Why Projects Excel?
The Business Case for Lean Construction

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*National VP, Operations & Lean*

*Balfour Beatty*
Does this sound familiar?

**WHAT ARE YOU DOING??**

I'M PUTTING THIS FIRE OUT.

**WE DON'T HAVE TIME FOR THAT!!**

BUT IF I DON'T PUT THIS OUT, IT'S JUST GOING TO BECOME A BIGGER PROBLEM.

**THIS WEEK'S PROBLEM.**

**WE CAN WORRY ABOUT THAT LATER!! WE NEED TO FIX THIS NEW PROBLEM...**

**LAST MONTH'S PROBLEM.**

...BY THE END OF THE DAY!!!
The Business Case for Lean

PROJECTS with HIGH LEAN INTENSITY are MORE LIKELY to complete AHEAD OF SCHEDULE & UNDER BUDGET

3X  2X
Lean Construction Tenets

- Optimize the Whole
- Continuous Improvement
- Removal of Waste
- Generation of Value
- Focus on Process & Flow

RESPECT FOR PEOPLE

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Most who never heard of Lean think the industry is **Efficient**
Owner Satisfaction

quality

owners

Architecture and Contractors

Cost

Owners

Schedule

Owners

always

frequently

sometimes

infrequently/never

Architects and Contractors

Always 7%
Frequently 52%
Sometimes 30%
Infrequently/Never 11%

Architects and Contractors

Always 1%
Frequently 31%
Sometimes 57%
Infrequently/Never 11%

Architects and Contractors

Always 10%
Frequently 36%
Sometimes 53%
Infrequently/Never 10%
Satisfaction

Fulfillment of one's wishes, expectations, or needs, or the pleasure derived from this.

How satisfied are you with the delivery of capital projects?

- Always
- Frequently
- Sometimes
- Infrequently/ Never
Research Overview

Owner Satisfaction & Project Performance

Objectives:
1. Benchmark owner satisfaction & project performance
2. What is the impact of lean?

Survey: 81 Owners/ 162 projects

- Institutions: 46%
- Industrial: 15%
- Government: 15%
- Developer: 12%

IPD & Lean Motivation & Means

Objective:
3. How and why does integrated lean succeed?

Case Study: 10 Owners/ Projects

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Performance from Approval of Capital Project (% of Best/Typical Projects)

Completed Ahead of Schedule
- Best Project: 24%
- Typical Project: 6%
- Total (n=81): -21%

Completed Behind Schedule
- Best Project: -61%
- Typical Project: -46%
- Total (n=81): -61%

Completed Under Budget
- Best Project: 46%
- Typical Project: 10%
- Total (n=81): 46%

Completed Over Budget
- Best Project: -49%
- Typical Project: -17%
- Total (n=81): -49%
Satisfaction vs. Value

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Typical Project</th>
<th>Best Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated 3 or 4 for Quality</td>
<td>83%</td>
<td>56%</td>
</tr>
<tr>
<td>Rated 3 or 4 for Safety</td>
<td>84%</td>
<td>69%</td>
</tr>
<tr>
<td>Rated 1 or 2 for Quality</td>
<td>-44%</td>
<td>-17%</td>
</tr>
<tr>
<td>Rated 1 or 2 for Safety</td>
<td>-31%</td>
<td>-16%</td>
</tr>
</tbody>
</table>
Importance of Team Cohesion

% Projects Reporting the Highest (4/4) Rating

- Perception of Team Chemistry: 68% (Best), 10% (Typical)
- Integration of Project Team Members: 61% (Best), 9% (Typical)
- Commitment of Team Members to Same Project Goals: 54% (Best), 11% (Typical)
- Timeliness of Decision Making Related to Issue Resolution: 40% (Best), 5% (Typical)
Timing of Key Stakeholder Engagement

**Best Projects:**
76% engage key stakeholders before or during conceptualization

**Typical Projects:**
42% don’t engage key stakeholders until design development or later

- **Pre-business case:**
  - Best: 9%
  - Typical: 3%

- **Business case validation (pre-design):**
  - Best: 9%
  - Typical: 42%

- **During conceptualization (0-15% design):**
  - Best: 25%
  - Typical: 7%

- **During schematic design (15-30%):**
  - Best: 22%
  - Typical: 15%

- **During design development (30-60%):**
  - Best: 17%
  - Typical: 11%

- **During construction documents (60-90%):**
  - Best: 16%
  - Typical: 3%

- **End of construction documents or later (100% CD):**
  - Best: 4%
  - Typical: 9%
Key Stakeholders Selection Process

