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A Review of the Impact of Lean Manufacturing on Performance through PARETO Analysis

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Abstract. Nowadays, mastering the Lean Manufacturing tools is becoming a necessity, especially for industrial firms wishing to excel and reach the highest level of industrial performance. There is a growing tendency to conquer the market with the simple tools we have and even with the simple methods. Moreover, through our research study of 41 authors who have clearly discussed the impact of Lean Manufacturing on the different aspects of industrial performance, we demonstrate very specifically the interest in the term of Lean Manufacturing, because the benefits of realization and application will be quite seen, if we apply the right means in the field. Thus, a PARETO analysis is always present in our research article in order to value the research works of previous authors who have demonstrated the impact of Lean Manufacturing on the company's performance and even discussed to what extent the key tools of Lean could play a fundamental role within the company and perfect the method of operation of such an industrial firm by playing on 4 following criteria: Cost, Quality, Lead Time and Service. The goal is clear, to achieve the optimization of these four criteria, because together they form the impacted object which is the company's performance.

Keywords: Lean Manufacturing, Company's performance, PARETO analysis, Impact.

1. Introduction

In today's world, there are a multitude of methods and tools that deserve to be considered and that facilitate the access to total perfection. Some of them are often mastered but others are neglected. We will then know with clarity how much we can improve if we first master our own methods guaranteeing the success and the blooming of the company. But it must be emphasized that reaching today's high level of performance is a major requirement for any company wishing to market its product or service and improve industrially.

On the other hand, the market demand is of a continuous growth day after day, we always wonder what are the good means and tools that allow resisting to the competition of the different firms operating in the same sector. For some, they show a stagnation of satisfaction of the simple tools that they possess in order to remain in the right way of production and commercialization of products or services. For others, there is a real need and necessity to find the right means to compete.

Thus, to develop these tools is an extreme necessity in order to be able to challenge the obstacles of commercialization of their own product or service and to start each year a new phase full of real experiences regarding the deployment of the right tools and methods related to a given case. It is then time to project the light on two notions that have a major importance in the whole industrial entity that are: Lean Manufacturing and the company's performance.

So, no one can deny the major importance of Lean Manufacturing in various fields given its major impact on production and company operations. These two concepts together will be the subject of our study. The objective of this article is to clarify which pillar of performance is most impacted by lean through a review of 41 authors who discussed this point.

2. Literature Review

According to (Aguinis, 2019), *performance management is a continuous process of identifying, measuring, and developing the performance of individuals and teams and aligning their performance with the strategic goals of the organization.*

On the other hand, Lean is a combination of tools and methods that encourage the elimination of all forms of waste (Wilson, 2010). These tools are cited by different authors:

- **FMECA:** Failure Mode Analysis and their effect on criticality, a criticality there hold is defined (Landy, 2007).
- **A3:** The A3 draft is one-page document that reflects the results of the entire process. There are seven key elements to developing a complete A3 draft (Sobek and Smalley, 2008).
- **KANBAN:** KANBAN scheduling is a demand-based scheduling that allows production to be started only to replace products consumed by customers (Gross and McInnis, 2003).
- **The 5s:** This technique of Japanese origin aims at the continuous improvement of the tasks carried out in the company, it includes five phases (Hirano, 2009a).
- **TPM:** The aim is to improve the performance of production resources in a permanent way. Eight pillars represent the leverage of this tool (Bufferne, 2011).
- **PDCA:** The PDCA cycle refers to (Sobek and Smalley, 2008) means the development of a continuous improvement process that follows four sequential steps: Plan, Do, Check and improve.
- **HEIJUNKA:** This means the distribution of the load so as not to exceed the capacity of the work (Thiery, 2012).
- **VSM:** A value stream mapping groups all the essential flows of each product (physical flow, financial flow, information flow) (Mika, 2006).
- **GEMBA WALKS:** "Go see, ask the question why, and show respect" is what the GEMBA WALKS method tries to do according to (Womack and Shook, 2011).

