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APPLICATION OF THE LAST PLANNER SYSTEM IN SPORTS INFRASTRUCTURE PROJECT IN PERU

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OUTLINE

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- Key Concepts
- Methodology of Implementation
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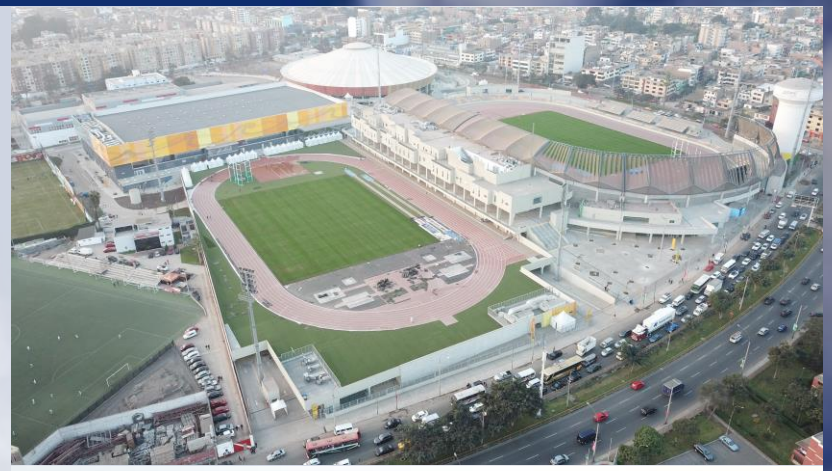
- Acknowledgements

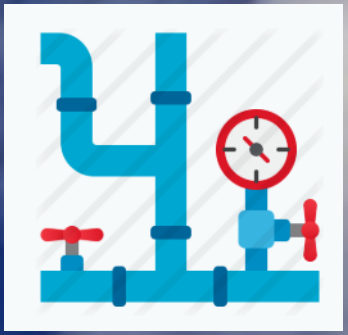


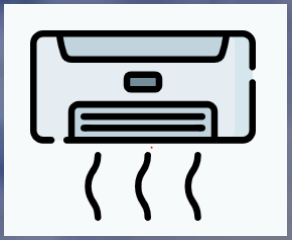
INTRODUCTION

The aim of this research is:

a) To show the implementation of The Last Planner System during the finishing phase and MEP phase in an infrastructure project and the improvements on the project indicators (SPI and Percentage of Complete Plan)

b) To describe the behaviours of the subcontractors during the implementation of LPS.



