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COVER PAGE AND DECLARATION

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Introduction

It is the job of an organization's operations system to transform raw materials and labor into finished goods and services. A definition of operations management is the technique whereby all available resources within a predetermined framework are coordinated and converted in a way that maximizes value according to the guiding principles established by management. Toxic chemical wastes are a major issue for modern businesses. Any liquid, gas, or solid waste item that, if handled improperly, poses serious risks to human health and the environment is considered chemical waste. Companies' chemical waste presents risks to both people and the human environment. Oils, insecticides, and other commercial chemicals are used in industrial tractor manufacturing operations, leading to the release of toxic waste. These pollutants mostly release NO₂ and NO as byproducts of their emission. Their release is undesirable because nitrogen imbalances are detrimental to vegetation. Due to their prevalence in heavy-duty trucks and greater pollution output, diesel engines produce disproportionately heavily to air pollution. In the first section of this research, we will discuss the operational industrial streamlining procedure guide that will assist the Big Green Tractor Company in Indonesia throughout the full manufacturing process. The report will also include suggestions for making a company's production process less harmful to the environment. It will talk about how to create a greener process using 21st-century technology. Second, this report will craft a manual for Big Green Tractor's polluter-friendly operations. Standards for the safe disposal of chemical wastes in process and environmentally green alternatives to industrial manufacturing are also communicated. In the Palembang area of Indonesia is where you'll find The Big Green Company, a tractor manufacturing. The lack of environment and environmental friendliness in the company's operations is mostly to blame for the company's stagnating success in recent years. This business plans to reorganize in order to become more competitive.

1. Operational Procedural Guide

A. Recommendations for manufacturing processes

During the manufacturing process, a substantial amount of agricultural equipment is used as overhead. The large quantities of costs are a result of the newly developed technology, the large machinery, the higher prices for both energy and parts, as well as other factors. It is imperative that the Big Green Tractor Company of Indonesia be recommended to put the following strategies into practice in order to make their manufacturing processes more cost-effective:

- **Cost Reduction by Modular Designs and Standardization**

Because of the modular construction of the tractors, the Big Green Tractor Company is able to reduce the amount of money it spends on the manufacturing process. The term "modular design" refers to a design that has been customized, updated, and modernized. It will assist in the reduction of costs and will, as a result, develop a variety of products by utilizing standardization and combination procedures. As a result of the entire modular design process being implemented in the manufacturing process, the order lead time will be reduced, the expansion time will be reduced, large economies of scale will be achieved, preservation and repair will be easier to produce, and diagnostics will be produced more quickly. It will be of additional assistance in elongating the life of the tools and will, as a result, improve the desirability of the equipment. The standardization of products and the simplification of processes can both contribute to a product in the cost of manufacturing. The standardization of standardizing a product involves determining which industrialized processes are most effective, determining which connected procedures for the production of a product are most effective, and locating the best feasible manufacturing tools. The standard must be met in all aspects, including the design and engineering, practices, resources, testing approaches, provisions, and more.

- **Reduction of cost of the purchased materials**

The Big Green Tractor Company is going to have to start using the strategy of diversification in order to improve their material procurement. The organisation needs to evaluate both the comprehensive sourcing plan as well as the supply chain system strategy in order to accommodate the different sources of supply they use. As a result of implementing various diversification strategies, the company now possesses a wide variety of options, which enables it to choose the appropriate balance between off-shore and near-shore manufacturing. The company needs work

close relationships with its many varied types of suppliers in order to gain access to a wide range of intelligences. In addition, the diversity of the supply chain terms in improved flexibility in meeting the ever-changing expectations of clients, which in turn ensures that quality service is provided.

- **Just in Time Approach in manufacturing processes**

Just in time is an approach that needs to be implemented into the firm's manufacturing process. This will enable the company to boost productivity while also cutting down on waste by ensuring that products are only obtained at the point in the process when they are required. Because of this, in the long run, we will see a decrease in the cost of inventory. The Just-in-Time (JIT) approach eliminates the waste that is caused by excessive production, waiting for the material, and maintaining an excess of inventory. By utilizing this approach, manufacturers will be able to cut down on their overall overhead costs, and as a result, they will be able to ensure that the components they need to produce their merchandises are readily available.

