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for the 6th CitA BIM Gathering

What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Authors

Introduction

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What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Presentation Overview

Presentation Overview

- Research Motivation & Objective

- To Explore the Barriers and Enablers to the implementation of Lean & Digital Construction
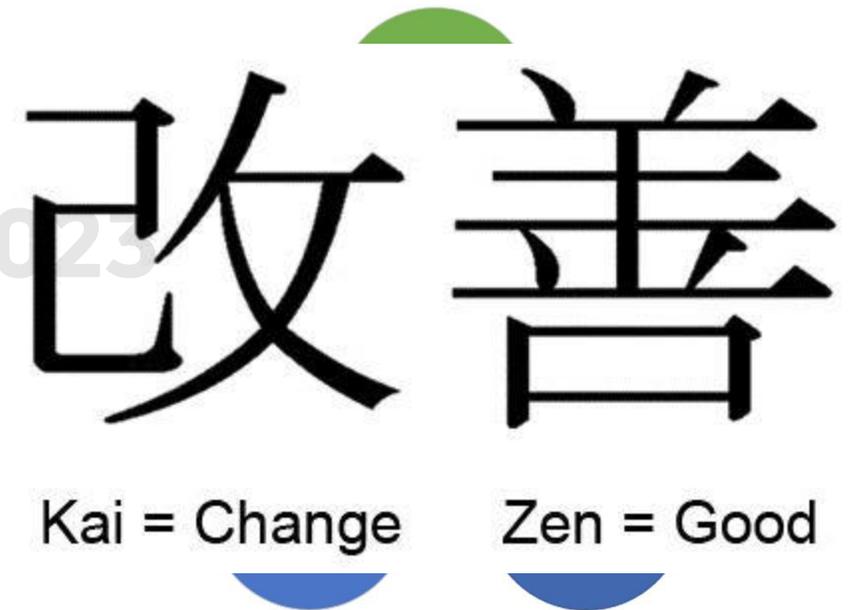
- Results & Conclusions

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What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Research Motivation

Research Motivation

- What is the Problem?

- Limited Digital Construction & Lean implementation in the Irish Civil Engineering Sector

- There must be a better way?

What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?
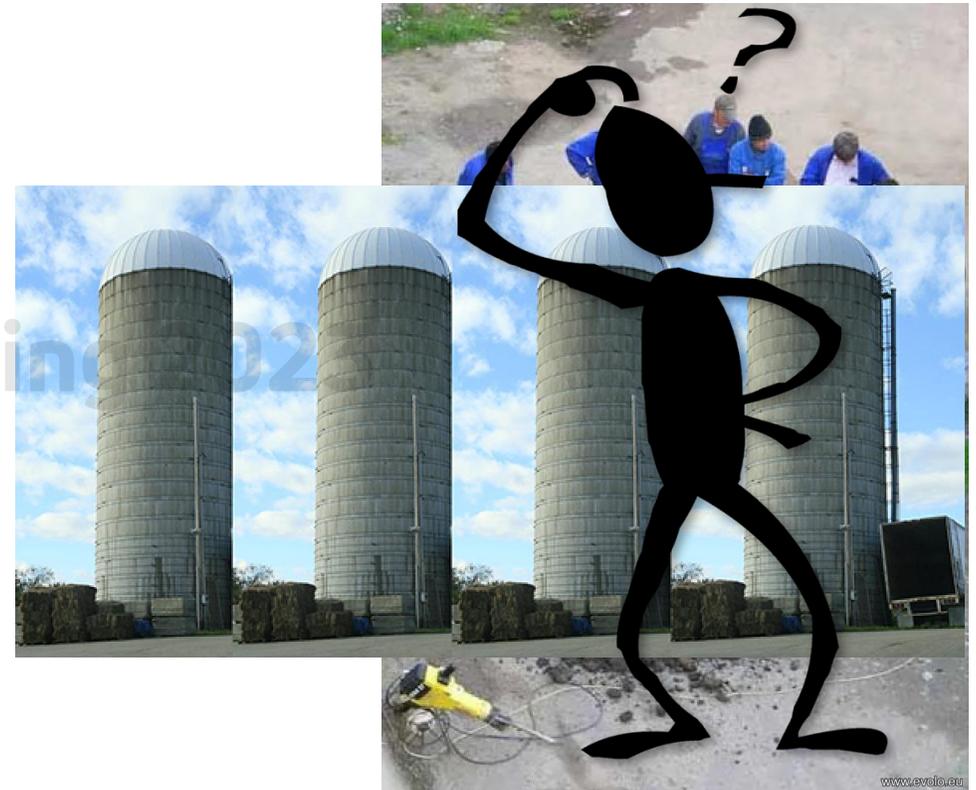
Lean Construction