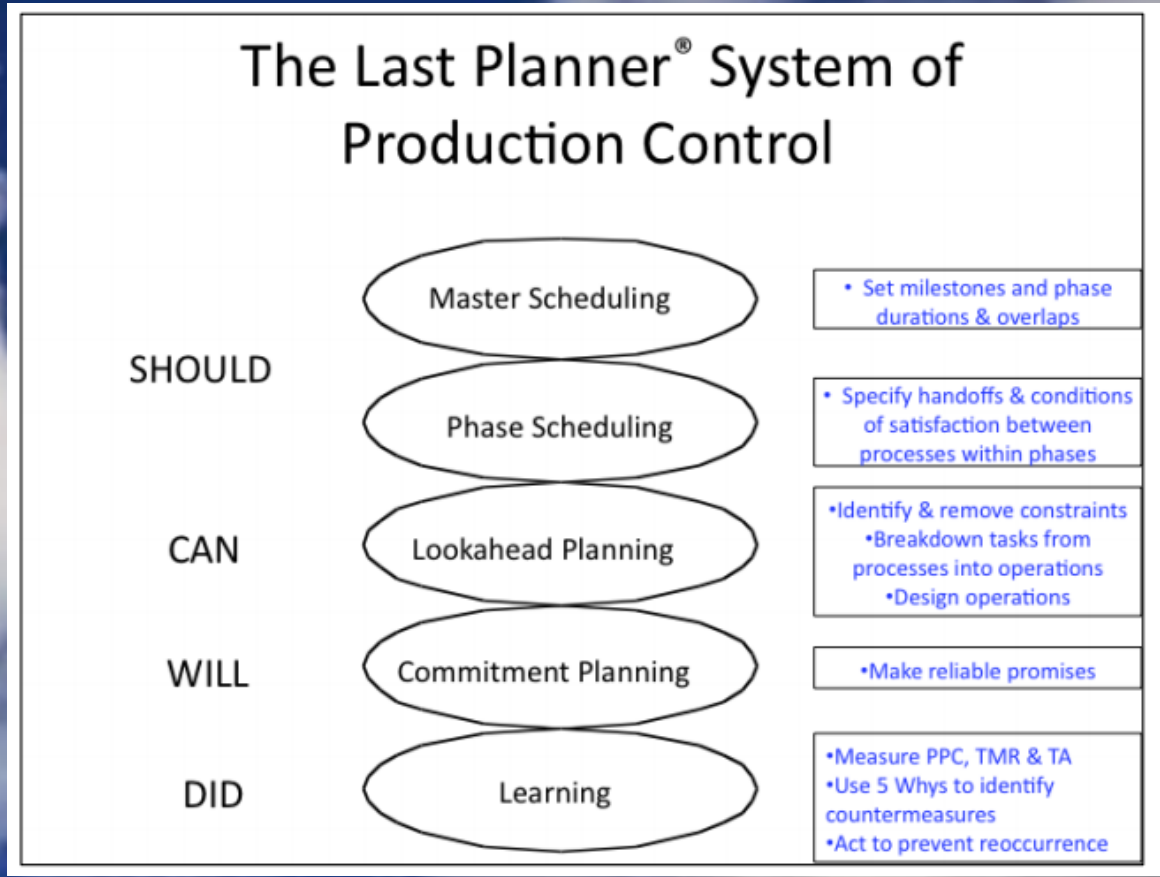


KEY CONCEPTS

- **LAST PLANNER SYSTEM®**

LPS is a structured collaborative process that dramatically improves coordination and the identification of constraints on projects through effective conversations, shared understanding, and reliable promising. (Ebbs and Pasquire, 2019).

LPS promotes conversations between foremen and site-management at appropriate levels of detail, and before issues become critical. These conversations increase the chance that workflows and recognizes that personal relationships and peer pressure are critical to that process. (Mossman,2017).



(Ballard and Tommelein 2016).

KEY CONCEPTS

- **PULL PLANNING**

It is a collaborative planning process where project performers work together to design the process to deliver a milestone. The term "Pull Planning" refers to the lean concept of "pull" as a request from downstream as opposed to the top-down "push" as applied in a traditional practice. (Tsao, Drapper and Howell,2014).

- **VISUAL MANAGEMENT**

Visual Management (VM) is an important management strategy and a fundamental element of the Toyota Production System that creates highly visual (sensory) information fields from which people can pull information for an augmented self-management and control (Tezel et al. 2013).

- **BIG ROOM**

Big Room can be defined as the place where collaborative planning meetings are held, milestones plan, Pull Sessions, weekly meetings, and daily stand up meetings. The Big Room helps to encourage people to collaborate, improves the communication of the key information. (Pons, 2019).

METHODOLOGY OF IMPLEMENTATION

Implementation of LPS

FIRST STAGE
10 weeks
37th week to 46th week

- In this stage the subcontractors were trained in the use of LPS correctly, GC taught them to identify restrictions and made a correct look ahead. Also, the team identified key indicators in the Project: PPC (Percentage Plan Complete) and SPI

Diagnostic of level of Implementation

- Balandron (2017) mentioned a tool developed by the Centro de Excelencia en Gestión de Producción de la Pontificia Universidad Católica, (GEPUC) that permits to evaluate the level of implementation of LPS in projects

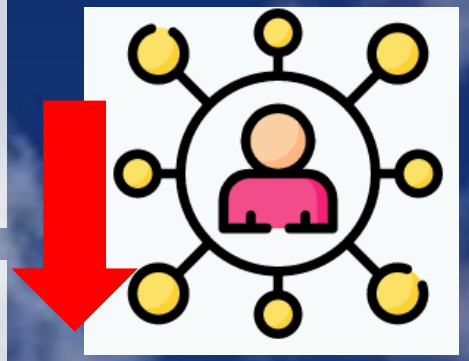
SECOND STAGE
17 weeks
47th week to 64th week

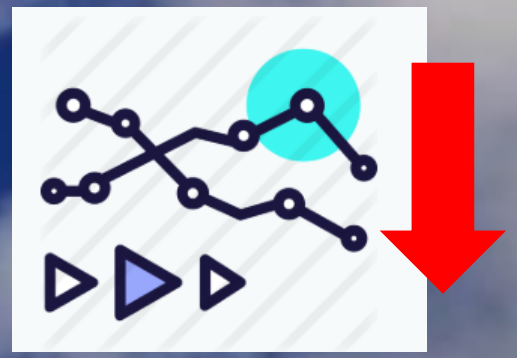
- Based on the diagnose of the level of implementation GC prepare and implement improvements to increase the level of implementation. In this stage, the team applied visual management, big room, and other tools to increase collaboration and communication on the Project.

