Lean Six Sigma: A New Powerful Process Improvement Methodology

Lean Six Sigma: Une Nouvelle Méthodologie Puissante pour l'Amélioration des Processus

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Abstract:

This study aims to discuss the possibility of providing a synergistic effect by the combination of two improvement methodologies: Six Sigma and Lean Management. The paper demonstrates also the applicability of the combined approach -Lean Six Sigma - to different kinds of processes.

Results show that the effective integration of these methodologies offers to different kinds of businesses (service or manufacturing) a value stream that provides the highest quality at the lowest possible cost by eliminating waste.

Keywords: Lean management; Six Sigma; Lean Six Sigma; Process improvement; Quality Management.

Résumé:

La présente étude vise à évaluer la possibilité de générer un effet synergique par la combinaison de deux méthodologies d'amélioration : Six Sigma et Lean Management. L'article démontre également l'applicabilité de l'approche combinée - Lean Six Sigma - aux différents types de processus.

Les résultats montrent que l'intégration efficace des deux méthodologies, offre aux différents types d'entreprises (services ou fabrication) un flux de valeurs qui permet d'atteindre un état optimal, avec la qualité la plus élevée et les coûts opérationnels les plus bas en éliminant tout type de gaspillage.

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Mots-clés: Lean management; Six Sigma; Lean Six Sigma; Amélioration des processus; Management de la qualité.

1. INTRODUCTION

Every business needs to improve its processes in a way that meet and exceed customer expectations and build a powerful bond with them, and this will only happen when there is holistic use of resources in a proper manner so that there should be a minimum waste of resources and high productivity.

Therefore, to overcome this problem and improve the efficiency and effectiveness of processes, management researchers have tried different theories, such as Total Quality Management (TQM), Six Sigma, Lean management, Theory Of Constraints (TOC) and many others.

The popularity of both Six Sigma and Lean management has grown significantly and they have gained acceptance as industry recognized business improvement methods.

Over a period, many companies have appreciated that these methodologies are complementary and since then, much has been written about combining Six Sigma with Lean as a process improvement approach, using best practices from each.

Consequently, the question that can be raised in this regard is "**How can Lean and Six Sigma methodologies complement each other to improve upon processes?**" Thus, the main objective of this paper is to clarify the benefits of combining Lean and Six Sigma methods for processes improvement.

2. Lean Six Sigma overview

Lean Six Sigma (LSS) is an approach focused on eliminating waste, reducing variation and improving quality in an organization. It solves potentially complex problems and helps to use the correct tools, in the right place and in the right way. This approach is the combination of two improvement programs: Lean management and Six Sigma.

2.1 Lean management

Among the several quality management concepts that have been developed, the lean concept is one of the more widespread and successful attempts. Briefly, lean is about controlling the resources in accordance with the customers' needs and to reduce unnecessary waste. Toyota (the 1950s) introduced the concept at a larger scale, but it was not labelled lean manufacturing until 1990. (Dahlgaard-Park, Andersson, Eriksson, & Torstensson, 2006, p. 288)

According to Sobek, Durward & Lang: "Lean is an approach to operations management that considers any resource expended that does not add value to the end customer to be waste".(Kadarova & Demecko, 2016, p. 11)

The implementation of Lean Management removes eight types of wastes(Mehta, Mehta, & Mehta, 2012, p. 120):

- **Defects**: Production of off-specification components, products or services that result in scrap replacement production, rework, inspection, and/or defective materials;
- **Waiting**: Delays associated with stock-outs, equipment downtime, lot processing delays, capacity bottlenecks;
- **Unnecessary Processing**: Process steps that are not required to produce the product
- **Overproduction**: Manufacturing items for which there are no orders;
- **Movement**: Human motions that are unnecessary or straining, and work-in-process (WIP) transporting long distances;
- **Inventory**: WIP, Excess raw material, or finished goods;
- **Unused Employee Creativity**: Failure to tap employees for process improvement suggestions;
- **Complexity**: More parts, process steps, or time than necessary to meet customer needs.

