The Value of Megaprojects

Megaproject: Learning from Cases
Leeds University, 30th November 2012

Prof Rodney Turner
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University of Technology Sydney
PS: I am sorry the letter is so long. I didn’t have time to write a shorter one.

Oscar Wilde

The Value of Megaprojects

Introduction
Infrastructure projects in China
Megaprojects in the oil and gas industry
Leading performance indicators on complex projects
A project is ……

- A temporary organization
- to which resources are assigned
- to do work
- to deliver beneficial change

Beneficial change – project results
The Value of Megaprojects

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Chinese economic system - 1949-1977

- Planned economy
- Brought China from semi-feudal, semi-colonial, war ravaged country to industrialized nation
- Public money mainly invested for political or military purposes
  - not public good
**Chinese economic system**
- 1978 to present day

- Significant progress
- More delegated to provincial and municipal government
- GDP growth 10% per year
  - fuelled by substantial investment in infrastructure
- GDP
  - 45% investment
  - 45% consumption
  - 10% exports

**Poor project performance**

- Project outputs cannot deliver desired outcomes
- Operating costs not considered
- Feasibility study unrealistic
- Poor quality of outputs
**Aims and objectives**

- How can the public and government in China get the best results from key infrastructure projects by increasing results orientation?
  - China can realize the maximum benefit from key projects in the public sector by increasing results orientation and performance
  - A clear definition of the project organization, with the assignment of responsibility to project sponsors and owners, can improve the benefits from key projects

**MW Kellogg Logic model**

<table>
<thead>
<tr>
<th>Results-oriented M &amp; E</th>
<th>Traditional M &amp; E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resources/ Inputs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Outputs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Impacts</strong></td>
<td></td>
</tr>
</tbody>
</table>

- Planned Work
- Intended Results
**Results-based M&E on Projects**

- **Exploitation**
  - Improved performance
  - Benefit
  - Operation
  - Outcomes
- **Implementation**
  - Resources
  - Project
  - Outputs
- **Do the right project**
- **Do the projects right**

**The project life-cycle**

- **Concept**
- **Feasibility**
- **Design**
- **Execution**
- **Exploitation**
  - Improved performance
  - Benefit
  - Operation
  - Outcomes
- **Goals**
- **Outputs**
- **Close-out**
Principles of good governance in the public sector

- Integrity
  - act impartially, ethically and in the best interests of the public
  - do not misuse information
- Stewardship
  - enhance value of public assets
- Leadership
  - good governance through leadership
- Efficiency
  - optimal use of resources

Principles of good governance in the public sector

- Accountability
  - answerable for decisions
  - adhere to standards
- Transparency, openness
  - clear roles and responsibilities
  - clear procedures for exercising power
- Rule of law
  - abide by the rules of society
  - contracts, property
  - police and courts
Results-based M&E in the public sector

OGC project organization structure

Development
Problem, stakeholder, and
Public Needs/ project
Expected output,
Indicators,
Activities
Project cycle
with milestones
Efficiency
Internal
Result orientation
External
Transparency
**Propositions**

**P1: Strategy and objectives**
- align project strategy to government strategy
- clear definition of needs and project objectives
- effective start-up
- portfolio and program management

**P2: Conceptual planning and design**
- quality of conceptual planning
- definition of project results
- relationship between results helps align outputs to use
- helps define O&M requirements

**P3: Implementation**
- aim for the best results
- poor output guarantees poor results

**Propositions (cont)**

**P4: Project transfer, operation and maintenance**
- transfer output and adapt outcome based on experience of O&M

**P5: Project organization and ownership**
- clear ownership of results (at all levels) improves performance
- facilitate coordination between government departments

**P6: Transparency and participation**
- interest and involvement of owners and managers responsible for O&M during delivery improves performance
Water treatment plants in China

- Ministry of Health: Owner
- Ministry of Water: Sponsor
- Ministry of Finance: Formal Communication
- Ministry of Works: Required Communication
- Local Government: Operator
- Project: Manager

