

# **LEAN DESIGN IN HYDRAULIC INFRASTRUCTURE – RIVER DEFENSES AND DIKES -A CASE STUDY FROM PERU**

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# AGENDA

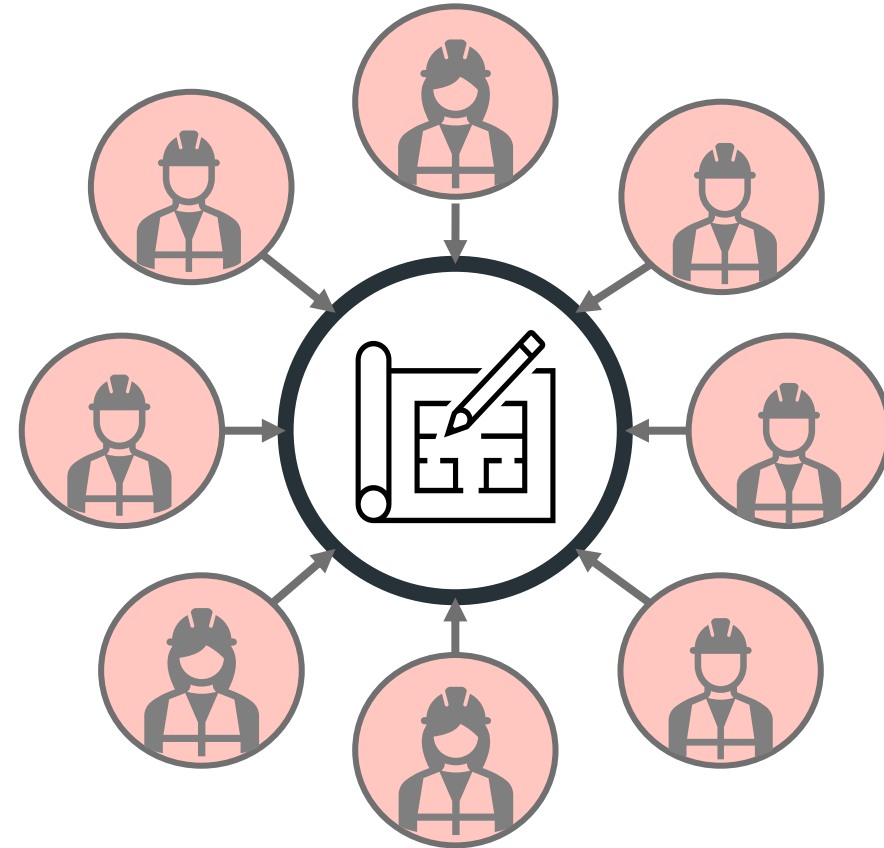
- Introduction
- Key concepts
- Research question
- Methodology of implementation
- Results
- Discussion
- Conclusions

# INTRODUCTION

This study is about the implementation of lean design in public projects, specifically in hydraulic infrastructure.

Tools: set based design and value stream mapping.

This paper explains the barriers found in the implementation of lean design from the perspective of change management.



# KEY CONCEPTS

## Change Management

Method to implement changes. According to *Zimmermann (2000)* any important change will have resistances or difficulties to overcome.

## Lean Project Delivery System (LPDS)

Production systems based on temporary projects. The LPDS comprises: conceptual design, process design and product design.

