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## **1. Introduction**

The creation and delivery of services and goods by organisations is the focus of operations management. To support us with all we do in the sports industry when it comes to what we wear, consume, sit on, use, read, and touch, we will use operations managers to coordinate its development and implementation. Every library we use, every medical treatment we receive, every retail service we anticipate, and every college lecture are all no longer in service (Alabi et al., 2019).

Operations management, which contains all layout, application, production, anmanage and control on all industries and sections associated with the manufacturing process, can be defined as those organised processes through which all industrial processes in the organisation are organised and planned that result in the production of goods that the organisation seeks to provide to consumers (Ahmed, Page & Olsen, 2020). The term "operations management" refers to all initiatives taken by the workforce and management cadres to allocate energies and material and human resources in a flexible manner in order for the organisation to achieve its objectives and ensure that the goods and services it produces are in line with the standards, requirements, and expected quality.

Operations management is a branch of management that focuses on planning, organising, and redesigning the production process for the creation of commodities and services. involves the obligation to make sure that the business's operations are efficient in terms of requiring the least amount of resources and meeting client needs (Ashima et al., 2021). Planning, arranging, and overseeing in the contexts of production, manufacturing, or service supply are the main concerns of operations management. Operations management is concerned with overseeing the entire production process, including the steps that turn inputs (such as labour, energy, and raw materials) into outputs (such as goods and/or services), or deliver a product or service. Operations create service, control quality, and produce goods (Anastas &

Zimmerman, 2019). Work with suppliers and customers, enterprises, banking systems, hospitals, and other industries are all included in operations management. One of the key roles in a corporation, along with supply chains, marketing, finance, and human resources, is operations.

. The administration of both the strategic and ongoing production of goods and services is a requirement of the operations mission. 4 Operations strategy, product development, design engineering, quality and capacity management, facilities planning, production scheduling, and inventory control are just a few of the decisions that are taken in industrial or service operations management. To increase the efficacy and efficiency of production or service operations, both require the capacity to analyse the present situation and identify better options. The importance of operations management is highlighted in finding a state of balance and interdependence between the various productive elements that are available in the organization so that all efforts and resources are unified in order to convert them into highly efficient goods and services that contribute to increasing the organization's profit and outperforming its competitors in the market, and the organization's management is responsible for balancing The costs incurred by the organization at all stages of the production process with the revenues generated from sales operations in order to achieve the largest possible operating profit.

First, this report will cover the Procedural Guide to Industrial Operational Simplification that will assist the Big Green Tractor Company based in Indonesia from start to finish in their production operations. It will also cover recommendations for an environmentally friendly way to reduce the use of pollutants in the company's production process. He will discuss the use of 21st century tools to develop a greener process. Second, this report will develop a socially responsible operational guide for the Big Green Tractor to its pollutants. It also

conveys industrial standards for chemical waste disposal and green alternatives to the traditional manufacturing process.

## **2. Company profile**

Big Green is a production company located in Palembang, Indonesia. It is a production facility. Due to low productivity and environmental productivity, the organization has faced regressive progress in recent years. The company needs to restructure its operations to make the sector more competitive.

## **3. Recommendation procedure guide for operational industrial simplification**

Many manufacturers are immediately looking for cost-effective techniques for making cuts. This could be anything from taking workers to backtracking on emerging technologies. These strategies can also squash creativity in ethics and squash, allowing competitors to move forward (Alabi et al., 2019). Every organization needs a sound production plan to improve productivity. However, effective on-boarding is a dynamic process that covers a wide range of activities in order to include personnel, equipment and resources wherever and whenever they are needed (Ahmed, Page & Olsen, 2020). Production planning is a roadmap which allows us to know where and how long it will take to get there. Here are some of the benefits of an effective production and planning strategy.