Propositions (cont)

- P7: Monitoring and evaluation
  - results-based M&E improves success
  - distribute critical reports to responsible parties
- P8: Law, regulation and process
  - political consensus improves public projects
  - professional project management helps
- P9: China context
  - coordinate results with context
  - apply good governance
Nine case study projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Sector</th>
<th>Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hebei Roads</td>
<td>Transportation</td>
<td>Operation 3 years</td>
</tr>
<tr>
<td>Yuannan Environment</td>
<td>Urban environment</td>
<td>Operation 3 years</td>
</tr>
<tr>
<td>Capital Museum</td>
<td>Culture</td>
<td>Operation 1 years</td>
</tr>
<tr>
<td>Luanhuachi Xilu Roads</td>
<td>City infrastructure</td>
<td>Operation 1 years</td>
</tr>
<tr>
<td>Sichuan Zipingpu Water Conservation</td>
<td>Water Management</td>
<td>Operation 1 years</td>
</tr>
<tr>
<td>Beijing Youan Hospital</td>
<td>Public Health</td>
<td>In construction</td>
</tr>
<tr>
<td>Disabled Occupation and Skill Sports Training Centre</td>
<td>Social welfare</td>
<td>In construction</td>
</tr>
<tr>
<td>Jiangsu Sutong Yangtze River Highway Bridge</td>
<td>Transportation</td>
<td>In construction</td>
</tr>
<tr>
<td>Guanxi Longtan Hydroelectric Power Station</td>
<td>Energy</td>
<td>In design</td>
</tr>
</tbody>
</table>

Data collection

- Access to project documents and project archival record
- Interviews with the project owner, implementation agency and operators and users
- Site visits
- Participation in and observation of project meetings, including progress meetings and post project review
- Workshops
- Work groups with the KPIO
- Other sources such as World Bank and Asian Development Bank specialists
## Results

<table>
<thead>
<tr>
<th>No</th>
<th>Proposition</th>
<th>Support</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Strategy and objectives</td>
<td>Strong</td>
<td>Fit multi-year strategy</td>
</tr>
<tr>
<td>P2</td>
<td>Conceptual planning and design</td>
<td>Strong</td>
<td>Hebei roads design changed</td>
</tr>
<tr>
<td>P3</td>
<td>Implementation</td>
<td>Medium</td>
<td>Late changes difficult</td>
</tr>
<tr>
<td>P4</td>
<td>Project transfer, O&amp;M</td>
<td>Weak</td>
<td>Due to lack of experience</td>
</tr>
<tr>
<td>P5</td>
<td>Project organization and ownership</td>
<td>Strong</td>
<td>Ownership important</td>
</tr>
<tr>
<td>P6</td>
<td>Transparency and participation</td>
<td>Strong</td>
<td>Problems with people in different departments</td>
</tr>
<tr>
<td>P7</td>
<td>Monitoring and evaluation</td>
<td>Medium</td>
<td>Reduce post-implementation justification</td>
</tr>
<tr>
<td>P8</td>
<td>Law, regulation and process</td>
<td>Medium</td>
<td>Safety important</td>
</tr>
<tr>
<td>P9</td>
<td>China context</td>
<td>Strong</td>
<td>Good fit brings value</td>
</tr>
</tbody>
</table>

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### Results-based M&E important through the whole life-cycle

- **Feasibility**
  - align project with strategy
  - set clear objectives
- **Design**
  - improved by good conceptual planning
  - set logical relationship of results
- **Execution**
  - a good output is a necessary condition for success
- **Operation**
  - adapt outcomes based on experience
  - good maintenance and changes ensure fitness for purpose
**Responsibility and ownership**

- Project organization and individual responsibility
  - clear ownership improves results orientation
  - through the governance structure
- Transparency and participation
  - interest of the owner in O&M
  - clear information enables parties to accept ownership
- Monitoring and evaluation
  - results-based M&E improves performance
  - critical reports distributed to key parties
- Law, regulation and process
  - enforcement of law and political consensus necessary
  - useful that professional project management applied

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**The Value of Megaprojects**

Introduction
Infrastructure projects in China
Megaprojects in the oil and gas industry
Leading performance indicators on complex projects
Influence managers of mega-projects

- The ability of managers to influence strategy is a function of the amount of resource they control not their seniority.
- The managers of mega-projects control between $0.5-20 billion.
- Decisions underpin the allocation of resources and the cost of poor decisions is high.
- Information is a key input to decision processes.
- A challenge of megaprojects is inadequate, unreliable or misleading information; and conflicts between decision making, policy and planning.

