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Keleti Károly Faculty of Business and Management
Institute of Enterprise Management

DEGREE PROJECT

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Student's surname, forename (s): Thepphalack Soulya
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Branch of study: Technical Management
Specialization: Electrical Engineering
Corporate Strategy

Thesis title: The art of leadership, that is, through an example, to examine what can be leadership in art

Task description:
1. State your research questions!
2. Introduce the LEAN working!
3. Introduce your business case!
4. Analyse your results!
5. Draw your conclusions!

Institutional consultant's name: Dr. Gábor Géza Gyarmati

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STUDENT'S DECLARATION

I the undersigned student named Thepphalack Soulya (Neptun code: [redacted]) hereby declare that the degree project is the result of my own work; I referred to the special literature and the means used in an identifiable manner. The results included in the degree project completed are allowed to be used by the university and the institution announcing the task for their own purposes free of charge, subject to any restrictions on classification as confidential.

Budapest, 12, December 2023

student's signature

ABSTRACT OF DISSERTATION

LEAN TRANSFORMATION IN AN ORGANAZATION

This study explores the Lean Transformation in an Organization. Through an extensive literature review, we will examine the possibilities and difficulties of implementing Lean concepts into practice in a modern organizational environment. This dissertation will include a framework for implementing lean successfully while accounting for the unique characteristics and difficulties of the organizations within the study.

The research methodology involves a thorough analysis of Hôtel-Dieu Grace Hospital's implementation of lean principles as a study case for data collection includes document analysis, and process observations of the organization's operations before, during, and after lean implementation for the business case that will consist of different methods and strategies of lean principles.

By providing insights on lean transformation and the implementation of lean approaches in various organizational situations, this dissertation will expand the knowledge on lean transformation. The practical approach and research findings will provide invaluable assistance for organizations seeking to cultivate a culture of continuous improvement and lean thinking.

Table of Contents

List of figures

Chapter 1: Introduction

Lean is the systematic disposal of waste. A systematic strategy is necessary to identify and eliminate the root cause of waste that exist in all organizations (Loughrin 2023). Lean transformation is a process that moves away from traditional business methods to maximise the flow of value delivery. The procedure leads to the identification, elimination, or optimisation of inefficient operations. Contrary to what is commonly believed, Lean is not just about getting rid of waste. It's common to mistake a Lean effort for budget or cost reduction if we approach it solely from the standpoint of eliminating waste. Unfortunately, when many organizations say they are implementing lean, they meant just to go budget or cost reduction (Businessmap). Organizations that use lean transformation can remain flexible and resilient to change by adjusting to recent developments.

Henry Ford was the first person to launched what he called "flow production" in 1913, and he was the first to fully integrate a lean production system from start to finish. Although the public understood this through the remarkable depiction of the moving assembly line, manufacturing engineers made many more advancements in this area. Ford's system didn't have a flow issue; Instead, it was his lack of diversity. There was more than one colour available for the Model T. Additionally, it was restricted to a single standard, guaranteeing that all Model T chassis were virtually same until the end of production in 1926 (https://www.lean.org).

Taiichi Ohno, a Japanese industrial engineer and businessman frequently recognised as an important figure in the creation of lean principles, looked at this situation in the 1930s, they realised that it could be easier to offer both a wide range of product options and continuity in process flow if they made a few little adjustments. As a result, he went back to Ford's initial ideas and developed the Toyota Production System. Ohno and other Toyota employees established the TPS in the 1950s and 1970s, the system's goals were to increase productivity, get rid of waste, and optimise the manufacturing process (https://global.toyota/en). TPS main goal is to lighten the workload for employees while emphasising on creating meaningful work, by putting these ideas into practise, they can effectively and quickly meet client demand for their products. It indicates that each car satisfies both their high standards for quality and the specific needs of each customer (Toyota EU).

Lean enables the growth of a long-lasting, customer-focused culture that prioritises values and constant improvement while keeping an eye on their demands and expectations. The Toyota Production System (TPS) is frequently associated with the concept of lean

transformation (https://www.lean.org). The evolution of lean philosophy and the guiding ideas of lean transformation can be traced back to Toyota and the important people within the company.

As the world's most successful lean company, Toyota is on track to surpass all other automakers in global sales. The best evidence of the effectiveness of lean enterprise comes from its incredible success in growing sales and market shares in every international market, not to mention its unrivalled dominance in hybrid technology.

Over the past 20 years, this continuous success has led to a huge desire for greater understanding regarding lean thinking, there are thousands of media articles on the topic, hundreds of books and studies, and an abundance of other resources available.

The term "Lean" itself was popularized by the book called "The Machine That Changed the World" by James P. Womack, Daniel T. Jones, and Daniel Roos, which detailed the implementation of TPS and Lean principles in the 1990s (https://www.lean.org). James P. Womack, Daniel T. Jones, and Daniel Roos have simplified the lean transformations to 5 principles as seen as the figure below, with all the principles come around to another principles, (Figure 1.1- Lean Thinking and Practice). (Womack, Jones and Roos, 1990):

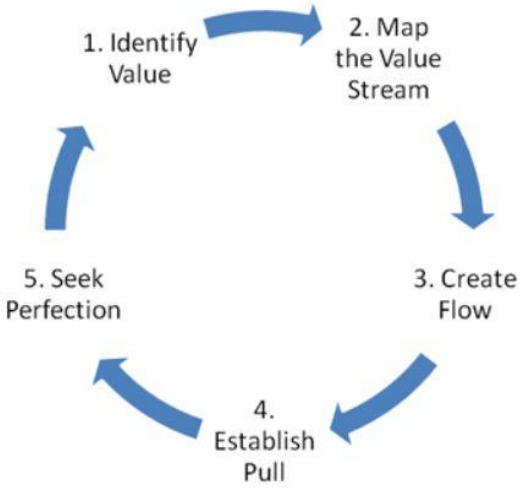


Figure 1.1- Lean Thinking and Practice

Source: Lean Enterprise Institute 2021

- Identify Value.

Determining the value, you intend to provide for the customer is crucial. Anything that doesn't help with this is pointless. Being clear about your goal from the beginning is essential when it comes to one of the core principles of lean. Determining value guarantees that your organization focuses on the aspects that clients find appreciate (Vasisht, 2023). Consumers purchase their products for what they are worth, which is why customers are less likely to purchase your product if it fails to produce enough value.

- Map the Value Stream.

The process of value stream mapping involves identifying the organization's processes. It is necessary to determine the precise production system and the people involved (Gomez, 2022). You may then start to find any steps in your organization's process that are not adding any value for the customer in the end. Mapping your value stream allows visualisation of your process, this streamlined version of the procedure helps you maximise the value you provide to clients. A physical map that clearly illustrates the crucial steps in an organization's process to all parties involved is the result of value stream mapping (ASQ). It will also help in the search for opportunities to cut waste. Having a broad viewpoint helps Lean organizations understand value flows and helps identify team members who can take responsibility for various organizational step process.

- Create Flow.

The value stream can be processed into continuous workflows after it has been mapped. It is essential that all the teams, materials, and steps involved in the typical manufacturing process are coordinated because they involve multiple teams and are all coordinated. When the flow stops it is certain that there will be mass waste, whether in the form of materials or time (Wong, 2023). One useful method for anticipating possible obstacles is to visualise the workflow and break it down into smaller sections. Parts of the supply chain that, if interrupted, could result in significant waste, must take proactive measures to resolve them beforehand to avoid any stoppage. Creating ongoing workflows guarantees that everything operates as smoothly and effectively as possible.

- Establish Pull.

Establishing a pull system enables you to produce products in response to orders from clients. You must have a quick cycle time to successfully deliver products promptly. However, this will now be simpler because you've embraced lean thinking and are utilising lean principles, along with mapped value streams and continuous workflows.

With a pull system, production is determined by the real demand for a product rather than by forecasting. Things shouldn't be produced in advance because, if unused, this results in waste and hinders smooth flow. When a pull system is implemented, waste will be significantly decreased, and resources will be exactly matched with demand Rvj (2022). You may remain at the forefront and stay ahead of the curve by continuously enhancing your processes. Organizations who use this strategy are positioning themselves for long-term success and profitability.

- Seeking Perfection.

While the first four phases will assist you in developing a Lean management system, the last step enables you to constantly grow and thrive. When you reach your final step, you go back and examine any area of the organization's process where there is still room for improvement (Gomez, 2022). In your search for perfection, you continually evaluate each procedure for potential value addition, emphasising the components that bring value and getting rid of the those that do not. Continuous efficiency gains are the outcome of striving for continuous improvement, and productivity rises steadily in step with customer satisfaction.

Chapter 2 – Lean Transformation Implement.

2.1. Crucial factors to focus on for lean implementation.

You must have a clear idea of what you want to achieve before you start on your lean transformation. This vision needs to be in line with stakeholder expectations, customer needs, and your business strategy (Hatch, 2023). Additionally, everyone participating in the change, from top management to frontline staff, should be informed and shared with it. Establishing SMART (specific, measurable, achievable, relevant, and time-bound) goals is essential for directing your efforts and tracking your progress.

Determine where you are now and where your vision and reality gap. To find the sources of waste, inefficiency, and variance in your methods, you can utilise tools like value stream mapping, which is a visual depiction of the flow of resources and information from the supplier to the customer. To get rid of mess, errors, and safety dangers, you can also utilise tools like the 5S method, which is a methodical way to clean, organize, and standardise your workspace.

You can identify the areas that require development and evaluate them according to their impact and viability by evaluating your current situation. After the gaps have been determined, you must make the necessary adjustments and maintain to do so to close the gaps and get closer to your goal. To fix issues and increase productivity, you can use techniques like kaizen (Daniel, 2021), which is a process of small, gradual, and ongoing adjustments that engage every member of the organization.

You can also establish a pull production system that meets client demand by utilising techniques like kanban, a system of visual signals that controls workflow and prevents overproduction and inventory build-up. But maintaining changes requires more than just applying them into practice, you also need to create a culture of accountability, learning, and feedback.

To succeed with lean transformation, engaging and empowering your workforce is crucial. Lean is about mentality and attitude as much as it is about tools and procedures. From problem identification to solution implementation, you must involve your workers in the improvement process. In addition to encouraging people to voice their problems, ideas, and proposals, you must train, coach, and acknowledge them. In addition to encouraging a sense of ownership and accountability, you must appreciate their autonomy, knowledge, and skill sets (ZeeshaN.SyeD. 2018). Learning from others and comparing the most effective practises is another essential

component of a successful lean transformation. Both inside and outside of your organization, there are plenty of organizations that have successfully implemented lean that you may learn from.

