

INCORPORATING PSYCHOLOGY OF LEARNING THROUGH THE MALABARES METHOD FOR EFFECTIVE IMPLEMENTATION OF THE LAST PLANNER SYSTEM

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ABSTRACT

This study investigates the impact of teaching through a method developed by a Chilean company, Malabares Consultores, based on psychology of learning theories and in the adherence to the Last Planner System methodology. It takes a qualitative and descriptive approach to the teaching of LPS by implementing this so-called the Malabares method, that is a compound of six key factors, as is described in the present document. The study shows the evolution of this method in three stages of development, where the learning obtained in each stage is analysed as well as the adjustments made to improve it. The results show that through the security, confidence and willingness to learn of the participants, added to the gamification of the contents, a link is generated between teacher and student that allows the LPS methodology to be transmitted very effectively both to the person and to the company as a whole. On the other hand, transversal participation from the entire team, including administrators and on-site managers, added to an implementation program that trains work teams at their own workplaces, supporting teams in generating the planning habit under the LPS in the long term, are proven to be crucial to success. The study provides evidence for the effectiveness of the Malabares method in the construction industry and concludes that it offers a valuable approach to implementing the LPS, emphasizing the importance of continuous improvement within the method development example itself.

KEYWORDS

Serious games, simulations, action learning/research, trust, collaboration, Last Planner ®System.

INTRODUCTION

The need to change to survive is observed and understood in both plant, animal, and human nature, as well as in competitive organizational environments. Plants and animals must adapt to their habitat conditions, available resources, and predator threats. Humans must learn to live in an increasingly inclusive and technologically advanced multicultural society. Companies

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must figure out how to compete and meet the new needs of people, the changing society values and the other companies threats (Hamel, 1996; Yoon et al., 2019). Facing these diverse realities, change results from the transition of an individual or group of individuals from their current condition to a new one that allows them to face aspects of their environment that they could not in their current state (Hamel, 2000).

The change or changes, in the case of human beings, and therefore in the organizations that they make up, can be conducted and achieved through the teaching-learning process, which in turn can occur in different ways according to how the person processes the information he receives and how he transforms it into knowledge, either reflecting or experiencing it in a concrete way. Finally, this process can be promoted and even ensured with the use and planning of methodologies, that is, with strategies, procedures and actions ordered in such a way that they allow the achievement of the objective of facilitating student learning.

Regarding organizations, the change requires learnings to adapt its methods and policies at the level that is necessary, to effectively be profitable in the face of the market and self-conditions (the only path that does not mean ceasing its activities of course). This need for change may not be evident or may not necessarily have to be resolved in the short term, but the organization should be aware of the possible need in the long term (Drucker, 2012). You can be in a healthy health condition today, but given the dizzying social, technological, and competitive changes, the current condition may not guarantee survival in future social, technological, or competitive contexts. Thus, the need for change, or at least the ability to change, presents itself as a relevant and interesting aspect for any organization that aspires to continue operating tomorrow (Abraham, 2012).

But, how to prepare for this change, and how to effectively carry it out? Nature takes its time, evolutionary changes take hundreds, thousands, and even millions of years. It is humble for humans to understand that their own changes cannot happen overnight (Commoner, 2020). There are things that should be approached gradually and sustained over time to see positive and permanent results (Abraham, 2012). Strict diets that seek results in a few days often have negative effects and eventually lead the person to a worse situation than the original (Sidor & Rzymiski, 2020). Sudden implementations of new work methods in an organization make it difficult for workers to understand, adhere to, and use these, leading to the failure of their implementation or to the turnover of their workers, affecting the human group that makes up the organization (Bortolotti et al., 2015). Changes must be approached gradually, to give the organization time to be able to change, being one of the first conditions that the members of the organization, at its different levels and hierarchies, are open to change. It is about generating a culture that allows it to effectively implement the specific changes required in various situations (Drucker, 2012). Given this context, the Lean philosophy and the concept of continuous improvement are conceived as a way of being, thinking, and doing that, when implemented and rooted in an organizational culture, contributes to an organization as a whole being more efficient, effective, and flexible (Bhasin & Burcher, 2006; Pellicer et al., 2015).

