



香港大學

THE UNIVERSITY OF HONG KONG



Lean Construction for Improving Productivity in the Hong Kong
Construction Industry Workshop

Lean Construction Status Quo, Benefits and Future Development

Dr. Wei Pan

Associate Director

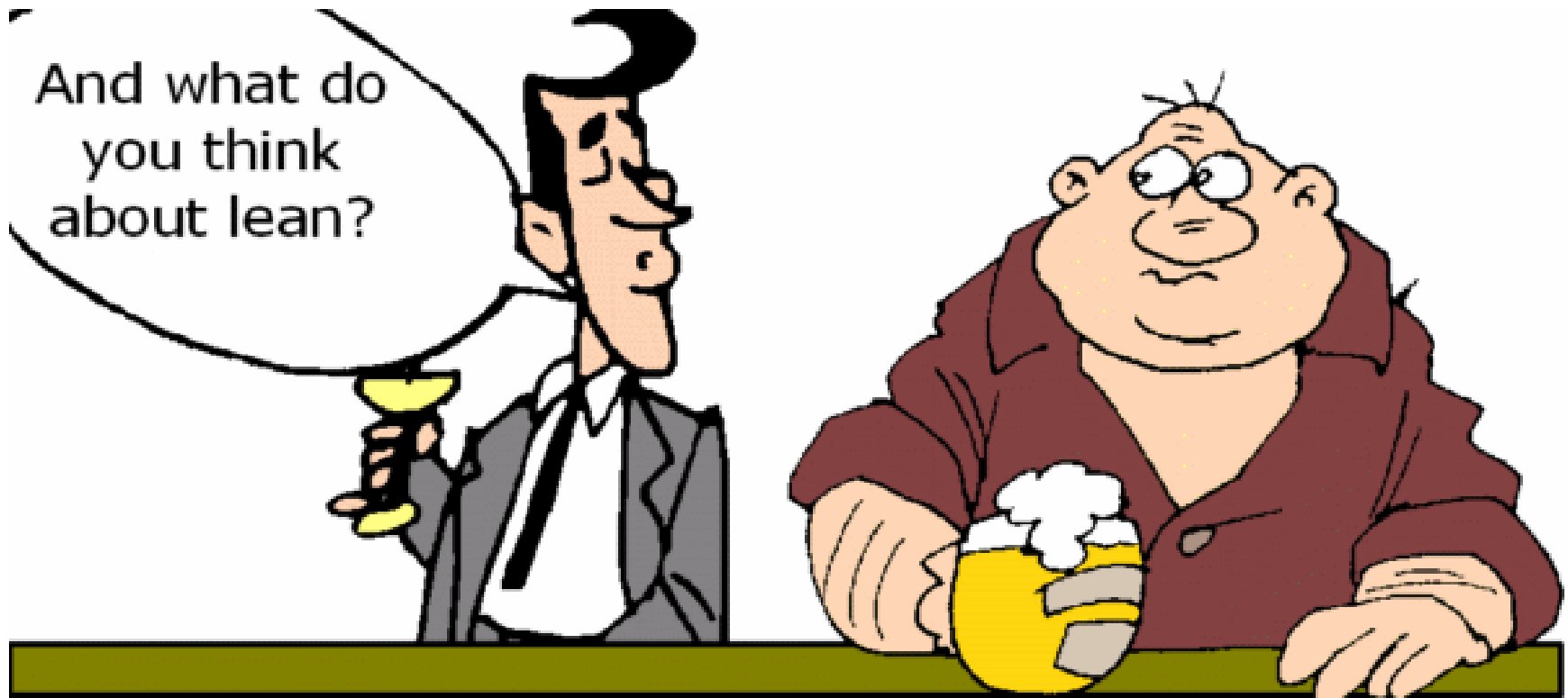
Centre for Innovation in Construction and Infrastructure Development (CICID)
The University of Hong Kong

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Outline

- Understanding and perspectives of lean
- Benefits and drivers for lean construction
- Lean related tools, methods & approaches
- Future development of lean in Hong Kong