Lean Construction (LC)

- Origins of Lean Construction

- Muda (waste), "Mura" (levelling) & Muri (overburdening)

- Lean Construction is based on 5 guiding principles

- Eliminate non-value adding activities

- ✓ Generate value for your Client

- ✓ Reduce variability & cycle times

- ✓ Increase process transparency

- ✓ Kaizen – Continuous Improvement & Benchmark
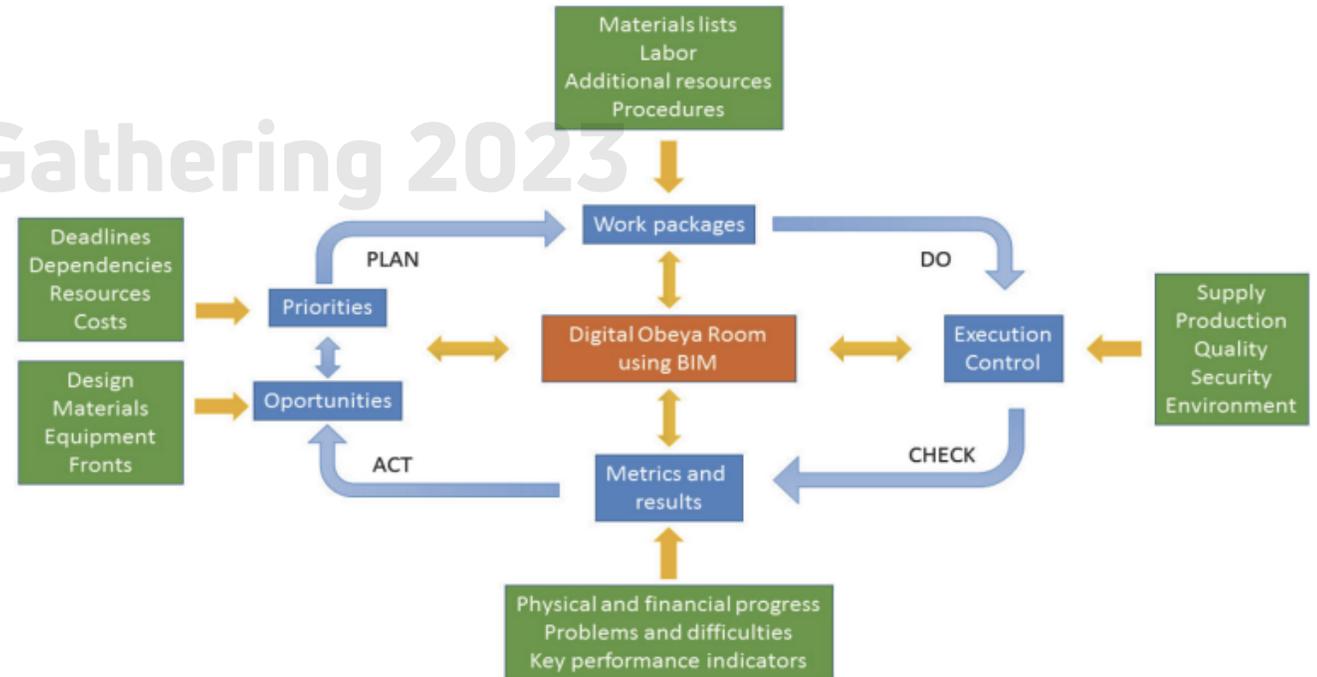
- Where can I get help?

改善

Kai = Change   Zen = Good

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What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Lean Digital Construction

Lean Digital Construction

- Why do we need Digital Construction?
- BIM provides a collaborative platform where the 3D digital visualisation capabilities provide greater engagement levels between stakeholders (Hire et al., 2020)
- Studies show that the dynamic nature of construction and the significant input materials and equipment requirements required, like an infrastructure should generate quantities of materials and energy while producing waste (Hai et al., 2020; J. Y. Lee et al., 2020; Luo et al., 2021; Youyang et al., 2021)

- What are the benefits of Lean Digital Construction?
- The sustainability of an asset is becoming more important to digital modellers and governments.
- This results in better project management and construction performance by producing waste...

- The consequences of these processes result in increased greenhouse gas emissions which are harmful to the environment by contributing to global warming
- McAuley et al., (2020) support the view that digital construction technologies are recognised as a driver to implement the sustainable growth agenda by ensuring that project life cycle and cost certainty targets are achieved. .
- Farmer, (2016) advocates in his report that the construction industry must *"modernise or die"*; therefore, change must be embraced to make the sector more attractive to the next generation of construction professionals to ensure project performance, sustainability, and cost certainty benefits are realised.