Lean philosophy and continuous improvement are considered key elements in generating a culture of change within an organization (Dave et al., 2013; Howell et al., 2004). The question now arises, how to introduce this philosophy in an organization, both in its work methods and operation and in its group of collaborators? It must be gradually introduced to ensure its correct understanding, adherence and permanence at both individual and organizational levels (Alsehaimi et al., 2014). Intensive inductions for the entire work team do not guarantee effectiveness, as they can confuse and the natural tendency will be to return to the familiar, in this case, to how things were done before the induction (Salazar et al., 2019). The implementation process of a new work methodology in a group must consider not only the introduction of this new knowledge but also its sustained implementation over time, ensuring the necessary accompaniment and adjustments that may be required based on the results

obtained (Dave et al., 2015). Finally, it is about developing a continuous improvement process in the use and growth of the new knowledge by the organization (Hu et al., 2016).

Learning styles are the result of the combination of two ways in which individuals process information from lived experience. The first way to process information is by living the experience in a direct and concrete way, involving emotions through challenging and short activities with quick results. The second way to process information is through abstract experience, when the individual reads or someone tells him something. In addition, two ways of transforming information into knowledge are identified in people, the first occurs in the reflective student, who analyzes experiences from many different points of view, and the second occurs by concretely experiencing the information received, where the individual puts into practice the new knowledge acquired.

The mentioned is complemented by other theories on the nature of human learning at the individual level that emphasize the importance of concepts such as meaningful learning, which means that new knowledge must be linked to the individual's interests, and situated learning, which is when the new knowledge must be put into practice in the individual's real-life activities so that they can demonstrate its impact and usefulness. In both cases, learning is achieved by giving meaning to what is being learned, whether at a personal or work level.

In addition, the "teacher's work" becomes key to using the learning potential in the human being, since it is the teacher who best perceives the different styles and ways of learning of their students, generating techniques and environments suitable for learning. the learning and change that is sought based on the people with whom one is working. The teacher will act as a mediator between the experiences, the environment and the new learning, generating a security, bond and trust in the environment to encourage all these variables to combine harmoniously in people (Feuerstein, 1980).

Today, the so-called Malabares method, developed by the company Malabares Consultores, is formally defined as the integration of six factors that, applied correctly, make it possible to modify people's work habits. It has been proven in the implementation of the Last Planner System (LPS) in companies of the construction industry in Chile, and also in the implementation of other Lean methodologies. These factors are: (1) A space of security and confidence; (2) Learning "here and now"; (3) Transversal participation of the organization; (4) An implementation program through trainings, training sessions and accompaniments; (5) Interactive dynamics for meaningful learning; (6) Long-term work program that ensures adherence to the methodology. With the above, the method permeates the work teams, generating a positive experience and a long-term adherence and permanence of the methodology in everyone, both in individuals and the company, which ultimately contributes to the necessary ability to survive in the changing and competitive environment of today's business organizations, particularly in the construction industry. The purpose of this work is to present and describe this method from its conception to the proven success of its use today, to contribute, as a case study, to the teaching-learning processes of this and other methodologies.

RESEARCH METHOD

The aim of the study is to demonstrate the impact of the Malabares method on adherence to the Last Planner System (LPS) methodology and to verify changes in adherence indicators resulting from the method's application over time. The study employs a qualitative approach to study phenomena and subjects within their contexts and find meaning in them based on people's own interpretations. The study is descriptive, analyzing the characteristics of the training process and the profiles of the participants using the Malabares teaching method as the phenomenon under investigation. The authors seek to verify effective adherence to the LPS methodology and describe the impact of the Malabares teaching method on this adherence .

