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The Big Green Tractor Operational Industrial Streamline Guide

Introduction

A company's operations framework significantly contributes to its failure or success. Every firm needs to have organized processes for all its operations; industrial, control, and production, among others, to ascertain optimum utilization of resources and cost-efficiency. Additionally, a firm's operations structure determines its sustainability in the market and competitive advantage. Many firms struggle with operations, and Big Green Tractor is no exception. However, there is always a solution to declining growth due to operations malfunctions, which fundamentally lies in streamlining and modifying a firm's operations management framework. Production efficiency is essential to consumer satisfaction; hence, Big Green Tractor needs to develop sustainable solutions for its declining growth. Some solutions the firm should consider include developing; more cost-efficient manufacturing processes, plans that minimize defects during manufacturing, and utilizing twenty-first-century tools to create a greener process. Moreover, consumers are attracted to environmentally-friendly brands; hence the firm should invest in green manufacturing initiatives and develop better ways of chemical waste disposal. This report will provide a detailed guide on how Big Green Tractor can streamline its operations and boost its growth using; cost-efficient manufacturing strategies, reduction of manufacturing processes defects, and utilization of twenty-first-century tools for a greener manufacturing process. Additionally, the report will highlight better industrial standards for chemical waste disposal and green manufacturing process alternatives.

Big Green Tractor Company Profile

A firm's operations management framework is critical to its success or failure. Big Green Tractor is a production firm in Palembang, Indonesia, experiencing a downhill growth margin for several years. As a result, the company aims to streamline operations to enhance efficiency and stop declining growth, which is detrimental to its sustainability in the market.

Part 1: Operational Industrial Streamline Procedural Guide

A firm needs to have strategies to produce quality products at minimal costs, ensuring a higher profit margin. Many factors are involved in a manufacturing process, such as; labor, materials, inventory, and utilities, and how a firm handles each aspect can determine the ultimate returns (Indeed, 2023). Therefore, it is essential to regularly assess manufacturing spending processes and incorporate cost-efficient production methods, including using technology to enhance manufacturing processes.

A: Cost-Efficient Manufacturing Processes Recommendations

Cost Identification

Manufacturing involves costs, and companies like Big Green Tractor need to understand its expenditure to know where capital is spent most and how it can be reduced. Some of the manufacturing costs incurred include; indirect and direct labor, material, utilities, and inventory. Materials describe the tangible goods used in the manufacturing process, while utilities include; water and power costs and additional overhead expenses that facilitate production (Indeed, 2023). Inventory involves several components, the most fundamental being stock procurement and maintenance costs during or after manufacturing. Manufacturing process costs also involve direct labor, which describes labor that directly contributes to manufacturing processes. On the other hand, indirect labor defines labor that is essential for operations functionality but is not directly involved in creating a product. For instance,

workers' wages are categorized as direct labor, while production managers and supervisors are categorized as indirect labor. Once Big Green Tractor identifies and evaluates manufacturing costs, it will provide visibility on the categories that must be reduced. For instance, labor costs can be reduced by time reduction and process flow enhancement. Additionally, inventory costs can be reduced by cutting unnecessary inventory and inventory protection standards. On the other hand, the firm can enhance on-time service and product delivery or enhance machine capacity (Indeed, 2023). Ultimately, understanding costs is the first step in finding ways to reduce them.

Leveraging Just-in-Time Methodology

Manufacturing companies often make the mistake of ordering unnecessary supplies and materials, which leads to wastage. The company can reduce wastage using the JIT ordering methodology, ordering only what is necessary for the work at hand. JIT is beneficial in inventory cost reduction as it reduces overproduction and stock wastage. Second, the methodology reduces transport costs since only necessary supplies and materials are transported to and from the company. Third, resource-saving streamlines production systems and reduces capital tied up in unnecessary stock; last but not least, JIT reduces product defects since the requirements for manufacturing a product are carefully evaluated before orders are made (Siddiqui, 2022). Though JIT or lean manufacturing can be expensive and complicated to implement, it will benefit Big Green Tractor in the long term since wastage significantly contributes to profit and revenue reductions, and JIT is an evidence-based solution.

