The CYRUS Global Business Perspectives (CGBP), Volume V9, p71-93:2025
DOI: https://doi.org/10.52212/CGBP2025-V9i1m5 **ISSN:** 2573-5691

The Role of Stakeholders in the Success of Lean Manufacturing Consulting Projects for Productivity Improvement

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ABSTRACT
This case study investigates the crucial role of stakeholder management in the success of Lean Manufacturing projects, focusing on a metal-mechanic company that sought to optimize its operational efficiency and increase productivity through a consulting program. Given the existing gap in the literature regarding the influence of stakeholder engagement on the outcomes of Lean projects, this study seeks to answer the following question: How do stakeholder engagement and management influence the results of Lean Manufacturing consulting projects for metal-mechanic industries? The research employed a qualitative methodology, analysing the implementation of Lean practices and the engagement of stakeholders in all phases of the project. The main results demonstrate that the active involvement of stakeholders, through workshops and Lean tools, was fundamental to achieving a 49.8% increase in productivity and a 51.3% reduction in movement. The study concludes that effective stakeholder management and the promotion of a culture of continuous improvement are essential for the success of Lean Manufacturing projects, highlighting the importance of aligning project objectives with the needs and expectations of stakeholders.

Keywords: Stakeholders, Lean Manufacturing, Project Management, Successful Projects, Project Strategy

INTRODUCTION
The metal-mechanic sector faces constant challenges to optimize operational efficiency and increase productivity. In this context, the Lean Manufacturing philosophy has proven to be an effective approach to eliminate waste and improve performance. However, the success of Lean projects depends not only on tools and techniques but also on the effective engagement and management of stakeholders.

The existing literature highlights the benefits of Lean Manufacturing in various sectors, as well as the importance of employee involvement in implementing Lean practices. However, there is a gap in understanding how stakeholder engagement and management in all project phases affects the results, especially in consulting projects.

[1] Corresponding author email address: renanalmeida@uni9.edu.br. We, authors of the current research paper, certify that the paper is an outcome of our independent and original work. We have duly acknowledged all the sources from which the ideas and extracts have been taken and we are responsible for any errors that may be discovered.

This study seeks to fill this gap, investigating the role of stakeholders in the success of Lean Manufacturing consulting projects in metal-mechanic companies. The results of this study will be relevant to managers, consultants, and researchers interested in optimizing the implementation of Lean projects and increasing productivity. By understanding the influence of stakeholder engagement and management on the results of Lean projects, it will be possible to develop more effective strategies to ensure the success of these initiatives.

This study aims to analyse how stakeholder engagement and management influence the results of consulting projects in Lean Manufacturing for industries in the metal-mechanic sector. To address this aim, this study seeks to answer the following question: How do stakeholder engagement and management influence the results of Lean Manufacturing consulting projects for metal-mechanic industries?

THEORETICAL BACKGROUND

The concept of projects is continuously revised over time, aiming to refine and standardize the understanding of organizations that work with this approach (Carvalho & Rabechini Jr., 2018). According to the PMBOK (PMI, 2021), a project is defined as a temporary endeavour undertaken to create a unique product, service, or result. To achieve these objectives, project management procedures are required, which refer to the planning, organizing, directing, and controlling of organizational resources to meet short-term goals, established to complete specific objectives (Kerzner, 2003).

Within project management, we have stakeholder management. Freeman (1984) defines stakeholders as organizations or individuals who can affect or be affected by the achievement of a project's objectives, encompassing a wide range of actors and recognizing the legitimacy of stakeholders such as clients, suppliers, employees, regulatory authorities, local communities, and unions. The stakeholder management process begins with identifying all stakeholders and analysing their attributes, such as interests, needs, expectations, fears, desires, power, proximity, urgency, coalitions, influence, and support levels, all of which will impact the project outcomes in some way. It also involves developing effective strategies to engage them in the decision-making and execution of the project (Rabechini Jr. et al., 2022).

Aaltonen and Kujala (2016) argue that stakeholder management is a crucial process in project management, particularly in the importance of analysing the stakeholder landscape to understand their influences and develop effective engagement strategies. This means identifying and mapping stakeholders, analysing their interests, evaluating their power and influence, and understanding the dynamics and uncertainties of the environment in which the project is embedded. Rabechini Jr. et al. (2022) highlight that relational factors in stakeholder management are, for the most part, more relevant than prescriptive factors, that is, those that bring benefits to stakeholders. This conclusion was drawn from an analysis where 8 of the top 10 factors influencing project outcomes were

relational, and only 2 were prescriptive, thus emphasizing the relevance of relationships in stakeholder management relative to project results.
Furthermore, regarding the importance of stakeholders and their impacts on the success of the project, several reasons can be cited: the project relies on contributions from stakeholders (both financial and non-financial); it is often the stakeholders who set the criteria for evaluating project success; resistance from stakeholders to changes or project outcomes may generate risks, negatively affecting the project's success; and as a premise, the project can affect stakeholders in both positive and negative ways, meaning that stakeholders become interested in the consequences generated by the project when it impacts their domains (Eskerod & Larsen, 2018).