The population studied consists of collaborators from companies trained by Malabares and collaborators from Malabares itself who have witnessed the changes and results obtained from the training developed over time. A non-probabilistic sample was used, with convenience sampling for trained companies that agreed to participate and purposive sampling for members of Malabares who participated in the trainings and witnessed adherence in the trained teams. The trained companies are among the most relevant in the construction industry in Chile, including one operating in the stock exchange, and their collaborators mostly hold managerial positions or are area managers with experience in construction, planning and team coordination, and have previously implemented methodologies, including LPS. The Malabares collaborators are a team of people from the areas of engineering, psychology, communication and academia, with 10-20 years of individual professional experience in their respective fields and at least 3 years implementing the methodology. The co-founders, Andrés and Guillermo, have 15 years of experience in LPS and active teaching, respectively.

The study utilized semi-structured in-depth interviews as well as existing documentary data on the results of the training and implementation of LPS by Malabares. The in-depth interviews were designed based on Mertens' typology, which aimed to obtain background, opinions, and expressions of feelings from the subjects of the study. The documentary information had two main sources: the results of adherence and permanence of LPS measured by the companies themselves, and Malabares' own information gathering through evaluations of adherence to the methodology during periodic visits. This evaluation involved scoring key steps of the meetings, commitments, and fulfillment of tasks by the work teams, with possible outcomes of 0%, 50%, and 100% depending on the execution and achievement of the objectives.

Through this research methodology, the effectiveness of the Malabares method in different implementations was evaluated by comparing expert opinions and empirical data. The study established three stages in the life of the Malabares method: the initial stage, the transition stage, and the current stage, with each exhibiting different characteristics and results. To present the findings, graphs were included for each stage, showing the results of the evaluation of adherence to the methodology of different works during the accompaniment stage (three cases per each accompaniment stage).

THE “MALABARES” METHOD

For the past 9 years, Malabares Consultores has been working to implement the last planner system (LPS) in the construction, real estate, and other industries in Chile. Their approach aims to promote learning, adherence, and long-term retention of this new knowledge. The results of Malabares' work over the years have demonstrated concrete and lasting benefits such as better effective communication within the teams, greater efficiency in meeting planning, and adherence and persistence of new knowledge at both the individual and company levels.

Malabares' implementation of the LPS initially focuses on three planning instances: the Master Plan, Intermediate Plan, and Weekly Plan. The Master Plan provides a strategic vision of the project, identifying deadlines, activity sequences, and milestones traditionally presented in a Gantt chart format. The Intermediate Plan analyzes the activities of the project from a horizon of 4-6 weeks, identifying the detailed sequence of each activity, the necessary resources and the restrictions to guarantee that all the conditions are available so that the deadlines of the project can be met. Finally, the Weekly Plan is a short-term weekly schedule expressed as an expected progress schedule, which is then analyzed by the responsible parties to create a credible engagement schedule. The philosophy of "continuous improvement" is introduced with the commitment program that is reviewed and validated during the Intermediate and Weekly Planning meetings, where the fundamental root causes of unfulfilled commitments are identified and corrective actions are established to prevent recurrence. The goal of Malabares'

implementation is to enable teams to apply the concepts and tools of the LPS and establish the weekly use of Intermediate and Weekly Planning meetings.

ORIGIN OF THE “MALABARES” METHOD

Malabares Consultores S.A. was founded with the goal of teaching the LPS methodology to construction companies in Chile through a pedagogical approach that uses games. The founders had previously observed unsuccessful attempts to teach and implement the LPS methodology through traditional methods, where people struggled to understand and apply the concepts. One of the co-founders, an industrial civil engineer, had experienced this firsthand while working on teams that attempted to use the LPS methodology. Despite being convinced of its benefits, he found that there was a lack of an environment that promoted easier and more effective teaching at a conceptual level while visualizing and concretizing the practical application of what was taught. On the other hand, the other co-founder, a psychologist, believed that people could learn and apply any work methodology if they were in a favorable environment with reduced stress levels and if the content taught made sense to them. These two perspectives led to the idea of using play experiences to teach the LPS methodology, encouraging the participation of the entire team. As the psychologist explained, "the engineer believed in the method, and I believed in people". The goal of using this approach is to ensure that the teams can grasp and internalize the concepts of the methodology and apply them effectively to their work, resulting in improved teamwork and adherence to the LPS methodology.