Research questions

- Which aspects of information-feed factors supporting project managers’ decision impact strategic objectives the most?
- How can the decision framework of the managers of megaprojects be enhanced?
**Influence of project managers**

**Front-end Engineering**
- IDENTIFY
- ASSESS
- SELECT
- DEFINE
- EXECUTION
- OPERATION

**Execution**
- Initiation
- Evaluation
- Generate & Select Concept
- Technical Specification
- Detail design, construct, commission
- Operation & Maintenance

Decision gate go/no go/go back

Stage deliverable

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**Focus of mega-project managers**

- Megaprojects are complex:
  - long project and product life-cycles
  - unpredictable in terms of time and scope
  - substantial irreversible commitments
  - high probabilities of failure
  - skewed reward structure

- The focus of managers of megaprojects should be on strategic objectives and business benefit not project efficiency.
Results-based view

Shenhar and Dvir (2007)
Challenges of megaprojects

- Numerous stakeholders
  - high socio-economic and political interest
- High time and cost pressure
  - can impair decisions
  - project efficiency versus business effectiveness
- Decisions influence
  - team performance
  - senior management perception

Strategic value in the Oil and Gas Industry

- Admiration of key stakeholders
- Health, safety, security and environmental responsibility (HSSE)
- Significant socio-economic contribution to the society
- Profitability of the business
**Normative decision approach**

- People make decisions to maximize utility based on self-interest and rationality
  - restricts ability to respond to uncertainty
  - oil and gas industry dominated by technical people who adopt a normative approach

**Descriptive decision approach**

- People make decisions to satisfy their important needs
  - even if they do not have all the required information
  - their choice is not optimal
- Faced with uncertainty people simplify
  - rules of thumb/heuristics
  - bounded rationality/satisfying
  - prospect theory
**Prospect theory**

- Decision making under risk
- Framing
  - analysis of prospects
  - simplification of risks
- Valuation
  - assess value of prospects
  - opportunity-threat/gain-loss
- During framing information feed has a big impact
  - untimely information is degraded
- Decision-makers who use more information
  - are more comfortable with ambiguity and uncertainty
  - are more positive with labelling their challenges

**Research model**

![Research Model Diagram]

- PM’s perception of controllability
- Information-feed
- Long-term strategic value
  - PM’s perception of needs of senior management
  - PM’s professional experience

H2

H1

H3
Variables

- Information feed
  - information on stakeholders
  - project performance
  - corporate performance
  - information timeliness
- Strategic value
  - value to partners
  - HSSE compliance
  - profitability
  - value to host community

Variables - Controllability

- 10 areas of challenge on megaprojects
  1. Contracting and procurement management;
  2. Government relations
  3. Host community relation
  4. Joint venture interfaces
  5. Health, safety, security, and environmental (HSSE)
  6. Multi-location of fabrication and facilities integration
  7. Implementation of local content policies
  8. Project governance;
  9. Aspirations of the core project team
  10. Multi-cultural leadership
Variables - context

- PMs perception of senior management drivers
  - cost
  - schedule
  - stakeholders
  - safety
  - economics
  - ....
- PMs experience (tenure)

Survey

- 107 total responses
  - 8 not from the Oil and Gas Industry
  - 30 did not complete the questionnaire
- 69 useable responses
  - 11 responses per variable
- 5 pilot responses also not used
Information feed and strategy