Top 3 Selection Processes: Best Performing Project

- Best value (price + proposal): 35%
- Negotiated: 17%
- Self-selected team: 12%

Top 3 Selection Processes: Typical Project

- Pre-Qualified open bid: 24%
- Best value (price + proposal): 21%
- Open bid: 16%
Support the Team

Top Project Delivery Methods on Typical and Best Projects (20% or more usage on either)

- Construction Management at Risk: Typical 38%, Best 31%
- Design-bid-build: Typical 41%, Best 11%
- Integrated Project Delivery: Typical 1%, Best 22%
- Design-Build: Typical 14%, Best 23%

Top Contracting Types on Typical and Best Projects

- Lump Sum: Typical 44%, Best 20%
- Guaranteed Maximum Price (with or without shared savings): Typical 38%, Best 19%
- Cost Reimbursable with Target and Shared Risk/Reward: Typical 44%, Best 1%
# Learn as a Team

## Methods with Most Degree of Difference Between Usage

<table>
<thead>
<tr>
<th>Method</th>
<th>Typical (%)</th>
<th>Best (%)</th>
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</thead>
<tbody>
<tr>
<td>Co-location Big Room</td>
<td>6%</td>
<td>44%</td>
</tr>
<tr>
<td>Target Value Design</td>
<td>6%</td>
<td>40%</td>
</tr>
<tr>
<td>Prefab/Modularization</td>
<td>17%</td>
<td>49%</td>
</tr>
<tr>
<td>Conceptual/Continuous Estimating</td>
<td>22%</td>
<td>48%</td>
</tr>
<tr>
<td>Full-team On-boarding</td>
<td>17%</td>
<td>41%</td>
</tr>
<tr>
<td>BIM Design authoring</td>
<td>17%</td>
<td>41%</td>
</tr>
<tr>
<td>A3 Thinking</td>
<td>5%</td>
<td>27%</td>
</tr>
<tr>
<td>Last Planner System®</td>
<td>19%</td>
<td>40%</td>
</tr>
</tbody>
</table>

- **Part-time co-lo more common than full time**
- **LPS more common in construction than in design**

Total (n=81)
Lean Intensity Scoring

- 5 S’s
- 5 Whys
- A3 Thinking
  - BIM 3D Coordination
  - BIM 4D & Site Logistics Planning
  - BIM Design Authoring
  - BIM Execution Plan
  - BIM Model Based Estimating
- Co-Location Big Room
- Conceptual/Continuous Estimating
- CPM Scheduling
- Design to Budget
- Electronic Information Exchange

- Full-Team On-Boarding
- Kaizen
- Last Planner System
- OAC Report Out Meetings
- PDCA
- Prefab/Modularization
- Production System Modeling
- Root Cause Analysis
- Set Based Design
- Target Value Design
- Value Engineering
- Value Stream Mapping
- Visual Management

Eliminated Methods Deemed Standard Industry Practice

Greater Weight Given to Methods Deemed Particularly Valuable
Succeed as a Team

Correlation of lean intensity to outcomes (% likelihood on best projects)

Completed Ahead of Schedule
- Low Lean Intensity
- High Lean Intensity

Completed Under Budget
- Low Lean Intensity
- High Lean Intensity

3X
2X
IPD & Lean

- IPD (Best): 65%
- CM at Risk (Best): 39%
- Design-Bid-Build (Best): 21%

High Intensity Users: Design-Bid-Build (Best)
Low Intensity Users: CM at Risk (Best)
How and Why:
IPD creates need to collaborate
Lean provides the means

All projects in the study* were highly successful:
Regardless of project type, scope, geographic location, previous experience with IPD or Lean.

IPD establishes out the terms for collaboration:
financial incentives, baseline costs plus overhead, metrics of success

Lean tools and processes facilitate collaboration:
creates alignment around cost, schedule and other goals

*projects self-selected to respond to our request for participation and may not be representative of all IPD projects. However teams were candid about the challenges they faced and their lessons learned
Common Project Myths…

