

# **A SCENARIO-BASED MODEL FOR THE STUDY OF COLLABORATION IN CONSTRUCTION**

**Alejandro Garcia and Danny Murguia**

Construction Management & Technology Research Group (GETEC),  
Pontifical Catholic University of Peru

# AGENDA

- The Problem
- Factors influencing Collaboration
- Research method
- Empirical validation
- A scenario-based model
- Discussion
- Conclusion

# A CRITICAL PROBLEM FACING THE INDUSTRY

“Finding good players is easy. Getting them to play as a team is another story.”

- Casey Stengel

What is behind of collaboration?

How do organizations or individuals collaborate?

How is collaboration achieved in our projects?

**Coordination**

**Cooperation**

**Collaboration**



# FACTORS INFLUENCING COLLABORATION

Quality of communication



Trust

Commitment to project



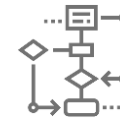
Goal congruence

Physical and cultural proximity



Project uncertainty

Clear roles and processes



Expectations fulfillment

Change orders



Conflict resolution

Client's operational capability

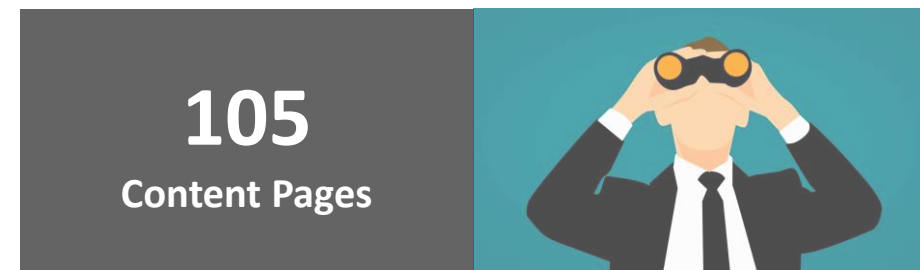


Alignment of incentives

# RESEARCH METHOD

## Qualitative approach

- Literature review
- Semi-structured interviews using the critical incident technique (CIT)
- Deductive and inductive coding
- Empirical factors of collaboration were compared with factors found in the literature
- The scenario-axis technique was later deployed to construct scenarios for collaboration



# EMPIRICAL VALIDATION

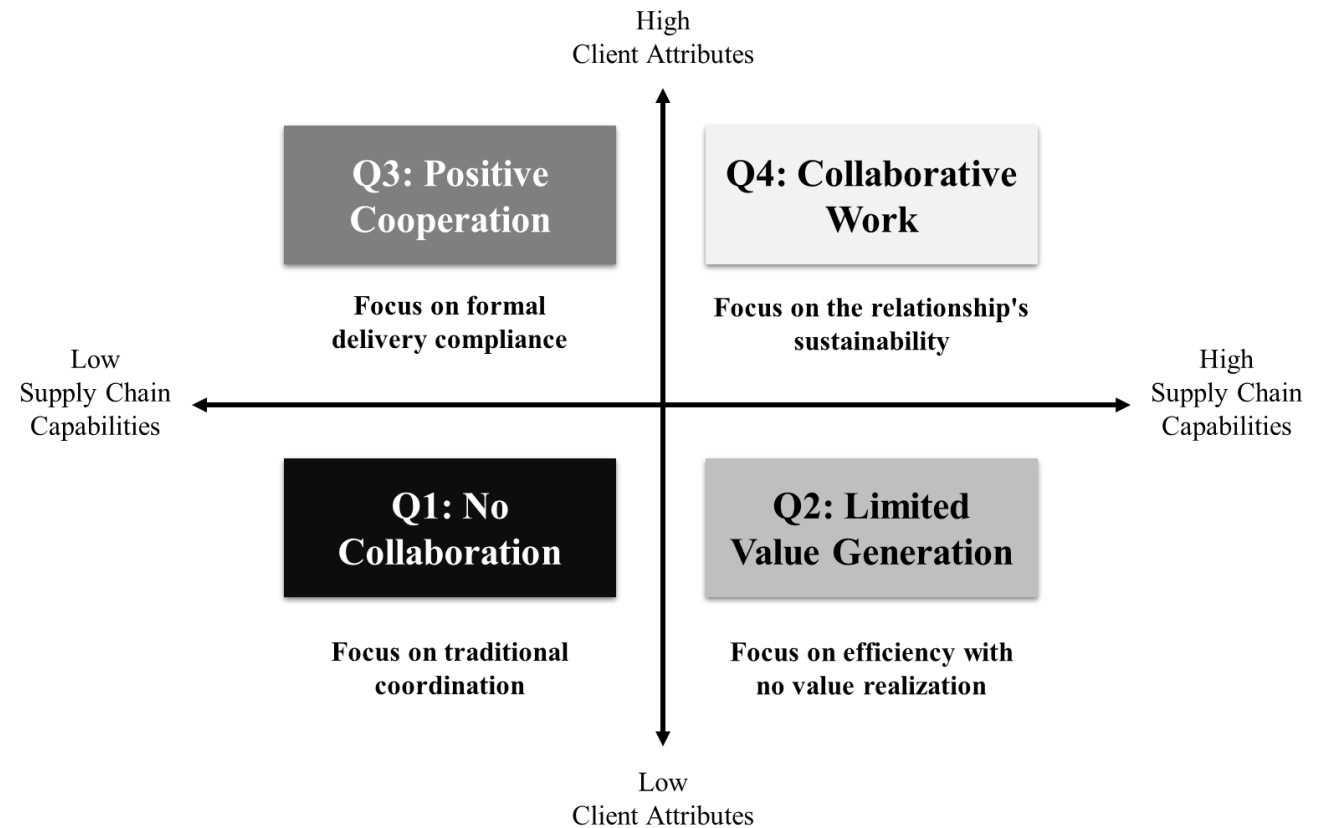
Node	Subnode 1	Subnode 2	Subnode 3
<b>Trust</b>	<b>Achievement capacity</b>	<b>Physical and cultural proximity</b>	<b>Quality of communication</b>
<b>Project uncertainty management</b>	<b>Goal congruence</b>	<b>Change orders</b>	<b>Conflict resolution</b>
<b>Client's operational capability</b>	<b>Clear roles and processes</b>	<b>Alignment of incentives</b>	<b>Team empowerment</b>
<b>Business relationships</b>	<b>Intra-organizational support</b>	<b>Expectations fulfillment</b>	-