Supporting the importance of the theme, Eskerod et al. (2015) state that the origins of stakeholder management in projects trace back to strategic management theories, particularly the work of R. Edward Freeman. There can be a strong link between effective stakeholder management and project success. The study argues that strategic stakeholder engagement, based on a comprehensive analysis of their needs, expectations, and power, is crucial for ensuring project performance. The ability to manage relationships with stakeholders, identify and mitigate potential conflicts, and foster a collaborative environment significantly contributes to achieving the project's goals and meeting stakeholders' expectations (Aaltonen & Kujala, 2016).

For Womack, Jones, and Roos (1990), Lean Manufacturing is applicable in all companies, regardless of their size. However, introducing Lean in Small and Medium Enterprises (SMEs) presents significant challenges. As noted by Achanga, Shehab, Roy, and Nelder (2006), SMEs, compared to larger organizations, have limited resources, and in many cases, leadership does not have the long-term commitment necessary for Lean implementation. Therefore, these companies require that the costs of implementation and the subsequent benefits of adopting lean manufacturing be carefully designed beforehand, which poses a significant challenge.

Thus, in the face of these challenges, the importance of "people systems" as a critical factor for success in a Lean implementation project is highlighted. Although Lean tools and methods are valuable, success depends on how they are implemented. In other words, success lies in the selection of the appropriate people system, role and responsibility definitions, and proper training, which should be considered in such situations (AlManei, Salonitis, & Xu, 2017). Additionally, Eskerod et al. (2015) emphasize the importance of recognizing the duality in stakeholder management: the instrumental approach, focused on obtaining resources, and the normative approach, which prioritizes the rights and benefits of all stakeholders.

METODOLOGY

The case study method was chosen, which, according to Yin (2001), is an empirical research approach used to study a contemporary phenomenon when the boundaries between the phenomenon and its context are not clearly defined. Gil (2008) further adds that this is an

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exhaustive and in-depth study of one or a few objects, allowing for a comprehensive and detailed understanding of the subject. Additionally, Martins (2008) explains that it is research into phenomena within their real context, where the researcher has no control over events or variables, aiming to learn about the entirety of the situation and creatively describe, understand, and interpret the complexity of the case.

This paper was constructed based on the data collection and improvement implementation strategies outlined by the Federal Government's Program. The company, a manufacturer of machines, equipment, parts, and accessories, faced issues with delivery delays and a lack of knowledge regarding tools. The problem revolved around the effort to achieve a 20% productivity gain in the analysed operations, within the established phases and an 8-month monitoring period. As recommended by Eskerod et al. (2015), the present research adopts a qualitative approach to stakeholder analysis, using interviews, observations, and document analysis to build a deep understanding of the relationships between the project and its stakeholders.

INFORMATION FROM THE CASE STUDY

Company Information

The organization of this case study is an industrial company in the metal-mechanic sector, specializing in the manufacture of machines, equipment, parts, and accessories. The company was founded in 1953 in the metropolitan region of São Paulo and specialized in the production of CNC grinders, gaining national and international prominence in the field, until becoming part of an important German-origin group in mid-2015.

Currently, the company operates by supplying machines, equipment, parts, and accessories to major clients, particularly in the automotive sector. Its products stand out for their customization, meeting the specific needs of its customers. Thus, the company’s operating model is Engineer to Order (ETO). The company is part of a sector that generated over 65.8 billion dollars in net revenue in 2023, including more than 12 billion dollars in exports. The sector employed 394,000 people in 8,654 registered companies, with over BRL15 Billion in investments, according to data from the Brazilian Machinery and Equipment Industry Association (ABIMAQ, 2023).

Project Information

The project analysed and the subject of this study is part of a program created by the Federal Government, aimed at developing the Brazilian automotive sector by reducing the import tax on automotive parts not produced in the country. In return, companies contribute 2% of the imported value to projects within a consulting program by an educational and technological institution, which promotes industrial and technological development across the entire supply chain.

The category of the program in which the company participated is the Productivity category, which includes solutions to boost the productivity of the automotive sector by more than 20%, through Lean Manufacturing consulting services. The consulting lasts a maximum of 8 months, and the

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cost of the consultants' hourly rate is fully subsidized by the program, with no direct costs to be borne by the company.

To be eligible, the company had to undergo several stages, as the program, due to its subsidies, has entry requirements and project prioritization criteria for approval. The first stage the company underwent is called the Maturity Assessment. The assessment is conducted via a self-instructional and free questionnaire, aimed at measuring the company's level of maturity regarding the implementation of Industry 4.0 concepts and technologies. The diagnosis generates a technological evolution plan. Furthermore, it is based on a model developed by the German Academy of Science and Engineering (Acatech) and follows the maturity levels represented by the model in Figure 1.

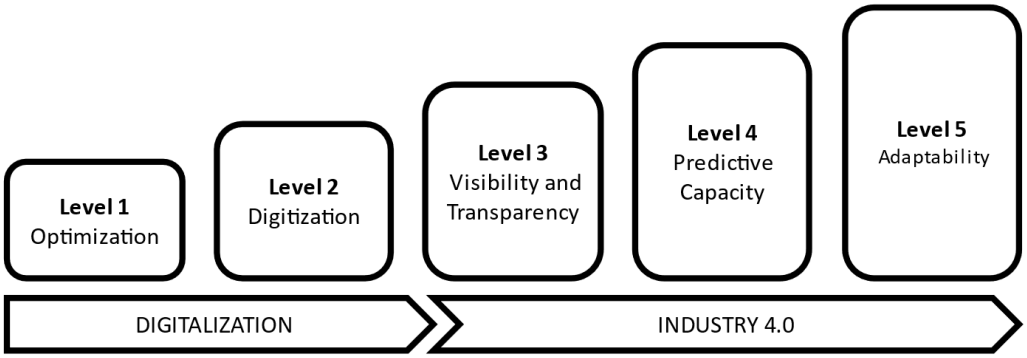

Figure 1. Maturity levels for industry 4.0.