  The central theme for Lean is to exploit customer value through reducing the wastes that are generated within an organization. Thus, the key principles of lean are:(Bhasin, 2015, p. 6)

  - Identify the customers and specify the value; clearly define value for a product in view of the customers' perspective; targeted attempts to waste reduction can occur;

- Proceed to categorise and map the value stream which essentially comprises of all the collective activities used to deliver the end product;
- Improve the flow by eradicating the waste which assists to reduce the lead time of delivery;
- Be responsive to the customers' demand schedules;
- Continuously pursue perfection.

There are many reasons to introduce lean techniques in an organization, as it may contribute substantially to cutting costs and providing competitive advantages. (Dahlgaard-Park, Andersson, Eriksson, & Torstensson, 2006, p. 289)

Even to this day, most organizations that implement Lean do so for the operational improvements, primarily because of the perception that Lean only applies to the operations side of the business. However, Lean's administrative and strategic benefits are equally impressive. According to a recent survey of 40 companies that had adopted lean manufacturing, typical improvements are visible in those three areas: (Kilpatrick, 2003, pp. 3-4)

- **Operational improvements:**
  - Reduction of lead time;
  - Improvement in quality;
  - Lower levels of inventory;
  - Less space required.
- **Administrative improvements:**
  - Reduction in order processing errors;
  - Streamlining of customer service functions so that customers are no Longer placed on hold;
  - Reduction of paperwork in office areas;
  - Reduced staffing demands, allowing the same number of office staff to handle larger numbers of orders;
  - Documentation and streamlining of processing steps enables the outsourcing of non-critical functions, allowing the company to focus their efforts on customers' needs;
  - Reduction of turnover and the resulting attrition costs.

- **Strategic improvements:**
  - Cost Reduction;
  - Rise in sales volume;
  - Increase in revenues with no increase in labor or overhead costs;
  - Improvement in cash flow.

Lean emphasizes an array of tools and methods to aid managers and workers in improvement, each designed for specific types of problems to illuminate and remove sources of waste through systems redesign. These tools and methods include value stream mapping, Kanban and pull, demand levelling, single-piece flow, 5S, kaizen events, A3 reports, visual management and more. (Kadarova & Demecko, 2016, p. 11).

2.2 Six Sigma methodology

Six Sigma (SS) is a methodology and a process developed by Motorola in the late 1980s that aimed to reduce the variance of defective products that impact on continuous and advanced improvements. SS can be thought of as an improvement methodology that focuses on the outcome and eliminating causes of errors or defects in the process. (Alsaffar & Ketan, 2019, p. 13)

It has been considered as an organized and systematic way of improving processes or developing the products or services. It is based on the statistical and scientific approach to reducing defects indicated by customers. (Kowalik, 2018, p. 10)

The term "Six Sigma" refers to a statistical measure of defect rate within a system. Underpinned by statistical techniques, it presents a structured and systematic approach to process improvement, aiming for a reduced defect rate of 3.4 defects for every million opportunities, or Six Sigma. (Jenica, Mihai, & Sorin, 2010, p. 440)

The six sigma, perceived not only as a statistical tool but also as a perspective of business strategy in literature, is defined as a method of improving companies profitability by driving out waste, reducing costs and increasing the efficiency and effectiveness to achieve the goal of meeting customers' expectations.(Kowalik, 2018, p. 10)

The most powerful logic of Six Sigma is DMAIC, which is an acronym from the words Define-Measure-Analyze-Improve-Control. This method is

based on process improvement according to the Deming cycle. This methodology offers a structure for analysis and diagnosis of problems; driven by powerful tools and techniques. It is based on five phases, which should be executed sequentially. Each of them can be narrowed to the questions that should be answered by its users (Nowotarski, Szymanski, & Rzepecka, 2019, pp. 1-2). The five stages of the DMAIC cycle are: (Alkinaidri & Alsulami, 2018, pp. 195-196)

