

IDENTIFYING MANAGEMENT PRACTICES FOR IMPLEMENTATION OF OBEYA ROOMS IN INVESTMENT PROJECTS IN A CONSTRUCTION STAGE

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ABSTRACT

Lean Construction as a project management approach offers a comprehensive set of tools to solve problems that prevent a continuous flow in projects. The need to manage production processes through permanent work in the value chain by means of improved communication and coordination from the parties involved has been identified as one of the key factors of the Lean approach. Tools such as the Obeya Rooms represent an alternative to solve these problems by seeking greater effectiveness from the interaction of a project's participants as these provide a unique space under a collaborative management methodology based on continuous improvement. However, the experiences identified in Chile have failed to establish common patterns towards a proposal to standardise these tools. The present study aims to identify current practices in Obeya Rooms through literature review and qualitative data collected by national and international Lean experts who have participated in the design of this tool. Analysis of data collected allows the identification of common management practices to design future Obeya Rooms in the construction sector. Collected data is structured according to the following items: Frequency and Duration, Management of Indicators, Participants and Roles, Stages, Physical Space, Rules and Recommendations.

KEYWORDS

Lean Construction, Lean Construction Tools, Obeya Room, Standards, Planning

INTRODUCTION

Obeya Room (OR) is a tool developed in the context of the Lean philosophy. It can be defined as a physical space that, complemented by a methodology of continuous improvement oriented to waste reduction or elimination, improves communication and coordination of a project's teamwork, thus optimising the time consumed in coordination and planning meetings. Obeya is a Japanese concept that is translated into English as "large room"; however, it is currently known by other names, such as "War Room," "Big Room," "Control Room," "Discovery Room," "Visual management room," among others, depending on the company or author (Aasland et al., 2012; Siavash Javadi, 2012). Its origins lie in the G-21 project at Toyota in the 1990s, a project that led to the first

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generation of the Prius. Takeshi Uchiyamada, Toyota Chief Engineer, considered that he lacked authority for decision-making, which required approval from other managers. To solve this problem, Obeya was created (Aasland et al., 2012).

Attempts to implement Obeya Rooms have been identified in the construction industry. From previous experiences, it is possible to identify the implementation of Obeya Rooms in a mining project in Chile, which reported improvements regarding meeting lengths coming down from 120 to 45 minutes, improved attitudes of participants, enhanced fulfillment and quality of commitments, being no longer related merely to management of resources or activities, but focused on concrete results. (Retamal Pardo, 2016). A second experience showed progress concerning the effectiveness of continuous improvement cycles and enhanced coordination among specialists, arriving at effective solutions in less time (Mikati et al., 2007). Finally, a study conducted with focus on the information flows analysis in the workplace in a large-scale hospital project in the US reported that a survey applied to 53 participants of the project's Big Room showed that 90% assumed this tool allowed enhanced management (Khanzode 2018).

Nevertheless, despite the fact that the Obeya Room tool is starting to be introduced as an alternative for construction, the McGraw Hill Construction study (2013), conducted by construction professionals, showed that a very high percentage of contractors (62%) are not familiar with this tool. On the other hand, 18% of companies are familiar with the tool but have never used it, and it is used by only 20%. Study results fully agree with the study by Soukas (2015), which states that there is no single correct definition or function for working with the Big Room method. A similar situation occurs in Chile; consequently, this study will be responsible for disseminating this tool by identifying common management practices according to the opinions of national and international experts who have participated in the design and management of the Obeya Rooms.

BENEFITS OF OBEYA ROOMS AGAINST TRADITIONAL MEETINGS

Numerous authors highlight the benefits of implementing OR compared to traditional meetings. The main aspects enhanced by this tool are detailed below.

Visual Management

One of the main aspects promoted by Obeya Rooms is Visual Management (VG). This relates to the use of visual aids to increase accessibility and information flow in a work environment (Tezel et al. 2016). According to Lurie and Mason (2007), the use of graphic screens provides managers with the ability to identify and detect patterns that are generally difficult to observe through statistical methods; in turn, this may improve decision-making. Based on certain findings, Liker and Morgan concluded that OR is one of the most effective tools in this context (Lurie and Mason 2007 cited in Alaassar 2017; Liker and Morgan 2011 cited in Alaassar 2017).