The steps to apply for a position in the program, which are limited, involved writing a technical project proposal that contained a roadmap for consulting services, including: Objectives; Main problems encountered; Justification for the consulting services; Type of consulting to be executed and its stages; Deadline and execution method; and Physical timeline. Thus, it was possible to submit the proposal, which was then evaluated by the program organizers.

The company under study went through all these stages and was selected for the program to receive Lean Manufacturing consulting services, aiming for a minimum productivity gain of 20%, with a total of 600 man-hours, and a maximum execution time of 8 months. The consulting followed some pre-established performance indicators, which were: Productivity, Movement, and Quality.

Thus, the project analysed in this study brings the context mentioned above, where the project originates from an incentive program within a specific supply chain, executed by external agents to the company, with resources, methodology, goals, and indicators previously set by the incentive program. The project also underwent an initial evaluation and analysis process before it even started.

The intervention conducted in the project analysed in this study used a methodology divided into 5 phases: Preparation; Planning; Execution; Monitoring; and Closure. By gather project-related information, it was possible to build Table 1, which presents the Project Phases, Tools, and Stakeholder Engagement through a structured overview of the Lean Manufacturing consultancy

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process, detailing the main objectives of each phase, along with the methods and strategies used to actively involve stakeholders.

Table 1. Comprehensive Matrix of Project Phases, Tools, and Stakeholder Engagement.

Phase	Main Objective	Tools and Methods	Involved Stakeholders	Engagement Strategies
Preparation	Define the project scope, align expectations, and create a shared vision.	Alignment meeting to identify "pain points"; Kick-off with Lean Manufacturing workshop, PMC, and SWOT.	Sponsors, managers, team leaders.	Conversations to identify pain points; interactive activities with sticky notes and physical boards for collective idea visualization; use of Project Model Canvas and SWOT to integrate perspectives.
Planning	Diagnose problems, structure solutions, and prioritize actions.	Genba Walk, SIPOC, Value Stream Mapping, Pareto, MASP, 5W2H.	Department leaders, operators, managers.	Active participation in process mapping; interviews for bottleneck analysis, using sticky notes and physical boards to build workflows and sequences; Pareto analysis to prioritize the highest-impact causes.
Execution	Implement improvements and test solutions based on the action plan.	Gantt Chart, 5S, layout optimization, reapplication of Value Stream Mapping for future state projection.	Operators, supervisors, Lean consultants.	Training workshops; collaborative interventions with simulations and layout adjustments, using physical diagrams to validate changes; active operator participation in continuous process improvement identification.
Monitoring	Track action plan progress, analyze results, and adjust strategies as needed.	Action plan follow-up, KPI analysis, review meetings, and ongoing replanning.	Managers, sponsors, area leaders.	Continuous feedback; review sessions with physical boards to visualize progress and prioritize corrective actions; Gantt chart to align deadlines and sequences.

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Closure	Consolidate learnings, formalize results, and celebrate achievements.	Final report preparation, closing event, results presentation, and final performance analysis.	Entire team (operators, supervisors, managers, sponsors).	Celebration event with visual before/after results display, reinforcing progress perception and recognizing individual and collective contributions; documentation of lessons learned for future reference and continuous improvement.

The table summarizes the project phases in relation to the actions of the Lean Manufacturing consultancy and stakeholder engagement initiatives. From the preparation phase, with alignment meetings and interactive workshops, to the execution of Lean tool-driven interventions aimed at reducing waste and increasing productivity. To achieve this, consultants relied on active stakeholder participation to drive the progress of actions. The constructed matrix reveals how different groups (sponsors, managers, leaders, and operators) were engaged through collaborative activities throughout process mapping, bottleneck analysis, and continuous review based on performance indicators. This integrated approach allowed the project to adapt quickly to the organization's needs, culminating in a closure phase marked by the celebration of achievements and the documentation of lessons learned.

Project Results

At the end of the consultancy, after 8 months and approximately 600 hours of work by the expert consultants, the results were satisfactory and can be divided into two types: tangible and intangible. The results were evaluated from both an academic and professional perspective.

The tangible results, or measurable outcomes, were shared through performance indicators, particularly in relation to the productivity indicator (increase). In the initial measurements, for the product family analysed, the product processing time (lead time) was 53 weeks from the order to delivery to the customer. After the intervention actions, this time was reduced to 40 weeks. Additionally, the consultancy showed a return on investment within 20 weeks from the results obtained. Table 2 illustrates the performance indicators of the work developed.