You can examine their approaches, outcomes, and difficulties and adapt them for your own situation. Additionally, you may compare your performance to theirs and see where you stand to gain. Learning from others, however, does not imply duplicating their methods mindlessly; rather, you must comprehend the reasoning and guiding principles behind their actions and adapt them to suit your own objectives.

The final factor necessary for the lean transformation to succeed is constant observation and improvement. Becoming lean is a process rather than a destination (Pannell and Pannell 2023). It is necessary to assess your performance, compare it to your objectives, and note any differences. After evaluating the underlying reasons for these deviations or gaps, you must put preventative or corrective measures in place. Regularly reviewing and adjusting your vision and goals is necessary.

It is essential that you collect feedback from your customers, suppliers, and employees to enhance your offerings, workflows, and relationships with others. You must pursue excellence and see change as an opportunity rather than a danger.

2.2. A Lean Transformation Model.

An effective approach for handling problems at all organizational levels, from executive-level strategy to front-line operations, is the Lean Transformation Framework. By responding to its five questions, you can utilise the Framework to solve any problematic issue, regardless of whether you are leading a startup or an established organization. The questions lead you through the core issues of people, process, and purpose and assist you in finding solutions that satisfy all three (https://www.lean.org).

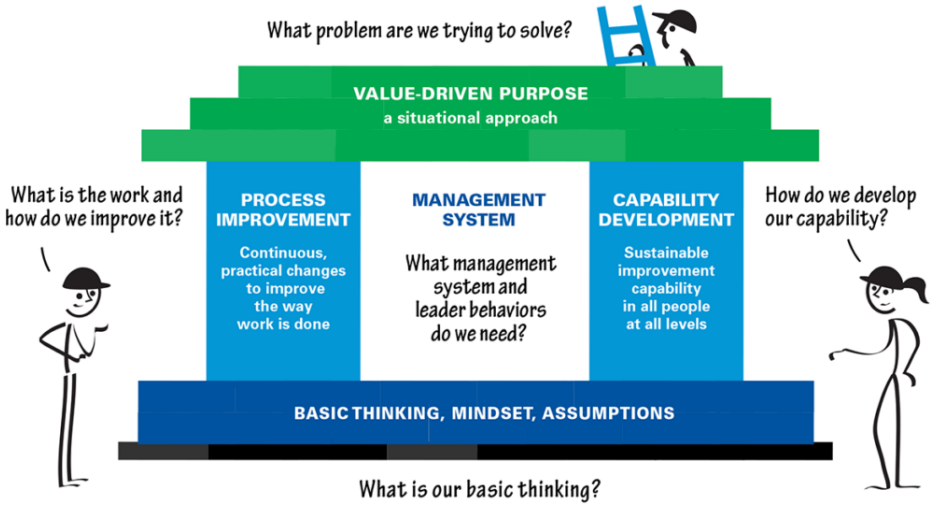


Figure 2.2 - The Lean Transformation Framework House

Source: Lean Enterprise Institute 2023

One of the first people in introducing Lean from Toyota's factories to the western world, John Shook, CEO of LEI, defines the model as a house built of five fundamental components as the figure above (Figure 2.2 - The Lean Transformation Framework House):

1. Situational Approach
2. Process Improvement
3. Capability Development
4. Responsible Leadership
5. Basic Thinking, Mindset, Assumptions

Lean practitioners now recognise that developing a work process aspect is the most effective way to learn about lean transformation, after decades of actual, hands-on lean implementation. Additionally, the lean community found that the questions Lean Enterprise Institute included in the Lean Transformation Framework are necessary for this improvement process.

2.3. 5 key questions for lean transformation.

- What is the value-driven purpose? Or what is the problem to solve?

The implementation of lean transformation is typically a top-down initiative, meaning that senior management of the organization or above is the one that starts it, the issues being addressed are those that top executives handle. During the implementation, the actual issue points must be identified, recorded, and given to all those involved. Keep an up-to-date

document or wiki page with all the information to ensure that managers and employees are aware of the true objectives of the change. Having too many objectives and problems to accomplish at once is another thing to be cautious of. It is better to have fewer. If the main goal is to increase quality, it will be lot easier for you to convey your message. Put it in contrast to raising profit, improving customer satisfaction, cutting delivery times, and improving quality (https://www.lean.org). Simply put, it won't work.

Inconclusion, people will be more supportive the more information they are aware of. Provide as much information as possible about the objectives and extend an invitation to everyone to contribute as much as they can. This should not be viewed as a one-time action. This section of the Lean Transformation framework is constantly changing and requires ongoing evaluation. It is essential that you continually ask yourself if it is still worthwhile to solve the problem you set out to solve. You must be agile and able to alter your course when necessary.

- What is the work to be done?

A list of process improvements that need to be addressed should be provided in response to this question. But be advised that this should only be a general overview of the processes that need to be changed, not a specification instructing everyone on how to improve their own process. In another way, the greater target must be supported by the specific process changes that are being implemented. It is not a good idea to strive for improvement just for the sake of improvement. Since the people who are executing the work need to know what is and isn't acceptable, the success criteria should also be stated (https://www.lean.org). One of the foundations of the Lean transformation model is process improvement, as seen in the picture of the house. It provides support for the roof, which stands in for the issue being resolved. Put another way, the greater objective must be supported by the set of changes that are being implemented.

The goal of process improvement is to conduct small-scale experiments, compare the outcomes, and adjust in response to the outcomes. To change everyone's perspective to one of experimenting will likely be the most challenging task to accomplish. It takes more energy to experiment; thus, people won't do it by nature. A true cultural revolution is necessary for this. But still be wary of suggestions to use a certain framework at this moment. Numerous consulting companies will gladly offer you training costing millions of dollars to get acquainted you with concepts such as SAFe, LeSS, DAD, Nexus, and so on. Avoid doing this unless you

are prepared to acknowledge that your organization will not become lean anytime soon and you are prepared to take a short cut to achieve some progress (https://www.lean.org).

You'll be far better off starting small and starting where you are if you're one of the select few who understand that shortcuts never work. All the lean management tools will be very helpful in this situation. Using techniques like Poke Yoke, A3, PDCA, 5 Whys, Kanban, and Hoshin Kanri will help you get closer to your ideal future state (businessmap.io). Thinking beyond the box is necessary once a sizable portion of the organization has become proficient in using multiple Lean management tools. Scaling Lean ideas and methods is challenging and demands unwavering commitment. Portfolio Kanban is an excellent tool to help you scale Lean throughout the organization.

- What capabilities are required?

"Developing people" is another term for "building capability." Remember that people are the ones who complete every work. People development is the second foundation of the Lean Framework because without improving our people, we cannot improve our organization. More importantly, the individuals who are required to conduct an ongoing flow of experiments and make constant improvements to the steps. There's a nice saying – "If all you ever do is what you ever did, then all you'll ever have is what you've already had" (businessmap.io). This is especially true regarding Lean. No matter how hard you try, your business won't become lean on its own if your employees aren't taught to think that way.

It happens much too frequently for managers to lack whereas employees get all the necessary training. As a result, there is a communication gap and less than ideal outcomes. Alternately, begin the learning process with the management and only then go on to the employees. In actuality, the best outcomes would arise from managers training their own employees. Toyota has done this and will continue to do this. Instead of a third-party organization with no actual business experience, managers train their employees members. As a result, the management and employee develop a unique master-apprentice relationship that strengthens the employees' long-term loyalty to the organization. To address this part of the Lean transformation, the board should genuinely see people development as a strategic issue. While few companies genuinely claim people development as one of their primary company priorities, there are plenty that will tell you it is not. Your organization will grow more quickly the more adept you are at creating, exchanging, and reusing knowledge.

- What management system, operating system and leadership behaviours are required?

Without a question, leadership is essential to putting a Lean transformation into practise. For this reason, it is located inside the Lean Transformation house. In exchange for the system protecting the house from the cold outside, it works with the entire system to improve it. An organization's management is the key to its overall operation. However, one point needs to be made very clear ‘’Every person should be a leader in a lean organization’’ (businessmap.io). What does it take to become a Lean leader if everyone should be one? It's as easy as learning. People will follow you if you just pick things up as quickly as you can. Having the ability to lead by example is the most crucial quality in a leader. A lean organization needs its leaders to be data driven. They must learn to accept failure and not let their egos get in the way. Without evidence to support their decision, they will not fit into a changing culture of continual improvement if they impose their viewpoint on others. Formal leaders, or managers as we refer to them, should be most skilled in developing competence. "My goal as a leader is to become unnecessary," says Businessmap's CEO.

It is almost impossible to become unnecessary in a truly lean organization; the more skilled lean thinkers have, the better able they are to coach and advise the next generation. However, the underlying idea is that a leader should assist their group in becoming self-sufficient and organized. A true Lean leader should instil in their team the ability to think critically and to challenge preconceived notions (businessmap.io). They should emphasise that hoping for the best is a waste of time and that the only way to effectively lead an organization is to actively monitor and track key performance indicators (KPIs). In a Lean organization, the leader should be the culture compass above all else. They ought to be the role model that everyone aspires to be like. The culture of the organization is shaped by the true leader, who also has the courage to alter it when needed.

- What basic thinking, including mindsets and assumptions, are required by the organization as a purpose-driven socio-technical system?

In relation to culture, we now reach the most crucial and significant section of the Lean transformation framework. Although it's defined as "basic thinking," "mindset," and "set of assumptions," all these terms refer to culture. The most asset of an organization is its culture. There is not much point in undertaking a Lean transformation if a company is not prepared to change its culture. It will eventually come to an end (https://www.lean.org). For this reason, the first step in attempting this must be a realistic evaluation of the current culture and any

associated issues. Once the assessment is complete, it is necessary to determine the ideal future state. The term "company values" refers to a useful vehicle that will carry these adjustments. The organization's culture is embodied in the corporate values, therefore altering the values should ultimately alter the culture. Naturally, new wall posters or another PowerPoint presentation won't cause this. Leadership must set the example for changing values by changing their actual behaviour. People will follow leaders that practise new behaviours regularly. They will follow; it might take a year or longer (businessmap.io). Once the vision is established, persuade senior leadership to endorse it. Nothing is more discouraging than putting in an extra hundred miles only to have the executives cut you off. The path will be achievable but difficult if they don't commit to it and if they are unable to lead the organization towards the culture it desires.