- **Define: What is most vital to the business?**
  This includes defining what the problems are, including customers' needs and demands that are mandatory to explore to determine requirements for the improvement;
- **Measure: How are we progressing with the present process?**
  This involves assessing the process to be applied - data needs to be collected and then compared to the predicted state;
- **Analyze: what could be wrong with the present process?**
  This includes analyzing data in order to determine what the major cause of the issue could be;
- **Improve: What could be possibly applied to improve the process?**
  Here, the team initiates brainstorming to develop ideas to solve the problems and identify different variations in that process. The results at this point are then analyzed to determine whether the problems have been resolved or not. Further alterations are required if problems still persist;
- **Control: How could performance be guaranteed in order to sustain improvements over time?**
  This means that the progress should be sustained so that no unanticipated or unwanted changes could occur. The process then should operate at the desired level of performance to make sure that the problem never re-exist.

Each of these stages has a number of corresponding tools and techniques such as statistical process control, design of experiments and response surface methodology, providing the user with an extensive toolbox of techniques, in order to measure, analyse, improve critical processes, and bring the system under control. (Pepper & Spedding, 2010, p. 142)

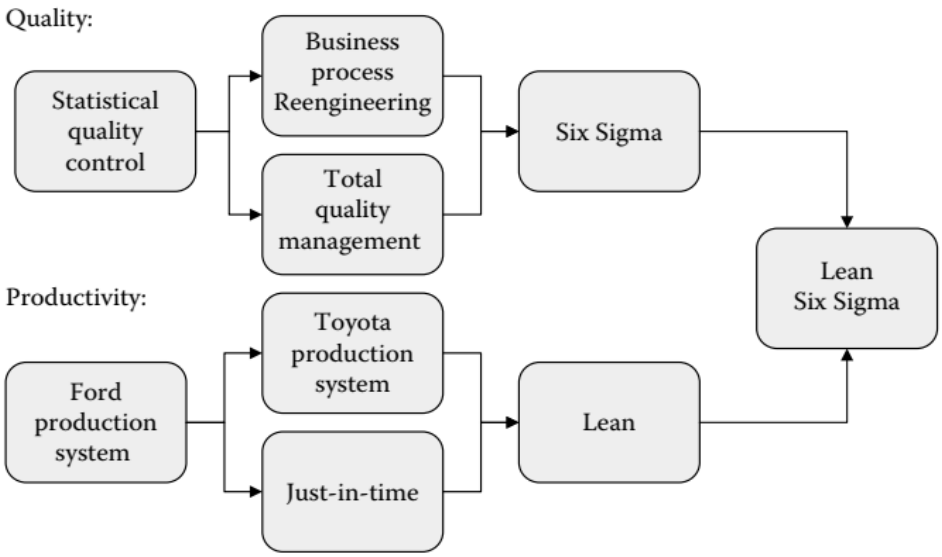
2.3 Lean Six Sigma: A combination of Six Sigma and Lean methods

Six Sigma was founded by Motorola Corporation and subsequently adopted by many US companies, including General Electrical GE and Allied Signal. Lean management originated at Toyota in Japan and has been implemented by many major US firms, including Danaher Corporation and Harley-Davidson. (Mousa, 2013, p. 1137)

The objective of these approaches is to eliminate waste and provide goods and services at a rate of 3.4 defects per million opportunities (DPMO). (Voehl, Harrington, Mignosa, & Charron, 2013, p. 10)

Figure 1 shows the evolution to the combined methods of Lean and Six Sigma.

Fig.1. Evolution of quality and productivity to Lean Six Sigma



Source:(Furterer, 2009, p. 12)

As shown through the previous figure, the concepts of control charts and statistical process control (SPC) were developed by Walter Shewhart at Western Electric in the 1920s. Dr. W. Edwards Deminginstalled SPC in

Japanese manufacturing as he assisted Japan in their rebuildingefforts after World War II. Japan's successes in the 1970s repopularized SPC in U.S. businesses. Total quality management (TQM) was a natural outgrowth of SPC, adding a process improvement methodology.

In the 1980s, Business process reengineering (BPR) and TQM became popular. BPR encouraged completely throwing out the old process and starting over, many times within the context of implementing changes in major information systems. TQM focused on a less structured approach with the principles of quality and process improvement. Thesemethodologies evolved into Six Sigma.