- Reduce labour costs by reducing time and enhancing process flow.
- Reduce inventory costs by reducing inventory protection standards and inventories that are not necessary to operate in operations.
- Machine use is simplified, and capacity is improved.
- Improving on-time delivery of products and services.

Successful planning depends on a sound understanding of the basic tasks that entrepreneurs and managers have to perform in the planning process. These cases are as follows:

### **Standard time and steps**

In general, mapping in order to perform and then adding the average time to complete our work is the most successful way to evaluate our production steps. Remember that not all steps occur in a sequence and many of them can happen simultaneously. We can understand how long it takes to complete the entire process after completing the process map. When work is to be repeated or matched, the work and time involved must be standardized (Ashima et al., 2021). Document and use similar practices as a basis for identifying potential pathways and times for potential use. This will greatly speed up the preparation process. We can select waste during the process map phase. We can use operational efficiency/lean production concepts to reduce waste, shorten the process, and increase delivery and cost.

Standardization facilitates efficient use and reuse of materials, saving volume and interoperability. In the standardization of mechanical systems, the industrial voltage is high. Electronic network systems also began to advance (Anastas & Zimmerman, 2019). In the same way that gauges, tires and belts are standardized, or energy is discharged, the normalization of electronics and controls such as networks and buses facilitate improvement in agriculture. But there is a greater need in this field for the rapid transfer and impact of electronic functions. The industry is running out of people who can do.

### **Design issues for manufacturing**

Certain design options for agricultural equipment can reduce production costs. In this context, good engineering and management will reduce production cost. The cost of production can be affected by several factors. The historical importance of standardization and reusable parts has been demonstrated. Increasing costs in the industry remain a concern. Modularization is one way to combat rising costs (Calzavara et al., 2020). Modularization reduces costs by

modularization through combination and requirements in order to achieve product diversity. Technical advances in electronic equipment and the evolution of computers into mechatronic systems can have significant positive effects on performance and production costs. Other factors such as regulatory problems may, if not foreseeable, result in significant manufacturing costs.

### **Just in time in the manufacturing process**

The company should take a timely approach to the manufacturing process that allows the company to increase productivity and reduce wastage by sourcing merchandise only as required by manufacturing procedures (Darko et al., 2019). This will eventually lead to lower inventory cost. The JIT approach avoids waste related to overproduction, waiting for materials, and keeping surplus stock. This approach will allow manufacturers to reduce their overall overhead and thus ensure access to parts to manufacture their goods.

### **Automation in manufacturing processes**

Big Green Tractor must automate their processes for cost effective manufacturing processes. Automation is that procedure of following a pre-prepared arrangement of processes without human intervention, by specific devices and tools that accomplish and organize the manufacturing processes. It is a technology that focuses on machine-centric, computer and electronic systems to operate and control production (Dushkova & Haase, 2020).

Automation is a necessity, not a choice in recent times. Generally, the manufacturing sector of any country contributes significantly to economic stability. Automation has changed the world in a significant manner. Irrespective of the domain, Automation has fixed its ground into all of it, especially in the manufacturing industry. The combination of human + machine has empowered the manufacturers to produce many relevant products. This combination of human and machine is just an example of Automation. The benefits of automation in manufacturing processes are as follows:

- **Better quality:** It reduces the rarity of defects and thus ensures the high quality of the products. The ability to focus on strategic, high-level tasks that really use their expertise. Tedious manual labor can simply be left to the machines. Instead, manufacturing personnel can focus on the best way to improve efficiency on the floor, expand their products' capabilities, and many other engaging tasks. It benefits everyone. Thanks to automation, even small companies can bring about ground breaking innovation that may be adopted around the world. Today, we're in the midst of a new automation boom that promises to fundamentally transform how manufacturing is done.
- **Reducing labour cost and reliance on labour scarcity:** Automation helps a company to replace labour-intensive processes and thus reduce labour cost. Even the most sophisticated robotic system is useless without human insight to guide it. When automation is deployed in a factory, it means team members no longer have to worry about the most dangerous and dirty tasks. Life-threatening processes are often the first to be delegated to robots. That reduces accidents and helps workers maintain their health over time
- **Minimized Manufacturing Lead Time:** Helps reduce the time between customer order and product delivery. End-to-end factory automation can double or even triple production compared to plants that use only a few automation systems. Not only that, but equipment can often be kept running for longer periods of time with comparatively little impact on the maintenance outlook. This lets companies outperform even rivals with much simpler or low-quality goods.