**Table 1.** Empirical results for collaboration factors

# A SCENARIO-BASED MODEL

The emerging nodes were subsequently divided into two key uncertainties 'client attributes' and 'supply chain capabilities'.

Most impactful tensions also emerge between the appointing party (client) and the appointed party (architects, engineers, contractors, and subcontractors).



**Figure 1.** A scenario-based model for collaboration in construction

# DISCUSSION

Low Client Attributes/Low Supply Chain Capabilities → **Focus on traditional coordination**

## Demand & Supply Relationships

“We might observe RE developers with a focal interest in the business’ ROI. There is a structural fragmentation between design and construction, and a disparity between the client’s objectives (if any) and the contractor’s operation”.

## Q1: No Collaboration

- Cost- and time-driven, dominated by the status-quo.
- Information is subject to basic coordination and knowledge exchange is minimal to non-existent.
- Unknown value generation and opportunistic behaviour are based on contracts that protect the most powerful actor.

## Opportunities

“Potential for lean design management with BIM by convincing the client of the need for more collaborative approaches”.

## Lean Construction Tools & Techniques

“Contractors might implement LPS to achieve better collaboration with subcontractors at the operational level. Moreover, contractors can create BIM models to detect clashes and for quantity take-off which is sometimes considered as the first step into BIM implementation.



# DISCUSSION

Low Client Attributes/High Supply Chain Capabilities → **Focus on efficiency with no value realization**

## Lean Construction Tools & Techniques

“Contractors can implement Target Costing in the early project stages to reduce risks and ensure profitability. This is a rich environment for lean design management with BIM for both synchronous and asynchronous collaboration”.

## Demand & Supply Relationships

“We might see a DB contractor leading lean and digital implementation, and a client unaware or unwilling to be part of collaborative practices. Therefore, the DB contractor retains the benefits”.

## Opportunities

“Potential to engage the client in lean and BIM applications in the operation and maintenance stage, and collecting lessons learned from facility managers from previous projects”.

## Q2: Limited Value Generation

- Focus on efficiency with unknown value realization to the client.
- Supply chain demonstrates competencies in the use of cutting-edge platforms and digital engineering tools.
- Small subcontractors are integrated into the network by big players such as a DB contractor.

# DISCUSSION

High Client Attributes/Low Supply Chain Capabilities → Focus on formal delivery compliance

## Q3: Positive Cooperation

- Focuses on processes that deal with unbalanced interaction between teams and deliverables.
- Designers and contractors do not possess the same maturity to deliver information and exchange knowledge.

## Demand & Supply Relationships

“We might see a forward-looking client, but noticeable disparities within the supply chain. There is a substantial gap between designers’ and contractors’ capabilities, with most major contractors being the leaders in implementing collaborative practices”.

## Opportunities

“Supply chains within would benefit if the focus changes from cost and time to end-user satisfaction”.

## Lean Construction Tools & Techniques

“Include client decisions using TVD to manage product profitability during product development and to reduce uncertainty and risk. Also, CBA would be used to bring actors with lower capabilities towards a more collaborative environment”.

# DISCUSSION

High Client Attributes/High Supply Chain Capabilities → **Focus on the relationship's sustainability**

## Lean Construction Tools & Techniques

“Leverages previous tools within financial incentives and moves from project outputs to social, environmental, and economic outcomes”.

## Demand & Supply Relationships

“Driven by pre-existing trust between the client, designer, and contractors with a focus on long-term relationships that depicts on IPD”.

## Q4: Collaborative Work

- Value-based relationships with symmetric power and profuse information and knowledge exchange.
- High degree of shared expertise with clear corporate commitment and leadership cascading throughout project activities.

## Opportunities

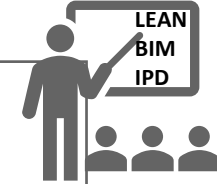
“Supply chains have the imperative to transform the industry by developing new business models from one-off transactions to long-term partnerships”.

# CONCLUSION

Common belief of collaboration refers to perform outstanding coordination, but adversarial relationships stand in sharp.

Collaboration as improving client's operational capacity, project uncertainty, trust, and developing partnerships over time.

Data suggested that collaboration practice is a tension between client's attributes and supply chains' capabilities.



The knowledge of these collaboration factors and four scenarios would provide valuable insights for practitioners.

Clients would understand their current position and formulate strategies. Supply would deliver more value by Lean, BIM, and VDC.

Future research would scrutinize case studies in each scenario to provide richer insights into how collaborative practices evolve.

# THANK YOU!

**Please contact us at:**

*garcia.alejandro@pucp.pe*

*dmurguia@pucp.pe*



Construction Management & Technology  
Research Group (GETEC),  
Pontifical Catholic University of Peru