## Set Based Design (SBD)

It is a design method in which sets of alternative solutions are evaluated until the last responsible moment (*Hill et al., 2017*)

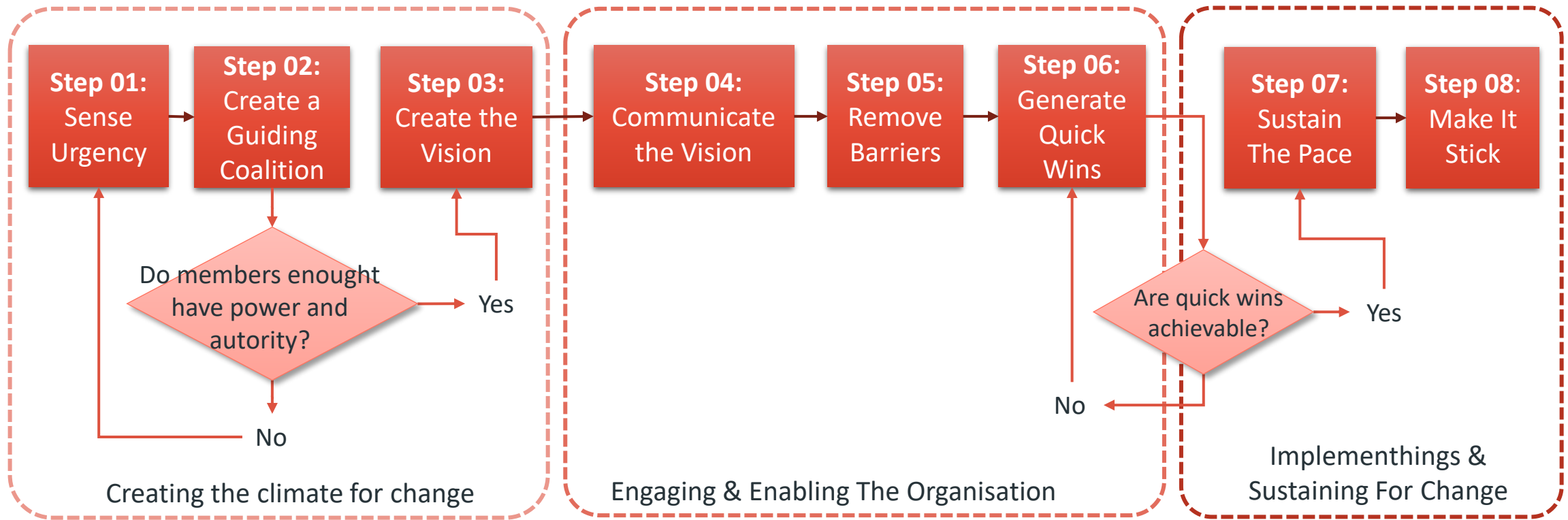
## Value Stream Mapping (VSM)

VSM is a visual tool which permits teams to correctly identify how the flow process are executing. (*Orihuela et al, 2015*)

# RESEARCH QUESTIONS

- How feasible is the implementation of lean design in hydraulic public projects?
- How to overcome the technical and managerial barriers?