2.4. Lean Six Sigma.

Lean Six Sigma is an approach to increase the efficiency of your organization by reducing waste and variation, improving quality, adding value, and making smart financial choices based on information from customer feedback, when Lean and Six Sigma are together, they both form a methods that can solve problem faster and more efficient as the figure being shown below (Figure 2.4 - What is Lean Six Sigma?). By attempting to lower long-term expenses while maintaining the level of quality that customers demand (Del Marmol, 2020).

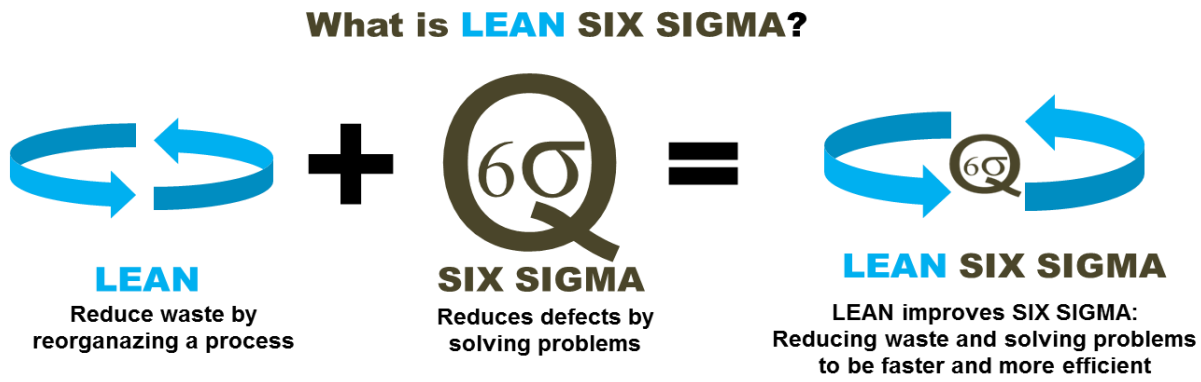


Figure 2.4 - What is Lean Six Sigma?

Source: Del Marmol 2020

Lean aims to reduce waste and increase efficiency by locating and getting rid of tasks that don't bring value. To provide more value with less work, this entails optimising resources, cutting down on errors, raising quality, and streamlining procedures. In contrast, Six Sigma is a statistical method of process optimisation that uses data-driven decision making to lower variance and failures. It entails establishing, monitoring, assessing, refining, and managing processes to provide predictable and consistent solutions. Lean Six Sigma offers a complete approach to process improvement that can be used in any industry or sector by combining the strengths of these two approaches. It is frequently utilised to increase productivity, cut costs, and improve customer satisfaction in the manufacturing, healthcare, finance, and service industries (Kumar, 2023).

- DMAIC:

A data-driven technique called DMAIC is used to enhance current products and services to increase customer satisfaction. It stands for the five phases, which are: D for define, M for measure, A for analyse, I for improve, and C for control. (Six Sigma US). The full methodology of DMAIC improves in both problem identification and concurrent solution implementation. This increases DMAIC's adaptability and appeal, making it useful across a range of organizations and industries.

- Define: Define the issue from the viewpoints of the organization, the stakeholders, and the customers. Determine the scope of the issue and the quality expectations of the clients.
- Measure: Measure the existing procedure and its position in the issue. Evaluate to see if the procedure can satisfy the customer's previously stated expectations for quality. Align every step of the process with your quality standards. Provide real performance statistics to back up your measurements.
- Analyse: Analyse everything that has been discovered so far to determine the precise nature, scope, and starting point of the issue.
- Improvement: Resolve the issue and approve the improvement. Work collaboratively to design a solution that gets rid of the issue and all its primary causes. Make sure that the solution corresponds to the issue at hand by using your data. Evaluate the solution and obtain performance information to back it up.

- Control: Keep updated on progress and keep making improvements when you can. Establish the final acceptable performance requirements. Create a plan that can handle changes as they arise, maintain developments, and stop the initial problem from happening again.

Toyota has always been recognised as the best Lean Six Sigma implementation case study. Toyota claims its success to its management styles and practices, which are purely Lean Six Sigma oriented.

As a result, its value exceeds that of General Motors and Ford combined. For Toyota, the question "What is Lean Six Sigma?" ultimately boils down to "How do you outperform the competition?" (Del Marmol, 2020).

2.5. 5S, a five-step methodology.

Lean production techniques the 5S method, is a way of keeping a workplace that is standardised, optimised, clean, and orderly. All factors of an organization, including the supply chain, manufacturing, distribution, file and information systems, and office spaces, are covered by 5S.

The Japanese terms seiri, seiton, seiso, seiketsu, and shitsuke were used to create the 5Ss at first. English terminology like sort, set, shine, standardize, and sustain were developed when the process advanced into the US. "Everything has its place and there is a place for it" is the fundamental idea behind the 5S system. The main objective of 5S is to keep the workplace clean; all 5S implementations should centre around achieving this goal.

Seiri (Sort): Get rid of all the rubbish. Place trash cans four steps away from employees. Promote the discarding of trash as it is produced, don't let pointless stuff get put up on walls. This contains framed photos of family members, sticky notes, documents with handwritten remarks, etc. Maintain tidy walls, printed work-related things that employees require daily should be posted. These are work-only items. Use recognised colour paper for these references that are posted. Colour paper keeps unnecessary clutter at bay. Make workstation signs. Unfamiliar workers can locate workstations with ease thanks to signs.

Red tags are a useful tool to use while implementing 5S best practises. Red tags are applied by employees to unnecessary products. This item's red tag tells you who moved it, when it was moved, and why (https://www.5stoday.com). Take these out of the workspace, put all the useless

stuff from every department in one place for quarantine. Allow employees to examine the holding area, the example of red tags are shown in the figure below (Figure 2.5 - What is 5S?).

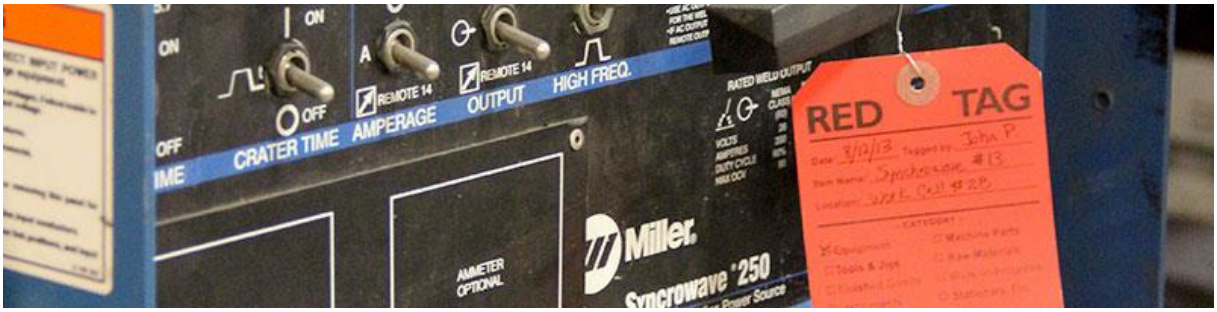


Figure 2.5 - What is 5S?

Source: 5stoday 2023

They might discover something their department needs. Once the 30-day period has passed, take out the remaining quarantine items (QAS). You should also get in touch with other company divisions that might want the merchandise. Additionally, think about recycling or selling the products online. This quarantine area should be kept and maintained for ongoing 5S sorting. There are various advantages to sorting using 5S best practises. Because tools are more easily found, cycle time is reduced. Communication amongst coworkers has improved. Inventory is reduced and significantly less space is used.

Seiton (Set in order): The item that a worker handles the most often should be kept closest to them. Assume a worker in a metal shop files a burr off each component to complete it. It is best to keep the file close at hand rather than on a wall many steps away. Every time a file is retrieved, the employee shouldn't have to move other objects out of the way or bend, extend, or twist to reach the file. Plan for the location of the rarely utilised tools' storage as well. When you need that annual tool, the last thing you want to do is waste time searching through a rat's nest.

Apply the same organising ideas that were used to arrange the tools closer to the workbench to the storage space (Olofsson). Mark off areas for the storage of each of these items. Place these objects back where they were marked when not in use. Use coloured tape to designate table storage spaces. Utilise the visual controls to locate the items. Establish guidelines for colours. For instance, "store here" may be indicated by blue tape on tables. Red tape may signify

things like "don't move." Using pegboards to store tools is one of the 5S best practises (QAS). Draw the tool's outline on the boards. Use small, clearly labelled boxes to store the tools for tools kept in drawers. Mark the areas where objects are stored by using a lot of labels. Making a 5S map or department layout is another example of a 5S best practise. The locations of all 5S workstations, storage spaces, tools, and equipment are indicated on this map. Items that are only needed once a week or once a month should be kept in cabinets close to the workstation. Write the item name on the cabinet shelves. If the object is kept in a box, make sure to label the box's exterior. Store objects that are rarely utilised outside of the work area.

You may keep these in a place in the company that is used by every department for the same thing (Glover 2023). Here, label both the item and the department. To record the in/out status and accountable individual, use a checkout sheet. Determine reorder points, minimum and maximum quantities for perishables. Name the person in charge of reordering. Don't forget to pack cleaning products.

Seiso (Shine): Make sure to always and everywhere to be clean. Give yourself enough time to do the cleaning at the end of the day. Dusting tables and cabinets, sweeping floors, and cleaning equipment are all included in this. Make a 5S checklist that lists the cleaning tasks and how often they should be done. Once the task is finished, get the person in charge to sign the checklist. Think about the cleaning process. Sometimes it's only water and a sponge; other times, it can involve acetone or alcohol. On the check sheet, note the precise procedure. Prepare a procedure and provide staff training for intricate cleaning procedures. Shining is the act of examining while cleaning. Look for loose wires, sharp edges, chipped tools, bad couplings, cracked hoses, and other potential safety risks. Make these repairs and restore the equipment to its original state. Replace any equipment or parts that are damaged, dangerous, or worn out. 5S best practices include using a portable shine cart (QAS).

Place cleaning items on the cart and roll it from one place to another as you clean. Return all tools and equipment to their designated locations at the end of the workday or before spending a considerable amount of time away from the workstation. Shining improves the area's safety, efficiency, and part quality. It impresses your customers as well (https://www.5stoday.com).

Seiketsu (Standardize): After completing the first three 5S processes, everything should to look rather fine. Everything is well arranged, areas are tidied up, and all the equipment is in operating order. The issue is that, when 5S is first implemented in a company, cleaning and

organizing things is simple. However, with time, things tend to revert to their previous state. What distinguishes 5S from the average spring-cleaning attempt is standardisation. Standardisation makes everything that just occurred more systematic and creates habits out of one-time attempts.