Table 2. Performance indicators

DOI: *https://doi.org/10.52212/CGBP2025-V9i1m5* **ISSN:** 2573-5691

Indicator	Initial Measurement	Target (20%)	Final Measurement	Result
Productivity (product/man/hour)	0,000006	0,0000072	0,000010	49,8%
Movement (meters)	353	282	172	51,3%
Quality: Rework/Scrap	Not measured	-	Not measured	Unchanged

The movement indicator, measured in meters, with the goal of reduction, also demonstrated satisfactory performance. It is important to emphasize that the planned actions were implemented in 90% of their totality by the end of the consultancy, generating these results. Regarding the Quality indicator, it was not addressed in this consultancy, as the scope was not directed towards this type of analysis and focus.

Since the Productivity indicator was the main objective to be achieved with the project, the SMART goals established at the beginning of the project were focused on this aspect. Therefore, the project's Preparation and Planning stages employed process mapping techniques to understand the current state of the process, identify bottlenecks and waste, and then develop action plans for optimization. A key point in these actions was the mapping process, where the involvement of key people in the processes, in the development of the SIPOC, Flowchart, Value Stream Mapping (VSM) of the process, and Gantt chart, was crucial, as they had information that the consulting experts would not have access to without the participation and engagement of the company's team.

The importance of this mapping lies in its ability to highlight the main problems or opportunities for improvement within the processes, so that interventions can be made to drive improvements. Proper and timely identification of a problem is the first step toward its resolution; conversely, incorrect or delayed identification can lead to severe implications. The Lean philosophy is primarily characterized by continuous efforts to improve the value stream, eliminating waste according to customer requirements through active engagement of people, standardization, and process transparency. This facilitates the rapid identification of improvement opportunities and, consequently, promotes problem-solving activities (Tortorella et al., 2023).

The problems highlighted in the mapping included issues related to inventory, rework, and delays. It is important to note that the company experienced frequent delivery delays and did not recognize this as a problem. Due to their familiarity with and regular exposure to this issue, the problem

became part of the routine. The approach used to resolve the problems was A3 management, which provides leaders with a step-by-step problem-solving process, guided by the Plan-Do-Check-Act (PDCA) cycle, utilizing MASP tools. A3 management teaches, above all, to "go and see" at the genba to understand the real nature of a problem, how to analyse it, and how to take effective actions to develop countermeasures and improve the situation (Tortorella et al., 2023).

Thus, in order to find solutions to the problems encountered, the consulting experts guided the company's team in the use of the tools through this approach. Educational workshops were conducted, and knowledge was provided as an essential resource so that the company's own team could find the solutions. Huo & Boxall (2018) discussed the effects of problem-solving demands in a Chinese manufacturer undergoing the Lean approach, and the importance of providing resources such as training, along with leadership participation in decision-making and employee engagement in problem-solving.

The causes of the problems pointed to failures in communication, lack of organization, and improper sequencing of activities, as well as the lack of integration between departments, the absence of prioritization in the delivery between departments, and a high amount of rework caused by outdated technical drawings and projects. As a result, the teams identified several solutions, with the primary one being the adoption of the Gantt chart to track the progress of production and assembly of each machine. This made delivery management more visual, simplifying the detection of delays in intermediate deliveries.

Regarding the intangible gains, it is worth emphasizing the cultural changes promoted by the consultancy within the organization. In other words, the consultancy was able to foster a shift in the way people who participated throughout the process think and act. These individuals became aware that there are opportunities for improvement in their daily activities, and such improvements are achievable if analysed and implemented with organized actions, using project management, for example.

One action implemented by the company, regardless of the action plan created during the planning stage, indicates that this was a result of the improvement process. In other words, the involved departments realized the need for improvement in communication and implemented methods to track activities through brief status meetings and alignments. Another significant moment came during the closing stage, when the engineering department manager shared the following remark about the work:

"Seven years ago, when I joined the company, my mission as a contractor was to implement the actions that were carried out during the consultancy, especially the Gantt chart. However, seven years later, I still hadn't achieved this, and within eight months of the consultancy, it became possible. This was certainly only achievable due to the involvement of the people."

Engineering Manager of the company.

The statement from the engineering manager shows that high-level members of the company recognized the value of the actions implemented, which suggests that the culture of continuous improvement should continue. As Salonitis and Tsinopoulos (2016) reported in their literature review on the main barriers organizations face when implementing or applying Lean Manufacturing approaches, the primary barriers, in order of importance, are workforce-related issues, such as lack of solid knowledge and commitment to the interventions. Secondly, as the Lean approach progresses, the lack of commitment from top management and the lack of resources can act as barriers to the continuity and success of the philosophy.

AlManei, Salonitis, and Xu (2017) reported that top management can either be a barrier or a driver of the Lean journey, depending on their involvement throughout the approach. In any case, Lean Manufacturing in an organization is primarily characterized by continuous efforts to improve the value stream, eliminating waste according to customer requirements through active engagement of people (Spear & Bowen, 1999; Womack & Jones, Lean Thinking: Banish Waste and Create Wealth in Your Corporation, 1996).

The engagement and commitment of the operators on the shop floor, as well as their participation, are critical for the successful implementation of such programs, as they possess the most comprehensive knowledge of the activities and tasks to be performed. This engagement can be enhanced by inviting them to take an active role in decision-making for the initiation of such projects (Salonitis & Tsinopoulos, 2016).