On the productivity side, the Ford production system was used to assemble cars, which was the basis for the TPS. Just-in-time (JIT) production philosophies joined with TPS, which evolved into Lean. Now Lean and Six Sigma are merging to capitalize on the best of both improvement philosophies and methodologies. (Voehl, Harrington, Mignosa, & Charron, 2013, pp. 11-12)

The companies using the integrated approach of Lean and Six Sigma will gain four major benefits, such as become faster and more responsive to customers, strive for Six Sigma capability level, operate at lowest costs of poor quality and achieve greater flexibility throughout the business.(Munteanu, 2017, p. 81)

Therefore, Lean Six Sigma helps companies flourish in a new world where customers expect no defects and fast delivery at the minimal cost.(Mousa, 2013, p. 1146)

Lean Six Sigma has five laws that are most efficient to reduce waste while maintaining speed. These laws help in the enhancement of business processes that aim to improve customer satisfaction, these five laws are:(George, Rowlands, & Kastle, 2013, p. 75)

- **The law of the market**: Customer needs define quality and are the highest priority for improvement;
- **The Law of flexibility**: The speed of any process is proportional to its flexibility: How quickly can people switch between task;
- **The law of Focus**: Data shows that 20% of the activities in a process cause 80% of the problems and delay;

- **The Law of velocity**: The speed of any process is inversely related to the amount ofwork or things in process;
- **The law of complexity and cost**: The complexity of the service or product offeringgenerally adds morecosts and work in process than either poor quality (low sigma) or slow speed process problems.

Lean Six Sigma adopted a large number of pre-existing tools from previous experiences of the world of quality (Visual management, 5 why, Cause and effect, Pareto analysis,…).(Volck, 2009, p. 3) Six sigma methodology have been successful at integrating advanced improvement tools with the methodologies. The tools range from design tools to management tools and from very simple tools to more advanced statistical tools. Lean manufacturing have a variety of tools are available for reducing or eliminating waste. (Mousa, 2013, p. 1145)

In simpler terms, Lean Six Sigma is the following: (Taghizadegan, 2010, pp. 1-2)

- It is a data-driven approach and methodology to analyze the root causesof manufacturing and business problems/processes by eliminatingdefects ,and dramatically improving the product;
- It improves the employee's knowledge of business management to distinguishthe business from the bottom line, customer satisfaction, and on-time delivery.Thus, Six Sigma is not just process-improvement techniques but amanagement strategy to manage the projects to financial goals;
- It combines robust design engineering philosophy and techniques withlow risks.

3. Lean Six Sigma applications

The Lean Six Sigma methodology can be applied to all kinds of process that has a definable performance goal and measurable characteristics, ranging from manufacturing to service and variegated transactional processes.

3.1 The rising need of using Lean Six Sigma

In any business, there are hundreds of ways for mistakes to be made and every business is leaking cash. Most of them blame these problems on their employees, but the problem is not the people.

However, from Lean Six Sigma, they only need to focus on preventing or eliminating three major leaks from the processes: (Arthur, 2011, p. 18)

- **Delays**: The delays between the steps in a process cost money and time that reduce profitability and productivity.
- **Defects**: The mistakes, defects, and errors that have to be fixed or scrapped. Fixing mistakes that should not have been made in the first place consumes money and time that could be spent boosting the bottom line and serving customers.
- **Deviation**: The small to large differences from piece to piece, day to day, month to month of your products and services.

Even a small reduction in defectsdelay and deviation in the mission-critical processes can offer a sustainable competitive advantage. Customers can tell a clumsy supplier from a finely tuned one.

Thus, the top ways to know the need of Lean Six Sigma are:(Arthur, 2011, p. 5)

- Growth stagnates or shrinks;
- Margins are thin;
- Sales flatline or fall;
- Employees complain about the roadblocks to serving customers;
- Customers still complain about the products and services;
- Blaming employees;
- Blaming customers;
- Customers return products for refunds;
- Customers switch to the competitors;
- Warranty costs climb.