To make these chores become routines, standardise assigns regular tasks, makes schedules, and posts instructions. It creates 5S standard operating procedures to ensure that tidiness is maintained. A chart or a daily 5S checklist may be helpful, depending on the workspace (Glover 2023). Another useful tool is a timetable that is put up and indicates how often specific cleaning tasks need to be done and who oversees them. People will most likely need to be reminded about 5S at first. It could be necessary to dedicate a little period each day to 5S duties (https://www.5stoday.com). However, as time goes on, tasks will become routine, and 5S cleaning and organizing will be a regular part of the job.

Shitsuke (Sustain): Organizations are responsible for maintaining standard 5S practises and making any necessary updates once they are put in place. Sustain is the process of maintaining both the smooth functioning of 5S and the involvement of every employee of the organization (https://www.5stoday.com). Employees working in the office, warehouse, or on the production line must take part, as must managers. Making 5S a long-term programme rather than only an occasion or temporary effort is the goal of sustain. Ideally, an organization's culture adopts 5S and organizations will start to see consistent improvements as soon as 5S is implemented over time. Ensure that new hires and employees switching departments are trained on the 5S procedures in their area. This will help to maintain 5S practises. Make the practice engaging. Observe how other businesses are implementing 5S. Innovative organizational concepts help maintain progress and employee engagement.

Safety (Some companies want to add a sixth S to their 5S model): The system is frequently referred to as 6S when safety is added (https://www.5stoday.com). The Safety phase focuses on strategies to arrange things in specific ways to avoid dangers in work operations. This could entail arranging workstations to be more convenient, labelling the cleaning chemical storage cabinet to alert people to potential hazards, and placing signs at intersections such as the spots where forklifts and pedestrians' cross paths (https://thedorseygroup.org 2023).

If there are risks associated with the way the workplace is set up or the jobs that employees do, such risks need to be minimised. Some claim that safety is the result of following the other five S's correctly and that a sixth S is therefore not required. They argue that an additional safety

precaution is not required if the workstation is neatly arranged, well-cleaned, and equipped with useful visual safety indicators. Approaches to safety can never be correct or wrong. However, the company chooses to address safety, it needs to understand how critical it is to prioritise safety.

2.6. Kaizen and Kanban Lean Methods.

- Kaizen Lean Methods.

A kaizen lean method is a lean manufacturing procedure in which a group of people focuses for many days at a time to improve a certain area (Daniel, 2021). Kaizens can span two to ten days and involve three to fifteen people. Employees from all departments and levels of an organization are considered kaizens. Kaizens have a goal, specific tasks to be performed, and a scope. finish the prework, which is creating a team charter with the aims, measurements, and objectives of the team listed. Kaizen training, which includes PowerPoint guidelines, training materials, and videos, starts off the event week.

The next stage is to transfer to the shop floor, where the work floor kaizen will be held for two to ten days, depending on the project's size, a stopwatch, egg timer, and pedometer/step counter are required tools. A report-out where affected stakeholders and company leadership provide their comments and acknowledge the accomplishments of the kaizen team should take place at the end of the kaizen. After then, until a kaizen closing meeting is held thirty days following the kaizen presentation, kaizen homework and results measurement should be done. A lean manufacturing kaizen event has the following advantages: it involves every employee, even the floor employees, in developing changes, and it brings different viewpoints and numerous sets of minds together to create the best possible answers. Above all, kaizen manufacturing is an efficient and quick process (Sugimoto, 2018).

- Kanban Lean Methods.

Unlike traditional production forecasting techniques, the Kanban system lets demand determine resupply in real time. By implementing Kanban, companies may eliminate the risk of overspending on inventory, which also reduces the possibility of quality assurance problems like concealed errors in products that are being stored (CSS). Fundamentally, the Kanban method minimises overproduction and removes waiting times between stages in the production process.

There are many types of Kanban systems. Some factories and stores utilise signal lights or flags to indicate when their inventory needs to be replenished.

Card systems: The cards serve as vital parts of the system of organization. These cards serve as alerts when inventory needs to be moved within a store or production site (CSS).

Occasionally, the cards can also function as indicators in the form of containers. Among the many details on these cards, the safety stock quantity is the most crucial since it indicates to the employees when it's time to place a new order. The reorder amount is one of the cards' other crucial pieces of information.

The manager or employees are informed by the reorder amount of how much stock to order or move to keep supplies in line with demand. To make ordering easier, cards frequently also feature item codes, bar codes, and prices. They also include the name of the ward, the location of ward storage, and the most recent update date. Simply said, a red card would indicate that there is a bare and empty portion of the inventories. The cards are meant to serve as markers for drops in product and item inventory or manufacturing, which prompts stock replenishment.

2-bin systems: is often used in storage spaces of many kinds of organizations. This method can be applied in a variety of settings, including supply rooms in hospitals, restaurants, bakeries, and warehouses (CSS). The way this works is that two containers of a specific item are arranged, usually on shelves, one in front of the other. The first bin is taken out and the second bin is moved ahead once it is empty. Then, two possible outcomes are possible. A Kanban card with reordering information placed at the back of the bin will either be placed in a special location with other cards that express reordering needs, or the empty bin itself will be placed in a designated area for reordering, the process is shown in the figure (Figure 2.6 - Kanban Training and Research Page).

3-bin systems: combines various departments or sections of work processes together. It sometimes even serves as an interface between an organization and its outside suppliers (CSS). For instance, a basic 3-bin system involves setting up one bin at the supplier, one at the store where components and materials are kept, and one at the factory where items are manufactured. The manufacturer sends its empty container to the store to be restocked when it runs out of parts. After filling the bin, the store sends the supplier its own newly emptied bin. After that, a full bin is sent to the store by the supply team. The bins act as a signal that something is needed in excess for each step of the procedure that comes after. Since nothing moves in a Kanban system without authorization, they also grant permission to move those

items. Most 3-bin systems also contain Kanban cards, which list the contents and quantity of each bin, inside the bins, the system is shown in the figure below (Figure 2.6 - Kanban Training and Research Page).

Since one of these bins is leaving the site to be refilled by another organization, it is essential that the relevant information be provided. Getting the correct data transferred is essential to the Kanban process' success.

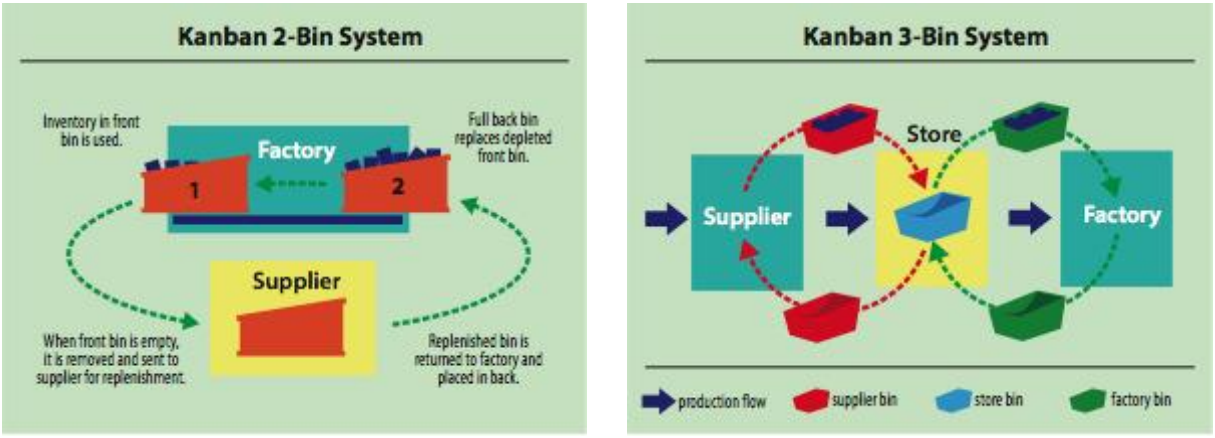


Figure 2.6 - Kanban Training and Research Page

Source: Creative Safety Supply 2023

Manufacturing system: Usually the final assembly's component parts come from a machine facility. An assembly is frequently produced in small lot sizes using manual labour in a very basic setup to satisfy the needs of the customer. Batch manufacturing is used to pay back setup, sequence parts to small tool cost. When the machine is being produced, a little amount of each component is kept in stock. The organization would then be informed about what products need to be created by the amount observation.

Electronic Systems: Many organizations have been able to move away from physical bins and cards because to technological advancements. Barcodes are applied to items, materials, or designated spots in electronic Kanban systems (CSS). When more of something is required for the workflow, these barcodes are scanned, sending a signal to the right person or department to fulfil the request. When specific barcodes are scanned, some systems even send emails that direct orders to outside vendors and services.

Call a meeting of every employee to begin the implementation process, and make sure everyone is fully informed about the organizational method, the kind of organizational system

you will be employing, and how the system operates. Examine your use of stocks. Determine which of your inventory list, customer ordering trends, and refill requirements will most benefit from the organizational strategy. Some functions might not require frequent reloading and hence wouldn't require inclusion in the system. On the other hand, some things may require frequent replenishing due to their decreasing quantity daily. Products in grocery stores that have a short shelf life, like meat and seafood, are an excellent example of this.

Determine the quantity to be ordered. Decide on the necessary lot sizes for your shelf supplies. This will assist the business in figuring out how many deliveries are needed to ensure that the shelves are supplied properly. Understanding that this will aid in a consistent delivery amount means that adjustments to the deliveries won't be necessary each time, maintaining consistency, which in turn maintains accuracy. Utilise a system for data inventory. Implement a tracking system as part of your inventory management strategies to help you identify when to replace the goods delivery. Barcodes are used by several supermarket retailers. The grocery manager is automatically notified when a consumer purchases a certain item using the tracking system and the cashier scans it, indicating that the supply is running low. A call for delivery and an inventory update would be indicated via the barcode. Select a trustworthy, high-quality sources. The organization frequently involves the suppliers in the implementation of this organizational structure. They might regularly send information about the inventory of the warehouse or facility. In certain cases, the programme can send alerts when the amount of inventory on hand is running low and delivery and restocking are required. Try to purchase the best materials from reliable suppliers.

Get the organization ready for the first changes. When the organizational technique is first implemented, there will be growing pains. Also, the organization may need to adjust some aspects of the technique.

