Dynamic Performance Monitoring and Management: A Metric-Based Methodology to Better Predict Project Success

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Motivating Case Study

- A Hospital Project in the Bay Area…
  - Case study period: May to September, 2010
  - Integrated Project Delivery Model
  - ~$80 million in contract value
  - ~2 year construction schedule
  - WHAT HAPPENED?
**Reported Client Satisfaction**

**Dimensions of Satisfaction**
- Green: Overall Performance
- Blue: Flexibility in Aligning with Client Priorities
- Purple: Responsiveness to Client Needs (Efficiency)
- Yellow: Responsiveness to Client Needs (Effectiveness)

**Satisfaction Rating**
(5 is most satisfied)

**Reported Latency of Critical Issues**

**Latency Levels**
1: 1-2 days; 5: >8 days

**Client reported dissatisfaction starting in August**

**More incidents of higher latency emerging in August**

Size of circles proportional to number of responses
One firm in the design/construction team was replaced in October. (two months after high latency and low Client satisfaction emerged)
Observed Industry Problem

Existing Management Practice in AEC Industry

Management is
1. precedence-based
2. intuitively-driven
3. ad-hoc
and performance is
4. statically assessed
**Intuition**

**4,000 CASE STUDIES IN MANUFACTURING:**
Performance problems are symptoms of *bad management practices* (Bloom and Van Reenen, 2006)

**BAD PRACTICE**

**GOOD PRACTICE**

Performance Monitoring is a management practice that can be improved.

We propose a **new management methodology** that is:
- *client-based* NOT *precedence-based*
- *tactically-driven* NOT *intuitively-driven*
- *systematic* NOT *ad-hoc*

and performance is *dynamically-assessed* NOT *statically-assessed.*

*Dynamic Performance Monitoring and Management Methodology (DPMM)*
Problem Statement 1:
*Lack of Meaningful Performance Monitoring Metrics*

Design and construction teams do not have performance monitoring metrics that accurately predict client satisfaction, which is a key factor of project success.

Problem Statement 2:
*Lack of Effective Performance Monitoring and Management Method*

Given that Problem Statement 1 is solved, design and construction teams do not have a method to assess progress and guide management.
Points of Departure

Problem Statement 1: Lack of meaningful performance monitoring metrics

Problem Statement 2: Lack of effective performance monitoring and management method

Which Metrics?
- Organizational Effectiveness: KPIs
- Strategic Management: TQM
- Applied Economics: Performance Monitoring

What Methodology?
Organizational Effectiveness: KPIs

Strategic Management: TQM

Applied Economics: Performance Monitoring

Claims from PODs used to Develop DPMM Methodology

Limitations from PODs to be Addressed by DPMM
Claims from PODs used to Develop DPMM Methodology

Dimensions of Performance Monitoring Metrics

Client Satisfaction is an Attribute of Project Success

No Methodology for Metrics Implementation

Limitations from PODs to be Addressed by DPMM

Organizational Effectiveness: KPIs

(Chan & Chan, 2004)

• Synthesized construction KPI literature for measurements of project success

• Developed the Consolidated Model for Evaluating Project Success

• Time, cost, quality are the “Iron Triangle” (Atkinson, 1999)

• User satisfaction is an attribute of success (Liu & Walker, 1998)
Metrics Dimensions

Consolidated Model for Project Success (Chan & Chan, 2004)
Strategic Management: TQM

(Deming, Juran and Ishikawa)

- Total Quality Management requires strategies for improving performance that takes account of how people and organizations actually work.

- Customer-oriented goal seeking → focus on customer to achieve quality conformance → need clarity on aspects of processes that are most consequential for customer satisfaction.

Claims from PODs used to Develop DPMM Methodology

Metrics need to Influence Client Satisfaction

No Description of Metrics that Actually Influence Client Satisfaction

Limitations from PODs to be Addressed by DPMM
(Bloom & Van Reenen)

• Better management practices are significantly correlated with higher productivity, profitability and sales growth

• “Good” performance monitoring: metrics are continuously tracked, communicated, display results publicly, review formally and informally, evaluate deficiencies

Claims from PODs used to Develop DPMM Methodology

Definition of “Good” Performance Monitoring

Not Applied to AEC Industry

Limitations from PODs to be Addressed by DPMM
Claims from PODs + Address Limitations = Contribution of DPMM

- Dimensions of Performance Monitoring Metrics
- Client Satisfaction is an Attribute of Project Success
- Metrics need to Influence Client Satisfaction
- Definition of “Good” Performance Monitoring

No Methodology for Metrics Implementation

Not Applied to AEC Industry

No Description of Metrics that Actually Influence Client Satisfaction

Metrics Framework

DPMM Methodology

Measure Performance

- Identify and Tactically Align with Performance Deficiencies
- Report Results Publicly