- **Standardized work:** Standardized work specifies both what the leader is expected to do and not to do (Mann, 2005).
- **KAIZEN:** A term of Japanese origin, its goal is to make continuous and progressive improvements to any process or equipment from its conception to its delivery (Mika, 2006).
- **Hoshin Kanri:** A powerful tool typically used in strategic business planning. The implementation of this tool relies on the alignment of resources so that they are adjusted to regularly measure progress towards key objectives (Mika, 2006).
- **Jidoka:** The principle is to encourage operators to press an emergency stop button every time an anomaly is detected (Hirano, 2009b).

A detailed description of the different types of waste is as follows:

Table 1. Descriptions of the different types of waste (Goldratt and Cox, 2014)

Types of waste	Description
The waste of overproduction	Produce more than the customer demand
Loss of time in hand (waiting)	unnecessarily Waiting
Transport waste	Transporting unnecessarily products
The waste from the processing itself	Produce products that do not meet customer requirements
Waste of available stock (inventory)	Have an excess of stock
The waste of displacement	Performing unnecessary movements
Waste related to the manufacture of defective products.	Manufacturing defective products

3. Data and Methods

Our study is based on the collection of different articles containing different keywords united. The keywords inserted in the bibliographic base are: Lean, performance and impact. Any article containing these united keywords is inserted as reference for our study. We then ask what kind or type of performance is potentially impacted the most by lean manufacturing through an in-depth search of 41 articles studied separately.

4. Results

The results of our extensive research allowed us to review 41 authors who discussed the real impact of Lean Manufacturing on different aspects of company performance.

Table 2. List of research articles related to the impact of Lean Manufacturing on Company's Performance

Research/Year	Name of Journal	Title of Article
(Ahmad and al., 2012)	Social and Behavioral Sciences	Relationship of TQM and Business Performance with Mediators of SPC, Lean Production and TPM
(Al-Zu'bi, 2015)	Engineering Management Research	Examining the Impact of Lean Practices on Flexibility Performance: The Moderating Effect of Environmental Dynamism
(Alaa and al., 2018)	Proceedings of the 4th International Conference on Green Design and Manufacture	Impact of sustainable lean manufacturing (LM) on organizational performances

(Abushaikha and al., 2018)	International Journal of Retail & Distribution Management	Improving distribution and business performance through lean warehousing
(Almusawi and al., 2019)	Journal of Engineering and Applied Sciences	Impact of Lean Accounting Information on the Financial performance of the Healthcare Institutions: A Case Study
(Almasarweh, 2020)	Management Science Letters	The applicability of lean manufacturing methods and its impact on the performance of the Jordanian industrial companies listed in ASE
(Antony and al., 2022)	Total Quality Management & Business Excellence	A meta-analytic investigation of lean practices and their impact on organizational performance
(Bonavia and Marin-Garcia, 2011)	International Journal of Manpower	Integrating human resource management into lean production and their impact on organizational performance
(Belekoukias and al., 2014)	International Journal of Production Research	The impact of lean methods and tools on the operational performance of manufacturing organizations
(Buer and al., 2021)	International Journal of Production Research	The complementary effect of lean manufacturing and digitalisation on operational performance
(Chetthamrongchai and Jermsittiparsert, 2019)	Systematic Reviews in Pharmacy	Impact of Lean Manufacturing Practices on Financial Performance of Pharmaceutical Sector in Thailand
(Dey and al., 2019)	British Journal of Management	The impact of lean management practices and sustainable oriented innovation on sustainability performance of small and medium sized enterprises: Empirical evidence from the UK
(De and al., 2020)	International Journal of Production Economics	Impact of Lean and Sustainability Oriented Innovation on Sustainability Performance of Small and Medium Sized Enterprises: A Data Envelopment Analysis-based framework
(Genaidy and Karwowski, 2003)	Human Factors and Ergonomics in Manufacturing	Human performance in lean production environment: Critical assessment and research framework
(Goncalves and al., 2019)	Management and Production Engineering Review	DOES LEAN PRACTICES IMPLEMENTATION IMPACT ON COMPANY PERFORMANCE? A META-ANALYTICAL RESEARCH
(Ghaithan and al., 2021)	Sustainability	Impact of Industry 4.0 and Lean Manufacturing on the Sustainability Performance of Plastic and Petrochemical Organizations in Saudi Arabia
(Huson and Nanda, 1995)	Journal of Operations Management	The impact of just-in-time manufacturing on firm performance in the US