Communication and Information Flow

As a consequence of promoting visual management, the communication of key information is improved as it allows all team members to have access to updated information, plans or designs; moreover, transparency among different actors of the project is promoted, enabling understanding and empathy throughout the different areas. Both the involvement of key project members and their interaction in the same physical space increase the sense of responsibility; also, information exchange is carried out among the right people, by knowing who to ask questions to get the right answers and eliminating communication "silos". (Dave et al., 2015; Lean Construction Institute 2015;

Pons Achell 2019). Additionally, role assignment to meeting participants generates an organized environment, where each area may disseminate its states and needs; all members participate, achieving an enhanced flow of information in the project.

Collaboration

OR promotes problem solving through collaborative work, so participants commit themselves instead of simply urging other professionals. Both group problem solving and more effective information flow increase confidence inside the team since a shared vision of values, objectives and project status is generated. Moreover, relationships among all team members are strengthened, and as a result trust among participants increases, which in turn boosts group's optimism (Olivencia 2014; Pons Achell 2019)

Problem Solving

The use of visual management facilitates problem identification or project deviations; likewise, both communication and collaboration contribute to avoid many unnecessary processes. Simple measures, such as all participants standing up, encourage decision-making hastening since the degree of comfort is lost in some way (compared to traditional meetings where people are usually seated), which promotes agreements. In addition, greater collaboration and gathering of all decision makers in one place help make the cycles of continuous improvement - PDCA (Plan, Do, Check and Act) shorter and more efficient (Andersson and Bellgran 2009 cited in Javadi et al. 2012). By applying the problem solving scientific method every day, workers develop autonomy (and confidence) to address problems and make the right decisions. (Alaassar 2017)

METHODOLOGY

In order to identify common characteristics and management practices for the implementation of ORs in future projects, this study is carried out through 5 phases.

- Literature review of national and international information sources, based on the internet using academic web search tools such as Google Scholar, Researchgate, scientific journals of the Journal type, conference articles, etc.
- Data collection through surveys and semi-structured interviews. A group of eleven Latin American Lean experts (Table 1) was selected according to their experience on implementing Lean Practices and Tools such as OB in order to apply semi-structured interviews. Semi-structured interviews were chosen because they offer flexibility to evolve during the conversation, but always following research guidelines. As the research progresses, some topics are concluded and new topics of interest emerge, so the questions evolve in accordance with those topics. (The questions address topics such as the level of acquaintance with the tool, the identification of its advantages, and weaknesses from experience and questions that aim to identify the practices in the dynamics of the Obeya Room meeting). On the other hand, surveys were carried out with those not available to be interviewed.
- Result analysis from a simple management characteristics and practices categorization and applicability analysis.
- Identification of common practices in the implementation of Obeya Rooms with the greatest possible consensus between the bibliography consulted and the experts.

- Validation of practices identified by the experts. After common practices were identified from simple categorization, these were validated by the initial group of experts who participated in the first stage of interviews and surveys.
- Work conclusions and recommendations for future research.

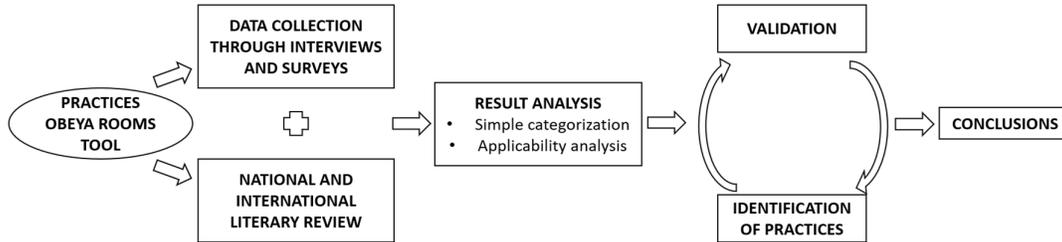


Figure 1: Study Methodology

CHARACTERISATION OF PARTICIPANTS

Characteristics of interviewees and survey respondents participating in the data collection process are presented below, who are identified as P1 through P11.

Table 1: Characteristics of Interviewees

Initials	Country	Expertise Field	Position	Experience in OR
P.1	Chile	Mining	Innovation and continuous improvement	Participation
P.2.	Mexico	Housing	Construction Operations Director	Design and implementation
P.3.	Spain	Consulting	Lean Management	Design and implementation
P.4.	Chile	Consulting	Lean Transformation Manager	Design and implementation
P.5.	Chile	Mining	Productivity Leader	Participation
P.6	Chile	Mining	Chief operational management and innovation	Participation
P.7	Chile	Mining and telecommunications	Productivity Leader	Design and implementation
P.8.	Mexico	Agroindustry	Lean Manufacturing Coordinator	Design and implementation
P.9	Chile	Consulting	Chief Consultant	Participation
P.10	Chile	Mining	Productivity Specialist	Participation
P.11	Chile	Infrastructure	Lean Implementation Manager	Participation in LPS meetings