#### **4. Plan to reduce defects in the entire manufacturing process**

It is well known that efficient manufacturing is completed with a low degree of product defects. The more defects in a product, the higher the costs and time (Florindo et al., 2019). Product defects are a pain at any manufacturing company. When all the time, energy, and money that is spent to produce a product is wasted due to defects in the final outcome, it can have a huge effect on the company. This effect can be widespread, from an increase in the cost per unit of an item to decreased customer satisfaction, and even a negative effect on the company's overall reputation and success.

**Inspection:** Production processes should be routinely reviewed by companies to identify the root cause of defects. Technologies such as ultrasonic, particle, vibration and resistive monitoring are now readily available and can be used to eliminate defects in the manufacturing process (Hayta & Oktav, 2019). Companies should inspect the manufacturing process regularly to identify the root cause of defects. Technologies like ultrasonic technology, particle testing, vibration, and resistance testing in order to reduce defects in the production process are available easily these days and should be used.

**Communication Flow:** Communication is the main force of any well-functioning organization. Day-to-day contact between the manufacturing crew, design staff and other engineers is important and leads quickly to problem detection and resolution. This teamwork can make it more effective and will lead to major disadvantages.

**The Six Sigma Method:** In 1986, Motorola introduced the Six Sigma principle as a series of tools and techniques to improve production processes. In 1995, Jack Welch used the term as a central concept in GE's business strategy now used by a variety of industries (Hayta & Oktav, 2019). To increase production performance efficiency, Six Sigma identifies and eliminates defective elements as well as reducing variability in market and production processes. Under this approach, the company has taken a certain number of steps to calculate the target value

of the project. The application of Six Sigma in manufacturing can help a company reduce emissions, reduce one or more process cycle times, and reduce production costs in order to improve levels of profitability and satisfaction for its customers (Jiang et al., 2022).

**Use of technology:** Technology can be useful to a company in discovering defects in the manufacturing process. In the early stages of the production process, there must be a use of technology such as the use of IT services, computer modelling, etc. in order to deal with it quickly. Major manufacturing companies are using computer modeling or simulations or other IT services to detect product defects and handle them in the early stages of the production process. Using technology like this can offer a real-life test of real-world production scenarios and help to identify problems early.

**Take precautionary measures:** This strategy will be for the late stage of the manufacturing process. The company must ensure that all machines are working properly so that there is no defect.

**Kaizen approach:** It is a technique that allows a product to continuously improve. It's a kind of business plan that provides brainstorming ideas that continually develop processes. The main objective of the strategy is to enhance existing standardized procedures and programs, to eliminate waste and thus increase efficiency in industrial processes.

This strategy consists of six steps: Determine potential for improvement; evaluation of current methods; producing original ideas; Design implementation plans. Provides a plan and tests new methodologies. Kaizen is an effective way to reduce deficiencies through increased competition, and product innovation; high expectations of consumers; and supply chain productivity.

## **5. Using 21st century tools to create a greener process**

Lean tools can have many consequences for environmental waste. Lean tool-based research conducted by the Environmental Protection Agency in organizations from different sectors has given extensive knowledge about 5S, TPM, cellular manufacturing, JIT, Kanban, and Jidoka, their environmental impact and waste minimization benefits (Li et al., 2020). This section summarizes the list of lean tools for creating a greener process.