FIRST STAGE

General Contractor faced certain problems with subcontractors:

- Low commitments, PPC (Percentage of Plan Complete) was around 50% percent and SPI was descending.

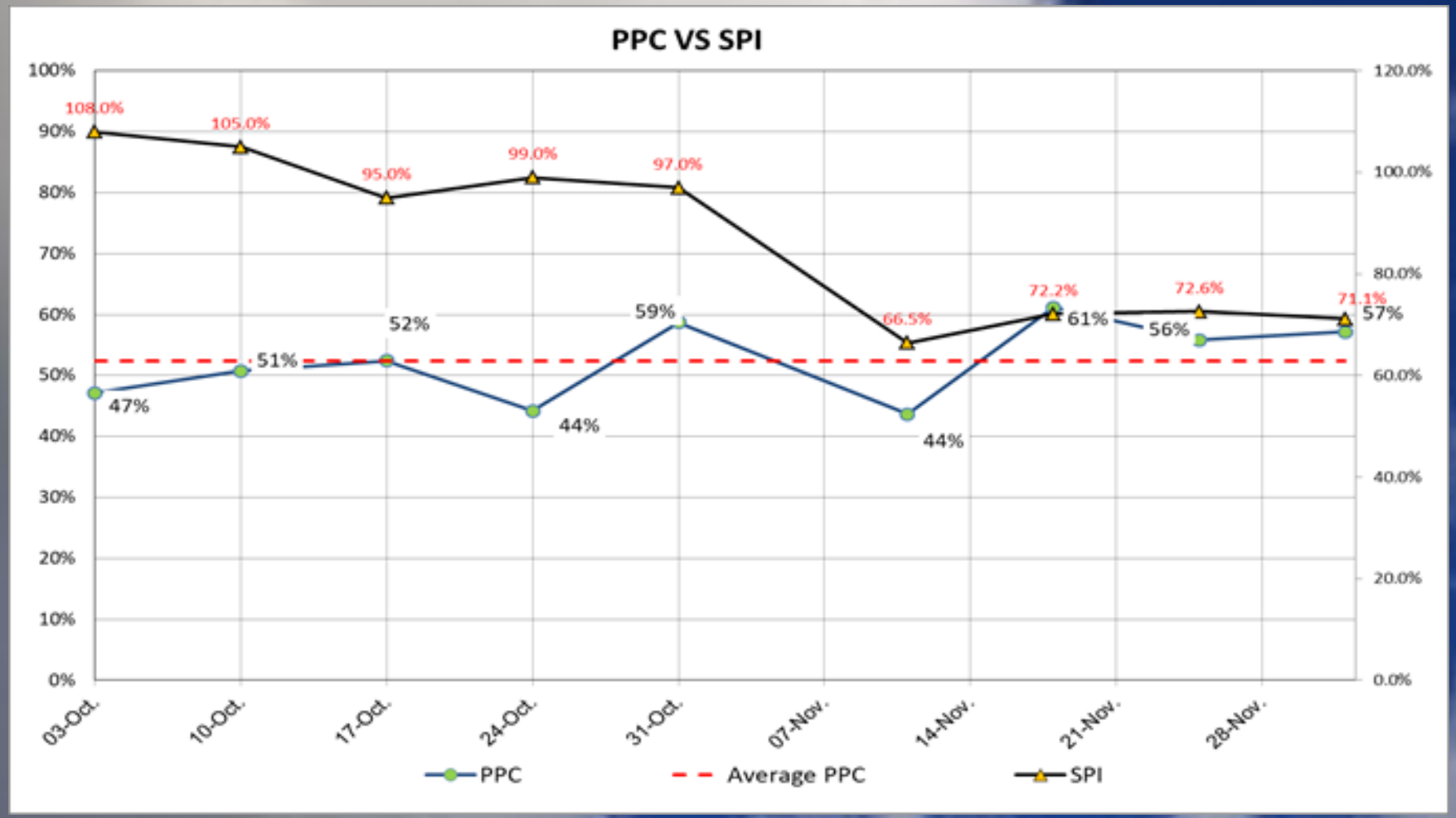




- Lack of knowledge in last planner tools. (Shortfalls in identified constraints, weekly plan, daily plan).