3.2 The benefits of using Lean Six Sigma

Lean Six Sigma is now more and more applied to a variety of processes in different types of businesses.

3.2.1 Manufacturing versus service businesses

There is so much opportunity for the business that decides to use Lean Six Sigma to break through to new levels of productivity and profitability. However, many people ask about Lean Six Sigma: Isn't that just for manufacturing?

The answer is that Lean Six Sigma is good for any business process-IT, customer service, administrative, and so on, because every business suffers from the three profit demons: delay, defects, and deviation.

In U.S. industry, more and more manufacturing jobs are moving offshore. Only one-third of the Fortune 100 make a physical product. Two-thirds thrive on services. In manufacturing companies, only 20 employees out of every 100 actually work on the assembly line; the rest work in support functions. More than half of the gross national product comes from information and service industries like Microsoft and McDonald's; but these industries are lagging behind manufacturing in the quest for quality.(Arthur, 2011, p. 9)

Lean Six Sigma was first applied to production processes, then to transactional processes (purchasing, invoicing, etc.). After that, the approach was adopted in the field of services, particularly in the banking and insurance sectors. (Volck, 2009, p. 4). It now encompasses a wide range of disciplines, including transportation, administration, manufacturing, medical, and a variety of other operating organizations and processes (by definition a process is any operation that has an input and produces an output). (Taghizadegan, 2010, p. 2)

At an abstract level, there is no real difference between a service process and a manufacturing one. One may produce purchase orders instead of computers, bills instead of brake liners, but they all take time, cost money, create defects, cause rework, and create waste.(Arthur, 2011, pp. 11-12)

- In an IT department, we might focus on downtime or transaction delays. We might focus on manual rework of order errors or the costs of fixing billing errors. Even a great manufacturing company can suffer tremendously from IT problems.
- In a hospital, we might focus on medication errors. We might focus on variation in admission, diagnosis, treatment, or discharge delays. We might focus on the costs of medical errors that result in longer hospital stays.

In a hospital, the clinical side is only one element. Defects and delays in issuing bills and insurance claims can cost millions of dollars.

Incorrect bills, missing charges, incorrect purchase orders, overpayment, underpayment, and so on can cost a fortune. Fielding the phone calls and

fixing the financial transactions can cost more than some invoices are worth.

So, for a good manufacturing company, Lean Six Sigma can be used to simplify and streamline the service components. For a good service company, Lean Six Sigma can be used to make breakthrough improvements that will differentiate it from all of competitors.

3.2.2 Small versus large businesses

Many small business owners don't think they can afford the time and effort to learn and apply Lean Six Sigma. Nothing could be farther from the truth.

- Are you a small business guerrilla?
- Are you willing to ignore the conventional, but incorrect, "wisdom" about how to implement Lean Six Sigma?
- Are you willing to start making immediate improvements in productivity and profitability using only a small fraction of your employees, time, and money?
- Would you rather follow the Fortune 500 path to Lean Six Sigma and spend a lot of time and money, and then have to wait up to a year for bottom-line, profit-enhancing results?

Small or large, service or manufacturing, the company follows somesort of procedure or process to deliver products and services. Those processes can be dramatically simplified, streamlined, and optimized using Lean Six Sigma.(Arthur, 2011, pp. 11-12)

4. Lean and Six Sigma: Key similarities & differences

There is generally a controversy about lean vs six sigma. We cannot pick one over the other; both methods have certain similarities and differences. The similarities allow them to mesh together seamlessly, and the differences provide multiple paths that can be used to reach a similar destination.

4.1 Similarities

Lean and six sigma are both techniques that are used to help improve quality and efficiency. The similarities between the two approaches as noted below: (Antony, 2011, p. 189)

- Both are process focused or process-centric;

- Both need management support for success, especially in terms of creating the infrastructure and allocation of the required budget and time for changing the culture of the business;
- Both can be used in non-manufacturing environments;
- Both methodologies are focused on business needs as defined by the customer;
- Both offer complementary toolsets, which, together with each other and with other best management practices, offer a comprehensive means of transforming a business from operational chaos at one extreme to operational excellence at the other.