Technology Incorporation

The modern business world operates in the digital era, and multiple innovations have simplified production processes. Azemi et al. (2019) highlight the essence of using Advanced Manufacturing Technology (AMT) in reducing manufacturing costs. AMT involves utilizing computer technology in designing, manufacturing, testing, controlling, and transportation

processes, among other factors. The researcher established that companies that utilize technology in manufacturing processes significantly decrease operating costs and reduce inconsistent human input. Moreover, AMT increases manufacturing flexibility and improves lead time, earning a brand consumer preference based on efficiency. A recent study in South-East Europe established that more than seventy percent of the firms which adopted technology in manufacturing processes reduced costs and increased their profit by more than five percent (Azemi et al., 2019). The study is among many that have proven digital technology's importance in developing cost-efficient production processes.

Some technologies Big Green Tractor should consider include; CAD, robotics, electronic data, and MRP systems, among other AMTs. Research establishes that AMT has integrated programs that can produce diverse products or parts at short intervals, reducing the manufacturing process time and costs (Stornelli et al., 2021). The benefits of using technology as a cost-efficient strategy are limitless and include reduced; defects, energy, and manpower due to automated processes. Additionally, technology simplifies productivity monitoring and simplifies outsourcing from other countries. Technology is especially significant for Big Green Tractor because it aims to undertake green initiatives in manufacturing processes. While traditional manufacturing methods have detrimental effects on the environment, technology reduces energy costs and promotes cleaner manufacturing processes (Mohapatra et al., 2022). Therefore, technology should be a big part of Big Green Tractor's initiative to streamline its operations.

Value Stream Mapping

Mapping can be described as a war against waste in a company's manufacturing process. Value stream mapping (VSM) integrates lean manufacturing techniques and concepts to establish visibility in the information and material flow needed throughout a manufacturing process (Kosasih et al., 2020). VSM was developed in the 1990s as a wastage detector along a

product's value stream. Big Green Tractor can use VSM to establish areas in the manufacturing process experiencing wastage and find ways to eliminate the hurdles. Additionally, VSM identifies non-value and value-added activities in a manufacturing firm, simplifying and establishing the root cause of issues in the manufacturing process. The company should establish which value stream needs enhancement, such as costs. Additionally, a firm should design a flow aligning with the lean principle, which is fundamental to the firm's future vision. (Kosasih et al., 2020) Ultimately, VSM is a cost-saving factor in manufacturing, assisting in waste detection and elimination and reducing manufacturing costs.

Machinery Design Architecture Modification

Machinery design significantly contributes to cost addition or reduction. Technology has simplified machinery design aimed at reducing costs. Big Green Tractor deals with machines that perform bulk materials operations. Tractors are designed to handle complex tasks, such as bulk land farming, which differs based on seasonal and location conditions. Soils have varying compressibility levels, some grounds have rocks, and the conditions affect a machine. Therefore, the equipment has to keep being tested, and physical testing is expensive and likely to miss some defects, which results in mechanical failure and output delay (Altair, 2018). One of the ways Big Green Tractor can streamline its operations is by ensuring its machinery is effectively working and can meet consumer needs without delays. Therefore, the company can change its machinery design process through simulation.

Simulation utilization in the design process has several benefits. First, it enables a firm to evaluate equipment virtually through the discrete element method (DEM). DEM describes virtual testing that allows a firm to identify the environment its machinery will interact with, such as; soils, crops, and seeds. Understanding the nature of the environment a machine will be used in enables a firm to optimize its machinery to deliver on consumer needs (Altair, 2018; Zhao et al., 2021). Second, simulation enables a company to predict complex bulk material

tendencies, including; bailing, transportation, and fibrous material cutting. Third, simulation can identify blockage risks in equipment and establish the tool wear risk when machinery interacts with various environments. Fourth, the simulation predicts the kinematic response of machinery when exposed to various environments, such as; land with large rocks or sticky material. Most importantly, simulation reduces the cost of having physical prototypes to test machines out of season (Mao et al., 2022; Mourtzis, 2020). Therefore, Big Green Tractor would significantly benefit from using simulation as a cost-efficient method in its machine design processes.