(Hardcopf and al., 2021)	International Journal of Production Economics	Lean production and operational performance: The influence of organizational culture
(Khanchanapong and al., 2014)	International Journal of Production Economics	The unique and complementary effects of manufacturing technologies and lean practices on manufacturing operational performance
(Khalfallah and Lakhal, 2020)	International Journal of Quality & Reliability Management	The impact of lean manufacturing practices on operational and financial performance: the mediating role of agile manufacturing
(Lecturer, Moratuwa and al., 2012)	International Conference on Engineering, Project, and Production Management	Impact of Lean Manufacturing on Performance and Organisational Culture: A Case Study of an Apparel Manufacturer in Sri Lanka
(Lucherini and Rapaccini, 2017)	Journal Of Industrial Engineering and Management	Exploring the impact of Lean manufacturing on flexibility in SMEs
(Mohd Zamri and al., 2013)	International Journal of Innovation and Applied Studies	Green Lean Six Sigma and Financial Performance in Malaysian Automotive Industry
(Moori and al., 2013)	Journal of Operations and Supply Chain Management	Lean Manufacturing and Business Performance in Brazilian Firms
(Mohamed Ismail and al., 2015)	Jurnal Teknologi	Mediating Impact of Manufacturing Technology , Lean and Strategic Flexibility on Manufacturing Performance
(Memari and al., 2022)	Asia Pacific Journal of Business Administration	The impact of lean production on operational performance: a case study
(Nawanir and al., 2013)	Journal of Manufacturing Technology Management	Impact of lean practices on operations performance and business performance: Some evidence from Indonesian manufacturing companies
(Okocha and Wan Daud, 2020)	Journal of Management Theory and Practice	The Impact of Lean Production and Flexible Manufacturing Strategies on Financial Performance of Manufacturing Companies in Nigeria
(Pardamean Gultom and Wibisono, 2019)	Materials Science and Engineering	A framework for the impact of lean six sigma on supply chain performance in manufacturing companies
(Prabowo and Adesta, 2019)	International Journal of Recent Technology and Engineering	A Study of Total Productive Maintenance (TPM) and Lean Manufacturing Tools and Their Impact on Manufacturing Performance
(Shah and al., 2017)	MATEC Web of Conferences	Lean Production Practices to Enhance Organisational Performance
(Shurrab and Hussain, 2018)	Journal of Engineering, Design and Technology	An empirical study of the impact of lean on the performance of the construction industry in UAE
(Saini and Singh, 2020)	International Journal of Lean Six Sigma	Impact of implementing lean practices on firm performance: a study of Northern India SMEs

(Siagian and Tarigan, 2021)	Uncertain Supply Chain Management	The central role of IT capability to improve firm performance through lean production and supply chain practices in the COVID-19 era
(Shebli and al., 2022)	International Conference in Emerging Technologies for Sustainability and Intelligent Systems	Developing A Conceptual Framework for the Implementation of the Lean System and its Impact on Quality of Learning and Organizational Performance
(T. Adesta and Prabowo, 2018)	Materials Science and Engineering	The Evaluation of Lean Manufacturing Implementation and Their Impact to Manufacturing Performance
(Tortorella and al., 2019)	International Journal of Operations & Production Management	Industry 4.0 adoption as a moderator of the impact of lean production practices on operational performance improvement
(Valente and al., 2019)	Journal of Manufacturing Technology Management	Assessment of the Lean effect on business performance: the case of manufacturing SMEs
(Vanichchinchai, 2019)	Sustainability	The Effect of Lean Manufacturing on a Supply Chain Relationship and Performance
(Yang and al., 2011)	International Journal of Production Economics	Impact of lean manufacturing and environmental management on business performance: An empirical study of manufacturing firms
(Yadav and al., 2019)	Industrial Management & Data Systems	The impact of lean practices on the operational performance of SMEs in India

5. Analysis

It is clear from this study of 41 authors who discussed the impact of Lean Manufacturing on different aspects of performance that an implementation of Lean tools leads to remarkable results and improves the performance of such an industrial firm. Nobody can deny the important role of Lean methods within the company. Moreover, an added value is well achieved and one can even improve the performance if one strictly applies the Lean methods.