1. Delivery matters less than choosing the right people – behaviors can’t be dictated by a contract

2. IPD contracts are too complicated, Lean tools are too rigid

3. IPD only works on large complex healthcare projects – Teams new to IPD and lean are at a disadvantage

4. Owners aren’t getting best value – or – Owners are getting value but the team is not making profit

5. IPD and IPD-lite are essentially the same; financial incentives and release of liability are no big deal
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<th></th>
<th>Validation</th>
<th>Co-Location</th>
<th>Lean Tools and Processes</th>
<th>BIM</th>
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<td><strong>Lean Team</strong></td>
<td><strong>Form</strong></td>
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<td><strong>Workplace and Meeting</strong></td>
<td><strong>Cost and Decision</strong></td>
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<td><strong>Project Management</strong></td>
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<td><strong>Mosaic</strong></td>
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<td><strong>Quail Run</strong></td>
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<td><strong>Rocky Mountain</strong></td>
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<td><strong>Wekiva Springs</strong></td>
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- ● Done well, used often, helpful to the team
- ● Done but only somewhat helpful or mixed comments about effectiveness
- ● Did it but not seen as particularly effective by most of the team
- ○ Did not have it

50%+ of team experienced in IPD/Lean

0% of team experienced in IPD/Lean
Tactical Takeaways for Projects

1. **Set targets:** Define owner’s business case & goals at c-suite

2. **Build the team:** Contract (using best value) key stakeholders prior to/ during concept design to validate targets & unify the team

3. **Learn as a team:** Provide training and coaching for the team to increase adoption of Lean methods

4. **Support the team:** Contracts should support (not thwart) a good team culture and adoption of Lean methods
THE BUSINESS CASE FOR LEAN CONSTRUCTION...THERE IS A BETTER WAY!

How do you increase speed to market and/or improve the return on investment of your capital projects? The Lean Construction Institute sponsored two separate research studies, conducted by Dodge Data & Analytics and the University of Minnesota, to explore how and why projects succeed. Empirical evidence now shows that projects with high Lean intensity are three times more likely to complete ahead of schedule and two times more likely to come in under budget.

HOW DID PROJECTS PERFORM?
Dodge benchmarked 182 projects identified by owners as best or typical vs. schedule and budget performance (what owners cited as most valuable to them). The sample represents projects using multiple delivery methods and contract types across the United States for owners completing more than five capital projects over three years.

![Graph showing % Completed Ahead of Schedule and % Completed Under Budget for Best and Typical Projects]

 WHY DID PROJECTS EXCEL?
Of the best projects Dodge found a statistically significant correlation between high Lean intensity projects and likelihood to complete ahead of schedule or under budget. Lean intensity refers to the extent a project used the management methods studied, particularly those that are recognized as the most effective.

![Graph showing % Likelihood to Complete Ahead of Schedule and % Likelihood to Complete Under Budget for Lean and High Lean Intensity Projects]

MYTHS ABOUT LEAN
The University of Minnesota "busted" some industry myths through in-depth case studies in partnership with the Integrated Project Delivery Alliance. Regardless of project type, regulations or Lean/IPD experience, the research found that teams leveraging Lean and IPD to foster and cultivate "project first" behaviors to deliver "A team results" with every team.

![Table listing top myths busted]

TOP MYTHS BUSTED
1. Delivery matters less than choosing the right people — behaviors can’t be dictated by a contract
2. IPD contracts are too complicated. Lean tools are too rigid
3. IPD only works on large, complex healthcare projects — Teams newer to IPD and Lean are at a disadvantage
4. Owners aren’t getting best value — or - Owners are getting value but the team is not maximizing profit
5. IPD and IPD-lite are essentially the same financial incentives and release of liability are no big deal

SO HOW DO I START?
Based on the research follow these four key steps:
1. Set Targets: Define owner’s business case and goals.
2. Build the Team: Use a best value selection process to contract key stakeholders prior to or during concept design to validate targets and unify the team.
3. Learn as a Team: Provide training and ongoing coaching for the team to include adoption of Lean methods.
4. Support the Team: Contracts should support (not thwart) a collaborative team culture and adoption of Lean methods.

WHAT DOES THIS MEAN FOR ME?
While the research is focused on the project business case, the benefits extend to the individuals and businesses of both owners and service providers for the project including:
- Reduced costs and improved profitability
- Increased employee engagement
- Better work/life balance

HOW DO I LEARN MORE?
For more information about the research, connect with the Lean community in your area and to advance your own Lean journey, please visit:
WWW.LEANCONSTRUCTION.ORG/LEARNING

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MOTIVATION AND MEANS:
How and Why IPD and Lean Lead to Success

Research Report
November, 2016

University of Minnesota in collaboration with University of Washington, University of British Columbia, Scan Consulting
Sponsored by Integrated Project Delivery Alliance (IPDA) & Lean Construction Institute (LCI)
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