Moreover, Applying Six Sigma and Lean manufacturing tool needs Team. For Six Sigma we have "Six Sigma project teams" and for Lean manufacturing, we have "Kaizen teams". Both of the teams requires a specialist under which work has to be done, such as master belts or Lean consulting specialist. (Siddh, Gadekar, Soni, & Jain, 2013, p. 590)

4.2 Differences

Though there are many commonalities between Six Sigma and Lean, there are some fundamental differences between the two methodologies:(Antony, 2011, p. 190)

- Application of Six Sigma methodology requires more intense training compared to Leanmethodology.
- Six Sigma implementation requires more investment as opposed to Leanimplementation.
- Lean is fundamentally used to tackle process inefficiency issues whereas Six Sigma is primarily used to tackle process effectiveness issues.
- Six Sigma will eliminate defects in processes, but it will not address the question of how to optimise process flow. In contrast, lean principles are not very helpful in achieving high capability and high stability processes.

Therefore, Lean is focused on efficiency by improving process flow and reducing waste, while Six Sigma is focused on effectiveness by reducing defects and errors. (Collier & Evans, 2016, p. 359)

The table below is taken from a slide created by Al Filardo for the Continuous Improvement and Six Sigma training program. It provides a brief comparison of the two improvement methodologies.

Table 1. Comparison between Lean and Six Sigma methodologies

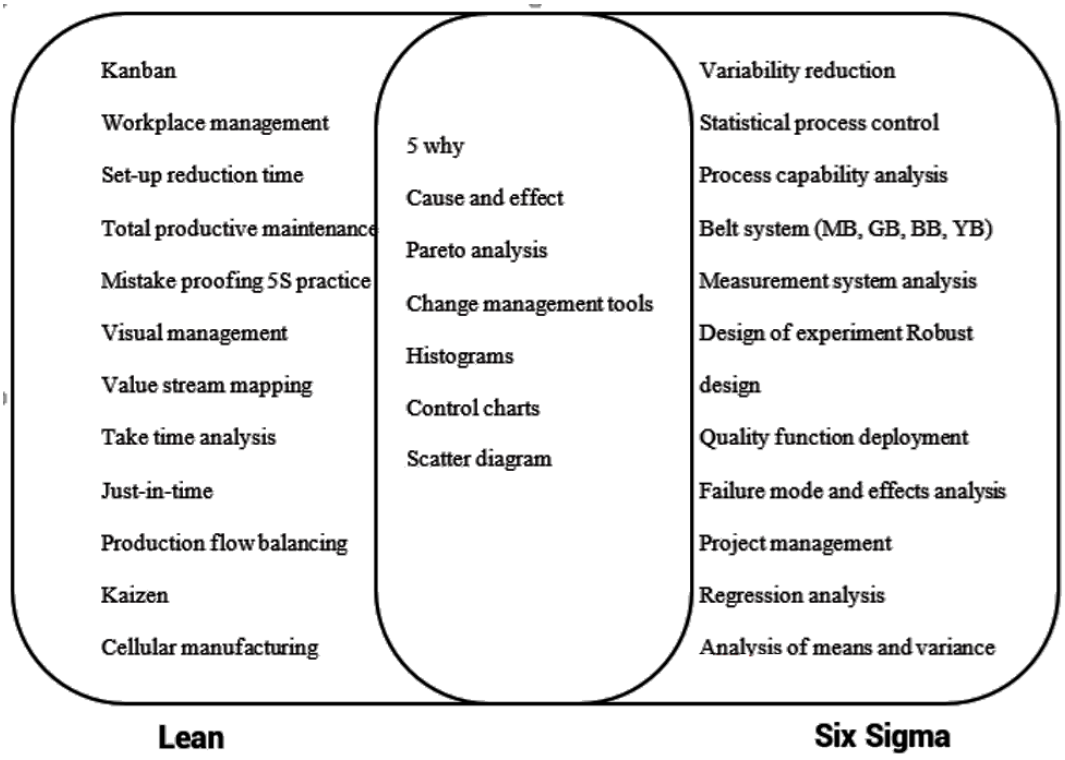
	Lean	Six Sigma
Focus	Maximize value and speed in a process.	Perfection to achieve a performance of 3.4 DPMO
Approach	Remove waste, reduce complexity and streamline the process.	Reduce variation and center the process on a target to maximize process capability.
Improve Revenue By	Adding value throughout the process.	Identifying and eliminating defects
Methodology	• Identify value • Map the value • Improve process flow • Pull work through the process • Seek perfection	• Define the problem • Measure the current state of the process • Analyze • Improve • Control