**Gemba:** Gemba is a Japanese term meaning "the real place", where work is carried out, such as the shop floor of a manufacturing plant. In Lean it refers to the place (physical or digital). Going to Gemba is a way to get to the core of the value being created, an invitation for leaders to get out of their desks and spend time at the plants to understand deeply and meticulously the reality of their work environment (Kumar, 2022). Many decisions about sources of value are made without consulting the people on the front lines, the people who can get the best insight into how systems can change, and challenges can be solved. If problems arise, it is important to look at what is happening and make accurate decisions that accurately reflect the reality of the problem. Gemba is one of the three essential Lean tools that can improve their analytical skills by helping leaders approach their situations with greater humility.

**Heijunka:** This tool is the best tool of the 21st century that helps organizations balance fluctuating customer demand patterns and reduce industry waste by flattening manufacturing output over a stable period. Helps reduce lead time as well as inventory (Jiang et al., 2022).

**Kanban** is a visual tool responsible for managing production as part of lean and part-time manufacturing. It is based on programmed replacement through signal cards that appear when additional merchandise is desired. The advantage of this tool is that it removes waste from stock and overproduction.

Poka Yoke: Another 21st century technology for lean manufacturing that helps avoid waste and make operations greener. It eliminates defects by stopping or modifying and paying attention to human errors (Lu, Xu & Wang, 2020). Since it is difficult to detect all faults and defects through inspection, this technique quickly detects defects.

Just in Time (JIT): Just-in-time production is key to lean production. It is the concept of manufacturing in the quantity demanded by the consumer, when and wherever he wants without delay or waste. It specifically tries to remove inventory from our operations.

## 6. Socially responsible pollutant plan

### a. Industrial standards on disposal of chemical waste

Industry standards for chemical waste disposal provide appropriate practices and guidelines for conducting manufacturing waste treatment. Most companies produce hazardous chemical waste at all stages of their manufacturing processes (Mitsea, Drigas & Mantas, 2021). The Environmental Protection Agency provides standards for managing the disposal of chemical waste generated by a company. Industry standards provided by the Environmental Protection Agency protect human health as well as the environment.

How to Properly Dispose of Chemical Waste			
<p><b>Aqueous Waste</b> (&lt;40% Organic Chemicals)</p>  <ol style="list-style-type: none"> <li><b>Acidic</b> (pH &lt; 4)</li> <li><b>Neutral</b> (pH ~4-10)</li> <li><b>Basic</b> (pH &gt; 10)</li> </ol>	<p><b>Organic</b> (&gt;40% Organic Chemicals)</p>  <ol style="list-style-type: none"> <li><b>Non-chlorinated</b> (e.g. THF, ethyl acetate, hexanes, toluene, methanol, etc.)</li> <li><b>Chlorinated</b> (e.g. DCM, chloroform, chlorobenzene, etc.)</li> <li><b>Chemicals in a commercial bottle</b> <u>Undamaged bottle:</u> Dispose in original bottle (no label necessary) <u>Damaged bottle:</u> Arrange disposal with Chem Stores</li> </ol>	<p><b>Solid Waste</b></p> <ol style="list-style-type: none"> <li><b>Lightly Contaminated</b> <ul style="list-style-type: none"> <li>No visible loose powders</li> <li>Collect in unlabeled green pails</li> <li>Empty into the solid waste drums on the 7<sup>th</sup> floor</li> </ul> <p><i>Examples:</i> Gloves, Kimwipes, paper towels, empty vials/centrifuge tubes, etc.</p> </li> <li><b>Chemical</b> <ul style="list-style-type: none"> <li>Loose powders</li> <li>Heavily contaminated solid materials</li> </ul> <p><i>Examples:</i> Used filter paper, unwanted samples, heavily contaminated gloves/kimwipes/paper towels, etc.</p> </li> <li><b>Silica gel</b> <ul style="list-style-type: none"> <li>Dispose in separate container</li> <li>May not be combined with other types of chemical wastes</li> </ul> </li> <li><b>Chemicals in a commercial bottle</b> <u>Undamaged bottle:</u> Dispose in original bottle (no label necessary) <u>Damaged bottle:</u> Place in secondary container with a waste label</li> </ol>	<p><b>Special Cases</b></p> <ol style="list-style-type: none"> <li><b>Sharps</b> (e.g. needles, razor blades, etc.)</li> <li><b>Inorganic Oxidizing</b> <ul style="list-style-type: none"> <li>Place in a container with a disposal label</li> </ul> <p><i>Examples:</i> Peroxides, chromates, etc.</p> </li> <li><b>Violently Reactive</b> <ul style="list-style-type: none"> <li>Contact Ken Greaves and Mike Dymarski</li> </ul> <p><i>Examples:</i> LAH, nBu-Li, HF, Piranha, etc.</p> </li> <li><b>Mercury Thermometers</b> <ul style="list-style-type: none"> <li>Labeled separate puncture resistant container</li> </ul> </li> <li><b>Any uranium, thorium or mercury containing compounds</b> <ul style="list-style-type: none"> <li>Contact Ken Greaves and Mike Dymarski</li> </ul> </li> </ol>
<p><b>A Note on Labeling:</b></p> <ul style="list-style-type: none"> <li>Indicate the content in the disposal container</li> <li>Write out all chemical names</li> <li>If the content is a mixture of chemicals, indicate the major components and list the most hazardous component(s)</li> </ul>			