- Low collaboration.

FIRST STAGE


PPC VS SPI
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
108.0%
105.0%
95.0%
99.0%
97.0%
66.5%
72.2%
72.6%
71.1%
47%
51%
52%
44%
59%
44%
61%
56%
57%
03-Oct.
10-Oct.
17-Oct.
24-Oct.
31-Oct.
07-Nov.
14-Nov.
21-Nov.
28-Nov.
PPC
Average PPC
SPI

DIAGNOSTIC

1
- The master plan was not visible,; and the milestone plan was not published among all participants in the planning sessions

3
- Some subcontractors are in a learning period and are still learning to identify constraints and properly fill in the look ahead.

4
- Proper management of constraints was not being carried out in the project

5
- The team established an adequate space and schedule for meetings. However, not all subcontractors were integrated. Some of them arrived early and others arrive late.

6
- Subcontractors were working on their plans and understanding the methodology as they have not worked on previous projects with the use of LPS.

7
- A correct analysis of the CNC was not being carried out. There was a CNC survey, but was not updated

DIAGNOSTIC

8

- There was no work being done on an analysis of corrective actions by type of subcontractor and the corrective actions being taken on the project were not recorded.

9

- Everyday general contractor and subcontractors submitting daily plans, however, there were no panels promoting transparency on the planning site or in the meeting room

10

- Regarding the phase plan, it was not carried out, it was not updated and there was no record of commitments associated with the phase planning meeting.

11

- Attendance Control of subcontractors was registered. Causes of Non-compliance and indicators were not published or updated.

12

- The production manager, the venue manager used to participate. In some meetings, the client was invited to promote the transparency of the project. Subcontractors were involved, but not all of them arrived prepared.

SECOND STAGE

The team of the project implement some countermeasures to improve project indicators and level of implementation of LPS, these actions are described below:

- **Alignment the Organization**
- **Pull Planning Meeting**
- **Make Ready Planning**
- **Weekly Work Planning**
- **Daily Planning**

PULL PLANNING MEETING

- Stage 01: In these stage participants were MEP and communication subcontractors. Duration: 02 hours.
- Stage 02: In these stage participants were facade subcontractors (curtain wall, Huaca wall, piping, electrical, and metallic structure subcontractor). This meeting took 01:30 hours.
- Stage 03: Finishes subcontractors, this meeting took 01:00 hour.

MAKE READY PLANNING

- GC used the pull planning panels to support the planning because it helped to see all the planning easily.
- GC created a culture with subcontractors based on the schedule in pull planning meetings.

WEEKLY WORK PLANNING

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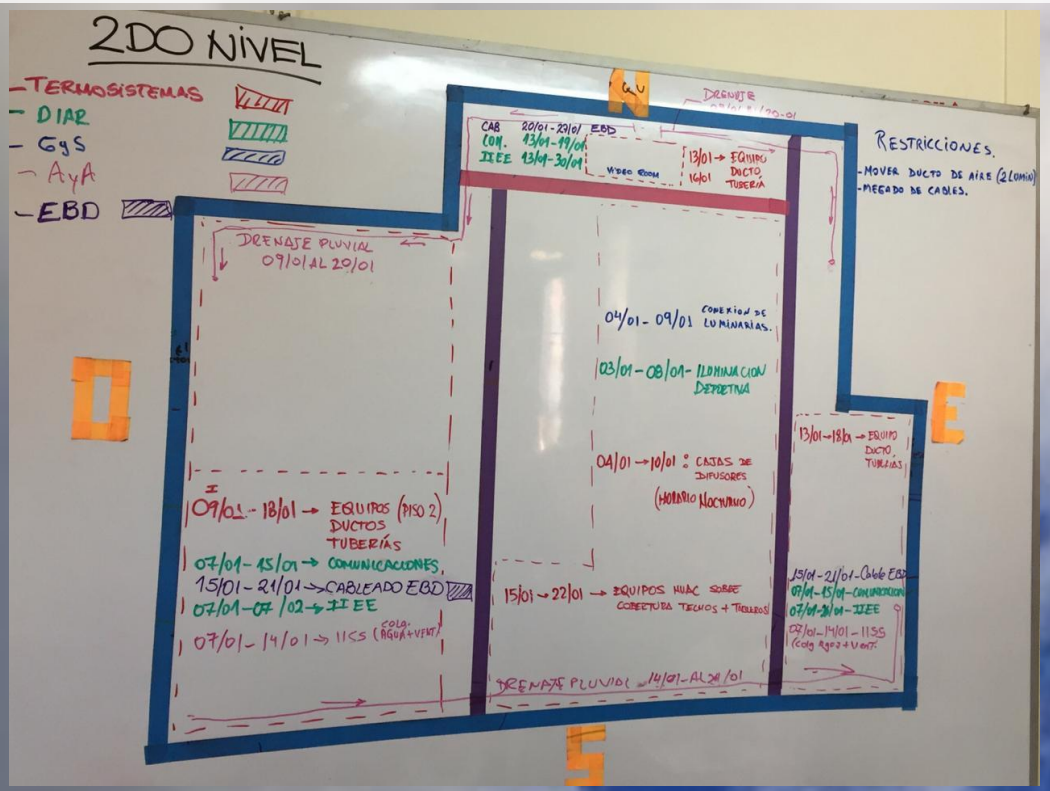
- GC implemented a whiteboard with the shape of the project, assigned a color marker for every subcontractor and it used the board to mark the area of work. It helped to visualize the work and interferences