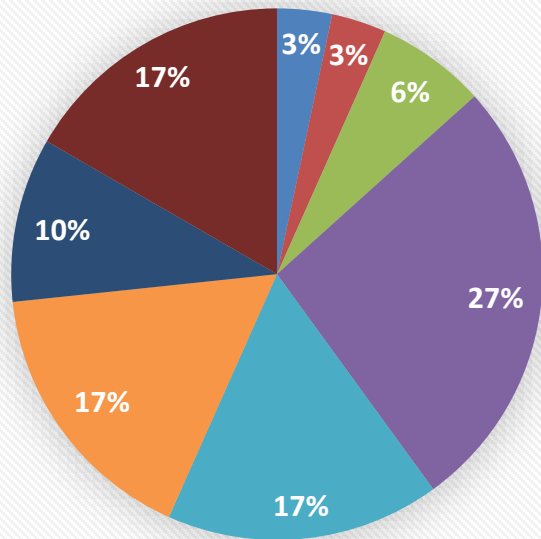


<http://www.leanvalidation.eu/>



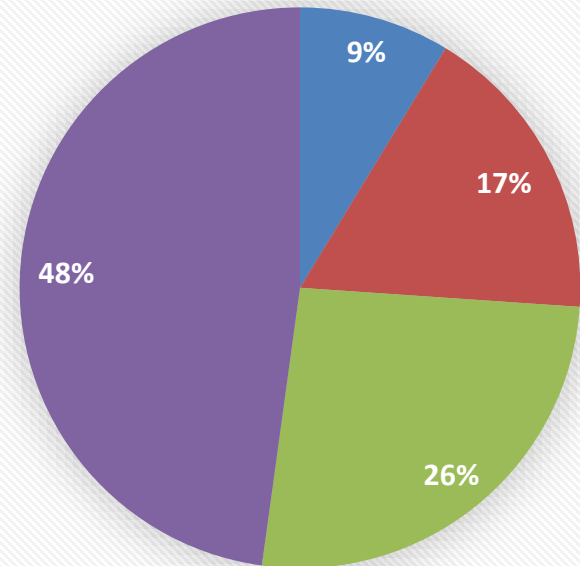
Participants in Interviews

Type of the organisation of the interviewees



- Specialist Contractor
- Architect
- Manufacturer & supplier
- Institution
- Developer /client
- Contractor
- Government
- Consulting engineer

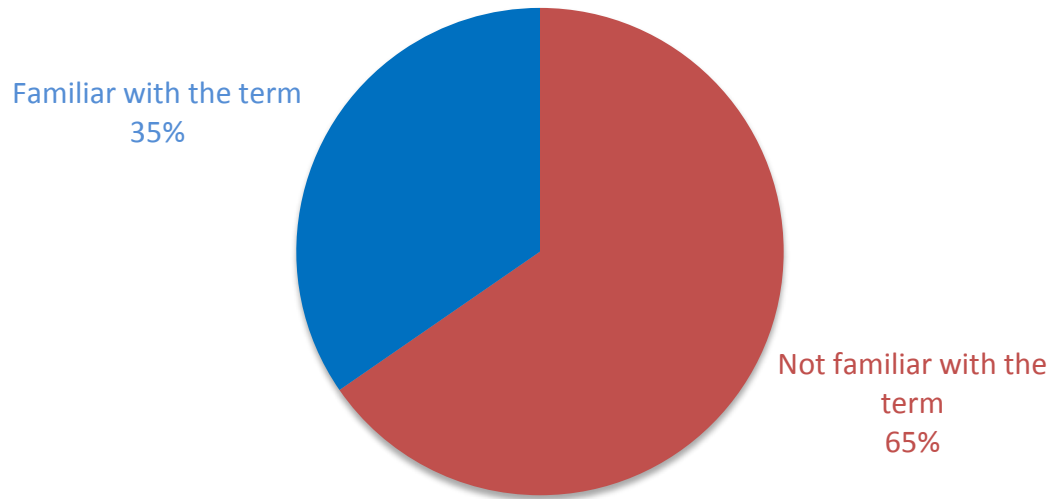
Years of experience in the industry of interviewees



- 0-10 years
- 10-19 years
- 20-29 years
- More than 30 years



Does the Term “Lean Construction” Matter?



Nearly two thirds are not familiar with the term of “lean”,
but actually follow the lean principles in their practices.



Understanding of Lean Construction

From Lean Production

“Lean construction was originated from Lean production in factory.”

“For the best of my knowledge, lean is a concept for manufacturing, which is developed by auto-motor industry, it is a very good model in helping company.”

“Lean originated from manufacturing industry many years ago. It moved to the similar context in the building industry.”

Reduce Waste

“For my opinion, lean is actually a tool to reduce waste, improve efficiency and can also improve the overall turnaround time of a project.

“My understanding of lean construction is to eliminating waste.”

“Mainly it’s to decrease the time waste, material waste and labor waste.”

“lean construction is to reduce the unnecessary waste, improve efficiency and improve the quality and safety.”

Minimize resources

“In my mind, lean construction is simple for construction, simple for design.”

“Lean construction should to minimize the material, time and cost, to achieve the maximum value.”

“You can produce that with the minimum cost, as well as the minimum manpower, and time required.”



Perspectives of Lean Construction in HK

“Actually, lean construction, in a way, in HK, if you looked at the practices, has already been played, even we don’t call it lean construction. “

“I’d like to say that lean construction is not a very common term using in HK, I seldom hear people say lean construction”

“We don’t use the name of lean construction, but we have a lot of things going on in the same direction.”

“Lean construction is new concept in HK, with little research on it”

HK does not use the term “Lean construction”, but moves in the same direction to improve construction performance.

...stant
...design or lean construction, they probably will or have done it, without knowing they are doing lean construction. “

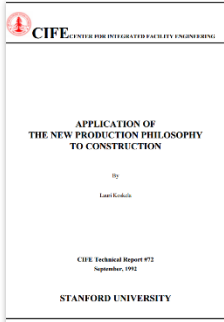
“I think lean construction is a very loosely defined term, to be honest.

“I think it was a term created like sometimes ago, and hearing people to talk more about it is like 6, 7 years ago in Hong Kong.”

“So for the lean, I think some of the HK government departments, they have already considered the way to improve the efficiency in order to reduce the high labor cost and labor shortage issue.”

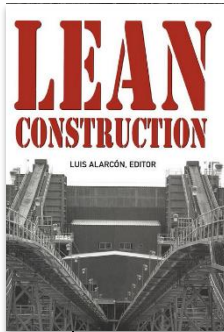


Definitions of lean construction



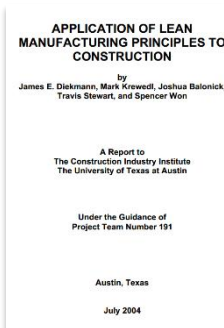
Lean production is perceived as the emerging mainstream approach to main principles, ideas, and techniques as JIT and Total Quality Control.

