COVER PAGE AND DECLARATION

	Master of Business Administration (M.B.A.)
Specialisation:	Innovation Management & Design Thinking
Affiliated Center:	CEO Business School
Module Code & Module Title:	MGT550: Managing Operations
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Student ID:	EIU2020842
Word Count:	3698
Date of Submission:	10/12/2022

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1. Introduction

Operations Management is the art of production management to support the organization's goals and objectives through the transformation process that converts inputs such as raw materials and labor into finished products and/or services. The transformation process is a set of activities that extends from the supplier to the customer and includes the design, control, and improvement of production systems.

The goals of production and operations management are to efficiently provide the consumer with the right number of products and services at the right time and with the accepted quality. Standardized OM is the key to business growth and competition; However, companies can face significant problems and challenges if they fail to develop and implement strategies that ensure their growth and long-term sustainability (Y.Kim, 1993). This is done with Big-Green company that operates in the tractor industry and has been experiencing a significant slowdown in growth for several years.

We will address here in this document the business challenges and focuses on Big-Green's value chain improvement plan, its market offering and proposing to streamline its operations with more profitable manufacturing processes, including waste management and controls, complying with the safe environment code and maintaining industry standards, in addition to eliminating chemical waste through ecological alternatives.

2. Operational Industrial Streamline Procedural Guide

2.1. Executive Summary

The manufacturing team is responsible for tracking products and optimizing operations by ensuring the company keeps pace with customer demands efficiently and profitably. The main concept is to constantly identify and eliminate waste, processes or activities that do not add value to the end user.

2.2. Understanding Processes Management

Operation management plays a major role in taking the organization to another level and improving its position in the market. The operations management features are listed below:

- Operation management addresses several fundamental issues such as the dimensioning of assembly plants and risk management techniques as well as the design of innovation data organizations. Additional operational issues include inventory management, such as labor standards and raw material procurement, quality control, resource management and maintenance schedules.
- To create or compose effectively, the OM is an important individual who must come first. Take an oil and gas company as an example. A product has been released from a supply vessel to be made available to various customers. The OM oversees the material's eventual transportation and plans what and how it should be handled. With OM, people get more done, and productivity increases (Burton et al., 2020).
- Operations administration includes the usage of resources such as people, materials, equipment, and innovation. Operation administration win create and transport goods to customers based on customer needs and the company's capabilities (Brown et al., 2013).
- Operations management is about controlling the use of raw materials and ensuring that as little waste as possible is produced. Operations managers use various equations, such as

the order quantity formula, to decide when and in what quantity to order goods and how much inventory to keep on hand Operations management spans all departments and industries. OM is applicable in all companies, but some are probably not obvious. In healthcare, process management confirms that medical equipment is transported correctly, with the right tools, and at the exact time. It also helps people turn to doctors, specialists, experts, and other wellness personnel for timely care. If something goes in the wrong way, a competent and intelligent person understands what is happening (Burton et al., 2020).

2.3. Problem identification

We will do process activity mapping and decision point analysis to identify the problem. We will interview the managers of each department, collect data, and build the holistic cross-company information flow to map all processes involved and assess performance levels and bottlenecks. In addition, we will focus on the production department and the related surrounding functions, from the perspective of customer order to product delivery. Finally, we will identify the root cause using a simple "5 Whys" method and close unnecessary and highly cost-effective activities as well as areas for improvement.

2.3.1. Process Complexities

Opting K. Singh (1993) definition, we categorized it into four types:

1. Logistical complexity
2. Technological complexity
3. Environmental complexity
4. Organizational complexity

2.3.2.Operations Waste

Following the definition of Sullivan et al. (2002), the discovered Big Green wastes is as follows:

- **Excess inventory:** Unnecessary warehousing that leads to increased capital commitment.
- **Improper processing:** Improper use of tools, systems and procedures leading to reprocessing.
- **Overproduction:** The production of too many goods counteracts the desired flow of production.
- **Waiting:** Inactivity in and between production processes leads to poor flow.
- **Unnecessary Transportation:** Waste of time moving people, information and materials.
- **Excessive motion:** workplace design leading to underutilization of human resources.
- **Defects:** The quality of the raw material leads to reprocessing and poor final performance.