THE SIX KEY FACTORS OF THE “MALABARES” METHOD

The method can currently be described in six key factors, those that arise from the initial purpose of its founders and are consolidated with the passage of time and the continuous improvement developed on the implementation process itself. They are described below:

(1) A space of security and confidence: Malabares Consultores emphasizes the importance of establishing rules at the start of workshops, such as arriving on time and actively listening to others. These rules provide a sense of security and care for all participants, and also values the experience and knowledge of the participants, encouraging mistakes as a natural part of the learning process. Trust is established through empathetic listening and validation of comments. As the group bonds, humor and laughter are encouraged to lower barriers and promote learning. To prepare the workspace, tables are set up with paper, markers, sticky notes... and candies.

(2) Learning “here and now”: The importance of attending with a willingness to learn is explained to the participants, asking them to concentrate on what is being discussed and the experiences that are being shared. This also means surrendering to the dynamics, wanting to play, move, share and open up to others. To encourage participation, induce the game and reward those who answer correctly, chocolates are distributed among the participants.

(3) Transversal participation of the organization: This is key in trainings, where entire real teams, including managers, administrators, field professionals, supervisors, warehouse, technical office, and subcontractors, are invited to participate in the same learning space. This generates positive bonds during training and then taking them to the field. When everyone participates in the presentation of new knowledge, language and meaning align, and technical concepts, for example the “restrictions”, are understood and used throughout the organization.

(4) An implementation program through trainings, training sessions and accompaniments: This 3-step program aims to provide the necessary theoretical and practical knowledge to apply the LPS methodology on site. Participants are trained in the necessary tools to carry out intermediate and weekly planning stages, such as the "analysis sheet" or the "weekly program", and then are taught a step-by-step methodology, considering the different roles and responsibilities of each member of the team. Accompaniments consist of scheduled visits to the planning meetings, evaluating adherence to the methodology, with six to ten visits per team.

The program spans over several months, with training in the first months and accompaniments in the following months.

(5) Interactive dynamics for meaningful learning: To enhance the learning experience, gamification is used within the logical thinking process designed for the participants to explore and discover the meaning of the adopted work method. Two facilitators are always present during the workshops and training sessions: Facilitator No. 1 is the theoretical expert who ensures complete delivery of methodology content, while Facilitator No. 2 ensures active participation and comprehension among all attendees. The use of games and activities helps participants to engage with the material in a meaningful way, leading to greater understanding and retention of the knowledge presented.

(6) Long-term work program that ensures adherence to the methodology: The sixth factor stems from the actual experience of Malabares' application and modifications to the method. This factor is related to the objective and the needs of the companies to ensure that what has been learned is maintained over time, which implies changes in the habits of the teams, for which time is required. The program considers the learning time of each team, which is why the implementations, in their current version, have a duration of 6 to 12 months, where the facilitators, according to their experience, identify the different support needs of each team.

The evolution of the Malabares method in its constant development and how it has impacted the evaluations of adherence to the methodology that are carried out in the program's accompaniment stage will be presented below. Although the changes have been constant, two key modifications over time are identified, which mark 3 stages with characteristics and their adherence results over time. The application of these 6 factors throughout the 3 stages called Initial, Transition and Current Implementation will be discussed.

INITIAL IMPLEMENTATION

The LPS programs carried out by Malabares Consultores from 2016 to 2019 are considered as an initial stage. In this stage, what is now called the Malabares method was only the idea that focusing a training on the learning processes of people with a theoretical content that made sense to them, would ensure changes in habits and use of what was learned. The participants' reception of this new way of teaching was one of total uncertainty.