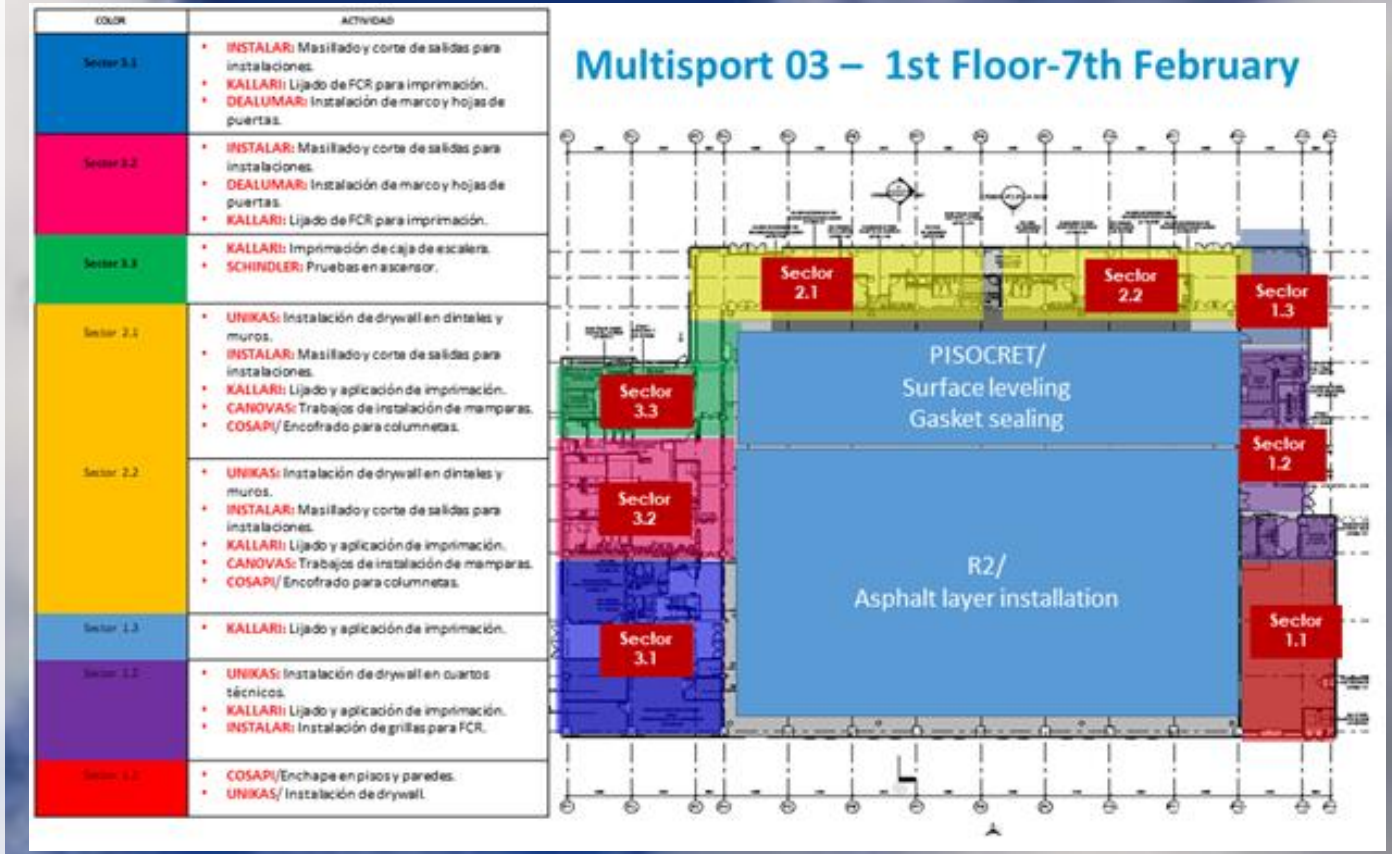
- With the coordination of facade works, GC used a whiteboard with post-it notes to improve the planning meeting; GC assigned a color of post-it notes to every subcontractor to mark its own location of work