Hypothesis 1

- Hypothesis 1 is supported with respect to
  - stakeholder pulse
  - project performance
- Hypothesis 1 is not supported with respect to
  - corporate performance
  - timeliness
- Strong interaction of mega-projects on society
  - context analysis is very important to successful strategic management in business organizations
Controllability and information feed

Scores for controllability

<table>
<thead>
<tr>
<th>Underlying variables</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controllability</td>
<td></td>
</tr>
<tr>
<td>Risk mitigation capability</td>
<td></td>
</tr>
<tr>
<td>Contracts and procurement</td>
<td>2.06</td>
</tr>
<tr>
<td>Government relations</td>
<td>2.55</td>
</tr>
<tr>
<td>Host community</td>
<td>3.00</td>
</tr>
<tr>
<td>Joint venture</td>
<td>2.48</td>
</tr>
<tr>
<td>HSSE</td>
<td>2.03</td>
</tr>
<tr>
<td>Multi-location</td>
<td>1.97</td>
</tr>
<tr>
<td>Local content</td>
<td>2.72</td>
</tr>
<tr>
<td>Project governance</td>
<td>2.65</td>
</tr>
<tr>
<td>Project team</td>
<td>2.43</td>
</tr>
<tr>
<td>Cultural diversity</td>
<td>2.87</td>
</tr>
<tr>
<td>Team cohesion</td>
<td>4.25</td>
</tr>
</tbody>
</table>
Hypothesis 2

- Hypothesis 2 supported
- All means (except team cohesion) less than 3
  - PMs of mega-projects feel exposed to risks
- 3 risk factors are external to the project team
  - quality of relationships with context is a major success factor on large projects

Influence of context

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Value to Partners</th>
<th>HSSE Compliant</th>
<th>Profitable</th>
<th>Value to Host Com</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information feed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate perform</td>
<td></td>
<td></td>
<td>Q: PO</td>
<td>P: SS</td>
</tr>
<tr>
<td>Stakeholder pulse</td>
<td></td>
<td></td>
<td></td>
<td>P: PS</td>
</tr>
<tr>
<td>Project perform</td>
<td>P: SS, PO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timelines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P = Pure moderator  PO = Profitable operations
Q = Quasi moderator  SS = Stakeholder support
PS = Project schedule
Hypothesis 3

- Hypothesis 3 is supported for some senior management drivers
- Hypothesis 3 is not supported for PM tenure

Conclusion

- Poor knowledge of the external environment has a significant impact on poor performance of mega-projects
- Risk mitigation on mega-projects significantly influences information feed
  - a superior risk management system enhances the PMs sense of control
- The significance project managers attach to HSSE as a core value is indicative of a fear of loss
  - they have greater fear of defaulting on cost and schedule than on HSSE.
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Early Warning System for Success and Failure in Complex Projects

Associate Professor Roxanne Zolin
Queensland University of Technology
Professor Rodney Turner,
SKEMA Business School
Dr. Kaye Remington, Research Fellow,
University of Technology Sydney
Dr. Artemis Chang, Senior Lecturer,
Queensland University of Technology
**Increasing complexity of projects**

- Projects finished late and overspent are later perceived to be a success
  - Sydney Opera House, Thames Barrier
- Others finished on time and on budget are later perceived to have failed
  - Sydney Cross City Tunnel
    - PPP project where the private sector investors lost their money
    - because motorists were not willing to pay the toll and use the tunnel

**Our research project**

- The aim was to identify leading performance indicators as early warning systems
  - modelling success
  - assessing complexity
    - dimensions
    - severity of the dimensions
  - impact of dimensions of complexity of complexity on success
- In this paper we describe the modelling of success
Leading performance indicators may be ....