2.7. Steps of implementation of Lean Transformation.

A clear goal and comprehensive plan for achieving the objective are the foundations of any organization. Organizations sometimes struggle to properly execute lean manufacturing because they typically don't grasp all its aspects. Organizations that intend to implement lean manufacturing frequently lack a solid strategy. Here, we describe a lean transformation step in details. creation of a lean implementation timeline using the implementation plan and related lean tools, or roadmap includes thorough instructions for implementing lean. Utilise it as a roadmap for directing your organization through an effective application of lean.

- Leadership Engagement.

Of all the steps, this one is the most crucial. The main cause of lean implementation failures is the lack of complete support and direction from top leaders. It is not advisable to undertake a lean implementation if upper management is not completely committed. To receive an introduction to lean, managers must take part in a kaizen at lean manufacturing organizations that have a solid lean foundation and gain lean journey experience (EM 2022).

Organizations that have received the Shingo Prize are advised to carry out so because they have demonstrated success and advancement in the application of lean manufacturing (Leeson, 2023). A useful tool for getting in touch with an organization that is highly involved in lean is a lean consultant. Hire an experienced lean leader by getting in touch with a lean recruiter as soon as leadership is engaged. Candidates with experience in lean engineering, continuous improvement, or management roles are preferable. They should also be lean certified. It is advised that organizations to work with a lean consulting organization. Interview potential consultants and choose a partner whose expertise and experiences match the procedures and overall size of your organization. Consultants will offer advice and contribute unique ideas based on their experiences working for various organizations. Next, a five-year plan including all the steps below and lean measures for evaluating the plan's efficacy should be created by the Lean Manager, the company's leadership, and the consultants. Any lean implementation should concentrate on a basic model value stream throughout the first year. All the steps listed below should be implemented in this model value stream to a world-class manufacturing quality. The goal of years two through five should be to implement best practises across the entire organization (NZBEF, 2019). Together with the annual value stream plans, the five-year plan should be reviewed quarterly to assess involvement, progress, and modifications. This will ensure that the business continues to carry out the five-year strategy according to schedule.

- Employee Lean Training.

Higher level lean training should be provided to all employees prior to beginning a lean implementation. Lean PowerPoints, factory lean simulation kits, Tom D Wip, definitions of key terms (Muda), a lean video featuring testimonials from all organizational levels, an outline of the lean manufacturing tools, and the lean manufacturing definition should all be included in this training. Large groups of 20–30 employees should receive training using a lean business simulation kit and an instructional video that introduces lean manufacturing. To obtain more superior thoughts, training focused on the lean employee suggestion system must be provided

(NZBEF, 2019). Anyone who works for the organization, from the highest position to the bottom, should receive education and training. The main trainer should be the Lean Manager, who should also be able to respond to questions from employees. After completing the course, employees will be well-equipped to adopt a lean mindset and begin continuously seeking out better ways to perform their duties. Employees should be able to respond clearly to the question, "What is lean manufacturing?" at the completion of the programme. Employees like engineers and supervisors who will be extensively involved in the lean attempts should be enrolled in a lean course and working towards a lean certification programme.

- Frequently Evaluate the Performance.

Far too often, managers attempt to handle problems daily from their offices through reports and employees' emails and communications. Leaders have a clear picture of the actual state of the factory floor by witnessing the problems firsthand on the factory floor every day (Pannell 2023). They may then use pareto charts to create projects and kaizens that will address bigger problems and opportunities. Leadership can incorporate improvement strategies to advance the area after they have a firm grasp of the shopfloor's pulse and the real potential inside.

The lean management or leadership team in charge of a value stream requires to walk around the factory floor, once a day (Pannell 2023. Every area ought to have a performance board that is examined to comprehend the results for the region in terms of quality, cost, delivery, and safety. Most significantly, to comprehend why an area failed its goal each hour, an hour-by-hour chart needs to be examined and analysed. Pareto charts should be used to trace the primary causes. On a downtime pareto chart, tasks for the daily irregularities should be finished, and kaizens/projects ought to be implemented to address the recurring problems.

Daily completion of these tasks is what is meant to be understood as lean manufacturing management. Finding each of the value stream's principal work centres is the first stage. Next, a revolving kiosk or magnetic white board with quick grids outlining the area's essential safety, quality, cost, and delivery criteria should be constructed. It is advised to graph the output hour by hour using paper. This increases the process's visual factor and allows for the storage of the paper copies for later use (NZBEF, 2019). The necessary resources, such as managers, supervisors, engineers, maintenance, and quality control personnel, should be identified. Next, the procedure for conducting the walkthrough should be established, and each authorised representative should be given a task to report on a performance-related section of the area. The floor supervisor must take the lead in the conversation about the work centres that fall within

their authority. Magnetic whiteboards, task cards, document holders, and magnetic strips are the supplies required to conduct daily walkthroughs.

- Value Stream Mapping.

The process of analysing the information and material flow for a product's value stream from the supplier to the customer is called lean value stream mapping. Value stream maps provide managers with a visual representation of how their company interacts with the crucial performance indicators at every stage of the procedure (Gomez, 2022). Leaders can make important operational adjustments with a visible impact on customers because to this high-level insight. The value stream mapping process should be finished using the kaizen process. First, have a team charter completed by employees from every department, including floor workers. Then, to bring all safety, quality, productivity, and customer information to the kaizen, gather it beforehand. Start training using kits, PowerPoint training, and a video as soon as the kaizen begins. Once finished, start publishing all the data for the value stream's material flow maps, people map, safety, quality, productivity, and ideal state maps utilising value stream mapping data boxes and kaizen burst forms. Afterwards, the team examines all the data and generates ideas for projects, kaizens, and tasks to enhance the value stream to reach the optimal state (NZBEF, 2019). The value stream's ideal, current, and future states should all be documented using lean software, along with important key performance indicators and a 12-month improvement plan.

- Poka-Yokes and Lean 6 Sigma.

Lean 6 sigma has been created by combining six sigma and lean over the past ten years. Because major quality problems can shut down a whole value streams when inventories are removed between processes, lean requires very high-quality standards. Lean experts in the US and Japan have been frequently quoted as disputing that organizations should not implement lean if they are unwilling to address these important quality challenges. Therefore, it is necessary to tackle these problems using poka-yokes and six sigma variation reduction procedures before eliminating work-in-process inventories (Lucidchart, 2020). Fishbone diagrams, five why process, and experiment design are a few examples of six sigma tools. The Japanese word for an error-proofing device is poka-yoke. The A poka-yoke will have 3 stages,

Stage1 poka-yokes: To find the source of the problem, you must observe the process in operation. Ask for help from others to figure out if the mistake is mechanical or human. To visualise your current process and create the ideal future state, think about creating a flowchart.

Stage 2 poka-yoke: decide what type of poka-yoka best suit for the solution, there are prevention, detection, and correction. The goal of prevention poka-yoke is to alter the environment or process to prevent the error from happening in the first place. Detection poka-yoke uses sensors, indications, alarms, or feedback to notify the user or the system when an error happens or is going to occur. Correction poka-yoke is using automatic or human processes, to corrects the problem or returns the process to its initial state (Linkedin, 2023).

Stage 3 poka-yoke Make sure a poka-yoke will function before putting it into full practice. Test it to make sure the patch doesn't slow down the operation and to see if the problem is prevented.

Kaizens should be organized, and the highest quality issues should be determined. Lean six sigma training, which includes training instructions, PowerPoint presentations, quality videos, and poka-yoke videos, should be the first step in every kaizen project. Kaizens need to start utilising variation measurement, fishbone diagrams, and the five whys to analyse the flaws. As soon as the quality issue's underlying cause has been identified, the kaizen team should come up with as many solutions as they can for it. After that, brainstorm the different concepts and put the best ones into practise. To eliminate the major quality problems in the value stream, these kaizen sessions must be held as frequently as necessary. Poka-yokes and other quality checks should be given to the operators in the production areas and incorporated into the production process as kaizens are held in each area. It is advised to reduce the number of traditional quality inspections carried out by quality inspectors and to appropriately scale down the quality organization.

- TPM (Total Production Maintenance).

Total Productive Maintenance, or TPM, is a lean maintenance management strategy to optimise equipment to get rid of errors and downtime TPM events and equipment abnormality reduction events are the two main TPM approaches (US EPA, 2023). TPM events are centred on disassembling equipment, swapping out worn-out or damaged parts, and altering devices to make maintenance and operator lubrication easier. Equipment is restored to like-new condition via TPM events. Preventative maintenance tasks carried out by production and maintenance employees to keep the equipment in like-new condition are crucial to maintaining TPM event improvements. Even after being restored to a good, design flaws in the machine will still cause errors and downtime. Equipment reliability kaizens should be used to eliminate these design problems. Specialised machine abnormalities not addressed by TPM kaizens are the focus of

equipment abnormality kaizens. The fundamental steps in these kaizen processes are to identify the specific problem, carry out a five why analysis to determine the underlying cause, create potential solutions, prioritise the best options, and finally make changes to the machine (Sugimoto, 2018).

Starting off by establish a new role for managing the TPM process and serve as the primary leader for TPM kaizens. To make sure that attention focuses on the TPM implementation across the plant, it is advised that this role be in plant maintenance but report to the Lean Manager. After this role is established, host a kaizen event. Collect the required training materials, books, PowerPoint training, gauge marking sheets, and TPM videos in advance of the event. Teaching operators to use their senses when operating equipment should be a part of this training. When working with equipment, they can detect noises, vibrations, or temperature increases using their senses of smell, sight, hearing, and touch. Early detection of these problems will stop errors or downtime. After receiving training, disassemble the equipment to restore it to like-new condition, and assign operators the jobs of cleaning, lubricating, and replacing wear-out parts. To maintain the equipment in like-new condition, productive maintenance duties should be included in maintenance (NZBEF, 2019).

After the kaizen measure results have been gathered, audit maintenance activities to make sure that operators and maintenance are doing their jobs. By using TPM in operations, equipment reliability is increased, downtime is decreased, and equipment problems are minimised. Improved quality, timely delivery, productivity, and operator morale all rise because of increased involvement and decreased time spent resolving equipment problems. TPM has an impact on safety as well since, when doing equipment inspections, operators and maintenance discover problems with guarding and safety devices (Sugimoto, 2018). It is crucial to adopt TPM at this stage of the lean implementation before cutting inventory since low machine dependability can seriously impact customer service and undermine the lean implementation's success. Leaders may become less confident in lean and show less support for the endeavour.

- Redesign Work Cell.

