

RESPONSE TO THE DRAFT REPORT ON PUBLIC INFRASTRUCTURE

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The key finding of the draft report is the need for better decision making in project selection, funding, financing and the delivery of infrastructure services and, in order to achieve this improvement, governance and institutional arrangements for public infrastructure have to be reformed. This submission addresses a number of information requests to that finding, and follows the chapter structure of the draft report:

- Chapter 6: Response to Information requests 6.1, 6.2 and 6.3;
- Chapter 7: Comments on points 3, 9 and 10 in Draft Recommendation 7.1;
- Chapter 9: Response to Information requests 9.1; and
- Chapter 11 Response to Information requests 11.1 and 11.2.

CHAPTER 6

Information request 6.1: The Commission seeks views on the costs and benefits of governments issuing project-specific infrastructure bonds, with the interest rates reflecting the risks of the project and which explicitly do not have a government guarantee.

Information request 6.2: The Commission seeks views on the costs and benefits of governments issuing converting infrastructure bonds to finance greenfields infrastructure investments.

Information request 6.3: The Commission seeks feedback on the advantages and disadvantages of alternative procurement processes focused on long-term equity, such as an 'inverted bid' model. In particular, the Commission is interested in how an alternative procurement process should be designed to

In response to the three information requests above, much of the submissions received by the Commission on financing issues would be described by a cynic as rent-seeking. The fundamental proposition underneath many of the proposals advanced in these submissions is a shifting of risk from the private sector to the public sector (a particularly egregious example is RBA repos). While that is not necessarily bad, in the case of a genuine nation-building project say, it is not desirable. The most important factors in this context are the depth of Australian financial markets and the quality of regulation, and how these make capital available and accessible.

The current funding of social infrastructure PPPs (hospitals, schools etc.) secured against government backed payment mechanisms indicates that capital is available but highly risk adverse. The major Australian banks are the most profitable in the world, but do not appear interested in significantly increasing their participation in the project finance market at the present time. They are, however, very interested in increasing their Australian Government bond portfolios. These social infrastructure projects can be delivered under some version of a build and maintain or design-build-operate and maintain contract, and there does not seem to be any logical reason why they could not be refinanced with project-specific bonds after physical completion and the capital recycled into new projects. These projects have a guaranteed income stream which would make them attractive, and could also be allowable investments for superannuation funds. Another option would be to pool a number of these, possibly with State Government participation, into a securitised asset. As a low risk asset class this would be an innovative development.

This type of project is in reality a separate class of project. For market based projects it is probable that global financial markets are now in an extended phase of capital scarcity due to:

- Ongoing balance sheet rebuilding after the financial crisis and an increased focus on domestic lending by banks generally;
- The effect of Basel III on capital requirements (absorbing capital) and capital adequacy (restricting loan tenor and availability of project finance);
- Competition for infrastructure finance from developing countries, particularly in the Asia-Pacific region; and
- Aging populations in the developed countries drawing down savings as they retire, or saving less as they reduce work hours.

If this is right the Commission's view on reforming governance and institutional arrangements to promote better decision making in project selection is the crucial element. The reason is because quality projects will attract funding in their own right, while access to finance for lesser quality projects will be difficult. There always is the possibility of optimism bias or political preference (for new, large projects) that the Commission refers to at several points in the draft report leading to poor projects getting approved. This however begs the question of what are quality projects, or more precisely what are the significant characteristics of quality projects?

A second and related question is whether those projects should receive some form of risk abatement? And what specific risks are being targeted here? It appears from the draft report the principle concern is patronage risk for transport projects. The established practice of government contributions to major transport projects is far preferable and a more effective way than any form of government guarantee, tax subsidy or covered bond of reducing debt and interest rate risk. The Commonwealth contributions to major projects such as the Alice Springs to Darwin railway, the M7 toll road and the Victorian Government's agreements on CityLink are good examples. Such contributions could be made conditional on some minimum level of equity in a project when the private sector is involved.

It should be noted in this context that the tax loss incentive for designated infrastructure projects only came into effect in July 2013 so it is too early to evaluate its effects, or effectiveness. This aims

to encourage private investment in infrastructure by allowing projects approved by the Infrastructure Coordinator to uplift the value of carry forward losses by the 10 year Government bond rate.

Response 1: Shifting risk from the private sector to the public sector is not desirable, but government contributions to major transport projects have been an effective method of reducing debt and, where applicable, could be made conditional on some minimum level of private sector equity in a project.

Response 2: Completed social infrastructure PPPs could be refinanced with project-specific bonds after physical completion and the capital recycled into new projects. The guaranteed income stream could allow these to be investments for superannuation funds. These bonds could be developed into asset backed securities.