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Synergies

Synergies

- According to Sacks, there are 56 synergies between digital and lean construction, 48 of which improved flow of material and information
- Nascimento et al., (2018) identified the positive benefits of the implementation of digital construction and lean principles by establishing the concept of a Digital Obeya room based on the PDCA management system
- This system encourages the visualisation of processes and ideas

What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?
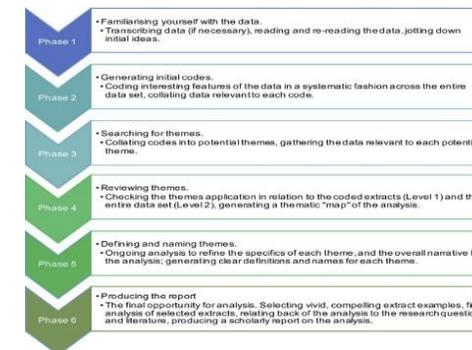
Methodology

| Literature Review | Qualitative semi-structured Interviews | Thematic Analysis |

XIII. REFERENCES

Al-Balushi, S., Sohal, A. S., Singh, P. J., Hajri, A. Al, Farsi, Y. M. A., & Abri, R. Al. (2014). Readiness factors for lean implementation in healthcare settings - a literature review. *Journal of Health, Organisation and Management, 28*(2), 135–153. https://doi.org/10.1108/JHOM-04-2013-0083

Alsehaimi, A. O., Fazenda, P. T., & Koskela, L. (2014). Improving construction management practice with the Last Planner System: A case study. *Engineering, Construction and Architectural Management, 21*(1), 51–64. https://doi.org/10.1108/ECAM-03-2012-0032

Antwi-Afari, M. F., Li, H., Pärn, E. A., & Edwards, D. J. (2018). Critical success factors for implementing building information modelling (BIM): A longitudinal review. In *Automation in*

Participant	Role	Contractor	Experience (Years)	Project Types
Participant 1	Project Manager	Tier-two	10	Civil Engineering/Building
Participant 2	Digital Construction Specialist	Tier-one	>30	Civil Engineering/Building
Participant 3	BIM Manager	Tier-one	5	Civil Engineering/Building
Participant 4	Digital Construction Manager	Tier-one	15	Civil Engineering/Building
Participant 5	Survey Manager	Tier-two	16	Civil Engineering
Participant 6	Civil Engineer	Designer	8	Civil Engineering design

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Barriers

Barriers to Digital Construction

What are the main challenges?
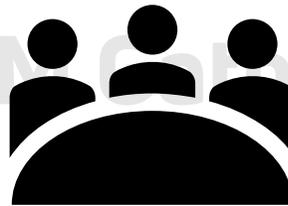
➢ Employees

➢ Management issues

➢ Cultural issues
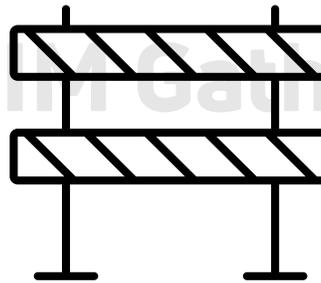
➢ Lack of support and training

➢ Employee resistance to change

➢ Lack of knowledge of managing digital construction processes

➢ Company culture

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What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Enablers to Digital Construction

What are the main drivers?

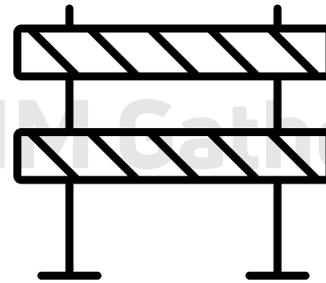➢ Technical Factors

➢ Employees

➢ Organisational cultural themes

➢ Digitisation of information

➢ Model Coordination

➢ CPD Training

➢ Employee engagement

➢ Company strategy

➢ Workforce supports & motivation

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What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Barriers to Lean Construction

What are the main Challenges?

➢ Cultural themes

➢ Management themes

➢ Resistance to change

➢ Misconceptions about Lean

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What are the Barriers and Enablers to the Implementation of Lean Digital Construction for the Irish Civil Engineering Sector?

Enablers to Lean

Enablers to Lean Construction

What are the main drivers?