B: Defect Minimization Plan throughout the Manufacturing Process

Defect minimization plans and strategies include regularly inspecting machinery, teamwork, communication flow, the Kaizen approach, and technology incorporation. However, this report will discuss the Six Sigma approach as the most suitable defect minimization plan for Big Green Tractor. Using lean strategies like JIT reduces wastage and lean practices, plus Six Sigma creates a force that reduces both wastage/ non-value added steps and variations in a manufacturing process value-added step, enhancing a manufacturing process quality. The Six Sigma approach enables a firm to deliver quality and reduce bottlenecks using the DMAIC five-step approach (Mittal et al., 2023). DMAIC Steps include; Defining, measuring, analyzing, improving, and controlling. The define step establishes a problem in the manufacturing process and a project goal. Second, the measuring step evaluates a problem's current status, while the analysis step evaluates the current situation to find solutions. Third, established solutions are implemented in the final improvement step to achieve the defined goal of a project. Finally, the implemented solutions are controlled to ensure permanent improvement. For instance, Big Green Tractors' reason for its growth decline may be; consumer dissatisfaction, excess process cycle times, or out-of-control production

costs (Mittal et al., 2023). The Six Sigma approach will enable the company to define, analyze, and correct the problem.

Utilizing the Six Sigma approach in manufacturing has several benefits. The methodology's fundamental benefit is defects and error reduction in a manufacturing process using standardized methods (Siregar et al., 2019). Defect reduction or elimination enhances a process's quality and efficiency, positively impacting a consumer. Productivity enhances a brand's market preference, improving profit and revenue margins. Second, Six Sigma relies on data, improving the prediction rate of possible errors. Data is collected, evaluated, and applied to improve product output quality. For instance, Big Green Tractor can collect data on previous wastages and failures it has experienced and use it to modify its operations. Additionally, the firm can research its competitors and use the data to improve its processes and gain a competitive advantage. Last but not least, the methodology improves consumer satisfaction due to a product's quality output. Consumers are pleased by products that are not a liability based on defects. Most firms have suffered from releasing defective products into the market only to receive negative consumer feedback. The Six Sigma approach incorporates quality maintenance strategies into manufacturing, reducing the chances of defective products hitting the market and facing consumer rejection (Siregar et al., 2019). Therefore, using the Six Sigma approach is the best plan for Big Green Tractor to minimize defects in its manufacturing processes, ultimately equating to cost reductions.

C: Creating a Greener Process through 21st-Century Tools

The 21st Century lean manufacturing tools are the best for creating a greener manufacturing process. Lean manufacturing aims to reduce wastage, improving production efficiency and quality. Though lean systems are not directly connected to eco-friendly intentions, they involve a production system that promotes higher energy consumption efficiency and waste reduction. As a result, lean techniques address the waste problem that

contributes to environmental pollution. Greener process manufacturing addresses product and process perspectives. The product perspective aims to manufacture eco-friendly products, enhance resource utilization, and use raw materials that are not damaging to nature. On the other hand, the process perspective aims to reduce raw materials consumption, energy, waste, and the dispersion of pollutant substances into the atmosphere (Younnes, 2023). Therefore, lean and green manufacturing processes promote waste reduction, highlighting a synergic effect on the environment.