Koskela, L. (1992). Application of the New Production Philosophy to Construction, Stanford University



A conceptualization of lean production in the context of construction.

Alarcon, L. F. (1997). Lean construction. Brookfield, VT, USA, Rotterdam.



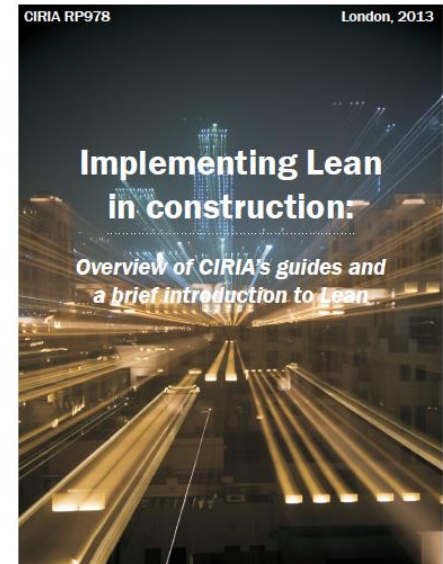
Lean construction is the continuous process of eliminating waste, meeting or exceeding all customer requirements, focusing on the entire value stream and pursuing perfection in the execution of a constructed project.

Diekmann, J. E., M. Krewedl, et al. (2004). Application of Lean Manufacturing Principles to Construction. The Construction Industry Institute



Lean - raise up to **strategic systems** level?

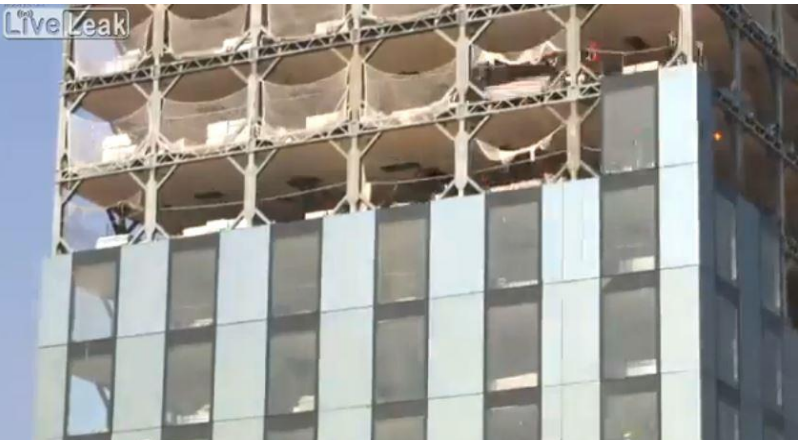
- Lean is a **total organisational and operational approach** to business that is customer focused and people centric.
- Often thought to be no more than tools, lean is widely misunderstood, but lean is as much about the way you think and the way you feel about your thoughts.
- You will not get to be a sustainable lean company unless you have a **system** that includes **all** managers, all operatives and a skilled support team of lean leaders working as an **integral** part of your business.



LiveLeak

30-storey hotel built in 15 days
5 times more earthquake-resistant
5 times more energy efficient
20 times purer air