- Measures of success criteria that show the project is heading to a successful conclusion
- Measures of success (or failure factors) that show the project is going off the rails
  - may interact with each other
  - may interact with dimensions of complexity
- Be perceived differently by differently stakeholders
- Be perceived differently over different timescales

Research questions

- How can we assess the success of large complex projects
  - multiple stakeholders
  - multiple time frames
  - during the life of the project
  - to predict the performance of the product it produces
- What leading performance indicators measured during project delivery
  - provide a valid and reliable forecast of the assessment of all the stakeholders during the product’s life
- Can the leading performance indicators be used as early warning systems
**Stages of the research**

1. Develop a model of project success reflecting the assessment of the project’s output, outcome and impact by different stakeholders over different timescales.
2. Evaluate the ability of success and failure factors as perceived by the project team to act as leading performance indicators during project delivery.
3. Evaluate the ability of those leading performance indicators to predict the achievement of the project’s output, outcome and impact as perceived by different stakeholders over different timescales.
4. Identify combinations of the leading performance indicators in the context of different combinations of complexity that are more likely to be precursors of project failure.

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<table>
<thead>
<tr>
<th>Measure</th>
<th>Stakeholder</th>
<th>Timescale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholder value</td>
<td>Shareholders</td>
<td>End+years</td>
</tr>
<tr>
<td>Profitable</td>
<td>Board</td>
<td>End+years</td>
</tr>
<tr>
<td>Happy sponsor</td>
<td>Board</td>
<td>End+years</td>
</tr>
<tr>
<td>Happy consumers</td>
<td>Consumers</td>
<td>End+months</td>
</tr>
<tr>
<td>Easy to operate</td>
<td>Users</td>
<td>End+months</td>
</tr>
<tr>
<td>Easy to sell</td>
<td>Marketing</td>
<td>End+months</td>
</tr>
<tr>
<td>Time, cost, quality</td>
<td>All</td>
<td>End</td>
</tr>
<tr>
<td>Happy project team</td>
<td>Project team</td>
<td>End</td>
</tr>
<tr>
<td>Profitable for contractor</td>
<td>Project team</td>
<td>End</td>
</tr>
</tbody>
</table>
Shenhar and Dvir

<table>
<thead>
<tr>
<th>Efficiency (end)</th>
<th>Team (end)</th>
<th>Customer (+months)</th>
<th>Business (+years)</th>
<th>Future (Learning) (+years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Satisfaction</td>
<td>Requirements</td>
<td>Sales</td>
<td>New</td>
</tr>
<tr>
<td>Cost</td>
<td>Morale</td>
<td>Specification</td>
<td>Profits</td>
<td>technology</td>
</tr>
<tr>
<td>Yield</td>
<td>Learning</td>
<td>Benefit</td>
<td>Market share</td>
<td>market</td>
</tr>
<tr>
<td>~ functionality</td>
<td>Growth</td>
<td>Use</td>
<td>ROI</td>
<td>product line</td>
</tr>
<tr>
<td>~ performance</td>
<td>Retention</td>
<td>ARM</td>
<td>Cash</td>
<td>competence</td>
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<tr>
<td>Others</td>
<td>Well-being</td>
<td>Satisfaction</td>
<td>Cycle time</td>
<td>capability</td>
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<tr>
<td></td>
<td></td>
<td>Loyalty</td>
<td>Organization</td>
<td></td>
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<tr>
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<td></td>
<td>Brand</td>
<td>Regulatory</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>acceptance</td>
<td></td>
</tr>
</tbody>
</table>