Figure 1: Chemical waste disposable ways

### **Stage 1 - Preparing the packages**

For waste management it is necessary to choose the right container. Incorrect container cannot be released in big green tractor company or environment. 3.5-gallon plastic (HDPE) is the preferred jar (Lu, Xu & Wang, 2020). The Big Green Tractor Company was instructed to supply bulldozers for two months. Next, the large green tractor company owns waste packages, while the company's empty RMS containers total.

### **Stage 2 - Waste Identification Card**

Correct identification of waste is just as important as the correct container. When the quality of the waste container is known, everyone benefits. The contents of the container must be recorded as soon as the first drop of waste is applied to the container in federal and state regulations (Mawson & Hughes, 2019). The tag aims to list the waste components of the Big Green Tractor Company. Until the bucket is used, it is a good idea to stick the tag to the bucket handle. Required card information includes Name of the person most familiar with the waste / Contact's number / Name of the building and laboratory / full chemical name of the waste / Percentage of total quantity

### **Stage 3 - the accumulation of waste**

The following compatibility classes should be distinguished from effluents:

- halogenated organic matter
- Inorganic acids and solutions of heavy metals
- cyanide
- Non-halogenated organic matter (including organic acids)
- Photo Stabilizer
- inorganic bases

The full chemical name must be indicated on the label where the waste is added to the bottle. (Accept simple abbreviations and formulas such as H<sub>2</sub>SO<sub>4</sub>, NaOH, and EtBr). A distinction

must be made between liquids and solids. Solids in waste containers prevent consolidation and can damage the pumping system at waste disposal facilities (Padmanabhan & Barik, 2019). Even when waste is added, containers should remain closed.

#### **Stage 4 - Requisition to receive**

After the RMS receives a receipt order, the waste will be collected.

#### **b. Green alternatives to traditional manufacturing**

Green manufacturing means eliminating waste and reducing environmental impacts. This can only be achieved by taking practices that affect the product plan, business standards, and process design. For a green and environmentally friendly production process, every organization needs to 13 prioritize activities such as reducing discharge, reducing energy use, generating waste, and reducing water (Pollok & Waldvogel, 2020). Below is a description of some of the new green change processes that can be produced during the production process.