Benefits and Drivers of Lean Construction



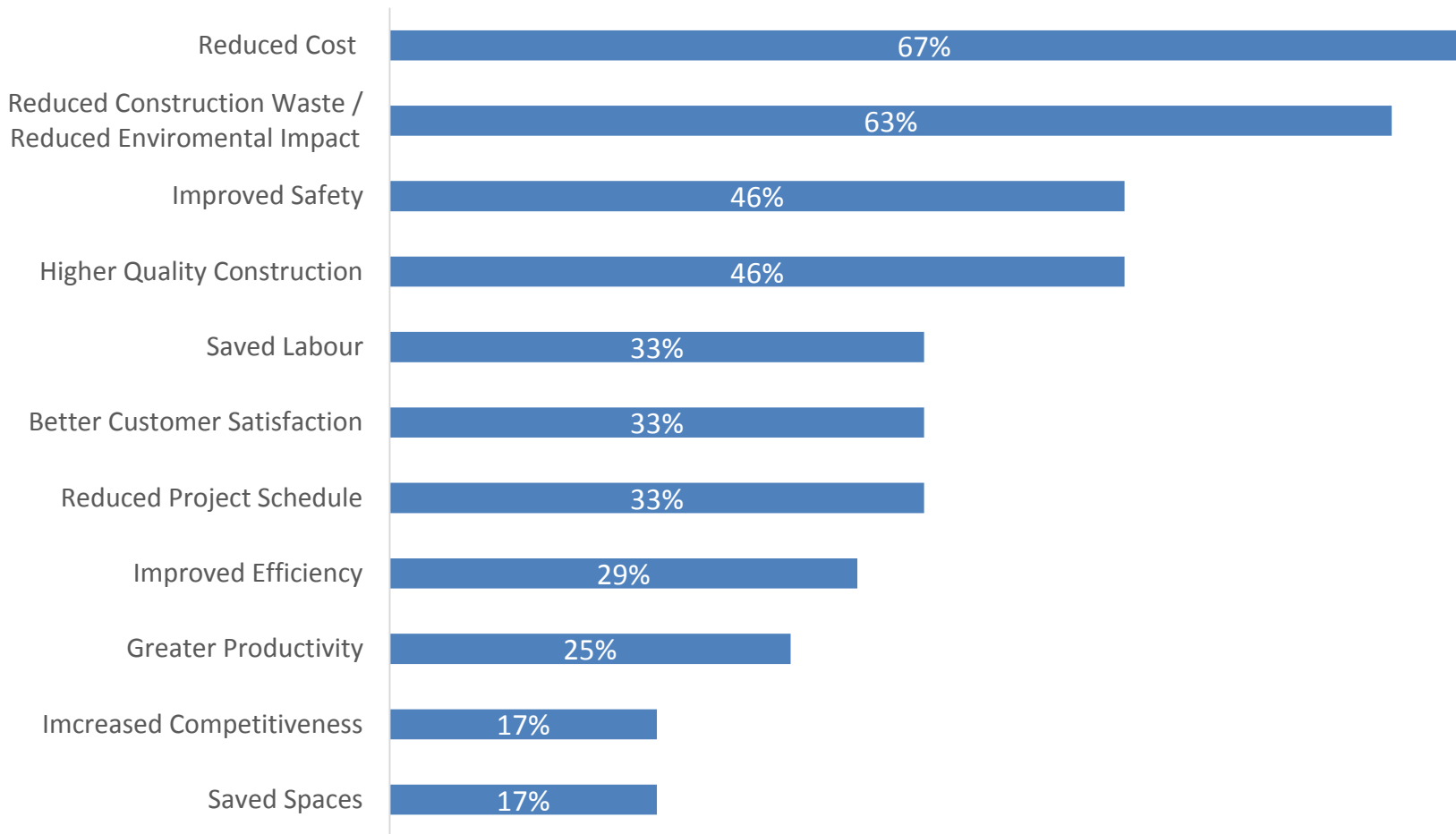
可建 远大
可持续建筑
9度抗震 5倍节能 20倍净化

BSB BROAD
SUSTAINABLE
BUILDING
9M earthquake resistant 5x energy efficient 20x purer air