- **Automation in manufacturing processes**

The Big Green Tractor Company must automate their processes in order to create products in a manner that is both efficient and economical. Automation refers to the process of following a planned order of processes without any intervention from human workers. This is accomplished by using specific apparatus and tools that perform and regulate the various manufacturing processes. It is a type of technology that focuses on the use of machine-driven, computer- and electronic-based systems to function and regulate production. The following is a list of the advantages that can be gained through automating the manufacturing processes:

- Improved quality: Because it leads to fewer instances of rare faults, it helps to ensure that products have a high overall quality.
- Automation helps the company to substitute the labor-intensive operations, which in turn results in a reduction in the labor cost: Reliance on labor scarcities, which in turn results in a decrease in the cost of labor.
- Reduced manufacturing lead time: This helps cut down on the amount of time that passes between a customer placing an order and the product being delivered to the consumer.

B. The Plan in Which Minimize The Defects:

It is a well-established truth that effective manufacturing can only be achieved with a low degree of faults present in the end product. The higher the number of defects in the product, the greater the increase in both the costs and the amount of time required.

- **The Method of Six-Sigma**

It is a method that has been shown to improve performance in the various stages of the manufacturing process. The primary goal of the six-sigma technique is to improve the quality control of manufacturing processes and, as a result, reduce the total number of defects that occur throughout such processes. In order to increase the value of the processes that come from a manufacturing process, Six Sigma recognizes and gets rid of the factors that contribute to defects in the product, as well as reduces the variability of the process.

Kaizen approach

It is a technique that assists the manufacturer in the improvement of continuously improving their products. It is a form of action plan that facilitates the generation of ideas through brainstorming, which in turn leads to the ongoing improvement of processes. The primary objective of this strategy is to enhance the existing standardized procedures and programs used in the manufacturing processes in order to get rid of waste and, as a result, increase productivity. Discovery of improvement potential, analysis of existing techniques, generation of new ideas, development of an implementation plan, execution of the plan, and evaluation of the new method are the six phases of this methodology. Due to its impact on competition, product innovation, meeting consumer expectations, and streamlining the supply chain, Kaizen is a vital technique for defect prevention. The following is an example of an effective plan for lowering fault rates in manufacturing:

- Product design is the first strategy recommended for reducing the design of defects in a product. A flawed design increases the likelihood of manufacturing defects in the final product. It is recommended that the manufacturing engineers be included from the very beginning of the development process. Their expertise in the manufacturing time can assist the organisation in reducing costs and maximizing efficiency. As a result, reducing the number of faults in the manufacturing process can be accomplished by involving a group of

engineers into the stage of product development.

- Flexibility in the production process: One approach to lowering the number of quality defects that occur is to increase the level of adaptability in the manufacturing process. It is necessary to have a transparent production methodology in order to reap the potential benefits for the company. It is sometimes necessary to develop new manufacturing processes in order to establish the quality of the product and to reduce the number of defects.
- The application of technology: The utilization of technology may prove beneficial to the company in terms of locating defects in the manufacturing process. In order to manage them efficiently in the early stages of the production process, it is necessary to make use of technology such as information technology services, computer modelling, and other similar methods.
- Immediately begin taking precautionary measures. This strategy is reserved for the later stage of the manufacturing process. The company has an obligation to check that all of the equipment is operating correctly in order to verify that there are no flaws.
- Inspection: The company is required to conduct routine inspections of the manufacturing process in order to identify the factors that are mostly responsible for the defects.
- Maintain stringent quality control: The company must incorporate a quality team that verifies the production process adheres to all of the specified instructions and rules at each stage.
- The flow of communication: If you want to lower the number of defects, one of the best tactics you can use is clear and effective communication. If there is effective communication between the employees in production, the engineers, and the other members of the product design team, then they will be able to detect problems more precisely. This will be of additional assistance in bringing about efficacy and lowering down the number of defects that occur in the production process.