2.3.3.Physical and Organization mapping structures

We discovered Centralization - Mechanistic - structure resembling a bureaucracy where the decision-making authorized only to higher level of the hierarchy. Also, all pricing, purchasing orders and B2B decisions wait for senior leader who don’t always have accurate or timely information to make an effective decision.

As a result, Big-Green is at a disadvantage against competitors.

2.4. Recommendations

Cost efficiency according to Ron (1998); Reducing scrap in production, avoiding quality defects, and wasting time, etc. To address waste factors for efficient production, Ron emphasizes streamlining and streamlining of processes across the organization that will potentially reduce redundancies and increase efficiencies.

Bergman and Klefsjö (2010) stated that "There is always a way to get improved quality using fewer resources", meaning that processes, methods, and products can always be improved to achieve higher quality at a lower cost. In addition, the goal of satisfying customers requires continuous changes and processes improvement.

2.4.1. Improvement tools and framework

We examine the pre-existing conditions that can facilitate the implementation of the improvement plan, such as: how Big-Green measures performance, level of learning and degree of standardization within processes, the following framework concluded:

1. Improvement Methods: Lean, TQM "Total Quality Management", Six Sigma, and 5S
2. Change Management: TQMain "Total Quality maintenance"
3. Optimization & Support: Continuous Improvement, MCDM "Multiple Criteria Decision-Making", and Information Quality.

2.4.2. Implementing Lean Production

Womack et al. (1990) found that lean manufacturing requires half the human effort in the factory, half the production area, half the investment in tooling, half the engineering hours to create a new product. Hold half the inventory required, resulting in fewer errors and producing an ever-growing product mix.

Just-In-Time is a manufacturing philosophy based on the planned elimination of all waste and continuous improvement in productivity, aiming to produce the right part at the right time in the right place, aiming to improve profit and return on investment:

- Reducing inventory levels/increasing the inventory turnover rate.
- Reducing variability.
- Improving product quality.
- Reducing production and delivery lead times.
- Reducing other costs (associated with machine setup and equipment breakdown).

JIT “Just-In-Time” is used in repeated manufacturing processes of the same products using the same components repeatedly. In general, we recommend establishing flow processes that connect workstations so that there is a balanced material flow throughout the entire production process, like that in assembly line. To achieve this, a test to buffer the entire inventory towards zero and achieve an ideal batch size of a product.

2.4.3.Streamline Manufacturing

- Stabilize the Master Production Schedule (MPS) with uniform plant loading, fluid daily production ensures equal utilization of all workstations (employs constant windows to avoid fluctuations in the assigned production schedule over a period of time) and mixed model assembly (offers the same products daily, with many products repeating the process flow are made on the same production line). Meet fluctuating demand with
- Reduce or eliminate setup times, we recommend setup times in the single digits (<10 minutes) or "one-touch" setup through better planning and implementation of our redesigned/simplified and coordinated process with dedicated software teams.
- Reduce lot sizes (manufacturing and purchase), in creating the Supply Chain Response Matrix, we recommend Big-Green to reduce set-up times, which allows for economical production of smaller batches, and acknowledge the need for better and closer collaboration with suppliers to reduce batch sizes reduce purchased items.

- Reduce lead times (production and delivery) by bringing workstations closer together, applying concepts of group technology and cellular manufacturing, shortening the length of the queue (decreasing the number of jobs waiting to be processed on a given machine) , and reduction of delivery times through coordination between successive processes and suppliers.
- Apply Decision Point Analysis (DPA) to identify where in the supply chain production demand (pull) is giving way to expected customer orders (push). With DPA, production can be tailored to the manufacturing approach used (push or pull).
- Preventive maintenance by using the machine and worker idle to maintain equipment and prevent breakdowns.
- Flexible work force, train and upskill production workers to operate various machines, perform maintenance tasks and quality checks.
- Apply supplier quality assurance, the organization needs to conduct internal and external audits to check the quality of material from different suppliers (Dimian, Bildea & Kiss, 2019). Since there is no buffer for excess parts, we formulate "Great Green Quality at the Source"." a program that gives employees personal responsibility for the quality of their work and the authority to stop production when something goes wrong."
- Small lot (single unit) conveyance by use a control system to deliver parts in small batches between workstations.