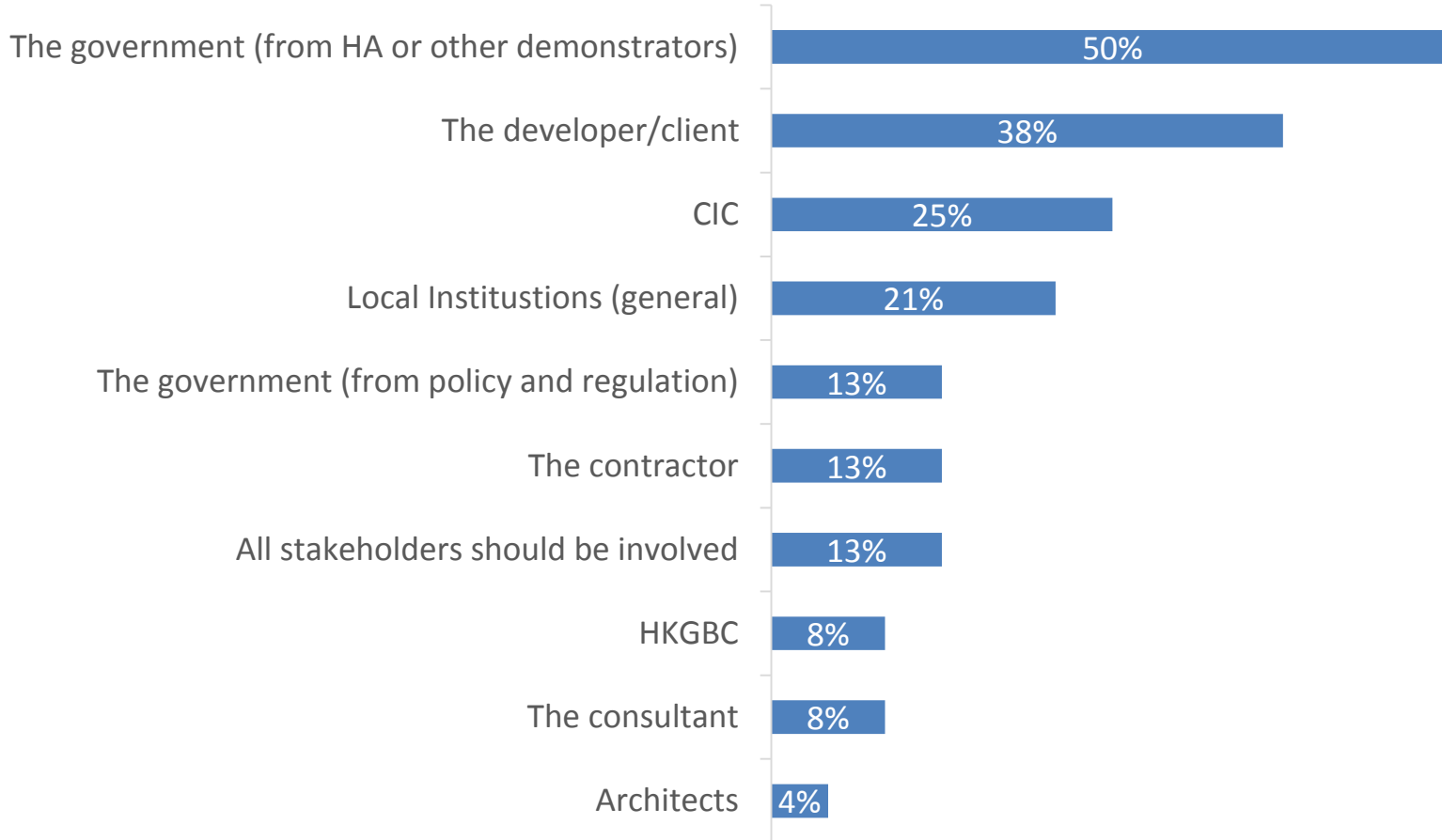
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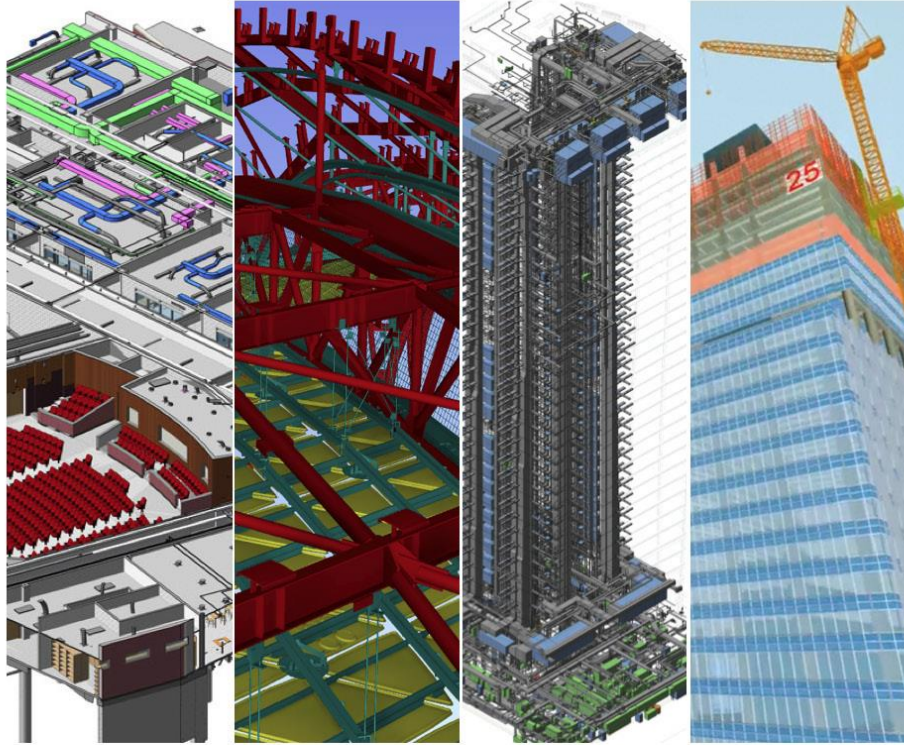
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Benefits of Lean Construction