Both the 1st factor, the idea of generating a safe and trusting space for learning, and the 2nd factor, inviting them to become aware of learning "here and now", were implemented from the beginning and as described in the definition of the method. The 3rd factor, regarding the transversal participation of the team, is a requirement that arises from Malabares, who proposes the participation of everyone (subcontractors, specialists, support areas, etc.), however, it is up to the organization to decide if it finally includes all the related parties or not. On the other hand, it is noted that a real impact is generated in participants' commitment when heads and managers attend the workshops. The 4th factor, the implementation program itself, considering the stages training, training sessions and accompaniments, in the first implementations of the LPS for construction companies' teams, were structured with 18 hours of training, divided into 4 modules and then 4 "training sessions". Finally, there are 2 surprise visits, initially called "monitoring", to actual team meetings on site for the Intermediate Planning and Weekly Planning meetings. The goal of these visits was to ensure that the meetings are being held regularly on the days and at the times established, and that the tools learned in the training are being implemented. The program as a whole was 60% training, 27% training sessions and 13% monitoring if we consider the time dedicated for each stage, and in general lasted 2-3 months. Regarding to 5th factor, in the initial stage the interactive dynamics for meaningful learning were focused on situations outside the construction. In a safe and trusting space, games and laughter come easily. In the trainings, participants are given costumes and props that are specific to working with Malabares that they would not normally use, especially in a work environment,

such as the use of a clown nose every time a participant had to present a concept, which makes the training more fun and less intimidating. The 6th factor, the long-term work program, had not yet been developed at this stage.

The greatest discovery in this initial stage was the link between facilitators and participants that is generated in the trainings. The importance of opening the bond or link in all the initial contact instances in order to teach the theoretical content that is required later on. With the certainty of having found the way to generate the "knowledge transfer bridge" between the participants and the facilitators, there was room to make other modifications.

The results of the evaluations also showed that, although good immediate adherence was achieved by the team, with team members remembering the main concepts of the LPS and the use of the tools (evidenced by an individual test), there were drops in evaluation due to two main reasons: the teams do not have a clear idea of how to apply everything learned to real work situations; and it is difficult to remember the structure of the meetings and replicate them weekly. The surprise visits at the monitoring stage induces the teams to carry out the meetings, but does not ensure the quality, leading in some cases to the practice of these only to comply with the Malabares visit and not to observe real progress with the execution of these (like a student who prepares to get a good grade, but not to really learn the content of the evaluation).

While the playful mode meets the objectives of favoring the learning environment, favoring communication and reducing barriers to changes in work practices, it has a deficiency in achieving that the methodology begins to be applied in a real work situation, so it is concluded that the training should, without completely losing the playful focus, be more focused on the real applications of the methodology and not on fictitious examples unrelated to work. Also, it is concluded that tools must be included to help maintain the adherence to the methodology achieved with the training stage throughout the entire project and not lost and returned to the previous work practices, which are precisely the ones being sought to change and for which the clients decide to develop the implementation of the LPS. The surprise monitoring system, as mentioned, ensures the execution of the meetings but not their quality. Thus, the logical conclusion is that the team visits should aim not only to evaluate the permanence, but also to improve the quality of the content of the meetings and their efficiency, contributing to the effective change in the team's work culture by visualizing the discrepancies that are obtained, thus giving meaning to the new knowledge in their daily work.

Figure 1 shows the results of the evaluation of LPS adherence in three construction projects (at five consecutive evaluation moments) where the initial stage method was applied. The x-axis shows the number of the evaluation for each work, the space between evaluations is from 1 to 3 weeks. The evaluated works are high-rise housing and may correspond to teams in different companies (I1, I2, I3, respectively).

