The Procurement Design Assessment System: The roadmap towards it

Paris, 22 June 2018
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Two challenges to advancing procurement

A lack of:

• Data on procurement performance

• Evidence based approach (including operational data) to procurement design
Contract formats are many

- Publicly financed ("Traditional")
  - ECI (Phase 1)
  - Alliancing
  - Non-price competition
  - Cost-share (e.g. costs plus a fee)

- Privately financed ("PPP")
  - Design Build (DB)
  - Engineering, Procurement & Construction (EPC)

- Design Bid Build (DBB)
- Alliancing
- Lump sum/fixed time ("Turnkey")

Note – Solid lines denote predominant choice, with dashed lines representing less common but observed options.
... and only a little evidence on performance

Most evidence is about on cost (and time) performance of low powered contracts for example

<table>
<thead>
<tr>
<th>Source</th>
<th>Reference estimate</th>
<th>Project type</th>
<th>Time period(^1)</th>
<th>Observ.</th>
<th>Average Cost overrun (%)</th>
<th>Area</th>
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<tbody>
<tr>
<td>Cantarelli et al. 2012b, Flyvbjerg et al. 2003</td>
<td>Decision to build</td>
<td>Roads</td>
<td>1927-2009</td>
<td>278</td>
<td>21.2</td>
<td>NW Europe</td>
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<td>Decision to build</td>
<td>Roads</td>
<td>1980-2009</td>
<td>39</td>
<td>25.3</td>
<td>Netherlands</td>
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<td></td>
<td>Bridges, tunnels</td>
<td>Roads</td>
<td>1980-2009</td>
<td>37</td>
<td>18.9</td>
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<td>Lundberg et al. 2011</td>
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<td>Roads</td>
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<td>Lee et al. 2008</td>
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<td>Roads</td>
<td>1985-2005</td>
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<td>Ellis et al. 2007</td>
<td>Detailed design</td>
<td>Roads &amp; bridges</td>
<td>1998-2006</td>
<td>1847</td>
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<td>Ellis et al., 2007</td>
<td>Contract value</td>
<td>Roads &amp; bridges</td>
<td>1998-2006</td>
<td>1908</td>
<td>9.36</td>
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<td>Bordat et al. 2004</td>
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<td>Roads</td>
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<td>5.6</td>
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</table>
Many opinions on how contracts and concepts should perform...

Some examples:

- Bundling design & build will reduce variation claims due to errors and omissions in design and lead to better project outcomes.
- Stronger enforcement package (e.g. performance bonds) leads to overall better contract performance.
- In PPPs bundling DB with OM will lead to life-cycle cost optimisation.
- ...
... actually very little evidence

• Just looking at on-time/on-budget performance is insufficient, a view on end cost is necessary as well!

• E.g. evidence on superior on-time/on-budget of D&B vs DBB for transport infrastructure potentially available, but no view on end cost.

• What about quality/service levels?

• In-house transaction cost?

• ...


Procurement design and performance?
Towards evidence based procurement design

Optimising procurement

ITF
Optimal risk pricing requires breaking the project down into different activities/contracts

QUT
Interfaces between contract choices and competition, bundling...
Economics about procurement...

• Procurement, or planning the contract, is like a hurdle race with key decision-points that need to be cleared, or optimised:
  
  - **make-or-buy decision** (given current capacities or long-term prospects);
  
  - **bundling activities** (bundling decision/LCC);
  
  - based on **competition** or **collaboration**.
Contract theory increases our understanding

**Planning the contract**

**NIE /Contract Theory**

- Coase’s thesis on internal and general external transaction costs
- Williamson’s Transaction Cost Economics (TCE)
- Property Rights Theory (PRT)
- Principal Agent Theory (PAT)

**Applications**

- “Make-or-buy decision”
  - Internalization vs Externalization of project’s activities
  - Boundaries between government and market firms, vis-à-vis project activities
  - Learning curve and economies of scale (frequency of activity)
- “Bundling Decision” (amongst externalised activities)
  - Economies of scope
  - Discrete contracts with market firms
- “Exchange relationship decision” (with each market firm representing each contract)
  - Competitive (=Discrete) vs collaborative (=relational exchange)