According to (Ahmad and al., 2012), total Quality Management (TQM) and Total Productive Maintenance (TPM) have both a direct positive impact on business performance. (Al-Zu'bi, 2015) has made it clear that setup time reduction, continuous improvement, synchronization of operations and pull system have a positive impact on flexibility performance. A Research after (Alaa and al., 2018), made in Malaysian industry has shown that the implementation of Lean Manufacturing has a positive impact on organizational performance. According to (Abushaikha and al., 2018), distribution performance & business performance are both clearly positively impacted while implanting Lean Tools. (Almusawi and al., 2019) showed us through a case study the positive impact of Lean on financial performance.

On his part too, (Almasarweh, 2020) has shown the positivity of impact of Lean Manufacturing on operational, financial and environmental performance. (Antony and al., 2022) has demonstrated that 12 different lean practices have positively impacted organizational performance. After (Bonavia and Marin-Garcia, 2011), the integration of human resource management into Lean production can impact positively organizational performance. While using multiple regression analysis, and by implementing Lean Manufacturing, we can affect positively the operational performance (Buer and al., 2021).

(Chetthamrongchai and Jermsittiparsert, 2019) used a questionnaire to test different hypotheses of the study related to the real impact of Lean practices on financial performance. The same author found that a positive impact of Lean is strongly identified by collecting different data from employees of pharmaceutical firms in Thailand.

The sustainability performance of Small and Medium sized enterprises is achieved and improved by implementing Lean in the broadest sense of the term (De and al., 2020). (Valente and al., 2019) discussed the positivity of impact of Lean Manufacturing on Business performance. But other authors have surely spoken about the double impact of Lean, like (Belekoukias and al., 2014), the aspect of performance impacted is the operational performance. (Dey and al., 2019) and (Genaidy and Karwowski, 2003) have successively discussed this double impact of Lean on sustainability performance and human performance. In our analysis of the research results, most authors have discussed the positive impact of Lean on different aspects of performance.

A study of (Goncalves and al., 2019) demonstrated that a positive relationship exists between Lean practices and enterprise performance. Furthermore, Lean is really able to maximise cost reduction, quality and reduce delivery time (Hardcopf and al., 2021). After data collection of 186 manufacturing plants in Thailand, we found that implementing Lean practices improves the four operational performance dimensions which are cost, quality, lead time and flexibility (Khanchanapong and al., 2014).

Lean Manufacturing influences positively Manufacturing performance by a study done in an apparel industry in Sri Lanka (Lecturer, Moratuwa and al., 2012). The same, in Malaysian Automotive Industry, implementing lean improves the whole financial performance (Mohd Zamri and al., 2013). While analyzing data of 68 Brazilian companies, we found that a positive relationship exists between Lean Manufacturing and Business Performance (Moori and al., 2013). A case study of (Memari and al., 2022) also shows the positive impact of Lean production on the small and medium size company's performance. Also a study of (Ghaithan and al., 2021) has well demonstrated a positive impact of Lean Manufacturing on sustainability performance by collecting data from 112 plastic and petrochemical organizations.

Only ten authors discussed the double impact and effect of Lean on overall performance, but a significant number of 31 authors did emphasize the positive impact of Lean on performance. Another example of (Pardamean Gultom and Wibisono, 2019) who has demonstrated a double impact of Lean Manufacturing on Supply Chain Performance. No research among the 41 authors showed only the negative impact of Lean on performance. We have grouped all the results found in a table of authors, the field of activity and the type of performance impacted.