Thus, the change in culture and behaviour of the people involved in the project aimed to address the different hierarchical levels from the outset, involving management, leadership, and operators. All were participants in the project stages, which included preparation, planning, and decision-making. Additionally, care was taken to provide a theoretical foundation to those involved through educational workshops. Therefore, such actions may be linked to the success of the project, especially regarding intangible results, which involve cultural and behavioural changes, as observed in the statement of an assembly line operator:

"The culture became so strong in me that I'm implementing 5S at my house."
Assembly Line Operator.

It was noted in the literature by Salonitis and Tsinopoulos (2016) that in many companies, Lean project approaches were based on a subject-matter expert. However, they also emphasize that this cannot rely solely on one person, as it is necessary to involve individuals from within the company to spread the knowledge throughout the organization. Relying solely on an external expert can be problematic, as they are not necessarily aware of the unique differences and characteristics that the

company exhibits. Furthermore, to successfully implement Lean tools, they must be adapted to the company's philosophy and culture.

In this regard, Hilbert (1998) suggested a two-phase Lean approach model, which focuses more on social, cultural, and educational aspects, rather than just the use of tools and their operational components. According to Deal and Kennedy (1988), culture is the most important factor responsible for the success or failure of organizations. In addition, the study by Salonitis and Tsinopoulos (2016), which interviewed three Lean experts with over 20 years of experience in the UK and Greece, based on the "5 Whys" approach to identify the root causes of challenges surrounding Lean implementation in companies, converged on the same key issue: the fundamental reason why implementing Lean is so challenging is related to the company's culture.

DISCUSSION

The results can be analyzed from both a professional (empirical) and academic perspective. From a professional perspective, the results were satisfactory as they achieved the perceived value by the company, delivering tangible and intangible results that improved business operations. From an academic perspective, the recent concept was adopted, which considers that traditional criteria of the triple constraint for project success (Iron Triangle: schedule, budget, and quality requirements) are incomplete factors in determining project success. Therefore, in addition to these factors, projects must align with the strategic objectives of organizations and deliver the desired benefits defined by stakeholders (Grander, Dal Vesco, & Ribeiro, 2019; Musawir, Serra, Zwikael, Ali, & I., 2017).

Thus, the process of building the success of this project, from the perspective established above, began in the front end of the project, which refers to the initial stages of a project and is considered one of the key points where the strategic success or failure of the project is defined. Certain developments need to occur before the actual project begins; therefore, these take place in the front end (Williams, Vo, Samset, & Edkins, 2019). For the project studied, the front end was marked by the opportunity diagnosis carried out before the submission of the project in the consulting financing program, as well as the pre-kickoff and kickoff meetings held after the project was approved by the funder, prior to the commencement of work.

Another important stage in the front end of the project is goal setting. Goals can be viewed from two perspectives. The first relates to the success of the project, meaning it refers to the efficient completion of the project (respecting time, budget, quality, etc.). The other perspective focuses on benefits, which are more strategic and long-term goals. These strategic goals describe the purpose of the project in terms of improving organizational performance in some way after the project's completion. These strategic goals are also referred to in project management literature as target benefits, defined as project goals that contribute to the long-term improvement of organizational performance after the project's completion (Williams, Vo, Samset, & Edkins, 2019; Young & Poon, 2013; Zwikael, Chih, & Meredith, 2018).

In the project analyzed in this case study, the goals were defined in the front end. During the pre-kickoff phase, the direction the project would take was defined, with the goals serving as the main drivers, in collaboration with the project sponsor. According to Sapountzis, Harris, and Kagioglou (2008), a common characteristic of many unsuccessful projects is indistinct project goals. Thus, goals that are well aligned with the strategy can support an effective project management process where the key stakeholders understand and aim to achieve the same shared objectives (Doherty, Ashurst, & Peppard, 2012). The project goals include short-term goals (such as delivering the project output on time and within budget) and long-term strategic benefits that increase organizational value. Examples of project benefits include "greater customer engagement" and "reduction of operational costs" (Zwikael & Meredith, 2019).

In this sense, the kickoff phase of the studied project played a significant role in defining the goals. As the goal-setting theory suggests, goals should be "SMART": Specific, Measurable, Achievable, Relevant, and Time-bound (Doran, 1981). Zwikael, Chih, and Meredith (2018) draw a connection between the SMART model and the context of project benefit management, suggesting that the effective benefits of the goal should be composed of three dimensions: specificity (the goal's benefits are measurable and have target values to be achieved), feasibility (the organization has the capacity to achieve the goal's benefits), and scope (the goal's benefits reflect the views of the key stakeholders). Thus, we can observe that an important part of the project's front-end stage is the interaction with the key stakeholders to understand the problem or opportunity that triggers the project, as well as to define its strategic goals.

This approach was followed in the analyzed project, both in the pre-kickoff and kickoff stages. The kickoff stage was a fundamental step for interacting with stakeholders and defining strategic SMART goals, as mentioned earlier. The tools used included the PMC, which defines the SMART goal in its application. At this moment, there was also a dynamic led by the project team in constructing the PMC, which promoted stakeholder engagement right at the front end and the sharing of goals, as discussed by Doherty, Ashurst, and Peppard (2012). Additionally, the dynamic was conducted with two groups made up of two different audiences from the project teams, and then the PMCs were compared, confirming that the visions were aligned between the teams, even though the dynamics were conducted at different times. This demonstrates that the goals were well defined and that there was a shared understanding between the teams.

