and maintenance.

Figure 12

Implementation of automation technologies in Manufacturing



21st Century Tools for a Greener Manufacturing Process at Big Green Tractor.

All aspects of our operations are in line with green manufacturing practices, not just chemical waste disposal, but other important areas: Figure 13

Chemical waste disposal: We will comply with all EPA, OSHA; ISO 14001 is an international standard for environmental management systems (NQA Global Certification Body, n.d.). Our key steps include:

Waste Identification and Segregation: Proper identification and segregation of chemical waste at the point of generation. We will color code the new waste system and provide training to all employees on proper waste management procedures.

Reduction of Waste and Recycling: We preferable incorporate process optimization and material substitution for waste reduction. A complete recycling programmed for all recyclable materials will also be created.

Proper Transportation and Management: Chemical waste will be safely transported in approved and labeled containers with secondary containment. Personnel will receive training on safe handling and emergency response procedures.

Manifests & Disposal: We will document the transportation of chemical waste all the way from generation to final disposal on a digital tracking system. All waste will be taken to licensed waste disposal companies for environmentally sound disposal.

Green Manufacturing Practices Different from One Another:

Energy efficiency is a key component of green manufacturing (U.S. Department of Energy, 2023). We will adopt energy-efficient technologies in all aspects of our factory, like LED lights, energy-efficient motors, and upgraded insulation. We are also going to look into renewable energy sources like solar power.

Water Use Reduction: We will adopt water-efficient practices in our processes, including low-flow fixtures, factoring in water usage in our supply chain, water recycling, and leak detection and repair programs.

Sustainable Materials: Opportunities for sustainable materials in our products and packaging. This entails the use of recycled materials, bio-based materials, and responsibly sourced materials.

Lead, Mercury, and VOC Free Manufacturing: Our focus will be on ensuring that we have lead, mercury, and VOC free manufacturing practices in order to reduce the levels of toxic metals and moisture involved in the process of creating our products. That could include a range

of options, from looking for different, less toxic chemical processes to changing out the chemical inputs themselves.

Complying and Outperforming: Our green manufacturing practices will comply with EPA, OSHA and ISO 14001 standards. The purpose of this is to verify compliance with sustainability efforts and keep accessible information regarding our environmental impact.

Figure 13

Green Manufacturing Practices

Socially Responsible

Big Green Tractor is dedicated to socially responsible operation. This particularly embraces reducing our environmental footprint, interacting with the community, and maintaining a fair business model. Figure 14

Community Engagement Programs: The specific community engagement programs that we will be implementing are:

Environmental Education:

Partner with local schools and community organizations to provide environmental education programs. The programs will cover sustainable agriculture, conservation, responsible waste management and other topics. Factory tour will be another activity to exhibit green manufacturing.

Community Partnerships:

We will contribute to local community efforts via sponsorships and by forming volunteer programs. That could look like supporting local farmers markets, community gardens, or environmental cleanup initiatives.

Scholarships and Training:

We will provide scholarships and training for local residents in manufacturing- and sustainability-related fields. Providing trained people to this community will develop the next generation of skilled workers and enhance economic development in the community.

Measuring Success: We will measure the success of our community engagement programs through:

• Participation Rates: We will monitor the number of individuals who take part in our environmental education programs and other community activities.

• Stakeholder Input: We will seek input from community members and stakeholders via surveys, focus groups, and community meetings.

• Impact Assessments: We will develop regular evaluations of our community engagement programs in relation to their impact on the community/environment.

Other Efforts in Corporate Social Responsibility:

• Ensuring that suppliers adhere to ethical labor practices and environmental standards.

• Employee Well-being: Our employees will work in a safe and healthy environment and will be compensated fairly with competitive wages and benefits.

• Transparency and Accountability: We will be transparent regarding our environmental and social performance, and will regularly report our progress to our stakeholders

Figure 14

Social Responsibility Initiatives

Conclusion

This operational revitalization program as presented is a testimony to the confidence and commitment in the future of Big Green Tractor and an investment to that end. The continuous challenges faced by BGT will continue to make it a viable company.

Main Advantages and Anticipated Results:

Reduced Defect Rate: Due to our quality control measures and standardized work processes we expect to reduce the defect rate from 15% to 5%

Our data: • Increase in Production Output: We expect our production output to increase 15% from 50 tractors to 58 tractors per month, by process optimization and automation.

• Lead Time Reduction: Anticipated improvement from 8-week to 6-week manufacturing lead time, enabling better response to client demand.

Cost Savings: We estimate a 15% decrease in operational costs due to efficiency improvements, waste reduction, and energy use.

• Reducing Environmental Impact: This includes green manufacturing practices, where we target a 40% reduction in waste and a 25% reduction in carbon emissions.

• Enhanced Brand Image: Our focus on sustainability and social responsibility will strengthen our brand image and appeal to eco-conscious consumers.

• Investment Return: We foresee a 25% return on investment (ROI) by our third year in executing this program.

By undertaking this holistic transformation initiative, Big Green Tractor will emerge as an industry frontrunner in the agricultural equipment sector, cementing its viability for years to come and playing a crucial role in fostering a more sustainable future.

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