C. Utilizing the Technology of the 21st Century to Achieve a Greener Process:

- Gemba is a tool for the 21st century that may be used to make processes more environmentally friendly. It is a belief that instructs us to stay away from our places of employment and instead spend time at the plant level, which is a location at which the actions themselves are carried out. It is possible for it to assist the company in supporting a profound and detailed comprehension of genuine industrial concerns through immediate reflection and by interacting with plant level.
- Hoshin kanri is an additional technique that is applicable in the process of ensuring that a company's strategy is carried out uniformly throughout the organization's hierarchy. It contributes to the reduction of waste caused by pitiful communication and unpredictability in the direction taken.
- Heijunka: This tool is the best tool of the 21st century since it helps businesses to equalise the volatile patterns of customer demand and it reduces waste in the industrial sector by flattening the amount of manufacture production over a consistent period of time. Both the lead time and the inventory can be reduced as a result of this change.
- Kanban is a visual tool that is responsible for regulating production as a component of lean manufacturing and the Just in time methodology. It relies on pre-programmed replacements made possible by signal cards that indicate when additional stock should be purchased. The elimination of waste in the inventory as well as excess production is one of the benefits of utilizing this tool.
- The Poka Yoke is another 21st-century technique of lean manufacturing that aids in minimizing waste and making processes greener. It was developed in Japan in the 1960s. It gets rid of defects by putting a halt to or changing anything about the human errors and paying attention to them. Due to the fact that it is difficult to discover all of the faults and defects through examination, this technique locates the defects in a very short amount of time.
- Overall Equipment Effectiveness (OEE): This instrument of the 21st century is also beneficial in creating processes that are more environmentally friendly. It is a system that determines whether or not a certain industrial process is losing efficiency or productivity.

There are three different kinds of losses, and they are named availability, performance, and quality respectively. It contributes to creating a standard as well as a mechanism to track development in the process of reducing waste from a manufacturing technique. If there is an OEE of 100%, this indicates that production is at its highest possible level.

2. Socially responsible pollutants plan

A. Industrial standards on disposal of chemical waste

The methods and Guidelines that are relevant to the procedure of dealing with manufacturing waste are provided by the industrial standards that regulate the disposal of chemical waste. During the manufacturing operations, the vast majority of businesses generate hazardous waste composed of chemical substances. The Environmental Protection Agency (EPA) provides standards for the management and disposal of chemical waste created by companies. Additional protection for human and industrial health is afforded by the EPA's establishment of industry-wide standards. Furthermore, these guidelines are helpful in fostering the ecologically comprehensive recycling as well as the preservation of resources; making the instructions easier to recognize; giving flexibility in how specific chemical waste is treated; and enabling improved compliance. The following is a list of the industrial standards and guidelines regarding the disposal of chemical waste:

Industrial Standards for several types of chemical waste, including methanol, acetone, methyl ethyl ketone, hydrofluoric acid, and xylene, amongst others.

- Assemble profitable biochemical items that have been discontinued or are outside of their specifications in preparation for renovation.
- Label and package hazardous wastes before transporting them on a hazardous waste truck to a harmful waste storage facility (TSDF).

Industrial standards for chemical waste, such as liquids polluted with heavy metals, solutions for blazing heaters, recycled oils, and recycled oil filters.

- judiciously drain the oil sieves, then collect the oil and dispose of it in the right manner.
- You should reuse the glowing fluid in the radiator.
- Treat as hazardous waste the recycled oils that have been mixed up with other types of waste that are scheduled to be harmful.
- For the aim of recycling, collect the various motorized fluids as well as the recycled oils.
- Label and bundle unsafe wastes before transporting them on a hazardous waste truck to a harmful waste storage facility (TSDF).

Industrial Standards for the chemical waste generated from the removal of rust and the degreasing of parts washing, including ammonium hydroxide, hydrobromic acid, benzene, potassium hydroxide, and other substances.

- Treat the wastewaters within an element of wastewater management that is governed by the Clean Water Act.
- An agreement with either a national or local EPA agency in order to determine the status of dusters in your state.
- Recover diluents on-site in a purification division for recycling or transaction, or arrange to have the diluents transported off-site for reuse.
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Industrial standards for the disposal of chemical waste such as that generated by the replacement of parts, including chemicals from batteries such as nickel, iron, and carbonate, etc.

- Making a deal with a reprocessing operation to sell the scrap metal you have.
- Collect the batteries so they can be repossessed.
- Recycle the used batteries on-site, either with the help of a contractor or at a local organisation specializing in resource recovery.

- Retread the scrap tires or send them to be reprocessed, whatever you prefer.

Industrial standards for the chemical waste generated from cleaning tank trucks, which may include acid cleansers, ethyl benzene, wastewater, volatile organic emissions, and other potentially harmful substances.

- Utilization of recycled wastewater solutions as the initial wash step for very polluted storage containers
- You should make a deal with a recovery unit to sell any leftover commercial biochemical products.
- The acid wastes can be neutralized by using the alkaline that was left over.