Xue Yan (2010) – sponsored by the Asian Development Bank

Exploitation

Improved performance

Goals

Operation

Outcomes

Resources

Project

Outputs

Implementation
### Multiple views, multiple stakeholders, multiple time-frames

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Output - end</th>
<th>Outcome - +months</th>
<th>Impact - +years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investor</td>
<td>Efficiency</td>
<td>Profit</td>
<td>Whole life value Learning</td>
</tr>
<tr>
<td>Consumer</td>
<td>Price, time</td>
<td>Reputation</td>
<td>Advantage Development</td>
</tr>
<tr>
<td>Operators</td>
<td>Features</td>
<td>Price, time</td>
<td>Operability, ARM Learning</td>
</tr>
<tr>
<td>Sponsor</td>
<td>Documentation Training</td>
<td>Operability</td>
<td></td>
</tr>
<tr>
<td>Manager/team</td>
<td>Efficiency</td>
<td>Reputation, Risk,</td>
<td>Relationships</td>
</tr>
<tr>
<td>Senior supplier</td>
<td>Experience</td>
<td>safety</td>
<td>Investor loyalty</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Efficiency</td>
<td>Reputation, Repeat</td>
<td>Reputation</td>
</tr>
<tr>
<td>Public</td>
<td>Profit</td>
<td>business, Repeat</td>
<td>Repeat business</td>
</tr>
<tr>
<td></td>
<td>Client satisfaction</td>
<td>business</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>Environment, Social cost/benefit</td>
<td>Social cost/benefit</td>
</tr>
</tbody>
</table>

### Evaluating and predicting success

- Success can only be evaluated in the days months and years following the project
  - different stakeholders
  - different timescales
- The aim is to develop leading performance indicators that predict the likelihood of achieving later assessments of success
  - monitor and adjust the performance of the project team, contractors and sub-contractors
  - identify as soon as possible that the project cannot be achieved within the resources the stakeholders are willing to commit
  - and cancel the project if necessary
### Possible success factors and leading performance indicators (LPI)

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Success factors</th>
<th>LPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investor</td>
<td>Clear accepted purpose</td>
<td>Satisfaction with specification</td>
</tr>
<tr>
<td></td>
<td>Endorsement, interest</td>
<td>Relationship with contractor</td>
</tr>
<tr>
<td>Consumer</td>
<td>Clear specification</td>
<td>Satisfaction with specification</td>
</tr>
<tr>
<td></td>
<td>Communication, acceptance</td>
<td>Relationship with sponsor</td>
</tr>
<tr>
<td>Operators</td>
<td>Clear specification</td>
<td>Satisfaction with specification</td>
</tr>
<tr>
<td></td>
<td>Commitment, communication</td>
<td>Prototype performance</td>
</tr>
<tr>
<td>Sponsor</td>
<td>Open communication</td>
<td>Stakeholder satisfaction</td>
</tr>
<tr>
<td></td>
<td>Political support</td>
<td>Clear strategic goals</td>
</tr>
<tr>
<td>Manager/team</td>
<td>Clear accepted purpose</td>
<td>Pride, satisfaction, growth</td>
</tr>
<tr>
<td></td>
<td>Respect, trust, risk awareness</td>
<td>Top management support</td>
</tr>
<tr>
<td>Senior supplier</td>
<td>Risk awareness, communication</td>
<td>Risk, HSE, stakeholders</td>
</tr>
<tr>
<td></td>
<td>Respect, trust</td>
<td>Contract, strategic goals, learning</td>
</tr>
<tr>
<td>Suppliers</td>
<td>Commitment, communication</td>
<td>Contract compliance</td>
</tr>
<tr>
<td></td>
<td>Respect, trust, collaboration</td>
<td>Business goals</td>
</tr>
<tr>
<td>Public</td>
<td>Transparency, accountability</td>
<td>Social impacts</td>
</tr>
<tr>
<td></td>
<td>Community outreach</td>
<td>Environmental impacts</td>
</tr>
</tbody>
</table>

### Based on the work of .......

- Jacobson and Choi, 2008
- Andersen et al, 2006
- Kang and Moe, 2008
- Müller, 2003
- Pinto and Slevin, 1988
- Müller & Turner, 2007
- Turner, 2009
- Yu et al, 2005
- Atkinson, 1999
- Bryde, 2005
- Turner et al, 2008
Scale development process

- DeVellis (2003) eight step guidelines for scale development

Pilot Study

- Ascertain reliability and appropriateness of survey questions
- 8 DMO project managers or program directors
  - by telephone
- Revised questionnaire
  - final check by senior DMO staff
**Main study**

- Zoomerang
- Project managers and program directors from DMO
  - 237 invited to participate
  - 152 responses
  - 64% response rate
  - 50 air projects
  - 31 land projects
  - 31 sea projects
  - 40 joint responses