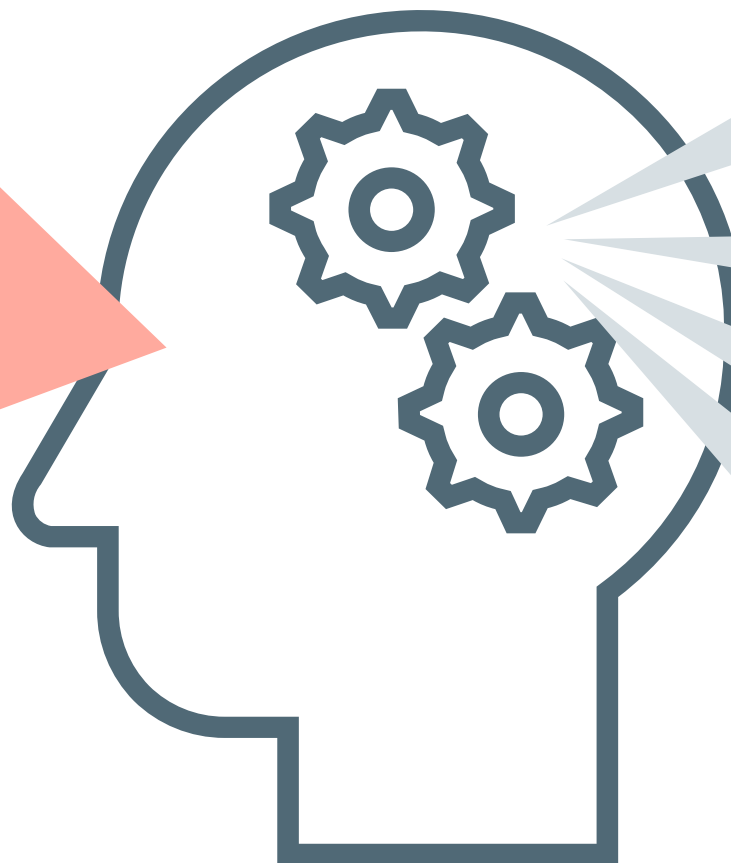
# METHODOLOGY OF IMPLEMENTATION



# RESULTS

- Sense of urgency
- Create a guiding coalition
- Create a vision
- Communicate the vision
- Remove barriers
- Generate quick wins
- Sustain the pace
- Make it stick

## Kotter step's



Strategies for implementing lean design management

Facilitating elements for implementation

Difficulties and barriers found

Strategies for overcoming difficulties

# RESULTS

<b>Kotter Step's</b>	<b>Strategies for implementing lean design management</b>	<b>Facilitating elements for implementation</b>	<b>Difficulties and barriers found</b>	<b>Strategies for overcoming difficulties</b>
<b>1.Sense of urgency</b>	Delay in the projects.	Stakeholders were aware of the urgency.	Make an emergency call	Define the milestones of the design.
<b>2.Create a guiding coalition</b>	<b>Get people involved with authority.</b>	<b>Construction manager, design manager.</b>	<b>Convince other stakeholders.</b>	<b>Explain best international methodologies</b>
<b>3.Create a visión</b>	Create a message about the importance of the infrastructure.	The visión was clear and feasible.	Multidisciplinary-eleven different disciplines	One to one meetings
<b>4.Communicate the visión</b>	Multiple fóruns, repetition and bilateral communication.	To be open to feedback and to stimulate this bilateral communication.	Recognize at what level people were understanding the visión.	Surveys implemented
<b>5.Remove barriers</b>	By training.	Suport of the guiding coalition.	Structural impediments and skill-knowledge obstacles	Extensive workshops, technical notes and clear communication
<b>6.Generate quick wins</b>	<b>Set measurable, achievable and quantifiable goals.</b>	<b>Kotter's eight steps framework.</b>	<b>Number of participants in the elaboration of VSM.</b>	<b>One to one meetings</b>
<b>7.Sustain the pace</b>	Weekly meetings.	Initial advocates	Attendance to the meetings.	One to one meetings.
<b>8.Make it stick</b>	Repeat this methodology in other projects.	Lessons learned in each Project	New projects, new workers	Training



## DISCUSSION

At the global level the most important barriers were: the decision at the executive level of implementing a lean design management approach, the conformation of the coalition team, the planning of the workshop-training to specialists and to plan which those quick wins will be.

At the local level, two elements were closely related: communications and the restrictions for pandemic in the country. This virtualizes the work because the restriction of having a limited number of professionals at the office propelled the use of virtual teams.

# CONCLUSIONS

The feasibility of the implementation had an important barrier to overcome which is related to how executives and directors used to work in a traditional framework and it took a long time to make a decision to implement lean design.

Directors, executives and specialists were convinced that knowing the entire process using a tool named value stream mapping and being aware of each interaction between different disciplines will bring more chances to obtain an optimal engineering solution from a cost benefit analysis that guarantees a better value for money

The use of a structured framework such as the eight steps of change management helped to overcome the technical and managerial barriers. It was found that each of the steps are important in order to protect the implementation from detractors and create the environment for those who advocate for this new methodology of lean design.

# THANK YOU!

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