If possible, each workstation in the value stream should be configured in a U shape. The cell has a U-shaped appearance, as suggested by its name being shown in the figure (Figure 2.7 - Cellular Systems). One of the most popular cellular layouts is this one. The smallest and least-travelled path between the workstations is the U-shaped design. In comparison to other cell designs, it also achieves the best operator communication (Hessing, 2023).

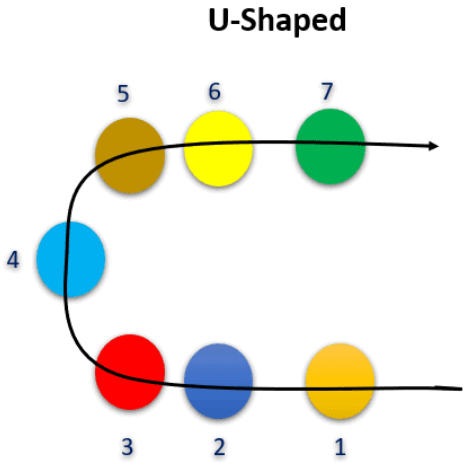


Figure 2.7 - Cellular Systems

Source: Hessing 2023

Enough material should be supplied at each workstation, and the cell's design should make it easier for materials to be transferred from the outside of the U to the operators' fingertips. Depending on the volume and size of the components. Usually, materials are supplied in totes or other compact containers that can fit inside the operator's workstation. Pallets are allowed if the amount of material dictates the number required but they should be arranged so that they are at the operator's fingers on a pallet stand (Aase, Olson and Schniederjans, 2004). Completing cycle time measurements and assigning work among employees at or slightly below takt time represents another aspect of work cell reorganization. For all staffing levels, the redesigned workstation should be planned with minimal operator movement and flexibility in staffing. Removing excess operators from the operation means that they can be deployed elsewhere in the plant or to cover for absences. If there is no open roles or absences to cover, extra employees need to be working on kaizen projects and support extra lean development (https://ottomotors.com). No one should ever fire an employee who has freed up time because of work cell balance.

Every work cell in the value stream needs to have kaizens planned for it. The kaizen should be concentrated on a single task for a duration of one week, with a varied team. Training, such as training videos, PowerPoint training, and training kits, should be the first step in the kaizen process. Observing the cycle time at each workstation is the first step. The cycle times should be measured and recorded on a cycle time takt time chart using a clipboard with a stopwatch. Next, to facilitate job sharing between employees and to equalise cycle times to takt time for changing customer demand levels, the team should start reorganizing the layout. Redesigning

the material flow and putting the material at the operator's fingertips should also be part of the plan. Material processors and standard work for material distribution with material delivery carts should have a delivery cycle specified. Takt time countdown timers should be installed on each assembly area after the workstations have been updated. This will allow you to count down the takt time and coordinate all the employees. The WorkCentre's countdown timer should begin counting down from takt time, and each operator should begin their cycle at the same moment. Pacing assembly lines is the process of having all operators begin the next cycle in pattern with one another when the countdown timer has been reset. It is recommended to use Andon lights as a visual signal for supervisors, material handlers, or maintenance (NZBEF, 2019). After making all the necessary physical adjustments, the kaizen team should manage the new procedure for two days, troubleshoot any issues, and then turn it over to supervision. When organizations eliminate overstaffing, labour costs drop dramatically. As surplus inventory in work cells is eliminated, inventory decreases. Workstation redesign reduces space and operator walking. Placing supplies in the best positions for operator access improves ergonomics. As the work cell's flow is established and cycle time is balanced, output increases. In the lean production work cell, cycle time is decreased since there is less walking and reaching for materials.

- Changeover Time Reduction.

There are internal and external steps in the setup times. When the machine is shut down, its internal operations need to be completed. The machine can be operated while carrying out the external steps. the six fundamental steps of implementing changeover reduction
are Separating internals from externals, converting internals to externals, carrying out with adjustments, applying quick change devices in place, optimising the procedure, and implement pit crew system with multiple operators to finish the changeovers (https://qualityamerica.com). Repeat changeover kaizens for a single machine several times until zero changeover time achieved, after years of changeover reduction kaizen efforts, companies following to this idea have witnessed 3-hour changeovers become 3-minute changeovers. As changeover times define process flexibility, which is the key factor in determining work-in-process and finished goods inventories, minimising changeover is crucial before reducing inventories in the value stream.

Form a diverse group consisting of operators, engineers, technicians, and supervisors to form a kaizen team. With training, such as changeover reduction videos, PowerPoint training,

and training kits, start the kaizen process. Make a spaghetti map by tracking the motions of the operators while keeping an eye on the ongoing procedure, recording the processes, and recording the cycle times for each step using a clipboard and timer (Oostenbrink, 2023). The cycle time tasks should then be displayed on a pareto chart, and the data examined by the kaizen team. Adjustable roller carts, push button clamping levers, C-washers, swing washers, flip bolts, tilt knobs, half turn screws, and push button nuts are examples of common quick-change devices.

After that, brainstorm the best ideas and put the most effective solutions into practise. New processes should be defined in standard work after the changes are put into place to guarantee that internals and externals are kept apart and to streamline the process. Pit crew methods and a countdown timer for the switch should be introduced once all changes have been made and procedures have been finalised. This entails utilising as many operators as is practical to expedite the setup process. Every segment of the value stream with a significant change over time should use this procedure. As kaizen teams figure out how to make the first item produced be a quality part, waste is decreased and product quality increases. Because manufacturing cells can switch over more frequently due to the shortened changeover times, there is a chance that inventory will be removed, freeing up cash.

Companies can offer a greater variety of products at a lesser cost than their competitors thanks to increased flexibility resulting from changeover reduction efforts (NZBEF, 2019). This adaptability has the potential to revolutionise the market and lead an organization to new levels of expansion and profitability.

- Connect Processes to Material Flow.

Throughout the value stream, inventories are being reduced and ultimately removed in this process. Material enters the first process straight from a trailer at the receiving dock in the ideal state value stream map. It then proceeds through each process step individually until it reaches the final one, where it enters the trailer at the shipping dock.

Factors such as process flexibility, changeover times, volume flexibility, process equipment reliability, and product quality are crucial in determining whether a kanban system or direct inlining of processes will be employed. A kanban system must be utilised when one upstream process feeds several downstream systems (businessmap.io). Organizations that have had the most success putting this step into practise have created equipment that is the proper size and matches the capacity of both the upstream and downstream processes one for one, allowing

processes to be integrated (CSS). Every step of process data should be updated with the status and each inventory point assessed using a value stream map. After that, a future state should be created, with kanbans planned for places that aren't flexible enough to inline or where a process feeds several downstream processes, and inventory reduced where it can be. Create a project plan to carry out the adjustments in the future, beginning with the receiving area's supplier kanbans. Reducing inventory leads to cash savings. There will be no need for material handling worker or equipment. Since material won't age and there won't be much defective inventory in WIP when defects are discovered, material defects will be avoided. Product damage and the amount of work required to restore damaged material will decrease with less material handling by PIVs (NZBEF, 2019). Less floor area means more room for future development and expansion. Less material handling and forklift accessibility along the value process will increase safety.

- Implementing Lean Transformation in every step of the value stream and in every process of administration.

Changes must be made throughout the whole value chain and in every administrative process for lean to be fully utilised in the view of customers. With this stage, lean efforts become a competitive weapon instead than just a cost-cutting or streamlining process. Customers believe that a fully engaged, lean organization will provide better customer service than its competitors, thereby taking market share away from them and ensuring long-term success.

Positions for Lean Managers in product development, distribution, suppliers, and company processes need to be established. These positions will be responsible for carrying out the previously mentioned steps, which will always begin with a value stream mapping exercise. The value stream will pinpoint the best possibilities that will have the most effects on the customer. Kaizen events should be led by each position with the goal of achieving the value stream of the future state. Every function should have challenging goals set to improve. Every area, from the production floor to the office, should be pushed to a 5%–10% increase in productivity target. Every section is pushed as a result, and they all figure out better methods to achieve more with less.

Business Process Lean Manager: This position will oversee the application of lean in the engineering, human resources, sales, and marketing offices. Pay close attention to the areas where lead time, cost, and quality have the greatest effects on the customer. It is recommended that the office value stream mapping and 5S processes be put into practise (Yoon 2022).

Product Development Lean Manager: To develop better products and processes faster than others, this position's primary goal is to streamline the development process. The organizations who can respond to the market the quickest win because they are able to provide the things that customers desire in a timely manner, at the best available price, and with exceptional quality. This role must make sure that the process development kaizen teams are stretched to provide the highest possible degree of process innovation as new processes are built for new products or for increased capacity (Chiva, 2023). These advances in method can be utilised as a competitive advantage by becoming trade secrets or patentable.

Supplier Lean Manager: Prioritise on the best suppliers and begin the lean journey with each one. hold kaizen methods project and cost-sharing reductions.

Distribution Lean Manager: The value stream from the dock door to the customer is the primary focus of this position. To expedite the steps and guarantee that all corporate lean adjustments are fully utilised to significantly benefit the customer, kaizen meetings should be organized.

Data and Methodology.

In Chapter 3, an in-depth exploration will be undertaken, presenting a comprehensive business case cantered around a restaurant's adoption of lean principles. This is a methodical strategy meant to maximise operational efficiency while maintaining and improving the standard of culinary offerings. Modifying the kitchen layout to improve productivity, reducing waste, and shortening wait times for customers are the main goals of this lean implementation.

This chapter will provide useful knowledge from the successful implementation of lean approaches at Hôtel-Dieu Grace Hospital, where patient wait times were dramatically reduced through careful data analysis. The chapter will close the gap between theoretical concepts and real-world application in the context of the restaurant industry by utilising the invaluable lessons discovered in the healthcare sector and with the methods and principles of Lean that the thesis has cover so far, I can make a business case of lean implementation on a restaurant. The methodology that will be used in making this business case are: Just-in-time (JIT), Demand Forecasting, Menu Simplification, Quality Control, Cross-Training Staff, Contingency Planning, 5S lean principles.

Restaurants in the food industry can use JIT to increase productivity, cut waste, and boost earnings. Theoretically, restaurants may order the correct amount of ingredients at the right time by putting in place a JIT system, which results in fresher food, fewer waste, and less storage expenses (Wampler, 2023). The food industry works with extremely delicate products. Quality Control is one of the fundamental justifications for upholding quality standards and regulations, which are crucial for those involved in the food industry. When it comes to food products, most of us tend to consistently purchase the same brand because we believe it to be high-quality and meets our expectations. Additionally, for a restaurant, even a small incident damaging the quality of the products could damage it reputation (SpendEdge, 2023).