Furthermore, regarding the kickoff stage of the studied project and its relationship to the construction of project success at the front end, we can mention the use of the SWOT analysis, which can be related to the proposition by Zwikael, Chih, and Meredith (2018) connecting SMART goals and project benefit management with its three-dimensional composition. The exercise of analyzing the project's strengths and weaknesses, threats, and opportunities can be

linked to the analysis of the factors: specificity, feasibility, and scope, as proposed by Zwikael, Chih, and Meredith (2018).

Thus, we can analyse the relationship between the success of the project under study and stakeholder management. Several authors (Aaltonen, 2011; Achterkamp & Vos, 2008; Aladpoosh, Shaharoun, & Saman, 2012; Bourne & Walker, 2005; Gil, 2010; Littau, Jujagiri, & Adlbrecht, 2010; Mok, Shen, & Yang, 2014) emphasize the need to establish an approach and engage with stakeholders to achieve project success. Therefore, the relationship between the project's stakeholders gained more emphasis as the approach focused on project performance criteria, such as cost, time, and scope, began to be seen as insufficient to ensure project success (Achterkamp & Vos, 2008; Bourne, 2015; Heravi, Coffey, & Trigunarsyah, 2015; Mok, Shen, & Yang, 2014; Olander & Landin, 2005; Rajablu, Marthandan, & Yusoff, 2015).

Thus, the act of establishing relationships in projects should be a routine action, as a project is a typically social activity where objectives are rarely achieved without people's participation. By establishing trust-based relationships, interpersonal interactions are facilitated, influencing the resilience of stakeholders and, in the event of conflicts or issues in the project, creating room for alternative solutions. Trust, therefore, plays an important role in stakeholder relationships and project management (Aaltonen, 2011; Aladpoosh, Shaharoun, & Saman, 2012; Gil, 2010; Karlsen, 2008; Shenhar, 2004).

In addition to starting the project with this perspective, it is important to remember that stakeholder management is an ongoing process throughout the project lifecycle, as stakeholder influence can change at any time in relation to their contributions and the intensity of those contributions. This can be strategically used to facilitate communication and effective engagement of stakeholders at all stages of the project (Cleland, 1986; Bourne & Walker, 2005; Mok, Shen, & Yang, 2014; Eskerod et al., 2015). In other words, the stakeholder influence base is not static, which justifies the need to update the stakeholder knowledge base at different project stages (Olander & Landin, 2005). Thus, for the project in this study, it was clear that, in addition to the Preparation phase, there were concerns and actions involving stakeholders throughout all project phases.

In the Planning phase, the Genba Walk action involved stakeholders by observing their attitudes and behaviours in the production process. In the data and information gathering actions, to map the process, tools such as Process Flow Diagram, SIPOC Diagram, Value Stream Mapping, Gantt Chart, MASP Application, Brainstorming Application, Prioritization Matrix, and Action Plan development were used, employing the technique of using a physical board and strips of paper in the form of sticky notes, with the objective of generating team involvement. This allowed everyone who participated in the actions to have their ideas and views on the production process exposed and considered, even during the creation of the action plan, ensuring their engagement in the project. Furthermore, all these tools underwent the process of updating the knowledge base

DOI: https://doi.org/10.52212/CGBP2025-V9i1m5 **ISSN:** 2573-5691

mentioned by Olander and Landin (2005), using workshops aimed at explaining and disseminating the concepts of the tools used. In other words, in addition to involving the stakeholders, their value was elevated by increasing their level of knowledge, and these tools were used to maintain stakeholder relationships and engagement.

In the Execution phase, the theme followed a similar approach to the previous stage, where Lean tools such as Value Stream Mapping (Future State), Gantt Chart, 5S Methodology, and Production Layout Adjustment also used the techniques mentioned earlier, maintaining the engagement and participation of stakeholders during this phase of the project. It is important to note that this was the phase where the action plans were implemented, marking the highest workload and project intervention. As it was a consultancy, where the consulting specialists had a low level of intervention within the company, this stage was largely executed by the company's project team. Therefore, without the engagement and relationships built up to this point, the implementation of actions, as well as the achievement of results, benefits, and goals at the end of the project, would not have been possible.

The Monitoring and Closing phases were also marked by actions focused on stakeholder management. The monitoring of action plan implementations was carried out using a visual tool adopted in the project's dashboard. Additionally, closing actions involved the use of key performance indicators (KPIs) established to communicate the project results, attributing them to the stakeholders responsible for the entire mapping and interventions in the processes, resulting in gains in productivity and waste reduction. Thus, in line with the observations of Eskerod et al. (2015) regarding the importance of stakeholder engagement, this study demonstrates that effective communication, trust-building, and respect for the interests of stakeholders are key factors for successful stakeholder management.

FINDINGS

The study was developed as part of a consultancy, based on a strategy set within a Federal Government Program aimed at increasing productivity by 20% over 8 months, with 600 hours of work. Thus, this context presents limitations in the application of the approach, and consequently limits the study, as the evaluation is carried out in an extremely unique context, starting with the type of sector (equipment manufacturing) in the application of consultancy.