Drivers for Lean Construction





Lean Related Tools, Methods & Approaches



The University of Hong Kong

Perspectives of Emerging Themes with Lean Construction

BIM

“I think today the developer, as well as some government department has not been supporting this broadly.”

“To me BIM is a tool you can use for anything, whether it create lean depending on the user”

“BIM is a very useful tool for us to achieve lean construction”

“The impact is not high so far in Hong Kong.”

Low or zero carbon building

“HK is catching now”

“Some of projects are complied with the green building standard, BEAM+, LEED”

“we already have long time focusing in energy consumption saving.”

Prefabrication/modular construction

“Prefabrication and modular construction definitely can help to achieve lean construction.”

“I think in Hong Kong we use a lot of prefabrication particularly in public housing, but there is also potential to increase the percentage.”

“I think we should bring precast activity back to HK.”

Look ahead planning (e.g. Last planner system)

“We may use some similar planning tools.”

“I do not hear about the term.”



Good Practices in Use of Improving Efficiency

Quality control circle (QCC)

'5S' model

Partnering

Just-in-Time

Prefabrication/precast

Sharing platforms

Modular construction

BIM

Software

Critical Path Method

SAP (Systems, Applications & Products in Data Processing)

Safety management

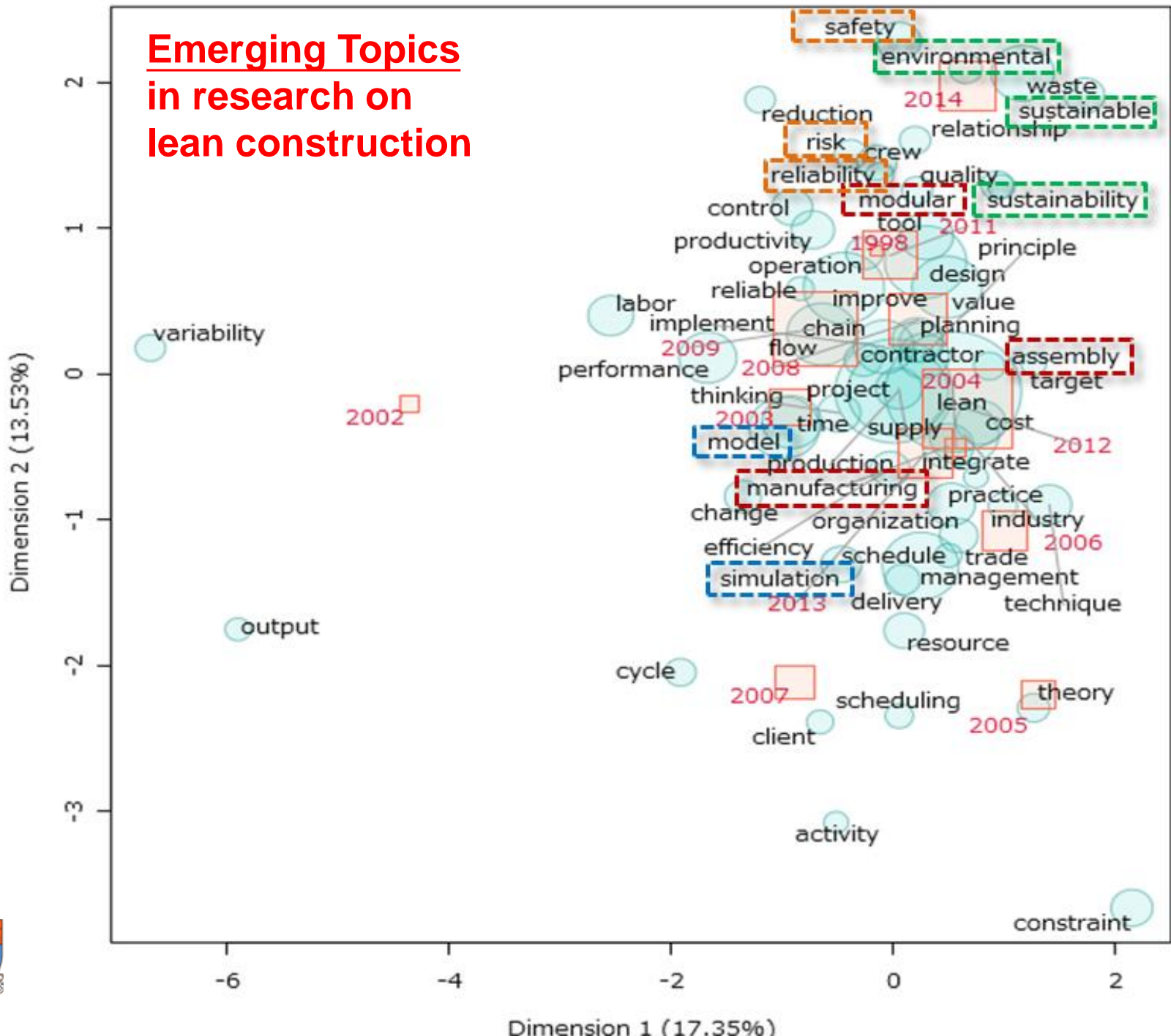


Lean Related Tools and Techniques from Literature

Name	Description
3D modelling	The process of developing a mathematical representation of any three-dimensional surface of an object (either inanimate or living) via specialized software.
5S	A disciplined approach to maintaining order in the workplace, using visual controls, to eliminate waste. The 5S words are Sort, Set in Order, Shine/Sweep, Standardize and Self-Discipline/Sustain.
A3	A one-page report prepared on a single 11 x 17 sheet of paper that adheres to the discipline of PDCA thinking as applied to collaborative problem solving, strategy development or reporting.
BIM	The process of generating and managing building data during the life cycle of a building.
Cost-benefit analysis (CBA)	The weighing-scale approach to decision-making
Last Planner System (LPS)	A production planning system designed by to produce predictable work flow and rapid learning in programming, design, construction and commissioning of projects.
Lean Project Delivery System (LPDS)	An organized implementation of Lean Principles and Tools combined to allow a team to operate in unison.
Just-in-time (JIT)	A system for producing or delivering the right amount of parts or product at the time it is needed for production.
Plan Do Check Act (PDCA)	A structured four-step approach to process improvement.
Root Cause Analysis/5 why	A systematic method of analyzing possible causes to determine the root cause of a problem
Value stream mapping (VSM)	A diagram of every step involved in the material and information flows needed to bring a product from request to delivery.
Visual Management	Placing tools, parts, production activities, plans, schedules, measures and performance indicators in plain view
Others	Kanban, Hoshin Kanri, Failure mode effect analysis (FMEA), Constraint analysis, etc.



Emerging Topics in research on lean construction





太陽電池模板



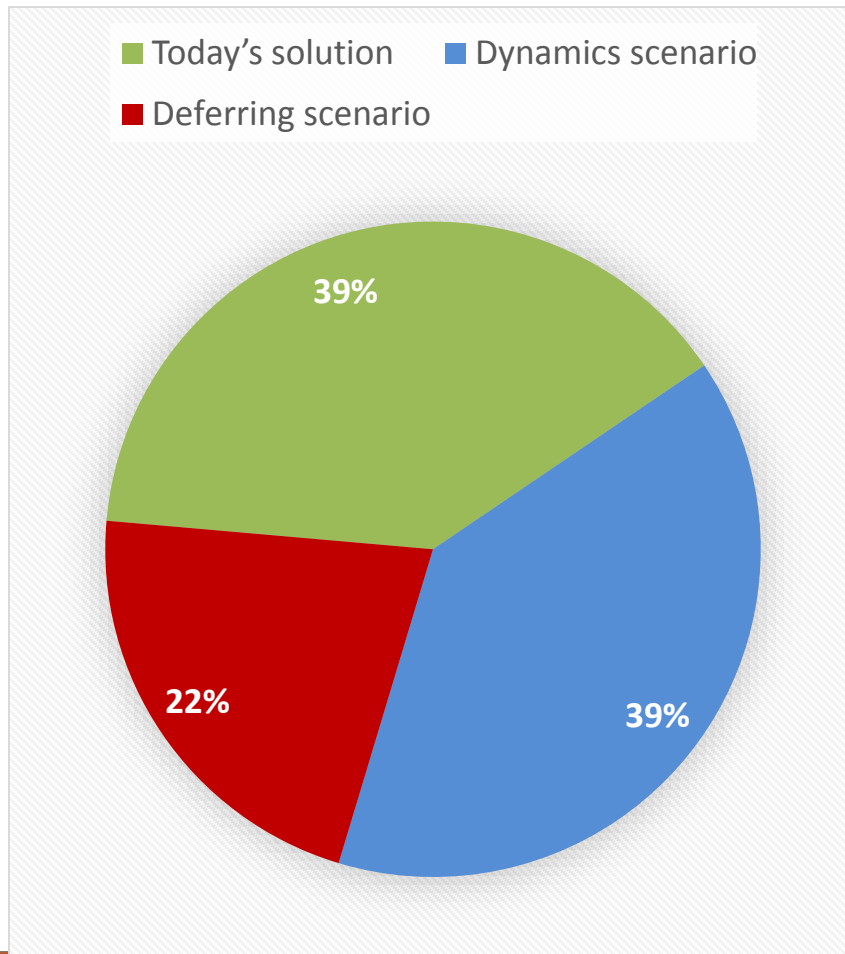
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Future Development of Lean Construction in Hong Kong