Several 21st-century lean manufacturing tools promote a greener process, such as; TPM, JIT, Jidoka, VSM, and Kaizen. The JIT ordering approach aims to reduce inventory costs, space wastage, and stock wastes that arise from overproduction (Genc, 2021). Total Productive Maintenance (TPM) describes a holistic equipment maintenance approach that aims to achieve perfection in production processes. TPM optimizes predictive, corrective, and preventive maintenance activities to achieve proficient and efficient manufacturing equipment. Third, Jidoka or autonomation describes a combination of visual control systems for defect analysis. Jidoka's main aim is to reduce a product's quality defects. Fourth, the value stream mapping (VSM) tools describe flow diagrams with future and current manufacturing state maps, which are significant in illustrating and measuring waste during manufacturing. Last but not least, Kaizen, also known as Continuous Improvement (CI), is a combination of many lean manufacturing tools, including; Kanban (whiteboards that map a production process at every step), data check sheets, VSM, run charts, and mistake proofing, among others. Kaizen aims to eliminate waste by continuously and gradually improving operations and maintaining the continuity of incorporated lean frameworks (Genc, 2021). Ultimately, lean manufacturing tools have one thing in common with maintaining a greener process; they minimize and manage waste, ultimately protecting the environment.

Part 2: Socially Responsible Operational Guideline for the Firm's Pollutants

Many manufacturing companies leave behind a hazardous trail of chemical waste that harms human, plant, and animal life. Therefore, firms must adhere to industry standards, which provide methodologies for efficient waste treatment processes. Big Green Tractor aims to have greener manufacturing processes, and socially responsible waste disposal strategies are a step in the right direction. Moreover, the firm benefits from efficient chemical waste disposal since consumers are attracted to environmentally and socially friendly brands. This section addresses ways Big Green Tractor can dispose of chemical waste according to Industrial standards, especially those provided by the Environmental Protection Agency (EPA) and green manufacturing alternatives. The methods of chemical disposal are highlighted in the Resource Conservation and Recovery Act (RCRA). The Environmental Health and Safety (EHS) program also aligns with EPA and RCRA standards to provide efficient chemical waste disposal guidelines (Case Western Reserve University, n.d; EPA, n.d). Safety is essential for every living being, and efficient pollutant disposal methods protect life and health.

A: Chemical Waste Disposal According to Industrial Standards

Disposal using Environmental Protection Agency Guidelines

There are several ways of disposing of chemical waste based on the EPA guideline. First, chemical wastes should be stored in appropriate containers, with the most recommended containers being plastic and not glass (EPA, n.d). Second, chemical waste containers must be labeled with relevant information to identify the waste, its place of origin, the level of hazard, and quantity, among other relevant data. Consequently, the labeling must be completed in words and not acronyms, abbreviations, or ditto marks to ensure the handler understands the sensitivity of the waste and is in alignment with the Hazard Communication Standard. Third, if the waste is to be removed from a manufacturing area by the EHS, a form from the office must be completed providing detailed information on the nature of the chemical waste and a

contact number in case of queries from the office. To avoid accidents, all chemical waste containers should be listed separately, sealed, and tagged with no leakage. Some chemicals are disposed of through the sanitary sewer but still require approval from the EHS. A firm is expected to submit a list of the chemicals that require disposal to the EHS offices for review and approval (EPA, n.d). Ultimately, the EPA guidelines prohibit chemical waste disposal into a solid waste disposal system.

Contracting a Waste Disposal Firm

Big Green Tractor can opt to contract a licensed and experienced waste disposal company, which has multiple benefits. Chemical waste is complex to dispose of, and improper disposal depicts harm to human and environmental health. A chemical disposal company offers expert services despite the complicated nature of the waste, and its services are hard to source internally. Outsourcing has several benefits, including; service flexibility, specialist support, less risk of legal problems, environmental initiatives support, cost-efficiency, and safety enhancement (Robert Hopkins, n.d). A waste disposal company offers services regularly and occasionally based on a company's needs. Big Green Tractor can benefit from the flexibility and outsource based on need. Second, waste disposal companies offer specialist support for handling hazardous waste. Though a company may have specialists, they may not be familiar with all types of waste. Therefore, having expert handlers reduces health and safety risks. Third, legal and licensed waste disposal companies save a firm the hurdle of dealing with legal risks that may occur if chemical waste disposal is made wrongly. Moreover, experienced chemical waste handlers ensure correct disposal, preventing environmental pollution. Last but not least, outsourcing is cost-efficient, and Big Green Tractor does not have to hire extra staff to handle chemical waste disposal processes (Robert Hopkins, n.d). Therefore, Big Green Tractor should consider the option since it meets industrial waste disposal standards.