B. The Green Alternatives to The manufacturing Traditional processes

Producing goods in a technique that is less harmful to the environment and reduces less waste is referred to as "green manufacturing." This is something that can only be accomplished by assuming the practices that will have an effect on the product strategy, operating principles, and the design of the procedure. Every business must make it their mission to reduce their discharge, energy use, waste generation, and water consumption in order to develop manufacturing processes that are environmentally friendly and green. The following are some examples of new environmentally green processes to the manufacturing process that could be developed:

Manufacturing processes that use laser assistance

It is a more environmentally friendly alternative to conventional manufacturing processes, as it makes use of fewer potentially harmful resources and generates less emissions. This technique helps to bring about a good impact on the environment by bringing about a reduction in the discharges that occur during the manufacturing processes. In addition, because it does not involve direct touch, it assists in extending the useful life of the tool.

Direct Digital manufacturing

It is yet another environmentally green option that makes use of FDM technology, which is what drives the reduction in waste while also driving up production. With the assistance of additive industrial technology, it is a low-volume industrial application that creates physical items directly from 3D CAD documents. This process is known as "additive manufacturing." Just-in-time

manufacturing and a harmful amount of waste on a physical level are two of the green benefits that may be attained through the utilization of this technique. Because of the FDM technology, there is less material going to waste throughout the manufacturing process. The creation of the product often made the use of plastic according to the traditional manufacturing practices. On the other hand, FDM industrial parts require only a small amount of plastic to be made, which results in an insignificant amount of waste structural material.

Sustainable sourcing of materials

It is the method that is concerned with the acquisition of materials and resources that are ecofriendly in nature and have properties such as recyclability, reusability, and minimal usage of harmful substances. It is a technique that has been increasingly popular in recent years. When implementing this technique throughout the supply chain, it is possible to reduce the costs of the products, as well as increase both the business performance and the environmentally friendly performance in the market.

Renewable sources of power and alternative biofuels

The activities of the company's supply chain absolutely require the use of renewable energy in order to achieve the desired outcomes of sustainable economic and environmental growth. The utilization of biofuels results in a reduction in carbon emissions, which in turn leads to an improvement in the economic performance of the company.

Green-Friendly Logistics

It is possible to define it as a collection of ecological strategies and procedures designed for the purpose of minimizing the negative influence that a company's processes have on the surrounding environment. The use of environmentally green logistics is now the most viable alternative to traditional manufacturing processes. It contributes to the process of quantifying the carbon impact that the operation of logistics has. In addition, it contributes to the reduction of soil, air, and noise pollution in addition to water pollution by analyzing the impact of each logistics region. In addition to that, it is concerned with the material handling, transportation, packing, and even the disposal of waste. When a green logistics technique is implemented to the supply chain, the end result is a performance in both the functionality and the look of the product.

Conclusion

It is possible to draw the conclusion from the operational guide of recommendations and pollutant plan that was presented earlier that sustainability is the most important idea that needs to be considered throughout the manufacturing processes of a company. It has been discovered that the primary recommendations to produce more cost-efficient processes are to make use of modular designs and to standardize the processes. In addition, it was determined that modulation of the processes helps in allocating the design across the various product lines. This was one of the conclusions reached. The company can cut costs even further by implementing the just-in-time methodology, which will assist in cutting down on the amount of money spent on inventory. This requires the inventory only in the quantities that are desired or necessary. In addition, the Big Green Tractor Company is able to automate its manufacturing processes by using fewer people and more machinery than is traditionally required. This reduces the amount of manual labor required. In addition, it has been determined that the reduction of faults in manufacturing processes can be accomplished through the utilization of a variety of methods, including the kaizen approach and the six-sigma method. In addition, the operational plan highlighted the utilization of tools from the 21st century, such as kanban, heijunka, gemba, hoshin kanri, poka yoke, and overall equipment effectiveness tools, with the purpose of creating an eco-friendlier process. It is also possible to draw the conclusion that distinct industrial standards apply to the various types of chemical waste that are produced as a byproduct of the manufacturing processes. In conclusion, it can be stated that direct digital manufacturing, laser assisted manufacturing, environmentally green procurement of materials, renewable energy, and biofuels are the environmentally green alternatives to traditional manufacturing processes.

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