Table 3. The different Lean impact Areas

Research/Year	Field of Activity	Pillar of Performance Impacted
(Ahmad and al., 2012)	Different Areas	Business Performance
(Al-Zu'bi, 2015)	Different Areas	Flexibility Performance
(Alaa and al., 2018)	Different Areas	Organizational Performance
(Abushaikha and al., 2018)	Different Areas	Distribution Performance & Business Performance
(Almusawi and al., 2019)	Healthcare Institution	Financial Performance
(Almasarweh, 2020)	Different Areas	Operational, Financial Environmental Performance

(Antony and al., 2022)	Different Areas	Organizational Performance
(Bonavia and Marin-Garcia, 2011)	Different Areas	Organizational Performance
(Belekoukias and al., 2014)	Different Areas	Operational Performance
(Buer and al., 2021)	Different Areas	Operational Performance
(Chetthamrongchai and Jermsittiparsert, 2019)	Pharmaceutical Sector	Financial Performance
(Dey and al., 2019)	Different Areas	Sustainability performance
(De and al., 2020)	Different Areas	Sustainability Performance
(Genaidy and Karwowski, 2003)	Different Areas	Human Performance
(Goncalves and al., 2019)	Different Areas	Firm Performance
(Ghaithan and al., 2021)	Plastic and Petrochemical Organizations	Sustainability Performance
(Huson and Nanda, 1995)	Different Areas	Firm Performance
(Hardcopf and al., 2021)	Different Areas	Operational Performance
(Khanchanapong and al., 2014)	Different Areas	Operational Performance
(Khalfallah and Lakhal, 2020)	Different Areas	Operational and Financial Performance
(Lecturer, Moratuwa and al., 2012)	Apparel Manufacturer	Firm Performance
(Lucherini and Rapaccini, 2017)	Not Specified	Flexibility Performance
(Mohd Zamri and al., 2013)	Automotive Industry	Financial Performance
(Moori and al., 2013)	Different Areas	Business Performance
(Mohamed Ismail and al., 2015)	Different Areas	Manufacturing Performance
(Memari and al., 2022)	A Stationery Manufacturer	Operational Performance
(Nawanir and al., 2013)	Different Areas	Operations performance & Business performance
(Okocha and Wan Daud, 2020)	Different Areas	Financial Performance
(Pardamean Gultom and Wibisono, 2019)	Different Areas	Supply Chain Performance
(Prabowo and Adesta, 2019)	Different Areas	Manufacturing Performance
(Shah and al., 2017)	Different Areas	Organizational Performance
(Shurrab and Hussain, 2018)	the construction Sector	Business Performance
(Saini and Singh, 2020)	Different Areas	Firm Performance
(Siagian and Tarigan, 2021)	Different Areas	Firm Performance

(Shebli and al., 2022)	University System	Organizational Performance
(T. Adesta and Prabowo, 2018)	Different Areas	Manufacturing Performance
(Tortorella and al., 2019)	Different Areas	Operational Performance
(Valente and al., 2019)	Different Areas	Business Performance
(Vanichchinchai, 2019)	Different Areas	Supply Chain Performance
(Yang and al., 2011)	Different Areas	Business Performance
(Yadav and al., 2019)	Different Areas	Operational Performance

Table 4. List of the Lean Impact Section (80 percent)

No	Impact Section	Frequency	% Frequency	Cumulative	% Cumulative
1	Operational Performance	9	19.56 %	9	19.56 %
2	Business Performance	7	15.22 %	16	34.78 %
3	Financial Performance	6	13.04 %	22	47.82 %
4	Organisational Performance	5	10.86 %	27	58.68 %
5	Firm Performance	5	10.86 %	32	69.54 %
6	Manufacturing Performance	3	6.52 %	35	76.06 %
7	Sustainability Performance	3	6.52 %	38	**82.58 %**

Our study was based on a review of 41 authors who discussed the true impact of Lean on performance in all its aspects. We concluded as follows: An operational performance was most impacted by implementing Lean tools according to 9 authors having discussed this point, with a cumulative frequency of 19.56%, this figure then clearly reflects the importance of this impact aspect of Lean Manufacturing. A number of 7 authors have well discussed as well as business performance was clearly impacted when implementing Lean tools with a cumulative frequency of 34.78% and followed by six authors having discussed the impact of Lean on financial performance and five having discussed the impact of Lean on organisational performance with a cumulative frequency of 58.68%. Thus, a number of 5 authors with a cumulative value of 69.54% discussed the impact of Lean Manufacturing on firm performance, 3 authors on Manufacturing performance with a cumulative frequency of 76,06% and 3 authors with a cumulative value of 82.58% showed the real impact of Lean Manufacturing on sustainability performance. At the same time, only two authors shed light on the impact of Lean on supply chain performance with a cumulative frequency of 4,35%, and similarly on flexibility performance with a cumulative value of 8,7% and only 1 author discussed the impact of Lean on operations performance, similarly on distribution, environmental and human performance with a