Assess Results Formally/Informally

Identify and Tactically Align with Client Priorities

Measure Client Satisfaction

- Identify and Tactically Align with Performance Deficiencies
- Report Results Publicly
Dynamic Performance Monitoring and Management Methodology

- client-based
- tactical-driven
- systematic
- dynamic

1. Measure Performance
   - Identify and Tactically Align with Performance Deficiencies
2. Measure Client Satisfaction
   - Identify and Tactically Align with Client Priorities
3. Assess Results Formally/Informally
4. Report Results Publicly
Research Tasks

- **Matrix of Metrics**
  - Interviews to find *perceived* (by designers, contractors and Clients) antecedents of Client satisfaction

- **Methodology Implementation - Case Studies**
  - Sutter Health Palo Alto Medical Foundation – started February
  - Walt Disney Imagineering
  - Stanford Hospitals
  - Others??

- **Validation**
  - *Meaningfulness of Metrics* – trend analysis of each metric longitudinally to see evidence for tactical alignment
  - *Effectiveness of Methodology* – compare prospective case studies with one retrospective case study (control case, no DPMM)
  - *Are the Metrics Accurate Predictors of Client Satisfaction?* – statistical regression analysis to find correlation between each performance metric and client satisfaction metrics → smaller set of significant metrics
# Research Progress – Preliminary Metrics

## Management Process Metrics

<table>
<thead>
<tr>
<th>QUALITY</th>
<th>COST</th>
<th>SCHEDULE</th>
<th>SUSTAINABILITY</th>
<th>ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issues Resolution (Precon)</td>
<td>Target Value Design Process Conformance</td>
<td>Detailed Schedule Conformance</td>
<td>Clarity of Sustainability Goals</td>
<td>Reliable Promising</td>
</tr>
<tr>
<td>Constraints to Work (Construction)</td>
<td>Cost Variance</td>
<td>Response Latency of Critical Issues</td>
<td>Behavioral Motivation</td>
<td>Core Group Effectiveness</td>
</tr>
<tr>
<td>Quality Conformance of Work</td>
<td>Contingency Use</td>
<td>Field Material Delivery</td>
<td>Effectiveness of Education/Training Processes</td>
<td>Innovation/BIM Utilization</td>
</tr>
<tr>
<td>Lean Project Delivery Conformance</td>
<td>Cost Incentives</td>
<td>Field Rework Volume</td>
<td>Effort Alignment with Existing Management Practices</td>
<td>Meeting Effectiveness/Efficiency</td>
</tr>
</tbody>
</table>

### CLIENT SATISFACTION

- Quality of Management
- Quality of Work
- Alignment of Mutual Priorities
- Efficiency in Resolving Issues
- Transparent Exchange of Information
- Responsiveness to Client Concerns
- Mutual Trust and Confidence
Fast and Easy Metric Tracking Tool

SURVEY TIME: ~10 mins/week/person

PAMF SCC - Cost Metric - Target Value Design Process Conformance

1. PARTICIPANT INFORMATION

   Company
   Title
   Cluster

2. Please highlight the most significant progress made on the TVD for the specific Cluster named above this past week.

3. How do you feel the IPD Team within the Cluster participated in driving value into the Project this past week?

   5 Excellent  4 Good  3 Fair  2 Poor

   Exceptional

   Please explain your answer

   [Text input field]

   Done
Results are reported to entire project team and company executive-in-charge WEEKLY.

3 and up ratings across all satisfaction metrics.

Click here to view detailed responses:
http://www.surveymk.com/sr.aspx?sm=9zPV1OURiSBghCETvU6ik_2fpqiuXGTGmv1TRlLA4P1_2fo_3d
Core Group Cluster scored low this week!

Examples of significant progress made on TVD:
"development and pricing of A3s"
"organized Core Gas A-3 for CG approval (2.5 yr payback and will save PAMF $30,000/year); finalized availability of Big Room space"
"identifying immediate tasks and schedule for completing tasks; assigning responsible persons"
"determined Pro-X header is not a cost savings but king studs at window jambs is, and requested KHSS to provide more accurate cost difference"
"it is too early in the project start-up to judge"

Click here to view detailed responses:
http://www.surveymk.com/sr.aspx?sm=MXG7PYCdc3bfDLgYEAfSGB6u_2fxUMhe2vM0WggNERw14_3d
Informal Assessment of Metrics via Online Comment Forum

detailed responses here: http://www.surveymk.com/sr.aspx?sm=9zPV1OURiSBghCETvU6ik_2fpqiuXGTGmv1TRlLA4P1_2fo_3d

responsiveness to client concerns appears lower - what did Sutter/PAMF feel were priorities that needed to be addressed last week?
Contribution to Practice

- Project teams can EASILY implement DPMM methodology to
  - reduce project risk (given more accurate prediction of project success measured by client satisfaction)
  - improve client satisfaction (given correlation)
  - influence organizational change (given evidence for tactical alignment and continuous improvement)