**Factor analysis**

- Ascertain construct validity and reliability
  - drop from scale questions which
    - detract from Chronback’s alpha
    - do not load optimally on scale’s factor
- Rotated Varimax
  - eigen values greater than 1
  - converged in 11 iterations
  - repeated Chronbach’s alpha test
Results

- Two project success factor scales
  1. success in planning
  2. stakeholder engagement
- Seven stakeholder satisfaction scales
  1. stakeholder satisfaction
  2. supplier profitability
  3. contractor satisfaction
  4. product efficiency
  5. project executive satisfaction
  6. satisfaction with specifications
  7. public stakeholder satisfaction

P1: Success in planning

- Well established information and communication routines
- Key information gathered and distributed efficiently
- Project control follows good managerial and technical methods
- Project tools used in an effective way
- Project is well described and well coordinated with other projects and programs
**P2: Stakeholder engagement**

- Key participants engaged in producing the business plan and could influence it
- Key participants given the opportunity to air their views on the project’s goal and mission
- Key participants know who has decided the project's terms of reference

**S1: Stakeholder satisfaction**

- Good relationship with prime contractor
- Good performance
- Appropriate earned value
- Project executive or sponsor profits
- Achieved stakeholder satisfaction
- Senior supplier achieves appropriate business goals
- Other supplier achieves appropriate business goals
- Good safety record
S2: Product satisfaction

- Useful prototype
- Good performance

S3: Contractor satisfaction

- Achieved stakeholder satisfaction
- Achieved performance effectiveness
- Reduced waste
- Demonstrated contract compliance
S4: Product efficiency

- Useful prototype
- Achieved performance efficiency
- Managed risk appropriately
- Good performance

S5: Project executive satisfaction

- Achieved stakeholder satisfaction
- Achieved performance efficiency
- Achieved performance effectiveness
- Helps executive achieve their goals
- Has stakeholder satisfaction
S6: Satisfaction with specifications

- Appropriate specifications
- Good relationship with the project owner

S7: Public stakeholder satisfaction

- Balanced social costs and benefits
- Acceptable environmental impacts
S8: Supplier profitability

- Achieved performance efficiency
- Allowed supplier to profit

S9: Project manager satisfaction

- Pride in work
- Job satisfaction
- Recognition
- Skil growth
- Contacts
- High morale
- Attracts top management support
Performance indictors

1. Clear specification
2. Clear purpose
3. Accepted purpose
4. Appropriate L1 plan
5. Appropriate plan
6. Open communication
7. Stakeholder endorsement
8. Interested owners
9. Appropriate specification
10. Effective communication
11. Efficient decision making
12. Contractor relationship
13. Useful prototype
14. Good performance
15. Met earned value targets
16. Right execution costs
17. Environmental standards
18. Met safety standards
19. Relationship with owner
20. Consistent safety record

Kippendorff's alpha

- 0.700-0.799  Appropriate for exploratory studies
- 0.800-0.899  Mostly acceptable
- 0.900-1.000  Nearly always acceptable
Alignment of the project managers views with … …

- The owner
  - good performance ($\alpha=.7367$ - low)
  - environmental standards ($\alpha=.8255$ - medium)
  - safety standards ($\alpha=.7301$ - low)
- The consumer
  - consumers’ acceptance ($\alpha=.7258$ - low))
- The project executives
  - good risk awareness ($\alpha=.7070$ - low)
  - managed risk ($\alpha=.8648$ - medium)
  - consistent safety record ($\alpha=.7576$ - low)

Alignment of the project managers views with … …

- The lead/prime contractor
  - lead contractor made a profit ($\alpha=.8355$ - medium)
- Other contractors
  - good relationship with prime contractor ($\alpha=.8673$ - medium)
  - clear specification ($\alpha=.8157$ - medium)
  - trusted ($\alpha=.7282$ - low)
- Operators/users
  - nothing
- Public
  - nothing
What a sorry tale!!!

- Interest is in more what is missing than what is there

That's All Folks

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