final cumulative value of 17.42 %. To conclude, it is well known that a major importance of implementing Lean Manufacturing and successively impacting operational, business and financial performance has been clearly underlined.

Table 5. List of the Lean Impact Section (20 percent)

No	Impact Section	Frequency	% Frequency	Cumulative	% Cumulative
1	Supply Chain Performance	2	4.35 %	2	4.35 %
2	Flexibility Performance	2	4.35 %	4	8.7 %
3	Operations performance	1	2.18 %	5	10.88 %
4	Distribution Performance	1	2.18 %	6	13.06 %
5	Environmental Performance	1	2.18 %	7	15.24 %
6	Human Performance	1	2.18 %	8	**17.42 %**

Below is the Pareto chart showing all the performance aspects impacted when implementing Lean Manufacturing. We can clearly visualize the importance of implementing Lean on the 3 aspects of performance: Operational, business and financial performance with a cumulative frequency of 47.82%.

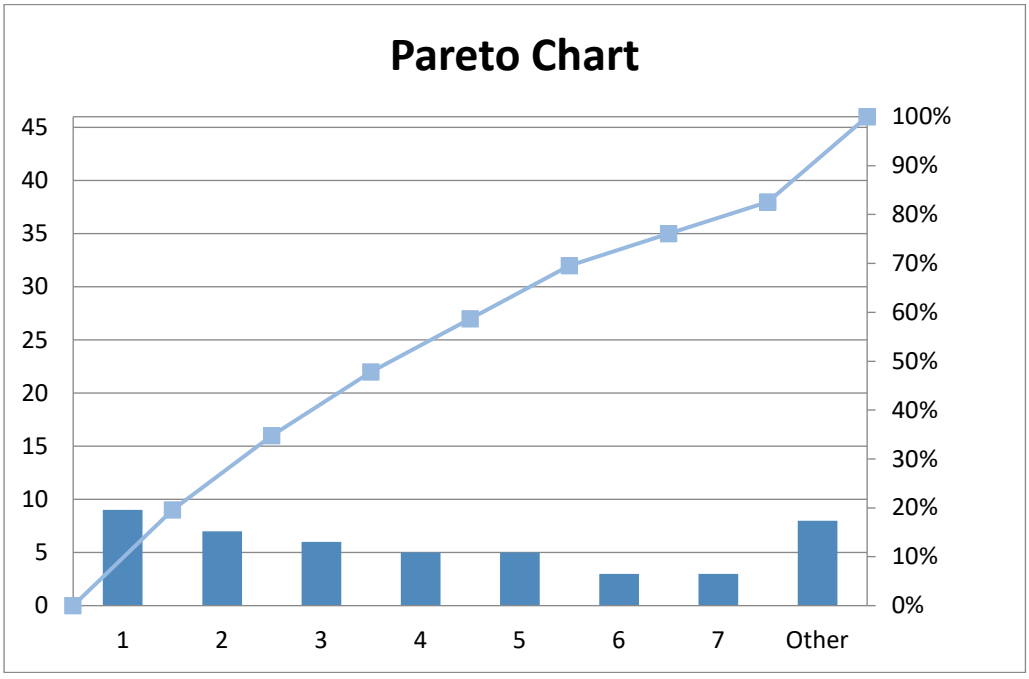

Fig.1: Pareto Chart of the Lean Impact Section

6. Conclusion

To conclude, we started with a global presentation of the different authors who discussed the nature of the impact of Lean Manufacturing on any form of Industrial performance. For more details, we have classified each author's research according to the type of performance impacted. The goal is to detail the importance of the term Lean Manufacturing on the Industrial performance of the company. Of course, the nature of the impact of Lean Manufacturing on any type of performance is not the same. Therefore, in order to know better the degree of importance of the impact of Lean Manufacturing on a particular aspect of performance, we had to make a particular classification scheme and PARETO chart seems to be the most adequate way for this subject.