2.4.4.Define set of Operation metrics and KPIs

The following are the recommended steps for developing solid KPIs:

- Define effective metrics and key KPIs to streamline manufacturing operations once you have current processes and systems in place to aggregate and use data from all data points by creating a dashboard showing the dependencies of these metrics to meet compliance business objectives implementation of a manufacturing.

- Execution System "MES" for tracking, monitoring and control all activities in production in real time and to define areas that need improvement or modification to better meet demand. MES will capture machine-level data and process parameters, metrics and KPIs to optimize manufacturing activities to maximize production and identify overall equipment effectiveness (OEE) to measure production effectiveness of assets running in one.
- Specified program. Attach legacy machines with sensors – so operations managers can visualize the entire production process. Sensors provide data to define parameters and performance indicators for each component or configuration.
- Develop an integrated system that connects all data points into one dashboard that analyzes the data in real time and makes it accessible across functions and enables live performance monitoring number etc. for continuous improvement and planning of future KPIs in line with evolving business goals.

2.4.5. Implementing TQM

Poor quality output of the different functions will lead to rework and poor information quality etc., Keyte and Locher (2008); Larsson (2008).

We recommend the following:

1. Set up a TQM department to ensure that tractor production meets high quality standards. In this way, manual and automated tractor inspection practices are consistently performed. (Lee, Speight & Loyalka, 2014).
2. Adopting eight concepts from Kanji and Asher (1996) to drive processes and develop a framework for continuous quality improvement:

a. Customer Satisfaction: Surveying customer voices, Big Green can measure performance based on customer expectations.
b. Internal customers are real: Fulfill cross-departmental relationships with streamlined processes to meet the needs of external customers.
c. All work is a process: A process is a combination of methods, machines, people, and materials that affect the end product
d. People make quality: A fair and healthy environment makes employees ready to take responsibility for the quality of their work.
e. Continuous Improvement Cycle: Meeting customer needs, measuring success and continue to improve both internal and external processes, a never-ending process.
f. Prevention: Continuously challenge the process to ensure failures do not occur/recur.
g. Measurement: The central concept of TQM states that to improve, you must first measure the current situation

3. Using the Kaizen tool: Kaizen is a simplified Japanese word for "change for the better". It is a philosophy of continuous improvement in daily activities that involves all employees. It includes learning from your own experience, systematic problem solving, the use of knowledge and explore new ideas by making an internal/external comparison of different ways of solving a task or problem to find inspiration for your own improvements, Berger (1997).
4. Following international standardization: a key to the Minimize the occurrence of errors in the process Manufacturing must follow accredited international certifications. Standards such as ISO 9001 that apply to the production, fabrication, and assembly of wealth in

organizations (Dimian, Bildea & Kiss, 2019). We recommend it to ensure efficient TQM with fewer deviations.

2.4.6. Enhancing IT and technology infrastructure

1. Automation.
2. Data and Analytics.

2.4.7. Personalized training

Effective in minimizing errors in the Big Green manufacturing process, especially as not all processes associated with manufacturing can be automated. Therefore, HR managers conduct a skills gap analysis for production workers and organize adapted training accordingly.

2.4.8. Material cost control

purchasing can reduce immense cost through effective negotiations with suppliers (Drucker, 1990). We recommend the following:

1. Switch from direct purchases to a bidding system.
2. Appropriate selection of suppliers; apply a supplier classification system based on the information provided by suppliers, materials, purchase order, date received, quantity Ordered vs. accepted quantity and quality on the rating scale points to weed out non-compliant suppliers, warn a supplier to improve and reject bids/offers from poorly rated suppliers.