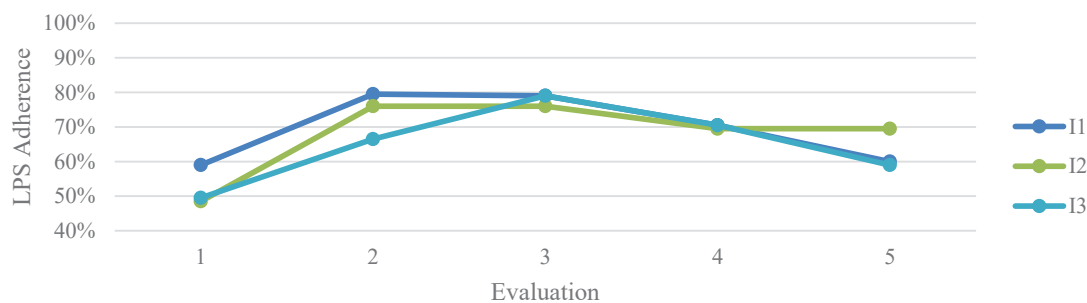


Figure 1: LPS adherence of three construction projects. Initial Implementation

TRANSITION IMPLEMENTATION

The transition stage covers implementations mainly in years 2019-2020. During this stage, the importance of generating a space of security and confidence (1st factor) and of learning “here and now” (2nd factor) was maintained. The participation of actors from different disciplines and positions within the organization (3rd factor) was reinforced and called to be fulfilled. The observations made on the initial stage and the results of the teams create the need to induce changes in the Interactive dynamics for meaningful learning (5th factor) and structure of the implementations (4th factor), aiming to reduce the negative impacts mentioned.

The structure of the Malabares' LPS implementation is now 12 hours of training divided into 4 modules of 3 hours each, 5 training sessions focused on preparing and executing Intermediate Planning and Weekly Planning meetings and 4 accompaniment sessions to strengthen the persistence of adherence to the methodology. The program was divided into 40% training, 47% training sessions, and 13% accompaniment based on the time dedicated to each stage. Increasing the hours of training sessions will result in more personalized teaching, better tool utilization, and earlier realization of the benefits of the methodology. Since it is crucial to prepare for meetings, such preparations should be included in the training sessions as well. The aim is to ensure that team members understand their roles and responsibilities, development and validating the planning information in advance of the meeting, rather than developing it during the meeting itself. The new iteration adds a stage of "accompaniment," consisting of 4 monthly interventions where the Malabares team supports the construction team in the preparation and meeting instances, ensuring better results, unlike the previous surprise visit, which only measured results. Additionally, the items evaluated in this accompaniment are modified to consider not only the step-by-step structure of the meeting but also the main preparation instances that must be respected to ensure the information is ready for presentation. All the applied changes affect the duration of the implementation in approximately one month.

According to the 5th factor, trainings themselves maintained a playful and participatory approach, but changed the games and dynamics that lead the participants to completely fictitious situations to simulations of equally fictional situations but within a construction context that LPS will later be applied in. Thus, the games and activities always talk about construction meetings, field activities such as excavation or concrete structures, and weekly building works programs. Before trainings, participants are asked to go to the field and look for changes in their work such as unused materials or idle times and then expose and develop ideas in the training that are completely adjusted to the project reality.

During the implementation of the LPS methodology, team adherence decreases over time, although there is stabilization and slight improvement during the accompaniment stage. Practical applications of the methodology are learned in trainings and replicated in project development with the support of Malabares, but when the accompaniment stage begins, some fundamental concepts are not clear to all team members, leading to tool abandonment. However, the extension of Malabares' team participation in the work helps maintain the team's application of the methodology, reversing the trend of decreasing adherence and leading to an improvement trend. Individuals from the work teams make personalized contributions, but these are not always shared with the rest of the team, especially in field teams.

After this iteration, it is concluded that the application of playful dynamics with examples applied to real work conditions helps teams understand how the tools of the methodology should be applied to the cases they will see in their work, but it is not a good option for participants to internalize the basic concepts of the LPS individually first. To improve the results of the implementation, it is first necessary to ensure that the team members understand the fundamental concepts of the LPS well, and then to apply these to real work cases. It is concluded and reinforced the idea of maintaining the accompaniment stage for the teams, even dedicating a greater number of hours to this stage and increasing the number of months in which the

Malabares team will continue to work with the teams until stabilizing the adherence indicators. Thus, the need for the 6th factor, long-term work program, is conceived.

Figure 2 shows the results of the evaluation of LPS adherence in three construction projects (at nine consecutive evaluation moments) where the transition implementation method was applied. The x-axis shows the number of the evaluation for each work, the space between evaluations is from 1 to 3 weeks. The evaluated works are high-rise dwellings and may correspond to teams in different companies (T1, T2, and T3, respectively).