Well, the expected results showed that 3 aspects of performance are of major importance with a cumulative value of 47.82 % if we want to implement the Lean Manufacturing methods and make a good implementation process. The PARETO chart or the law of 20/80 has well demonstrated and specified the major importance of seven performance aspects with a cumulative value of 82.58 % and strongly targeted during a particular intention to implement the Lean Manufacturing method. The importance of Lean within a particular industrial firm is always clear; one cannot even deny the positive impact of the term Lean Manufacturing on different aspects of performance. The various researches have shown the benefits of Lean Manufacturing and the goodness itself detailed.

These benefits even differ from the aspect of performance impacted. Certainly, we are sometimes faced with a case where the implementation of Lean Manufacturing has a double impact on a particular aspect of performance. The importance of the term Lean Manufacturing is always emphasized and the right means and tools are always desired to lead to production perfection and this remains the key objective of every company wishing to improve and differentiate itself in a general way. There are many questions on the horizon. One always wonders if a strict implementation of Lean will allow us to achieve added value within such an industrial firm in any case whatever the type or nature of the performance impacted. Because, according to some authors' researches, we find with clarity the negativity of implementing Lean Manufacturing and that is clearly seen in parallel with the positivity of Lean impact. Therefore, we often realize that those signs of negativity of Lean implementation must be emphasized. According to the authors' researches understanding the dual impact of Lean Manufacturing on any aspect of performance. Although the negative impact of Lean is really clear, the benefits of Lean, its major importance and its role leading to production perfection by improving the performance level of such an industrial firm operating in such a given sector can still not be overlooked. The overall interpretation of the values and data is always left to future researchers.

7. Discussion

We are interested in our research made by 31 authors conducting different studies on a number of companies operating in different sectors that a positive impact of Lean has been noticed on the different aspects of performance. At the same time, a defined number of authors have underlined the double impact of Lean on different aspects of performance. We realize then that we are indeed facing a question that is related to this subject: Does a rigorous application of Lean methods always lead us to the desired results and allow us to excel industrially and to reach the high performance level? Given the negative impact of Lean according to some authors discussing the real impact. We can consider that the implementation of Lean has certain harm on the global performance of the company and therefore we can implement Lean and expect harmful effects of implementation. Lean Manufacturing implemented at the beginning does not always have these desired results. One always wonders what the main purpose of implementing Lean tools is, if one always detects some negative impact on the company's performance. It is clear then, through this study of authors that an absolute necessity granted to Lean is well subject of interest. There is always a desire to discuss the limit of importance of Lean and the point at which one should withdraw and carry out other actions to improve performance other than Lean. It is thus always clear that others tools and methods can push the overall performance of such an industrial

firm towards perfection. It is also important to realize that a desired result is not always achieved.

It is always possible for future researchers to interpret and discuss all data and values. Moving on to our discussion of all the results interpreted by PARETO chart and which lead us to conclude seven performance aspects that are of great interest and impact when implementing Lean tools and methods. These seven aspects of performance are as follows: The operational performance in the first place, this subject of interest and impact which is in first position and which arouses the interest of research for an important number of authors seeking during the implementation of Lean to detect to which point the operational performance of such an industrial firm is really impacted during the implementation of Lean Manufacturing. Operational performance aims in the short term to optimize the four major criteria: cost, quality, lead time and service.

The other six aspects of performance are successively as follows: Business performance, financial performance, organisational performance, firm performance, manufacturing performance and sustainability performance. These seven aspects of performance are of major importance when implementing Lean. We resist the cruelty of the market competition with the simple tools and means we have, but a strict and rigorous implementation of these tools can lead to well appreciated results. As we can always find ourselves in a position where the impact of these tools is not fully appreciated. Of course, the causes are different. One can even find oneself in a position of ambiguity for such an implementation decision in very particular cases. But nothing tells us that an implementation well mastered at the beginning cannot lead us to the objective set at the beginning.

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