The restaurant's most valuable assets are its food and beverage offerings. the restaurant will be more profitable the more it makes of the ingredient it has in store. Why then do so many restaurants have huge menus? Large menus require a lot of back-of-house inventory, which will only result in wasted goods, food and drink spoilage, and deadstock. It's critical to consider menu profitability rather than quantity. Understanding which menu items are popular and developing a profit-driven inventory management plan are the keys to maximising your revenue. Simplifying the menu may significantly increase the profitability of restaurants (Dinsmore, 2021). Forecasting isn't merely about predicting the future; it's also about

understanding the past. Without reliable and accurate forecasts, restaurant managers and owners have no idea how much revenue to expect from a given period, which makes it very difficult to create a budget, plan staffing levels, and order food. Restaurant owners can gain a deeper understanding of industry trends and potential adjustments required to keep their company ahead of the competition through analysing past sales data (Umiten, 2022).

Cross-training improves your operations' efficiency, and increased efficiency typically results in cost savings. In this economy, every little bit helps. By allowing one or more employees to work several roles throughout a shift, you may cross-train your staff, which will undoubtedly come in handy (Dinsmore, 2020).

It makes sense that 5S applies to the restaurant industry as well, even if it is well acknowledged and understood as it's more so in the manufacturing industry. Cooks and chefs are, after all, the manufacturers of the meals that we all love. Reducing Lead Time is also essential to a successful operation because it ensures high profitability by quickly turning over tables and minimising customer wait times, as well as customer satisfaction because nothing is worse than having to wait a long time for food (Micklewright, 2018). Every restaurant area, including the drive-thru area, the kitchen, the salon, the hostess desk, the bathrooms, and the storage area, should comply to 5S to accomplish these changes. Each aspect always needs to be organised, kept in the proper location at the appropriate time, in the appropriate quantity, and in like-new condition. (Paulise, 2018).

Chapter 3 – Lean Implementation Business Case.

3.1. Analysis on a Lean Implementation at Hôtel-Dieu Grace Hospital.

The implementation of "lean" concepts in healthcare settings is to reduce waste in each activity, process, and procedure through a continuous improvement approach. Every employee in the organization, from physicians to operations and administrative personnel, works tirelessly to find waste and get rid of anything that doesn't benefit patients by applying lean concepts (NEJM Catalyst, 2018). By applying lean to the healthcare industry and examining procedures and frameworks using the lens of the eight wastes that involve around of reducing waste as being shown in the figure (Figure 3.1 - What is Lean Healthcare?), organisations may be able to:

- Reduce Waiting / Idle Time.
- Minimize Inventory.
- Eradicate Defects to Improve Quality of Care and Increase Reimbursement.
- Transportation – Decrease the Movement of Patients, Supplies, and Equipment to Improve Patient Flow.
- Prevent Injuries and Save Time by Reducing Motion.
- Maximize Resources by Minimizing Healthcare Overproduction.
- Remove Waste from Over-Processing.
- Understand how Healthcare Waste Leads to Untapped Human Potential – the Pinnacle of Waste in Healthcare.

Figure 3.1 - What is Lean Healthcare?

Source: NEJM Catalyst 2018

Cost reductions are frequently a byproduct of lean management, even if they are not its primary goal. Redesigning tasks and workflows to improve care ultimately results in time and resource savings. It may also lessen the causes of burnout in employees and provide them a sense of empowerment and engagement. Ultimately, the principles and strategies associated with quality-improvement are more significant than the labels applied to them, such as Lean, Six Sigma, and others. Numerous industries have put these theories and tactics to the test and found success (Virginia Mason Institute, 2023). They offer a great deal of potential to assist healthcare organizations in maintaining patient safety and satisfaction, motivating, and supporting employees at all levels, and long-term success.

To reduce ED, wait times and raise the standard of medical care, all employees in the emergency department at Hôtel-Dieu Grace Hospital started a revolution in 2005 by implementing Toyota Lean manufacturing concepts. The project was built on lean methodologies, including value-stream mapping, just-in-time delivery strategies, workplace organization, elimination of systemic wastes, using employees as the source of quality improvement, and continuous improvement of the process phases. (Ng, Vail, Thomas, and Schmidt, 2010).

A new way of thinking is satiating Hôtel-Dieu Grace and pushing it towards a goal of improving the end-to-end patient experience as lean departments collaborate with other lean departments. Five other departments diagnostic imaging, clinical teaching unit, central sterilising and reprocessing, mental health, and orthopedics, started their own lean implementations after the 278-bed hospital held a lean workshop for the emergency room in the fall of 2005 (Taninecz 2007). Healthcare organizations use a range of tools to implement change when they utilise lean principles. The emphasis changes to getting rid of procedures and stages that fail to deliver better patient satisfaction and care. Front-line clinicians' opinions are valued by healthcare leaders for their ability to offer new ideas. Is this adding value for the patient? is a question that all staff members in the organization learns to ask (NEJM Catalyst, 2018).

Following a short-lived lean experiment that failed to tackle the hospital’s pottering procedure overly ambitiously, from which important insights were extracted, McEvoy notes that certain fundamental standards were set for lean projects, starting with the ER:

Control: The employees that take part in the training will be the ones to put the changes into practise and make the improvements.

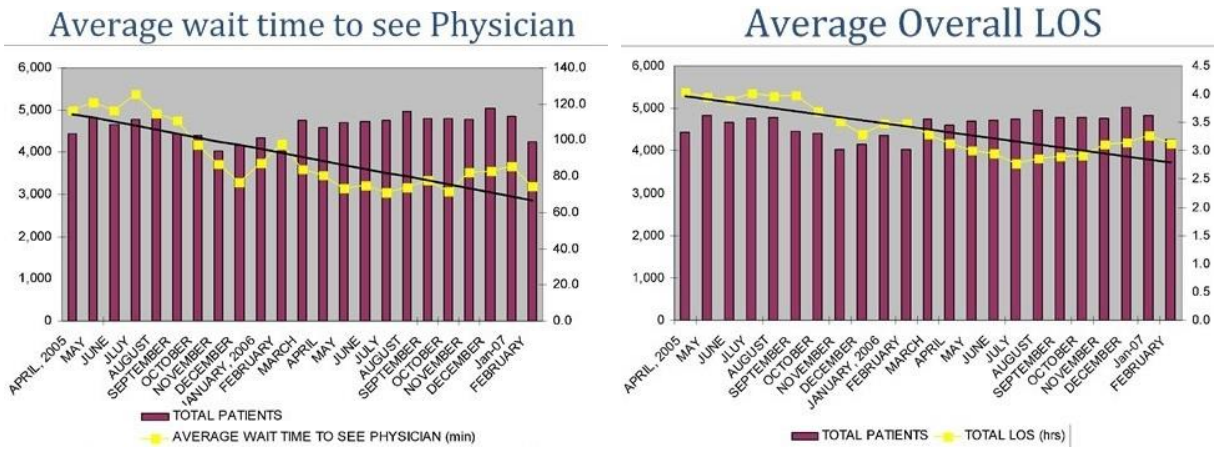
Benchmark: Some hospitals in Michigan had started implementing lean, and hospitals across the river in Detroit were maintaining 29 minutes of care in their emergency rooms. These hospitals provided targets and a benchmark for Windsor to work towards. Other Hotel-Dieu Grace departments now use the ER as an internal benchmark.

Champion and support: Dr. David Ng, the chief of emergency medicine, was an active and forward-thinking doctor, and the ER staff was eager for change.

Even if the lean momentum has been inconsistent, the department intends to make another effort to tackle new challenges that have developed as they work to sustain their progress in the face of increasing patient volumes:

Patient satisfaction: The number of walkouts, or patients who give up waiting and leave, decreased from 400 per month to approximately 150 per month. The number of complaints has also sharply decreased.

Wait time: Despite a 10% increase in volume, patients spent less than three hours in the emergency room on average, down from an average of four hours. Employee satisfaction: Following the training, staff turnover decreased from 50% to 6% in a single year (Taninecz 2007). The ED has achieved major improvements in departmental flow without adding any additional ED or inpatient beds. The mean registration to physician time has decreased from 111 minutes to 78 minutes. The number of patients who left without being seen has decreased from 7.1% to 4.3%. The length of stay (LOS) for discharged patients has decreased from a mean of 3.6 to 2.8 hours. (Ng, Vail, Thomas, and Schmidt, 2010) as the figure of the data analysis is shown below (Figure 3.1 - “Pulling” Lean Through a Hospital).