DAILY PLANNING

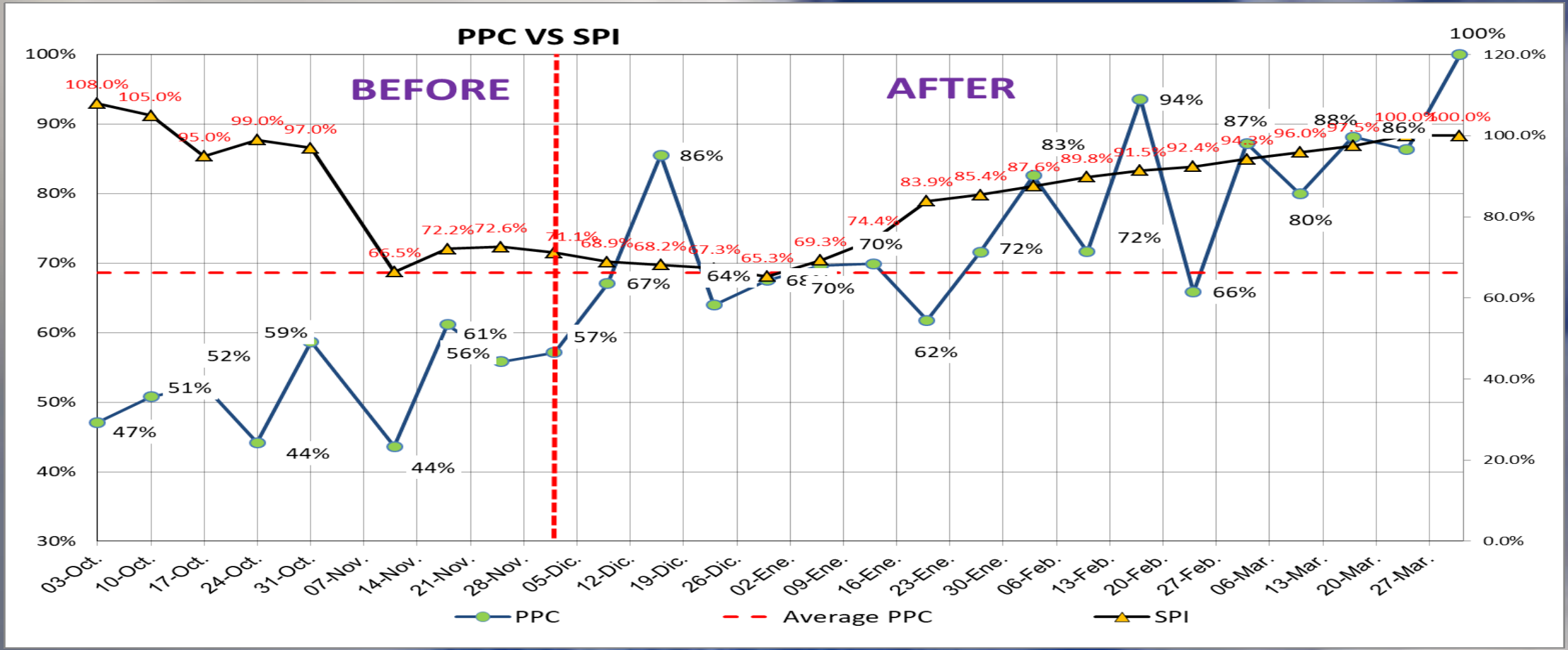
These practices replied with the principal subcontractors (Sanitary works, finishes, steel structure and other), based on this success and to increase the transparency of the general contractor, 02 WhatsApp groups were created on the critical activities in the project:

- Facade works: In this, GC needed to coordinate simultaneously between 06 subcontractors (curtain wall, Huaca wall, electrical. Plumbing, metal structure, facade subcontractor).
- Ceiling: In this case, the ceiling subcontractor needed that other subcontractor finishes their work to close the ceiling. He depends on HVAC subcontractor, communication subcontractors, firewater subcontractor, electrical, plumbing subcontractors.



COLOR	ACTIVIDAD
Sector 3.1	• INSTALAR: Masillado y corte de salidas para instalaciones. • KALLARI: Lijado de FCR para imprimación. • DEALUMAR: Instalación de marco y hojas de puertas.
Sector 3.2	• INSTALAR: Masillado y corte de salidas para instalaciones. • DEALUMAR: Instalación de marco y hojas de puertas. • KALLARI: Lijado de FCR para imprimación.
Sector 3.3	• KALLARI: Imprimación de caja de escalera. • SCHINDLER: Pruebas en ascensor.
Sector 2.1	• UNIKAS: Instalación de drywall en dinteles y muros. • INSTALAR: Masillado y corte de salidas para instalaciones. • KALLARI: Lijado y aplicación de imprimación. • CANOVAS: Trabajos de instalación de mamparas. • COSAPI/ Encofrado para columnetas.
Sector 2.2	• UNIKAS: Instalación de drywall en dinteles y muros. • INSTALAR: Masillado y corte de salidas para instalaciones. • KALLARI: Lijado y aplicación de imprimación. • CANOVAS: Trabajos de instalación de mamparas. • COSAPI/ Encofrado para columnetas.
Sector 1.3	• KALLARI: Lijado y aplicación de imprimación.
Sector 1.2	• UNIKAS: Instalación de drywall en cuartos técnicos. • KALLARI: Lijado y aplicación de imprimación. • INSTALAR: Instalación de grillas para FCR.
Sector 1.1	• COSAPI/Enchape en pisos y paredes. • UNIKAS/ Instalación de drywall.