CHAPTER 7

The points above in regard to quality projects strongly accords with Draft Finding 7.1, that institutional and governance arrangements for the provision and delivery of much of Australia's public infrastructure are deficient and are a major contributor to poor outcomes, and the points about good governance in Draft Recommendation 7.1, which in many ways is the core set of principles on this issue in the Commission's report. Therefore a few observations on three points from Draft Recommendation 7.1 follow, often linked to other parts of this submission.

Point 3: Effective processes, procedures and policy guidelines for planning and selecting public infrastructure projects, including rigorous use of cost–benefit analysis and transparency in cost–benefit assessments, public consultation, and public reporting of the decision.

Comment: Typically in Australia only one proposal is presented to the public for a project, usually after the decision is made. Thus both transparency and the public interest may be compromised. What would be better would be two or three alternative proposals with their data sets (such as their cost-benefit analyses, financial plans and forecasts, estimates of time and environmental plans) were to be made available for discussion and debate before a decision is made, which could then incorporate that debate. Ideally this would be done by an independent agency not sponsors, whether public or private. This could become part of the overhaul of the regulatory and approval process recommended by the Commission in a previous report.

Infrastructure Australia (IA) is statutory body with the primary function of providing advice on the range of issues associated with infrastructure investment. At present IA does not comment on specific projects, however expanding its role to manage the information release of alternative proposals suggested above and compilation of responses seems appropriate. Infrastructure Australia

could also assess proposed projects against their National Infrastructure Plan (2013) and Infrastructure Priority List. A national major projects agency could also undertake this task.

Point 9: Principles and processes for selecting efficient financing mechanisms and transparency of financing arrangements.

After a series of failed PPPs there are grounds for doubting current practices, as there have been some decisions approving PPP projects with highly questionable financing arrangements. Three examples of these on failed projects are:

- Payment of a \$100m fee to the NSW Government by the Cross City Tunnel, when a co-payment into the project is the convention. On this project the major shareholder had also borrowed the money for their equity contribution;
- The 17 refinancings planned during the Waratah Train PPP, generating large fee payments to the financial advisor for a project that had to be bailed out by the NSW Government; and
- The Clem 7 financial plan, released on financial close, that showed an increase in debt for the first ten years of the PPP to allow dividend payments before the eventual forecast traffic numbers would allow payments to reduce debt.

Comment: Again, transparency is the key to improved outcomes. The role for a national major projects agency or IA suggested above could be extended to publishing reports on project financing proposals and options and moderate the public discussion and debate. This would not exclude complex structured finance deals, but would make them open to challenges on risk, efficiency or transparency grounds. Sunlight is the best disinfectant.

The biggest change to current processes would be to exclude financiers from joining a consortium in the bidding stage for major projects, such as PPPs. This will prevent finance-led bids and may reduce the high level of fees found on these projects (10% is not unusual). By doing so the sponsors who win a project will then go to their advisors to arrange finance in debt and equity markets in the most efficient way possible. Such a policy could be recommended by the Commission.

Point 10: Performance reporting and independent evaluation of public infrastructure project performance.

Since benchmarking became fashionable in the late 1980s there have been many attempts by governments and academics to establish benchmarking groups with major contractors in the Australian building and construction industry. As far as is known none have been successful, which does not auger well for performance reporting.

There has been some Australian research, such as Abbott and Cohen (2008) on Australia water plants using DEA and Langston and Best's work, cited by the Commission in Chapter 9, at Bond University's Centre for Comparative Construction Research. What is striking about the latter's research is that it draws on publicly available data, which demonstrates that a lot can be gained from

such sources. The use of DEA allows ranking of performance between similar projects using limited datasets.

Comment: If the Commission could be more specific about what performance metrics would be involved in the evaluation, and how often and when these evaluations would occur, then a discussion on data collection and management would follow. It could be argued that a few robust measures that can be verified easily would be the best option.

For some PPPs a requirement for publishing annual reports could be a contractual obligation, with the data specified. The ABS could do a five yearly survey on major projects, similar to the industry surveys it currently undertakes. There is also the possibility of a national major projects agency or Infrastructure Australia (IA) carrying out performance evaluations. The how, who, what and when questions associated with this point are formidable.

CHAPTER 9

Information request 9.1: The Commission seeks further information on the possible causes of the relative low levels of capital deepening in the construction sector, and whether or not the trends in productivity identified for the sector apply to infrastructure construction activities and whether these trends are likely to be long-lasting.

The Commission has already noted the unavailability of data at the industry sector level and how this prevents productivity analysis and comparisons between the sectors. Therefore the comments below are at the industry level. The Commission might consider recommending the ABS separate engineering construction from building in the ANZSIC structure, which would then allow productivity analysis on the sector to be done.

Despite the efforts made by governments, industry organisations and firms over the decades, the rate of measured growth of construction productivity has remained low compared to other industries. The answers typically offered in explanation of construction productivity cover a wide range of factors and possible causes, but at the industry level the focus is on the measurement of output within the national accounting framework.