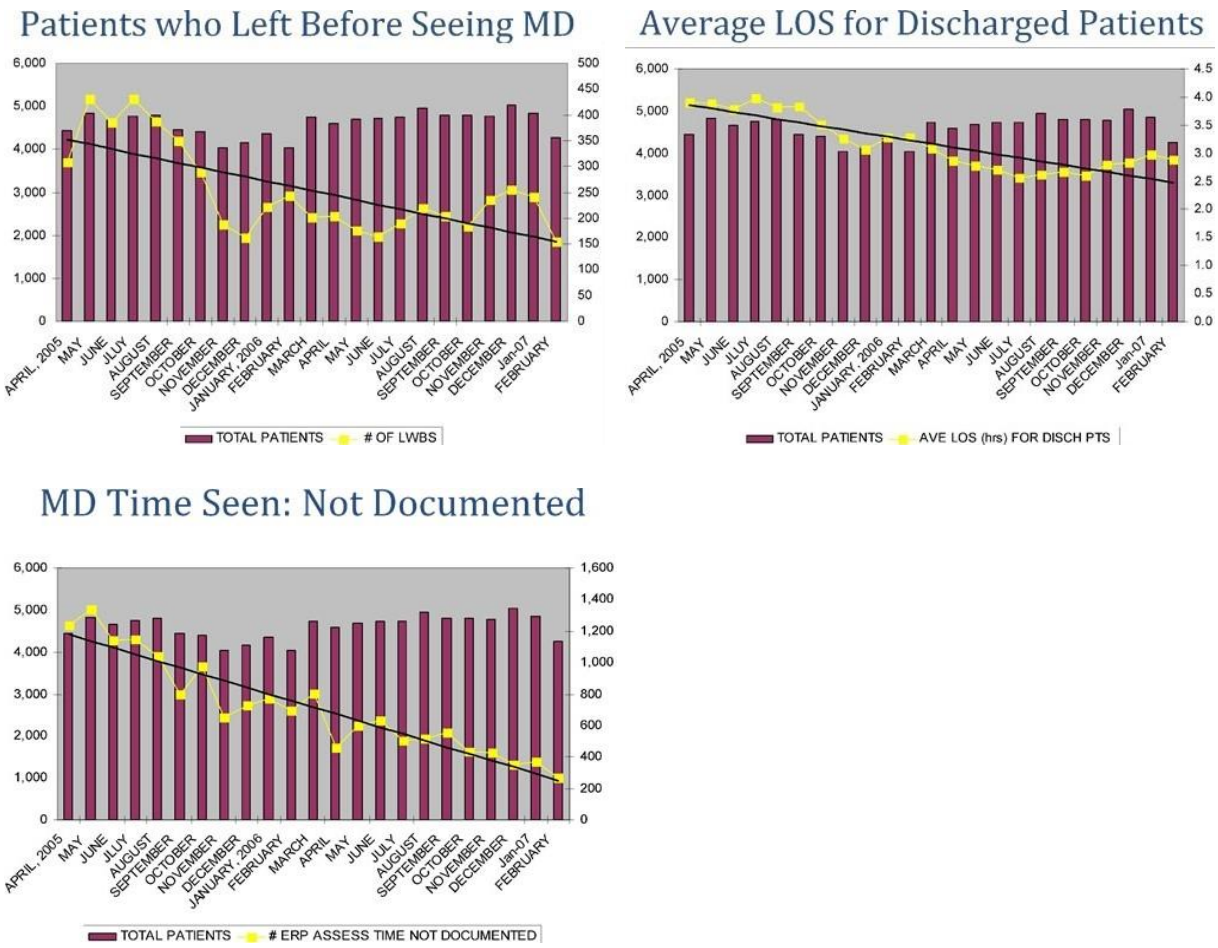


Figure 3.1 - "Pulling" Lean Through a Hospital

Source: Taninecz 2007

Lean has provided people an organised, non-political approach to see and improve processes, engage with coworkers, solve problems, and provide better care for patients even though the workshops, kaizens, and targets vary between departments.

3.2. Business case of Lean Implementation in a Restaurant.

Based on the data collection from this case study of Hôtel-Dieu Grace Hospital, I can make a business case on a project that will implement lean in a busy restaurant. The restaurant's biggest problem is that it can't serve customers quickly, which means that customers must wait longer than necessary, which takes away from the whole dining experience. A food establishment's total production and efficiency can be severely hindered by an unorganised kitchen staff, an inefficient kitchen layout, or a lack of communication within the team. All these factors affect customer satisfaction by interfering with the smooth operating flow and causing errors and delays in the cooking process.

The Hôtel-Dieu Grace Hospital study case demonstrates the successful application of lean methods such as just-in-time delivery strategies, workplace organization, eliminating systemic wastes, and continuous improvement. which we can apply to this implementation project in addition to all the other techniques the thesis has discussed.

Project Charter

Project	Implementation of lean in a busy restaurant	**Date**	2023, December 12
Created By	Thepphalack Soulya		

Mission	• Reduces the risk of food spoilage. • Solution for difficulties in getting the necessary supplies to unexpected spikes in demand. • Organizing the arrangement of workstations. • Reduce the likelihood of stockouts. • Maintaining the ideal ratio of inventory to demand. • Kitchen staff to competently handle a variety of tasks.
Objectives	• To reduce the customer waiting time. • To Satisfied the customer. • To have a good impression on the customers. • Reduce waste.
Approach	• Just-in-time (JIT). • Demand forecasting. • Menu Simplification. • Kitchen Layout. • Quality Control. • Cross-Training Staff. • Contingency Planning. • Continuous Improvement. • 5S lean principles.
Risks	• Not enough time. • Staff are not content with changes. • Supply Chain Disruptions. • Lack of Continuous Improvement.

- Just-in-time (JIT):

A crucial aspect of efficient restaurant logistics is thorough inventory management, which entails putting in place an advanced system that tracks inventory levels in real time and provides accurate, up-to-date information on stock levels as well as the ability to set up automated alerts that promptly signal low inventory levels and prompt timely reorders. By taking a proactive stance, the restaurant may reduce the likelihood of stockouts while simultaneously increasing supply chain efficiency and maintaining the ideal ratio of inventory to demand.

- Demand forecasting:

Demand forecast to accurately predict customer demand, demand forecasting is an essential part of effective restaurant management. A comprehensive approach involves utilising historical sales data, taking seasonal variations into account, and accounting for other relevant variables. Additionally, integrating modern technology solutions, like point-of-sale systems, makes it easier to track sales data in real-time, which offers insightful information for proactive decision-making and ensures optimal inventory management.

- Menu Simplification:

Consciously trying to simplify the menu by highlighting items with similar ingredients; additionally, as a countermeasure, less perishable items are offered on the menu to lower the chance of spoiling. This two-pronged strategy reduces complexity in ingredient handling and preparation while streamlining kitchen operations and minimising food waste, resulting in a more economical and environmentally friendly menu.

- Kitchen Layout:

Carefully organising the arrangement of workstations, equipment placement, and traffic flow is crucial for creating an environment that supports optimal workflow and efficiency in the kitchen. This ensures a smooth and well-organized operation. Moreover, an important component of this kitchen design strategy is the setup of a production system that perfectly matches with customer demand, enabling on-demand preparation that reduces unnecessary wait periods. Furthermore, similar tools and equipment are arranged in logical groups to reduce needless movement and improve smooth work. a lot of attention is paid to keeping workstations tidy and stocked with easily accessible supplies and equipment. This comprehensive method of kitchen design not only improves overall effectiveness but also creates a peaceful and productive cooking environment.

- Quality Control:

A thorough focus on steps to ensure that food is not only made with great care but also supplied to customers in a constantly fresh state, upholding unwavering quality standards, is necessary for a diligent commitment to quality control. Implementing a first-in, first-out (FIFO) inventory system is crucial to this quality assurance strategy because it reduces the risk of food spoilage by methodically using older inventory before newer stock, ensuring that ingredients are used at their peak freshness, and lowering the possibility of waste in the culinary operation.

- Cross-Training Staff:

Enabling an adaptable and versatile workforce, the restaurant wants to improve operational efficiency through the deliberate cross-training of kitchen staff to enable them to competently handle a variety of tasks; this deliberate skill diversification gives the team the ability to dynamically modify task assignments in response to shifts in customer demand. Such a thorough approach ensures that the kitchen can easily manage variable workloads, maximise efficiency, and maintain a high standard of service even during peak periods. It also promotes a collaborative and agile work environment.

- Contingency Planning:

The restaurant will place a strategic emphasis on contingency planning because we recognise that the industry is unpredictable and wants to make sure that it has clear, comprehensive plans that can be quickly implemented in the event of unexpected changes in customer demand or possible disruptions in the complicated supply chain, from unforeseen difficulties in getting the necessary supplies to unexpected spikes in demand. By anticipating the unexpected, the restaurant not only strengthens its ability to withstand setbacks but also maintains its commitment to provide its customers with a reliable and consistent experience.

- Continuous Improvement:

Operational excellence is based on a commitment to continuous improvement, which calls for a systematic method in which operational processes are frequently examined and assessed to identify possibilities for improvement. In addition to internal evaluations, collecting input from dedicated staff members and astute customers becomes crucial to discovering insightful information and areas in need of improvement. This two-pronged approach not only helps the restaurant develop a culture of continuous improvement, but it also makes sure that

changing demands and expectations from customers are satisfied in a flexible and timely manner, which eventually helps the restaurant continue to succeed and expand.

- 5S lean principles:

Sort (Seiri): Inspect kitchen and storage spaces frequently to find and discard everything that is not necessary for everyday tasks. Menus should be simplified to highlight well-liked, high-margin goods while lowering complexity and waste.

Set in Order (Seiton): To reduce on search time, designate distinct areas for utensils, tools, ingredients, and equipment. To make it obvious where each item belongs, use labels, colour coding, and visual clues.

Shine (Seiso): Make sure that every location, including dining rooms, storage areas, and kitchens, has a regular cleaning routine. Instruct staff on the value of hygiene and promote a team approach to keeping a clean the environment.

Standardize (Seiketsu): Standard operating procedures should be written down and distributed for various kinds of jobs, such as cleaning, inventory control, and food preparation. Staff should be trained on the standardised procedures to guarantee that everyone follows by the same standards.

Sustain (Shitsuke): Organise frequent workshops and training sessions to reinforce the implementation of Lean principles. Encourage staff participation in finding and addressing opportunities for improvement.

Conclusion:

The thesis emphasises how flexible and successful Lean is at streamlining processes while encouraging an efficient culture by carefully examining Lean concepts like waste reduction, employee engagement, and continuous improvement. Furthermore, the analysis of the cultural transformation required for successful implementation of Lean emphasises the importance of organizational buy-in and the development of a continuous improvement-oriented mindset. This shift in culture not only helps Lean initiatives succeed, but it also creates the groundwork for long-term, continuous improvement. The thesis acknowledges the value of customised approaches and adaptability in implementation techniques as it explores the difficulties involved in adopting Lean. Recognising that all businesses and organizations have distinct settings, the research emphasises the necessity of flexible frameworks that may be adjusted to meet requirements. Essentially, the thesis confirms the practical application of Lean principles in various circumstances while also strengthening their theoretical foundations.

Analysing the Lean implementations at Hôtel-Dieu Grace Hospital which the lean principles were originally adopted from the industrial sector provides a strong example of the observable advantages organizations may obtain by incorporating lean principles. The hospital's experience demonstrates the revolutionary power of Lean approaches, which routinely result in increased customer satisfaction, significant cost savings, and improved operational efficiency. These tangible results demonstrate the Lean methodology's wider applicability beyond its manufacturing origins and confirm the effectiveness of Lean practices. By delving into the specifics of the Hôtel-Dieu Grace Hospital case, this analysis contributes a nuanced perspective on the potential advantages and challenges associated with implementing Lean approaches. The business case for implementing lean in a restaurant setting benefits greatly from the lessons learned from this real-world situation. The results not only show what makes a Lean project successful, but they also clarify which Lean concepts work best in real-world, service-oriented environments like those seen in the restaurant business. The thesis evolves into an abundance of information by its in-depth examination of Lean implementation in various organizational contexts, offering useful information to businesses thinking about starting Lean initiatives. Organizational decision-makers can use the lessons learned from the Hôtel-Dieu Grace Hospital case to guide their approach, avoid errors, and modify Lean concepts to fit the demands and dynamics of operations.

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