IDENTIFICATION OF OBEYA ROOM PRACTICES

Based on data collected from both the reviewed literature and the interviews and surveys, it was possible to identify common practices that characterise an OR. It is important to mention that Fuentes (2020) includes complete details of data collected from interviews and surveys. As mentioned, these practices were subjected to an iterative process of validation by experts, who were interviewed two times in order to validate the preliminar practices identified from the first set of surveys and semi-structured interviews. Finally, it is possible to identify six main items to characterise an OR in the construction sector: (1) Frequency and Duration, (2) Management of Indicators, (3) Participants and Roles, (4) Stages, (5) Physical Space (room), and (6) Rules and Recommendations. Additionally, a dependency with two variables was identified for some Obeya characteristics: Organizational Level and Industry Area, detailed as follows:

1. Organizational Level (OL):
 - OL1: It corresponds to meetings held by senior managers of companies executing the project, whose visions are global for the project.
 - OL2: It corresponds to meetings held by intermediate managers of companies executing the project, whose visions are focused on coordinating and taking actions to fulfill the program.
 - OL3: It corresponds to meetings held by the project workforce, whose vision is the fulfillment of partial or daily goals.
2. Industry Area: Mining, Infrastructure and Housing or multi-story building

The following paragraphs summarise the practices identified for designing and implementing future OR, according to the experiences of professionals who contributed in the data collection stages.

FREQUENCY AND DURATION

The frequency of the Obeya meetings is variable, associated to the type of project, level of complexity, execution phase and maturity degree of the team. It is possible to decrease the frequency as participants' expertise in their fields is higher; however, this should be complemented with reports that support the information if required. Based on the information provided by experts, Table 2 provides recommendations regarding frequency according to category.

Table 2: Recommended Frequency by Category

	Mining	Infrastructure	Housing
OL1	Biweekly	Weekly	Weekly
OL2	Weekly	Weekly	Weekly
OL3	By turn	Daily	Daily

Regarding Obeya Room meetings' duration, data collected allows to provide the recommendations grouped in Table 3.

Table 3: Recommended Duration by Category

	Mining	Infrastructure	Housing
OL1	1 hour	1 hour	1 hour
OL2	From 30 min to 1:30 hr	1 hour	1 hour
OL3	From 5 to 20 min	From 15 to 25 min	From 5 to 15 min

In case of organising an Obeya meeting that does not fit with the indicated categories, it is suggested to determine an approximate duration from a pilot meeting, based on the stages and number of areas involved.

INDICATORS MANAGEMENT

Regarding the definition of performance indicators, it is suggested to hold a meeting prior to the implementation of the OR with the the project productivity areas such as client, contractor and subcontractors. In this meeting, a set of Key Performance Indicators (KPIs) could be defined, which may vary according to the contract's temporality. In order to guide this decision, the following questions must be answered: What do we want to measure? Why is this data being measured? Does the defined indicator follow our proposed objectives? Is this a key factor for the company? Who is responsible for supervising? How often should this be supervised?

Just like the previous aspects, there is some degree of dependence on the specific indicators recommended to use at each level of the company. In general, the OL1 level Obeyas deal with indicators related to cost, quality, term, safety, environment, etc. OL2 level Obeyas focus on the areas of security, term, labour, quality, purchases and acquisitions, programming, equipment, etc. Finally, OL3 level Obeyas address the areas of security, labour, programming and coordination.

It is recommended to start the OR implementation process with a limited set of indicators, so they can be increased as the team consolidates. Fuentes (2020) includes a list of KPIs for each Obeya Levels, which could be considered in the earlier stages of the OR design and implementation process.

PARTICIPANTS AND ROLE

It is possible to establish that an appropriate number of participants is around 15 professionals. If a larger number of members is necessary, two separate meetings are recommended, ensuring that there is information connection between them. Given the limit of participants, professionals with a relevant degree of responsibility in the area of analysis who are capable of promoting management of the indicators in the project should be selected.

Table 4 identifies similarities between each role's characteristics., which are structured according to their description, functions and expected good practices.