RESULTS


PPC VS SPI
BEFORE
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03-Oct.
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17-Oct.
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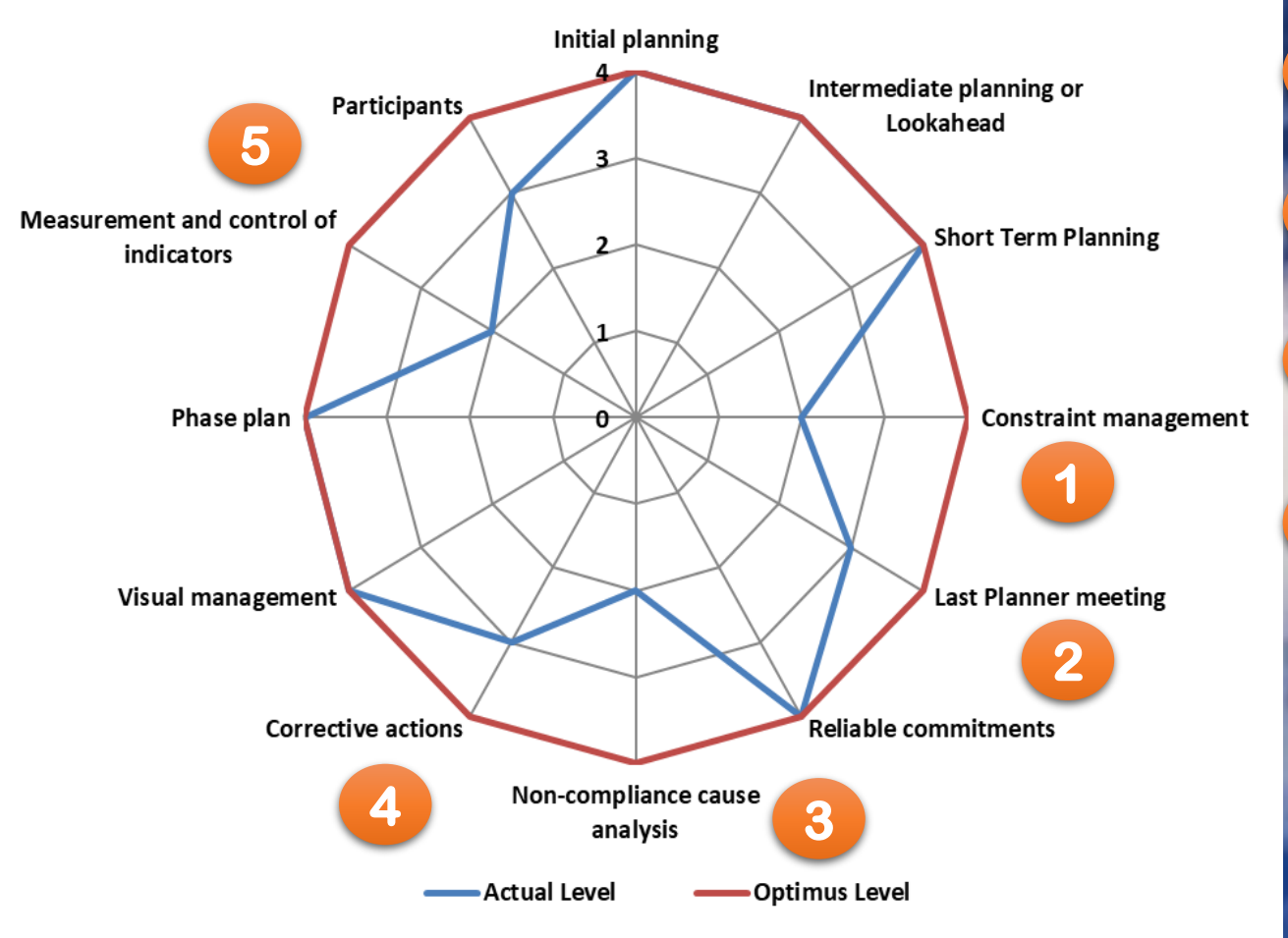
31-Oct.
07-Nov.
14-Nov.
21-Nov.
28-Nov.
05-Dic.
12-Dic.
19-Dic.
26-Dic.
02-Ene.
09-Ene.
16-Ene.
23-Ene.
30-Ene.
06-Feb.
13-Feb.
20-Feb.
27-Feb.
06-Mar.
13-Mar.
20-Mar.
27-Mar.
PPC
Average PPC
SPI

RESULTS



1 • In the case of restrictions GC identified some on them on the meetings and GC used a risk matrix to evaluate the impact of the restrictions of the schedule.

2 • Weekly meeting happened on Fridays. To improve the meeting GC could prepare a coffee break and reduce the use of cell phones during the meeting..

3 • A correct analysis of the CNC was not carried out. Some subcontractors only sent their look ahead planning and completed causes of non-compliance but they didn´t analyze.

4 • Some corrective actions were registered but not totally. The owner of the project usually indicated to General Contractor to send corrective actions of critical activities that could impact the final milestone of the project.

5 • During the Project, General Contractor registered SPI and PPC. However, in a future project, GC can use some indicators, Samad et al. (2017) proposed TMR (Task Make Ready), PCR (Percentage Constraints Remove).

CONCLUSIONS

- The implantation of a person as the Last Planner Facilitator helped field engineers and Venue Manager to improve the communication with the subcontractors.
- Indicators of the project (SPI and PPC) improve with the correct application of LPS. It's important to have tools to evaluate the level of implementation of LPS, so the team can act quickly before the variability affects the project. The team suggest considering more indicators related to LPS.
- Pull Planning Meetings helped to increase the collaboration between trades and noticed the dependences between subcontractors. Other important benefits were the identification of multiple restrictions of works.
- Visual Management was permitted to increase the collaboration, communication, and transparency between subcontractors, owner, and the General Contractor.

CONCLUSIONS

In this implementation, the Venue team noticed that subcontractors, client and general contractor experiment these behaviors:

- Learning, continuous improvement and goal-driven behaviors: Subcontractor was aligned with the milestones of the project, also they learned about the use of the last planner system and made a correct look ahead.
- Open participation/communication, transparency: They were free to participate in the meeting. At half of the implementation, the subcontractor arrives with restrictions that depend on other subcontractors and in the meeting other subcontractors made committed to solve these constraints.
- Reliable promising: PPC in the project increased with the pull planning meetings and use of visual panels.

ACKNOWLEDGEMENTS

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