Source: (Filardo, 2008)

Regarding the tools, most companies using the integrated approach apply basic Lean tools and techniques at the beginning of their program, such as current state map, basic house keeping using 5S practice, standardised work, etc. After implementing the above tools and techniques, some wastes are eliminated from the system. Now, the tools and techniques of Six Sigma are used to offer powerful solutions to chronic problems. (Kumar, Antony, Singh, Tiwari, & Perry, 2006, p. 408)

The comprehensive set of tools, techniques and principles that can be employed in the integrated approach of Lean and Six Sigma business strategies is delineated in figure 2.

Fig.2. The tools and techniques of Lean and Six Sigma



Source: (Kumar, Antony, Singh, Tiwari, & Perry, 2006, p. 409)

The tools in the lean concept are more analytical in nature compared to the more statistical tools used in six sigma (Mousa, 2013, p. 1145)

5. The synergy effect between Lean and Six Sigma methodologies

Lean Six Sigma is the combination of the two quality improvement methodologies: Lean and Six Sigma. The improvements that can be achieved by using them together are greater than those that can be achieved with either of them individually: They are synergistic.

5.1 The powerful combination of Six Sigma quality and Lean speed

As we all know, time is money (it is also an investment), and money is thebottom line for any business organization to grow and succeed. We also knowthat defects are nothing but loss. Therefore, Lean *Six Sigma* is the solution that enablescompanies to move ahead of the competition. With that in mind, Lean *Six Sigma*combines the two most important improvement techniques in today's businessand industry. One is the epitome of quality,

which uses *Six Sigma* strategies, andthe other is Lean principles in achieving world class performance (WCP).

Mathematically the WCP is the output response defined as a function of Lean and *Six Sigma*. In other words, WCP is dependent on Lean (*y*L) and *Six Sigma* (*y*SS). Thus, as a mathematical function:(Taghizadegan, 2010, p. 59)

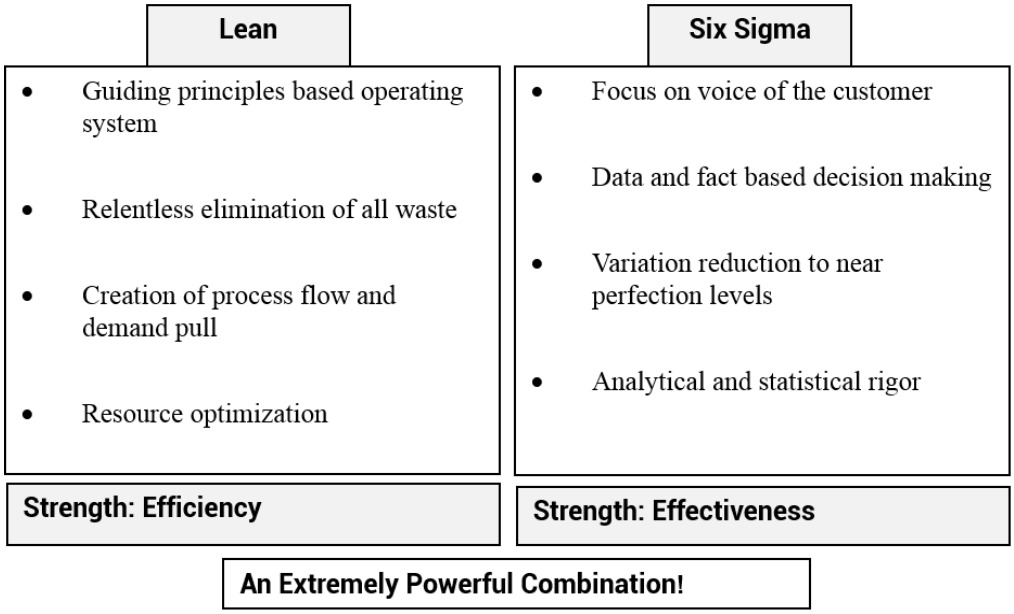
World class performance = f (Lean causes of variation, S S causes of variation)