The attention dedicated to stakeholder management throughout all project phases, with mapping actions, workshops, and constant follow-up, demonstrates the project team's awareness of the dynamic nature of stakeholder relationships and the importance of adapting strategies to deal with uncertainties and changes. In terms of the institutional context, participation in a consultancy program and the preparation of a formalized technical proposal indicate the presence of structures and processes that may have shaped interactions between stakeholders. In summary, the table demonstrates that the project in question presents challenging characteristics regarding the

The CYRUS Global Business Perspectives (CGBP), Volume V9, p71-93:2025
DOI: https://doi.org/10.52212/CGBP2025-V9i1m5 **ISSN:** 2573-5691

stakeholder landscape, but the emphasis on collaboration, communication, and adaptation seems to have contributed to the project's success.

Aaltonen and Kujala (2016) propose a conceptual framework for analysing a project's stakeholder landscape, describing four key dimensions that characterize this complex environment: complexity (subdivided into element complexity – number, variety, and internal complexity of stakeholders – and relationship complexity – number, variety, patterns, and complexity of relationships between stakeholders); uncertainty (related to a lack of information about stakeholders and their relationships); dynamism (referring to changes in stakeholders' influence strategies, positions, and importance over time); and institutional context (encompassing the norms, laws, and culture that influence the project and shape stakeholder expectations).

Table 3. Stakeholder landscape of the Lean Manufacturing project

Dimension		**Subfator**	**Project Insights**
Complexity	*Element Complexity*	Variety of Stakeholders and their Goals	• Sponsors, managers, team leaders, and assembly line operators. • Optimize operational efficiency, increase productivity, reduce waste, and improve company performance. • Different levels of knowledge about Lean tools.
		Internal Stakeholders	• Potential differing opinions and priorities regarding the implementation of Lean tools and changes in processes within the company team.
		Number of Relationships between Stakeholders	• Communication between consultants and the company team, between managers and operators, and between the operators themselves on the assembly line.
		Variety of Relationships	• Formal relationships (company hierarchy) and informal relationships (daily interactions on the assembly line). • Temporary and focused relationships with external consultants.
	Complexity of Relationships	Relationship Patterns	• The consultancy sought to create a collaborative environment.

		Internal Complexity of Relationships	• Conflicts of interest or resistance to change from some stakeholders could affect the dynamics of the relationships.
		Lack of Information	• Initially, a lack of knowledge about Lean tools among some stakeholders.
Uncertainty		Experience in Project Management	• The experience of managers and team leaders in continuous improvement projects influences how uncertainty is managed.
		Analyzability of the Environment	• The complexity of production processes and the difficulty in identifying bottlenecks generate uncertainty.
		Ambiguous Information	• Potential different interpretations of project data and results among stakeholders.
Dynamism		Changes in Stakeholder Attributes	• Knowledge about Lean tools increases throughout the project due to workshops and training.
		Changes in Stakeholder Positions	• Operators who were initially resistant to change become advocates for the Lean methodology.
		Changes in Relationships	• Relationships become more collaborative and trust-based as the project progresses.
		Emerging Stakeholders and Relationships	• No stakeholders or emerging relationships were identified in the article.
		Changes in Ways of Engaging Stakeholders	• Engagement strategies evolve throughout the project, adapting to the needs and characteristics of each stakeholder group.
Institutional Context		Local Stakeholders Connection	• Stakeholders are embedded in the culture of the metal-mechanic company, with its values and norms.

DOI: https://doi.org/10.52212/CGBP2025-V9i1m5 **ISSN:** 2573-5691

	Legitimized Structures and Processes	• Participation in the Federal Government program to increase productivity establishes a formal process for the consultancy.
	Nature of Influence Strategies	• Persuasion, education, and demonstration of the benefits of Lean tools are the main influence strategies used.
	Multiplicity of Institutional Environments	• The project is part of both the metal-mechanic company environment and the Federal Government consultancy program environment.
	Complexity of Interpretation	• How stakeholders interpret the project results and changes in processes influences their engagement and support.

Analysing the table, which uses the Aaltonen and Kujala (2016) framework to interpret the stakeholder scenario of the project analysed in this article, reveals a complex but manageable situation. The multiplicity of stakeholders, with different levels of influence and interests, suggests a high degree of complexity, both in terms of elements and relationships. The need to promote the alignment of visions and expectations through engagement dynamics, such as the kick-off with different stakeholders, reinforces this complexity. However, the emphasis on building trust, open communication, and teamwork suggests the existence of a collaborative relationship pattern, which may have facilitated complexity management.

The attention dedicated to stakeholder management throughout all phases of the project, with mapping actions, workshops, and constant monitoring, demonstrates the project team's awareness of the dynamic nature of relationships with stakeholders and the importance of adapting strategies to deal with uncertainties and changes. Regarding the institutional context, participation in an advisory program and the elaboration of a formalized technical proposal indicate the presence of structures and processes that may have shaped the interactions between stakeholders. In summary, the table demonstrates that the project in question presents challenging characteristics in relation to the stakeholder scenario, but the emphasis on collaboration, communication, and adaptation seems to have contributed to the success of the project.