Table 4: Characteristics of OR Roles

Aspect	Characteristics		
	Moderator	Participant	Owner
Description	Professionals with status enabling them to lead the meeting's agenda and the project's follow-up. They are motivators, observers, and highly-skilled communicators.	Professionals who participate in the meeting and are responsible to a certain degree in decision-making or are part of the total or partial management of the meeting's topics. Respectful and proactive.	A professional with experience and knowledge of the transversal areas of project management, from issues related to productivity to the nature and management of the contract.
Functions	Leading the meeting, following the established routine and times, asking for explanations and encouraging the management of commitments to participants when there are deviations in the management indicators, agreeing and defining those responsible for the commitments.	Paying attention to results presentation of the different areas, if responsible for an area; updating and presenting their boards when appropriate; participating and proposing solutions by raising important issues that hinder the progress of the project and by committing when appropriate.	Consolidating the meetings' commitments and emailing them to the participants; supervising commitments fulfillment; recording the times per section used in the meeting; ensuring adequate maintenance of the room and managing panel layout modifications when agreed.
Good practices	Promoting the "Obeya Room Rules". Encouraging participation of all members and intervening only when necessary, that is, if there are unresolved conflicts, personal attacks, or arguments that should be taken to the "parking lot" (If someone talks about a single point for more than two minutes, a parallel conversation may be worth or "parking" this idea for future discussions.)	Being prepared for the meeting, performing a root cause analysis of the deviations before explaining them in the meeting, and studying their area's KPIs and responsibilities.	Ensuring proper commitment management: a single person responsible must be declared, start with a verb, define an action, and state a release period no longer than 4 weeks.

STAGES

An agenda based on a cycle of continuous improvement (PDCA) is suggested, complemented by a sequence of monitoring the project's progress status. This can be past, (prior to the meeting), present (actions during the meeting) and future (measures taken to be carried out once the meeting is over). Table 5 includes information about the process and more details in order to better understand OR design and implementation.

Table 5: Obeya Room Meeting Stages

Time (Moment)	PDCA Cycle	Stage
Past	Do	Work done from the last meeting to the current one
Present	Check	Attendance list
Past		Security revision
		Advance revision
		Plan summary
Present	Act	Critical path revision
Future	Plan	Commitments revision

The details of issues addressed at each stage of an OR meeting are given below:

Attendance List

At this stage, each participant previously invited to the meeting must register attendance, date and name.

Security Revision of Project

It consists of a security reflection regarding recent events, in which the security officer announces the status of the indicators in the area. Based on this state, countermeasures are taken in conjunction with the involved areas to mitigate problems, which must be managed as commitments. The impact of the countermeasures implemented in the indicators is verified in each period, in order to improve the process.

Advance Revision of Project

The progress status of the project's main items (for example, excavation, assembly, etc.) is reviewed regarding the planification.

The suggested sequence to present the results on the dashboards is the following:

1. Definition of indicators: what they represent and how they are calculated.
2. Review of indicators status, visually represented through diagrams, graphs, etc.
Comparison of the theoretical program versus real progress: If there are deviations, the Causes of Non-compliance (CNC) are analysed, and agreements are settled in order to solve them (commitments).
3. In case of requirements, interference detections or future restrictions, commitments must be established in order to solve them.

Additionally, the transverse support areas for the project's performance, such as quality, environment, safety, etc., are reviewed. This consists of disseminating the results of the previous period following a sequence identical to the "Programming" case, with the exception of the "Theoretical program vs. real progress" point, and emphasising the requirements for next period.

For both categories, the lecturer is the representative of the area that presents its results. During this presentation, the rest of the team listens carefully, clears up doubts, and the moderator exerts a questioner role to identify the root cause of the CNCs generating the necessary commitments to solve them.

Plan Summary

The objective of this stage is to analyse the theoretical advance program versus the real one in conjunction, so as to generate a summary list of all the CNCs, restrictions and identified interferences that have not yet been solved. It is suggested to keep a record of the historical CNCs that are observed repeatedly, in order to identify if current breaches align to common causes; if so, respective countermeasures are taken.

Critical Path Revision

It corresponds to the stage where possible solutions to problems that have not yet been resolved are analysed. First, a prioritisation of activities is carried out regarding their impact on the project's progress. Based on this prioritisation, the actions or commitments for their solution are assigned. If necessary, tools such as A3 formats can be used to solve more complex problems. Finally, the planning manager estimates the extent to which new commitments impact the program and, if necessary, updates them, sharing the updated version of the program with all concerned areas. Each area is responsible for quantifying the impacts generated given the modifications.

Commitments Revision

Final stage during which the “Obeya Room Owner” registers commitments on a board (similar to the commitment log in a traditional meeting) and tracks those assigned in previous meetings.

It is expected that each commitment is provided with information such as start date, description, responsible, committed date, status (delayed, fulfilled or in progress), and rescheduling date (if any).