2.4.9. Scrap Waste Management

Recommended to sell scrap during manufacture to relevant suppliers. Special equipment for this purpose, which fetches a reasonable price, can be attributed to lower production costs and better profitability.

2.4.10. Control energy consumption

In addition to negative environmental effects, energy consumption leads to a significant increase in production costs. There are safe alternatives like; electric, solar and wind energy.

2.5. 21st-century tools to create a greener process

Due to legal regulations, manufacturers are increasingly taking responsibility for their products and gaining a competitive advantage. Customers often see the broader consequences of their purchases. As a result, companies are beginning to address the environmental impact of products and production. processes and economic factors. The negative environmental impact of the products in our case, the Big Green Tractor, can be eliminated through green manufacturing. With less CO2 emissions or maybe through fully electric tractors and a completely green production that relies on solar energy and a clean energy source and recyclable tractor parts. Currently, sustainability has become a major talking point for companies around the world. World. As consumer behavior often shifted toward environmental responsibility, the auto, tractor, and other machinery industries needed to change.

Consequently, sustainable systems are now commonplace. Production is moving towards recycling and there is also constant pressure for lighter, more fuel-efficient vehicles. Sustainable production minimizes waste and reduces environmental impact by adapting product design and the production process and operating systems. Quantitative advantages imply higher brand value and better market opportunities. Not to mention that minimizing waste can reduce costs through reuse of materials and lower waste treatment costs.

Companies that use sustainable products may also suffer fewer regulatory concerns, protecting them from legal liability. In the industry of Big Green tractors and other heavy machinery like this, a sustainable manufacturing process is achieved. By researching the manufacturing method from start to finish. Details of energy wastage and loss can be identified and addressed to perform these actions more efficiently and reduce costs and waste. The use of alternative materials in manufacturing processes is now more common.

They are residues or by-products of the food industry. Several manufacturers are currently using various sustainable materials in the production of their vehicles.

2.5.1.Reducing Vehicle Weight

A major environmental trend in automotive manufacturing revolves around vehicle weight. reduce the importance of their cars, and a 10.n reduction in curb weight results in a 6% to 8.0% increase in fuel economy. Vehicles today consist mainly of steel constructions with some aluminum. Still, the lightweight composites market is expected to grow to a 7.4% auto and machinery market between 2019 and 2027. So, keep an eye on this area; In the coming years we will no doubt see an increasing demand for lightweight materials.

2.5.2.Electric cars and tractors and other types of heavy machinery

Electric cars have long been a sustainability-driven project aimed at reduction emissions. While these will take a while to phase out, interpreters are predicting that in 20 years more than half of all modern cars will be electric. Companies like Tesla are continually developing batteries for electric cars so they can run longer. This change could likely increase the commercial value of these vehicles for years to come, making them an attractive option for buyers around the world. turning a blind eye to the waste and emissions generated by their works.

2.5.3.Sustainable Manufacturing

As one of the biggest environmental impacts, automakers continue to lead the way in installing permanent modifications.

2.5.4.Use of artificial intelligence Technologies

Automotive assembly and production use applications of artificial intelligence in a variety of ways. These include new generations of intelligent robots, human-machine synergies, and outstanding quality control methods.

While AI is widely used in vehicle design, automotive and heavy equipment manufacturers are currently using AI and machine learning ML in their production forms. Robotics in assembly lines is nothing new and has been used for decades. However, these were robots. in cages participating in strictly delimited spaces and not allowing human invasion for protective purposes. With AI, intelligent collaborative robots can go into common assembly conditions with their human counterparts. The collaborative robots practice AI to recognize and sense what human operators are doing and adjust their movements so as not to injure their human colleagues. When powered by AI algorithms, painting and welding robots can do more than follow a pre-programmed routine. Using AI, they can detect errors or variations in fabrics and elements, change the process, or issue quality control alerts.