Lean Six Sigma will focus the improvement efforts to drive dramatic improvements in speed, quality, and profitability:

- The methods and tools of Lean will help drive dramatic improvements in speed and productivity.
- The methods and tools of Six Sigma will help drive radical reductions in defects and deviation that will improve productivity and profitability (Arthur, 2011, p. 28)

Figure3 shows how Lean Six Sigma combines the strengths of each system:

Fig.3. Synergy Effect between Six Sigma and Lean



Source: (Aizad, 2011)

Thus, the LSS combines the principles of speed and immediate action of *Lean* with the vision Six Sigma of quality without defect and reduction of

the impact of the variation in the times of queue. From this, Lean Six Sigma attacks the hidden costs of complexity and is a mechanism that seeks the engagement of all for joint reach and without trade-offs of quality, speed and cost.(de Souza Moura, dos Santos, & de Mattos, 2017, p. 572)

5.2 Why Lean and Six Sigma need each other?

As robust as Lean is for dealing with lead-time and non-value-add costs, there are several critical problems you will not find addressed in the seminal books on Lean. Six Sigma provides robust solutions to these problems, which explains why Lean needs Six Sigma (George M. L., 2003, p. 46)

Just as there are gaps in Lean methodologies that can benefit from Six Sigma, Six Sigma falls short compared to what Lean has to offer. (George M. L., 2003, p. 50)(See table 2)

Table 2. Why Six Sigma and Lean need each other?

Lean needs Six Sigma because:	Six Sigma needs Lean because:
Lean does not explicitly prescribe the project set up and roles needed to achieve and sustain results	It identifies waste. Six Sigma sub-optimises processes (Lean applies a systems approach)
It provides a set of tools to understand problems and sources of variation	It improves process speed/cycle time
Lean does not recognise the impact of variation	It includes methods for rapid action (Kaizen)
Lean is not as strong in the measure and analyse stages of DMAIC	Six Sigma quality is approached faster if lean eliminates non value-added steps

Source: (Bevan, Westwood, Crowe, & O'Connor, 2006, p. 7)

Moreover, Six Sigma and Lean have complementary benefits:

- Six Sigma's project-by-project approach provides an effective embedding framework to apply Lean principles.
- Lean may use the management structures that Six Sigma offers (Van den Heuvel, Does, & De Koning, 2006, p. 381)

6. CONCLUSION

Lean Six Sigma is a powerful methodology to increase the efficiency and effectiveness of a business; it combines the benefits of both Lean management techniques and Six Sigma tools to help companies to improve their processes.

After clarifying the similarities and divergences of Lean and Six Sigma, and comparing the strengths and weaknesses of both, we can present the following results:

- Lean and Six Sigma methods can help maximize customer value by driving rapid improvements in cost and defect reduction, productivity and increased throughput;
- Six Sigma is focused on effectiveness by reducing defects and errors, whereas Lean is focused on efficiency by improving process flow and reducing waste;
- Lean six sigma can be implemented in all types of business: Small or large, service or manufacturing, because every business follows some sort of process to deliver products or services and Lean Six Sigma can dramatically simplify, streamline and optimize them;
- Lean and Six Sigma are highly complementary and both methodologies aim to achieve the same goal: Eliminating waste and creating efficient processes, but they simply take different approaches on how to identify the root cause of waste.
- Lean Six Sigma maximizes shareholder value and achieves the fastest rate of improvement in quality, customer satisfaction, process speed, cost, and invested capital.
- The effective integration of these methodologies will offer to the business a competitive advantage and differentiation by achieving a value stream that provides the highest quality at the lowest possible cost.

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