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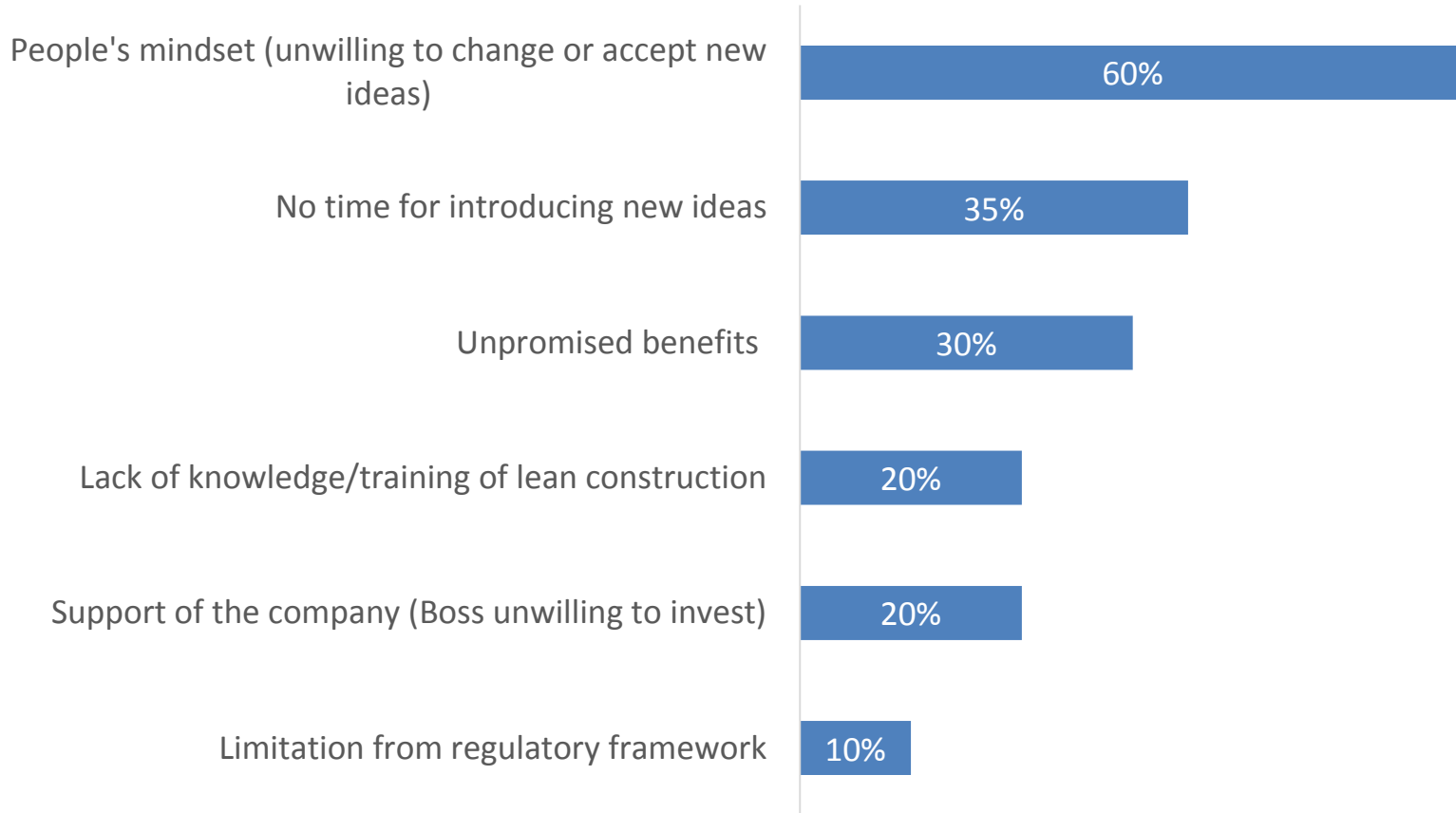
Future Development Scenarios of Lean in HK



- **Today's solution:** This is the trend. HK is facing a lot of challenges (e.g. labor, environment, low productivity) and lean construction should be the solution.
- **Dynamics scenario:** There is a need to promote lean construction, but the future development depends on how to implement. Also it depends on the project.
- **Deferring scenario:** It will happen slowly, and next generation might use it, but not in the nearly future.



Potential Challenges to Implementing Lean Construction Standards



Successful Cases are Highly Required to Promote Lean Construction

Pilot cases involving key stakeholders

“we need to do some pilot cases which include the government people, construction people, and also the relevant stakeholders. We can get all these people together, and conduct some pilot cases.”