Thus, Aaltonen and Kujala (2016) advocate the importance of proactive stakeholder landscape management as a continuous process that begins in the project's front-end phase and extends throughout its lifecycle, aiming to anticipate and manage challenges, ensure alignment of expectations, and promote project success. In the case of the project analysed in this article, the project team did not apply the framework proposed by Aaltonen and Kujala (2016), but this study

suggests its later application to verify the alignment between the actions taken, the theoretical framework, and their contribution to the success of the project.

The success of the Lean Manufacturing consultancy project can be linked to the emphasis on proactive management of the stakeholder landscape, as defended by Aaltonen and Kujala (2016). By recognizing the complexity of the stakeholder landscape, the project team adopted strategies to build trust, promote communication, and ensure alignment of expectations. These actions, such as the kick-off with different stakeholder groups, workshops to disseminate knowledge about Lean tools, and constant monitoring of stakeholder engagement, demonstrate an approach sensitive to the dynamic nature of relationships. The emphasis on collaboration and stakeholder involvement throughout the entire project lifecycle mitigated the challenges posed by the complexity of the landscape, such as the multiplicity of actors, varying power levels, and the need to reconcile divergent interests, contributing to the achievement of the results.

As a proposal for future studies, it would be important to evaluate the same stakeholder engagement and participation strategy at each step to verify whether the behaviour is similar when applying the same Lean approach techniques across different sectors, with the goal of determining if the results are similar.

CONCLUSION

This study aimed to conduct a case study of a Lean Manufacturing project in the context of consultancy application through a cost-free consultancy program for the end client, with the goal of developing the automotive sector. The establishment of factors derived from the literature was used to analyse and correlate project management actions employed in the studied case with project management practices present in the literature.

The company that received consultancy in the analysed case study underwent an initial maturity assessment phase to identify improvement opportunities and determine if it met the requirements for participation in the program. After the project was approved in the program, actions related to the project were initiated, such as the pre-kick-off, which established goals, objectives, and initial actions with the project sponsor. The project was defined in four phases: Preparation, Planning, Execution, Monitoring, and Closure. It was noted during the planning phase that the company had a 13-week delay in deliveries, which was due to the lack of tracking and management tools for activities. Through the interventions carried out, it was possible to reduce the Lead Time from 53 to 40 weeks. The results were measured through key performance indicators, showing a productivity increase of 49.8% and a 51.3% reduction in movement, which was favourable as the pre-established program goals were met.

Regarding the analysis of the results, the authors of this study established several likely factors for the project's success according to the literature. The success of the project was defined by adopting the concept of the Iron Triangle, associated with the delivery of benefits. Considered a success

from this perspective, it was linked to management in the project's front end, where the determination of SMART goals was associated with delivering benefits, as well as stakeholder engagement and relationships responsible for actions and interventions.

Thus, this case study, in line with the theoretical framework presented by Eskerod et al. (2015), demonstrates the crucial importance of stakeholder management for project success. The adoption of a strategic, ethical, and adaptive approach that encompasses the analysis and management of relationships between the project and stakeholders throughout the project lifecycle significantly contributes to achieving positive results and building an environment of collaboration and trust.

Theoretical Contribution

The theoretical contribution of the case study on the implementation of Lean Manufacturing in a metal-mechanic company lies in the following:

- The study fills a gap in the existing literature by investigating how stakeholder engagement and management in all project phases affect the results, especially in consulting projects. There was a lack of understanding about how stakeholder involvement influences the outcomes of Lean projects.
- The study reinforces the importance of stakeholder management, aligning with strategic management theories. It demonstrates that the strategic engagement of stakeholders, based on a comprehensive analysis of their needs, expectations, and power, is crucial to ensuring project performance.
- The study demonstrates the importance of aligning project objectives with the needs and expectations of stakeholders for the success of Lean Manufacturing projects. The ability to manage relationships with stakeholders, identify and mitigate potential conflicts, and promote a collaborative environment significantly contributes to achieving project objectives and meeting stakeholder expectations.

Practical/Policy Implications

As practical/policy implications of this case study on the implementation of Lean Manufacturing in a metal-mechanic company, we can observe:

- The study's results are relevant to managers, consultants, and researchers interested in optimizing the implementation of Lean projects and increasing productivity.
- The study highlights the importance of active stakeholder involvement through workshops and Lean tools to achieve a 49.8% increase in productivity and a 51.3% reduction in movement.
- Additionally, it emphasizes the need for effective strategies to ensure the success of these initiatives by aligning project objectives with stakeholder needs and expectations.

- The study demonstrates how changes in the culture and behavior of those involved in the project can lead to continuous improvements and the adoption of Lean practices in other aspects of their lives.

Limitations and Future research

As limitations, we understand that the context of this study is specific to a consultancy within a federal government program and presents limitations in the application of the approach. The evaluation is conducted in a unique context, starting with the type of sector (equipment manufacturing) in the consultancy application.

It is suggested that future studies evaluate the same strategy of stakeholder engagement and participation in different sectors to verify if the behavior is similar when applying the same Lean techniques. The goal is to determine if the results are comparable.

Additionally, the study proposes the application of the Aaltonen & Kujala (2016) framework to verify the alignment between the actions taken, the theoretical framework, and its contribution to the project's success.

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