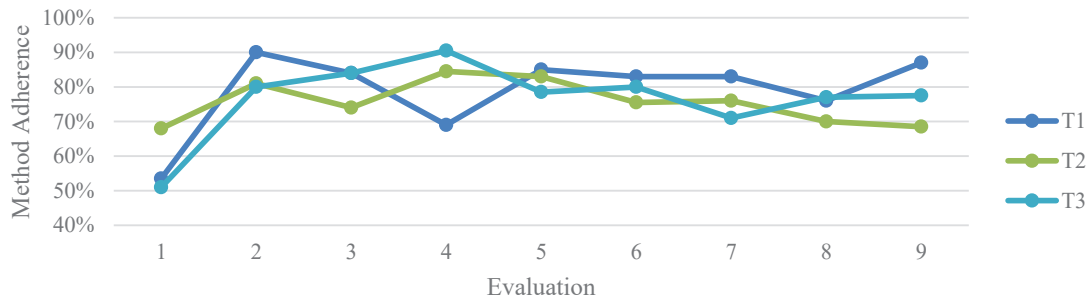


Figure 2: LPS adherence of three construction projects. Transition Implementation

CURRENT IMPLEMENTATION

The current stage started in 2021 and is implemented until these days. The current training of Malabares is characterized by returning to the more playful roots of the method, reserving the examples applicable in real-life work situations for the training stage, and then developing sustained support for several months. In this stage, the focus on generating the facilitator-student bond through the space of security and trust (1st factor) and learning “here and now” (2nd factor) is paramount. Regardless of the culture of the company or the characteristics of the people who attend the implementations, positive emotions are contagious, and everyone is open to play, to enriching discussions and to sharing experiences. Interactions between people are essential, giving the necessary time to each type of learning. Regarding the transversal participation of the agents involved (3rd factor), it remained the same as in the previous stage. Managers, supervisors, and supervisors are indispensable in the presentation of the complete program, where they support and validate the program itself to be implemented.

At this stage the complete program lasts 12 months, convinced of the importance of supporting the teams in adopting the habit in the long term (6th factor). The new structure of implementation program (4th factor) currently contains the following: 6-hour instruction divided into two 3-hour modules, where the aim is to teach the main concepts of the method and its application to fictional cases. 2 training sessions for the Intermediate Plan and 2 for the Weekly Plan. Accompaniment until completing 12 months of implementation in the team, which are maintained as instances where the construction team is supported to prepare the meeting and then evaluate it, pointing out opportunities for continuous improvement in front of each evaluation. The participation of each stage in this program is: training 12%, training sessions 31% and accompaniment 58%. The current composition of the program takes better care of the characteristics of the learning process of the participants, giving space for those who have different ways of learning to become users of the methodology.

The 5th factor in the current implementation program incorporates all the experience gained during these almost 10 years. All the dynamics of the training are aimed at getting the participants to reflect on the reasons behind the theoretical concepts, for example: Why to plan? Why to live a Lean culture? Why be aware of continuous improvement? Each answer to these questions is shown applied in their daily work and personal life through games, examples and analogies. So later, they feel the need and possibility of generating the change because they

know and validate the benefits it brings. Also in the current stage, new work instances are added with execution teams on the ground in continuous improvement meetings of 30 minutes, where the goal is to assess improvement opportunities observed by the field teams, to seek solutions applicable by the team, and to propose action plans to implement the improvement.

In this stage, work teams have similar level of adherence to previous cases and even better, but, unlike previous cases, with the transition to the training and accompaniment stages, a tendency to improvement or stabilization is maintained in high levels of adherence. The continuous improvement work with the field teams allows for an assessment of multiple improvement opportunities, in many cases unknown to the administrative professionals in the team, which are reported to the rest of the team along with solution proposals, which denotes proactive and positive work from the field teams in favor of good execution of the work. Although at the time of this study, the implementations of this method have not yet concluded, it is observed that in the evaluations of the support stage, a trend towards improvement is maintained without abrupt drops compared to previous implementation stages. Applying what was learned to real-life cases, which are closer to the work conditions of the teams, is also key to good implementation, if it is started once the fundamental concepts underlying these practices have already been learned and internalized by the team. Finally, in cases where significant deviations from the method are observed in the team, it is concluded that an immediate alignment should be made with the team to adjust group adherence.