**Outcomes**

- Avoiding costly mistakes by government arising because of lack of organizational capability and/or competence
- Avoiding risk of market firm/s holding-up government (appropriating super profits on occurrence of change in the works)
- Allocating activities to party with superior competence and/or capability to manage risk within activity
  → Void in NIE/contract theory
- Identifying sets of design and/or construction and/or operations and maintenance activities with potential to incentivize decisions in upstream activities to deliver lower whole-life costs and/or more functionality/user benefits (i.e. positive externalities)
  - Avoiding bundles that increase risk of hold-up
  - Avoiding bundles that create thin competition
  → Void in NIE/contract theory
- • Avoid mistakenly relying on a relational exchange that increases risk of hold-up
  • Avoid mistakenly relying on a discrete exchange that increases contract price
  → partially explained by NIE/contract theory
... adding a capabilities perspective to address incompleted explanations from, NIE/contract theory i.e. adding Barney’s Resource-Based Theory to advance our understanding...

Planning the contract

Capabilities Perspective  Applications  Outcomes

Barney’s Resource-Based Theory (RBT)

“Make-or-buy decision”

Allocating activities to party with superior organizational and/or product/ion capability to manage risk within activity

“Bundling Decision”

Avoiding bundles that create thin competition

“Exchange relationship decision”

• Helping to avoid mistakenly relying on a relational exchange that increases risk of hold-up; and
• Helping to avoid mistakenly relying on a discrete exchange that increases contract price
Infrastructure procurement in practice?

An example of an advanced economy (Australia; similar to UK):

- **Step 1**: Data gathering (objectives, risks; agency’s and market sounding/capability, unique project characteristics)
- **Step 2**: Shortlist delivery models (consider suitability of PPP, Alliancing, Managing contractor model)
- **Step 3**: Validation (what precedents exist for this project? What does the market think?)
- **Step 4**: Delivery model options analysis (Which model best achieves objectives and reduces risk?)
- **Step 5**: Preferred delivery model (structure preferred delivery model, consider risk; approve; execute gateway review)
How is infrastructure procurement informed in practice?

An example of an advanced economy e.g. Melbourne’s North-East Link project, Australia (business case at: https://northeastlink.vic.gov.au/project/businesscase)
How is infrastructure procurement informed in practice?
Infrastructure procurement in practice?

- Cut & cover tunnel
- "Simple" on-grade road and elevated sections of road
- Road at junction of rail involving third party works
- Driven tunnel
How is infrastructure procurement informed in practice?
Towards PDAS

PDAS = Procurement Design Assessment System: QUT have developed the core...

Step 1. **Activity** Analysis (splitting the project into activities/highest level of specialization on the market)
Step 2. **Make-or-Buy** Analysis
Step 3. **Bundling** Analysis (chasing LCC optimisation)
Step 4. **Exchange Relationship** Analysis (what contract type/power for each bundle)
The aim in bundling and make or buy

GOVERNMENT is technically and/or organizationally superior

MARKET is technically and/or organizationally superior

Supplier monopoly

Supplier oligopoly

Competitive neutrality

RBT variable/s (capacity, rarity, costly to imitate) dominate TCE variables

TCE variables dominate RBT (specificity, frequency, uncertainty)

RBT variable/s (capability, rarity, costly to imitate) dominate TCE variables
Driven tunnel

Third party rail alignment

Cut & cover tunnel

Simple road-on-grade and elevated structures

Driven tunnel

Contract #1 (Design of driven tunnel)

Contract #3 (Construction of driven tunnel and cut & cover tunnel)

Contract #4 (Construction of remainder)

Contract #2 (Design of remainder)

O&M same, in technological terms, to rest of road network and procured as part of a range of network activities and not procured as a project-based activity in this case.

How it should have been done
Pieces to be developed to get to PDAS

Aspects to be developed/expanded the current model

• **Consolidation** of multiple contract bundles/packages using multiple risk treatment (multiple exchange types in one contract) in conjunction with multiple sources of finance

• Consideration of activities in **network settings**

• Integrating insights from our **WG Synthesis report and current model**

• Inputs from **ex-post analysis** lacking at the moment (i.e. the first challenge of procurement)
Thank you!

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