Successful lean construction adaptors showing benefits

“If there is successful project/ case with adoption of lean construction in Hong Kong as reference for the future development, the developer/ client would likely to adopt the lean construction management approach in their future projects to enhance the quality and cost of the development.”

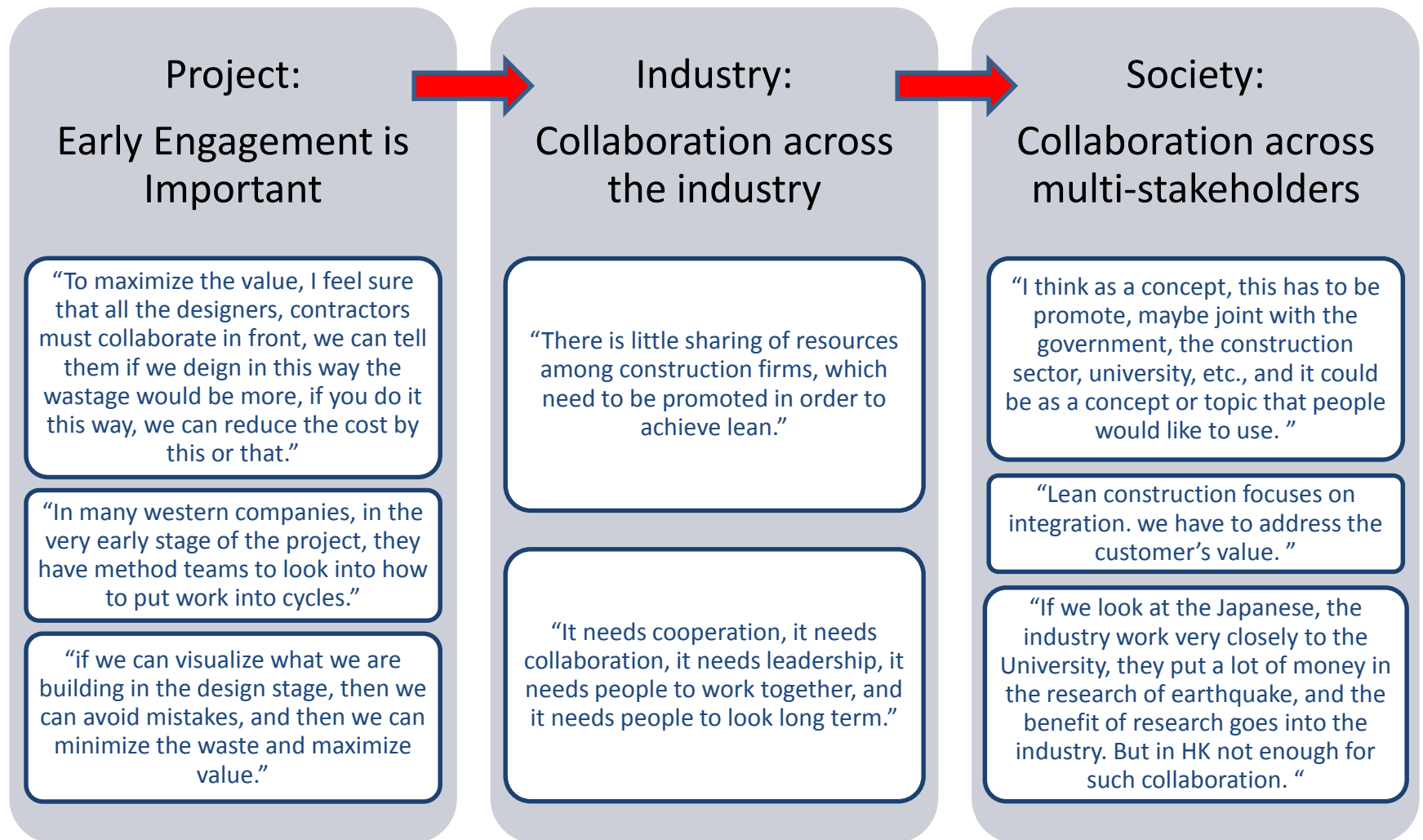
“We need to create the story and then publicise it.”

Successful examples can help to change people’s mindset

“I think there is a need to promote the idea of lean construction especially to use some successful examples.”



Collaboration is Critical to Improving Productivity and Achieving Lean



International Promotion of Lean Construction



- Founded in 1993 - a network of professionals and researchers in Architecture, Engineering, and Construction (AEC)
- Goal - to better meet the needs of the customer and dramatically improve the AEC process as well as **product**.
Through ... new principles & methods for product development and production management like lean production in manufacturing.
- <http://iglc.net/>

How about Hong Kong?

- Founded in 1997
- To develop knowledge on project based production management in design, engineering and construction of capital facilities
- LC approach maximizes value delivered to the customer while minimizing waste.
- <http://www.leanconstruction.org/>

Other National Institutions	Year of Established	Scope
Lean Management Institute (LMI)	2004	Germany
Lean Construction Institute UK (LCI-UK)	2006	U.K.
Lean Construction Institute Finland (LCI-Finland)	2008	Finland
Lean Construction Institute of Australia (LCIA)	2012	Australia
Lean Construction Institute Denmark (LCIDK)	2012	Denmark
Lean Construction Norway (LC-No)	2012	Norway
Lean Construction Institute Israel (LCI-Israel)	2015	Israel





香港大學

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Thank you !

Dr. Wei Pan

wpan@hku.hk

2859 2671

Associate Director, CICID
The University of Hong Kong

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