#### **Green product design**

Green product design is a strategic business practice that focuses on environmental issues at an early stage of product development processes to mitigate negative environmental impacts across the product life cycle, also known as environmental design (DFE) or eco-efficiency design. Design to design a sustainable product. Green product design may include material selection, resource use, production, and final disposal (recycling, reuse, or disposal) criteria for the product (Reid & Sanders, 2023). It is not a stand-alone technology but must be included in current approaches to product design in an organization to align environmental standards with classic product features, such as efficiency, competitiveness, and functionality. It may be possible to upgrade, disassemble, recycle, and reuse green goods more effectively than their traditional counterparts, to use less materials and to split modular, replaceable parts.

### **Laser-assisted manufacturing processes**

It is an environmentally friendly alternative to traditional manufacturing processes that useless hazardous resources and produce smaller emissions (Singh & Rathi, 2019). This technology helps make a positive impact on the environment by reducing wastes during manufacturing processes. Moreover, it helps extend the life of the tool due to its offline nature.

### **Direct digital fabrication**

It is another green alternative that contains FDM technology which is responsible for reducing waste and increasing production. It is a compact industrial application that makes physical parts directly from 3D CAD documents with the help of industrial additive technology. The green characteristics of this technology are: little material waste; less harmful materials and timely manufacture (Zimmerman et al., 2020). With FDM technology, there is less waste in making the product. Traditional manufacturing methods used plastic to make the product. Conversely, FDM industrial parts are 14 manufactured using a small amount of plastic which results in an irrelevant amount of waste structure material.

### **Renewable and alternative energy sources**

Prices have risen in recent years for unconventional energy sources, such as natural gas, and are expected to rise further. Basically, an increase in price increases the cost of production in relation to a wide range of operations such as stoves. Higher electricity and natural gas prices affect the costs of steam and compressed air (Kumar, 2022). The fighters are taking unprecedented steps to use renewables and alternative energies in their operations to fight rising energy expenditures and to ensure that food producers become a company of good people (Florindo et al., 2019). This not only gives them some leverage over their spending but also gives them a measure of legitimacy with environmental movements, a critical gain for the highly competitive food industry.

## **Implementation of new technology**

Technology has always been in demand in the manufacturing sector. Big data analytics and advanced robotics reduce human intervention, increase plant efficiency, and gain a competitive advantage in developments offered by new technologies (Mawson & Hughes, 2019). Cutting-edge technologies, including artificial intelligence, the Internet, and 3D printing, are shaping the future of manufacturing by lowering production costs, increasing uptime and reducing errors (Pollok & Waldvogel, 2020). Given that productivity is important to a plant's success, every producer must invest heavily in these technologies. Here are four technologies that positively impact the manufacturing industry.



## 7. Conclusion

From the above organizational guide to pollutant strategy and guiding principles, sustainability is the most relevant principle in the company's development process. It must be remembered that modular designs and process standardization are the main guiding principles for more efficient process manufacturing. Moreover, it has been concluded that defect reduction in manufacturing 15 processes can be done by using several methods namely Kaizen approach and Six Sigma method. Moreover, the operational plan showcased the use of 21st century tools such as Kanban, Hijunka, Gemba, Hoshin Kanri, Nir Buka, and comprehensive equipment effectiveness tools for an environmentally friendly operation. It can also be concluded that there are different industry standards for different chemical wastes from manufacturing processes.

Finally, it is concluded that green alternatives to traditional manufacturing processes are direct digital manufacturing, laser-assisted manufacturing, and green procurement of materials, renewable energy, and biofuels. Operations management is concerned with controlling the production process and business operations in the most efficient manner possible. Operational management professionals attempt to balance operating costs with revenue to maximize net operating profit. Operations managers are involved in coordinating and developing new processes while reevaluating current structures. Organization and productivity are two key drivers of being an operations manager, and the work often requires versatility and innovation. An MBA in operations management can give someone a global perspective on industry trends and an awareness of any financial regulations and political uncertainties that can affect an organization. It also gives someone a solid grasp of the inherent complexities and the tools needed to respond well to change.

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