Figure 3 shows the results of the evaluation of LPS adherence in three construction projects (at three consecutive evaluation moments) where the current implementation method was applied. On the x-axis is the number of the evaluation for each work, the space between evaluations is from 1 to 3 weeks. The evaluated works are high-rise housing and may correspond to teams in different companies (C1, C2, and C3, respectively).

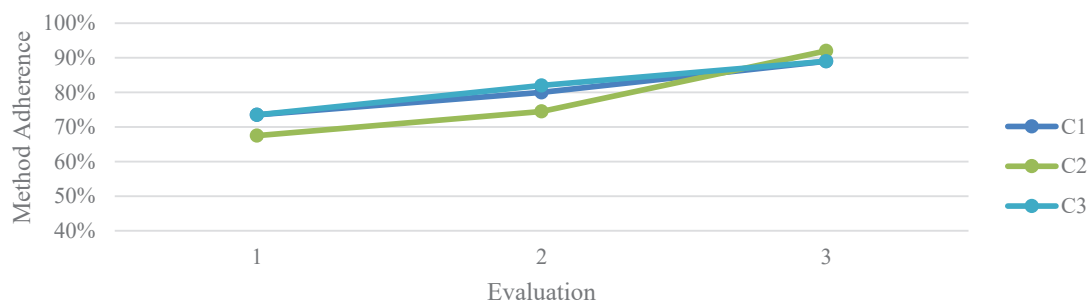


Figure 3: LPS adherence of three construction projects. Current Implementation

CONCLUSIONS

The implementation of the Last Planner System methodology under the method created by Malabares Consultores has proven to be efficient and lasting over time, since it allows for substantial and profound changes, generating a new way of understanding and seeing different situations, breaking paradigms and building new ones, thanks to the fact that it takes into account the environment in which people find themselves, whether at work or personally, the experiences of each participant, their biology in terms of the intellectual capacity of each one, among other factors.

Interventions in a learning environment are never the same, because the contexts and the people who learn are different. The Malabares teacher takes into account the different types of learning that each student has and through various dynamics achieves the participation of all, with which a greater diversity, points of view and experiences are obtained around the new knowledge that is being taught and to its application in real daily work. Different activities and

games are developed where the abilities of each one help the learning of the other, since they are put in situations and roles to which they are not used, where they have to listen, read, act, teach, reflect together and achieve the adequate synergy for learning and the sense of what is transmitted. This not only serves to better "understand" the subject, but also to generate an environment of trust and bonds between all the participants, which is finally transferred to the actual work on site, where people manage to connect what they have learned during the training. and apply it in their daily activities, and at the same time consolidate a work team that learns and advances as a whole.

It should be noted that the main limitation of the study is that although quantitative data was used, most of it was qualitative, so a much more detailed quantitative study of the adherence results could be developed in the future, and thus validate the Malabares method more accurately. All in all, it is possible to affirm that the six key factors through which the Malabares method is expressed can be useful for any type or area of knowledge, not exclusively LPS, that it is necessary for a team or commercial organization to acquire. Finally, the case presented in this study can be expressed as an example of continuous improvement in itself, this being a key concept within the Lean philosophy, and a necessity for the survival of human beings and companies.

In summary, the implementation of LPS with the Malabares method has shown that an effective way to teach this methodology and achieve good adherence to the team is by creating a close bond between people, as well as a pleasant and relaxed environment, regardless of hierarchies within the team and organization. Constant support over time, not only in training, but also in monitoring workers in the field, is essential for long-term adherence to the Last Planner System methodology. Learning effectively lasts over time thanks to the creation of new cognitive structures, mental maps and significant memories. Malabares believes in people, in their abilities and that it is never too late to face new challenges, and he puts this into practice with great passion in all his interventions.

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