➤ Technical Factors

➤ Cultural themes
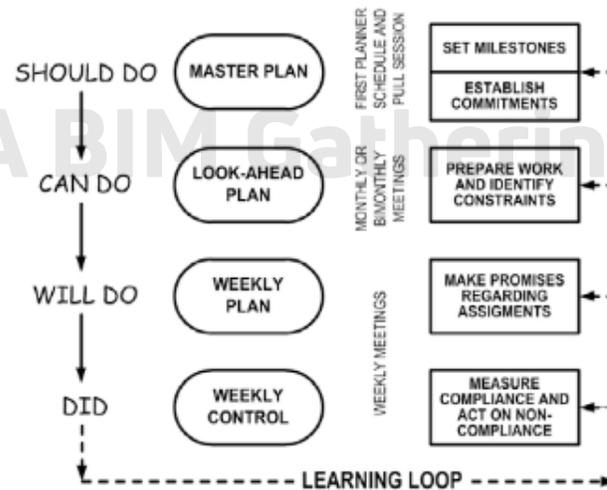
➤ Lean value stream mapping

➤ Last Planner system

➤ Collaborative approach

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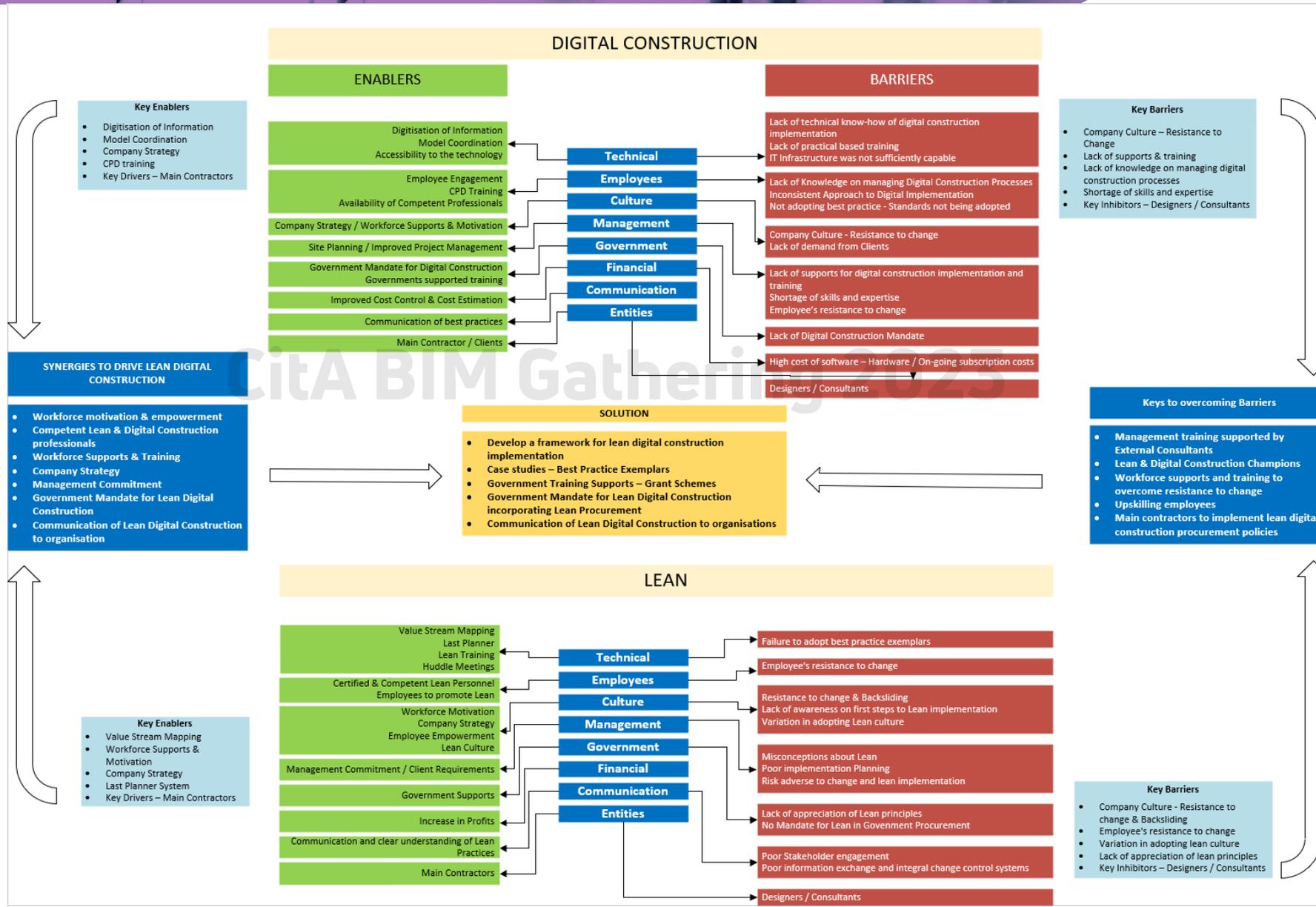
Conslusions

Conclusions & Future Research

➢ Challenges remain

➢ Inconsistent implementation

➢ Lack of a Government Mandate

➢ Lack of knowledge about implementing lean digital construction

➢ Framework for lean digital construction implementation

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THANK YOU