3. Socially Responsible Operational Guide

3.1. Industrial Standards on Disposal of Chemical Waste

Industry standards for chemical waste disposal provide appropriate practices and guidelines for handling manufacturing waste. Most companies produce hazardous chemical waste at all stages of their manufacturing processes. The Environmental Protection Agency provides standards for managing the disposal of chemical wastes generated by a company. Environmental Protection Agency industry standards protect human health and the environment.

3.1.1. Preparing the packages

For waste management it is necessary to choose the right container. The wrong container cannot be released into the big green tractor company or into the environment. 5-gallon plastic (HDPE) is the preferred container. The Big Green Tractor company was commissioned to supply excavators for two months. Next, the big eco-tractor company owns the waste packaging, while the company's empty RMS containers add up to a grand total.

3.1.2. Waste Tag

Proper waste labeling is just as important as the right container. When the quality of the waste bin is known, everyone benefits. The contents of the bin should be recorded as soon as the first drop of waste is placed on the bin. in federal and state regulations. The label is intended to list the Big Green Tractor Company's waste components. Until the bucket is used, it is advisable to stick the label on the handle of the bucket.

Required card information includes name of person most familiar with the waste / contact number / name of building and laboratory / full chemical name of waste / percentage of total

3.1.3. Accumulate Waste

The following compatibility classes are to be distinguished for waste water:

- Halogenated organic substances
- Inorganic acids and heavy metal solutions

- Cyanide
- Non-halogenated organic substances (including organic acids)
- Light Stabilizer
- Inorganic Bases

The full chemical name must be given on the label where the waste is added to the bottle. (Abbreviations and simple formulas such as H2SO4, NaOH and EtBr are acceptable.) A distinction must be made between liquids and solids. Solids in waste containers prevent solidification and can damage the pumping system at waste disposal facilities. Even if waste is added, containers must remain closed.

3.1.4. Request Pick-Up

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

3.2. Green Alternatives to the Traditional Manufacturing Process

We recommend the following:

- Reduce consumption of energy, water, other natural resources, and emissions of hazardous substances.
- Use or produce recycled and recyclable materials, increase the shelf life of products, and minimize packaging through effective design “reduce, reuse and recycle”.
- Educate and encourage employees to explore other ways to reduce the company's environmental footprint.
- Use green energy (renewable energy) as electricity with energy efficient lighting such as B. Old light bulbs being replaced with CFLs or LEDs.
- Become a member or start a local 'Green Energy Business Club' that helps local businesses access energy saving funding and expertise to reduce waste, water use and energy.

3.2.1. Renewable Energy

- Modernization of facilities for an effective inflow and outflow of materials, information and people.
- Floor insulation and thermo-efficient coating.
- Switch to long-lasting and cost-effective energy such as solar thermal/photovoltaic, heat pumps, and biomass systems that make an immediate impact and produce clean power and heat, reducing costs.
- Solar lighting.
- Closed line system for residual liquids.

3.2.2. Biodegradable Material

Using biodegradable material is eco-friendly considering that plastic material cannot be decomposed (Lee, Speight & Loyalka, 2014).

Big-Green will change its supply chain strategy to replace all plastic wrap, storage containers and parts used during the manufacturing process to reduce waste and hazardous health and safety impacts.

3.2.3. Deploying an Efficient Heating, Ventilating, and Air Conditioning “HVAC” System

Big-Green's new HVAC system offers the following benefits:

- Energy Efficiency: Programmable thermostat allows precise control with reduced energy consumption and costs.
- Optimized interior comfort: consistent and balanced temperatures and balanced humidity levels.
- Less waste.23-

3.2.4. Management of operational waste

implementation of the lean concept as described above.

3. Conclusion

Profitable and sustainable production, a never-ending process that can be achieved by managing lean operations focused on TQM and controls. Minimizing errors and standardizing throughout the manufacturing process are key factors in adding value to Big Green. Reduction of material costs / mass intensity of the process, automation, scrap management, and green energy are primary efficiency goals.

Environmental safety through safe landfill, processing, treatment policies, recycling and environmentally friendly alternatives are key responsibilities of Big Green to meet social needs, foster customer loyalty, business viability and sustainability.

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