Employee Training

Big Tractor can opt to train employees on efficient and legal ways of waste disposal based on industrial standards. For instance, the firm can teach its employees about chemical waste treatment before disposal based on its category and level of danger. Hazardous waste can be treated in several ways, including; chemical, thermal, biological, and physical treatment. Chemical treatment includes; precipitation, ion exchange, neutralization, and oxidation. Incineration is an example of thermal treatment, while land farming is an example of biological treatment. Additionally, physical treatment includes processes such as; sedimentation, evaporation, filtration, flotation, and solidification (AOTC, 2021). If employees understand how each category of chemical is disposed of according to industrial standards, it can reduce error possibilities during disposal processes.

B: Green Manufacturing Alternatives

Green manufacturing embraces the concept of clean manufacturing processes, which are not always available in conventional ways of manufacturing. Additionally, green manufacturing aims to reduce; the use of natural resources, waste, pollution, and excess energy during production processes. Consequently, green manufacturing processes support the recycling of materials as a waste reduction and resource optimization method. Some of the green manufacturing alternatives to conventional production include;

Technology-Assisted Manufacturing Process

Technology is an essential aspect of green manufacturing initiatives. Laser-assisted machining (LAM) is an example of a technology-related green manufacturing alternative that reduces emissions and works in favor of manufacturing machinery. The type of technology enhances machines cutting strength and lowers the force, resulting in a lower machine wear progression rate (UIOWA, n.d). Therefore, using technology innovations as a green manufacturing initiative is beneficial to the environment and Big Green Tractor since it reduces wear and tear repair costs and pollution and gives machinery a longer lifespan.

Recyclable and Lesser Carbon Footprint Materials

Big Green Tractor can invest in using sustainable materials, which can be removed from a manufacturing life cycle and reinserted. Recycling of production materials reduces the energy and emissions used in creating completely new products. Moreover, recyclable materials reduce waste accumulation in dumpsites and landfills, promoting the green initiative (Haleem et al., 2023). Therefore, Big Green Tractor can research sustainable and reusable materials that can fit its production process to promote the green initiative.

Utilization of Renewable Energy Sources

Firms globally are investing in renewable energy sources to mitigate climate impact and promote green initiatives. Big Green Tractor can be classified as one of the companies operating in energy-intensive industries. Research depicts that companies such as Big Green Tractor consumes over seventy-five percent of industrial energy though they only account for approximately five percent of global manufacturing plants (Smart Cities Dive, 2017). Therefore, renewable energies are a logical solution to reducing excessive energy consumption. Some renewable energy substitutions Big Green Tractor should consider include; solar thermal systems, electrification, and biomass. Biomass is essential in manufacturing because it reduces production costs and has a high energy density for energy-intensive manufacturing processes. Consequently, solar thermal systems have an industrial process heating potential though they were primarily designed for low-temperature processes. However, new designs can hold higher energy' hence a suitable energy option. Lastly, electrification reduces energy consumption, and is electricity is readily available; hence a suitable option (Smart Cities Dive, 2017). The highlighted renewable energy sources are suitable alternatives to fossil fuels use.

Conclusion

Big Green Tractor has a chance of reclaiming its lost glory, and its decision to streamline operations and invest in green manufacturing processes are steps in the right direction. The company should consider several cost-efficient production processes, such as; technology incorporation, JIT, and value stream mapping. Additionally, using the Six Sigma methodology to reduce defects will leverage costs, and the capital can be directed toward stabilizing company operations. A greener process can be created using lean manufacturing tools, such as; Jidoka, TPM, and VSM. Moreover, the company should be socially and environmentally responsible in industrial chemical waste disposal and using green manufacturing alternatives.

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