PHYSICAL SPACE

According to data collected, the following characteristics of the room are proposed for the Obeya meeting:

1. Physical space:
 - Measures proportional to the number of people (based on a recommendation of 1.6 m² per person).
 - Appropriate lighting, ventilation, AC or heating conditions.
 - Free space, limited use of chairs and tables (only if strictly necessary).
 - Walls are used as dashboards or control boards (Concerning the boards, their dimensions must allow information to be read by all participants during presentations).
 - Space for materials: Post-it notes, markers, flipcharts.
2. Use of technology: Project's monitoring activities can be reinforced with the use of smart boards, projectors and television screens.
3. Visual management: Encouraging the use of graphic tools to account for the project's indicators and progress status. The use of moderate colours that highlight only the important issues is advisable, and information must be organised in a logical way for improved monitoring. A printed clock that represents each stage with estimated duration is recommended.

RULES AND RECOMMENDATIONS

Data collection from this study, complemented with the literature review, offers a list of general rules for OR implementation. However, caution is advised when providing a very rigid structure that restricts creativity of the teams in charge of implementation. Considering this, the following general rules are suggested:

- The meeting must be prepared in advance (topics to be presented, indicators measured until agreed cut-off date, and panels).
- Punctuality is a must. The routine established in the meeting's dynamics and set times must be followed and respected.
- Participants must be standing up during the meeting, paying attention to the lectures displayed on the different boards.
- Close attention must be paid until the lecturer finishes, keeping up a spirit of cooperation, learning and improvement.
- Only relevant topics for the meeting must be included on the agenda.
- Opinions must be based on facts and judgements should be avoided.
- Members must be encouraged to engage in conversation and solution searching to problems identified.
- The "2 minutes rule" must be applied.
- The meetings' names can be adapted to every culture and company's language. Labelling them as "Obeya Rooms" is not mandatory.
- The room may be available for all project participants, so that they can report on the status of the project, taking advantage of its available space and visual information resources, etc.
- A fixed schedule for the meeting in a period of time with minimum distractions must be established.
- Any project participant must be allowed to enter the room and leave suggestions with a *post-it* note on the corresponding area's board. Each area manager should review, manage or provide a specific proposal as a suggestion before the meeting.
- In Obeya Room implementation projects that demand high level of development (that is, participants' correct execution of their roles, dynamics in accordance with the design, and adequate physical space), the use of technology may help reduce space and time barriers, and simplify and shorten durations. However, the use of virtual tools demands prior preparation of participants (previous face-to-face collaboration).

CONCLUSIONS

This research has allowed identifying common practices in the implementation of Obeya Rooms in construction stages. This tool's potential benefits can be identified in the literature review and expert opinions: enhancing visual management, improving collaboration, facilitating communication and information flow, and solving problems efficiently. Regarding Lean philosophy in construction, it is observed that the OR tool contributes transversally to its principles. First, it allows identification of flow or processes (constructive methods carried out in a project) through transparency in its different areas and the way work is carried out, considering the main problems faced.

After identifying the value flow chain, it acts on the third principle: waste elimination. This is mainly possible given the enhanced level of collaboration and coordination, by tackling overproduction wastes, delaying, overprocessing, transport, inventory, movement and quality, without forgetting talent waste, which is addressed by giving voice and space to a greater number of participants in the project. Finally, the last principle of continuous improvement is clearly reflected in the evaluation tools proposed in the standard, which allow finding flaws in the implementation and design, as well as generating space to propose improvements.

It is important to mention that all potential benefits based on the implementation of the OR go hand in hand with a responsible commitment of participants and the organization to which the project belongs. It is not enough to implement this tool if there is a poor level of involvement of both participants and senior officials with Lean thinking, continuous improvement, and its principles. There must be confidence and motivation concerning that what is being done will bring benefits to the project, which will be reflected in the different areas that comprise it. Finally, it is important to note that the results presented in this study are part of an investigation that aims to design an implementation standard for OR in investment projects in order to guide future implementations. A future research may explore in practice the way these recommendations should be addressed in the design of new OR, and identify their impact in dimensions such as collaboration, time management and decision making process. Thus, after reviewing the literature and the opinions of Latin American experts that have already participated in the design or implementation of the Obeya Rooms and are able to recommend common practices, it is possible to mention that a next step would be to establish variables that impact investment projects at the level of KPIs, but also at the level of collaboration and efficiency networks in the coordination and decision-making processes. For example, social networks analysis, which has already been used in construction, may help to identify how this tool favours the progress of projects. Finally, it is important to highlight that the present paper has attempted to summarise the main findings in the identification of common practices for the design and implementation of future Obeyas. Most detailed information, however, can be found in the undergraduate thesis of the main author of this document, Fuentes (2020).

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