There are two main schools of thought on construction industry data. The first emphasises methodology and the difficulty of accurately measuring such a diverse and fragmented industry, the second looks at the extent of the built environment industry cluster, of which the site work done by contractors is only a part.

Methodology

The measured rate of construction productivity growth may be low because of the measurement of output as value added is adjusted by a deflator for movements in prices and changes in quality. The

construction deflator may not fully take these movements into account, and therefore real output is underestimated. A number of researchers have criticized the use of input price indexes for deflating construction expenditure, for being unrepresentative of the inputs priced and geographical coverage, and being based on inaccurate weights.

Low (1995) describes the use of estimation indexes by Statistics Canada, using surveys sent to subcontractors. Around 100 different items are priced for five building types and each of five elements has its own index. Analysis of British building price indices by Yu and Ive (2008) found that these indices measure the price movement of the traditional building trades but almost completely ignore mechanical and electrical services.

Cannon (1994) questioned the accuracy of contractor statistics and Briscoe (2006) asked “How useful and reliable are construction statistics?” These papers identify a range of problems with data collection and analysis, including defining the scope and coverage of the industry; measuring outputs across different types of activity; identifying construction firms; measuring capital formation and capital stock, and inconsistent employment statistics. Crawford and Vogel (2006) also draw attention to data limitations for productivity analysis.

Table 1. Construction productivity analysis and measurement

| | |
|----------------------------------|---|
| Stigler Report (1961) | Recommended a significant increase in research on construction deflation |
| Cassimatis (1969) | Argued that price indexes for construction based on unit numbers at market prices cannot provide adequate deflators for construction |
| Stokes (1981) | Found no conclusive evidence that real output was understated |
| Allen (1985) | Used a price per square foot index for deflating non-residential building |
| Bowlby and Schriver (1986) | Developed a hedonic price index for construction as an alternative to the existing US deflators |
| Pieper (1990) | Also argued that deflation by input price indexes does not produce suitable estimates of output at constant prices |
| Chau and Lai (1994) | Measured the relative labour productivity of construction from Hong Kong national accounts data. Their price indexes are based on a construction output price index and a material cost index |
| Low (1995) | Describes the estimation indexes of Statistics Canada |
| Allmon et al. (2000) | Means's cost manuals were used to trace benchmark values for construction tasks |
| Goodrum, Haas, and Glover (2002) | Developed an alternative productivity measure based on individual work activities |
| Ive et al. (2004) | International comparison that addressed statistical data issues on definition and labour force numbers |
| Briscoe (2006) | Identifies a range of problems with reliable and accurate data collection and statistical analysis |
| Crawford and Vogel | Data constraints limit the ability to identify drivers of |

| | |
|-------------------|--|
| (2006) | construction productivity |
| Yu and Ive (2008) | Finds that British indices measure the price movement of traditional building trades but almost completely ignore mechanical and electrical services |

Source: de Valence 2012.

This is not a criticism of the ABS, which produces high quality data in the SNA format, and has introduced chain weights and many other innovations to improve data quality. The point is more about the problem of industry definition and measurement methods. All these points made above are relevant to the estimation of capital productivity as well as labour productivity, without going into the further questions of vintages and selection of depreciation rates that are specific to capital stock estimates.

While the data is not strong enough to draw strong conclusions about overall construction productivity there has been one clear important trend over the last few years. This is the levelling off of labour input, which Figure 9.3 in the Draft Report shows has only slightly increased since 2005. However, over this period both construction output and capital input have grown by around 50%. That this coincided with the Mining Boom Mark 2 could reasonably be attributed to the difference between the two building sectors and engineering construction, which is much more capital intensive than building, reinforcing the need for a reclassification of the sector in a restructured ANZSIC. This type of separation has been done before, for example with the retail and wholesale sectors.

Industry Cluster

The 'cluster analysis' approach applied to the building and construction industry by the Australian Expert Group on Industry Studies (AEGIS 1999) included the industry sectors that provide services before and after the construction stage and identified the flow of services between clients and industry participants. The cluster approach focuses on linkages and interdependencies between firms in a network of production.

When the ABS industry data on output and employment data for 1995-96 is compared to that below from AEGIS the size of the industry virtually doubles, both in total income (and therefore share of GDP) and employment. The industry income in was \$58.6 billion compared with total industry cluster income of \$110.4 billion, so the effect of inclusion of materials manufacturers and services is clearly seen. A similar result for total employment is found, increasing from 484,100 to 682,000 (de Valence 2001). Although these figures are now quite old the proportions are unlikely to have significantly changed, and an estimate of industry cluster size of around twice the ABS figure for output seems reasonable.

Table 2. Total B&C Income by Industry Segment 1995-96.

| Industry Segment | Total Industry Income (\$m) | Input-Output Discounted (\$m) |
|--|-----------------------------|-------------------------------|
| On-site Services (Trade Services) | 21,898 | 21,898 |
| Client Services (Engineering, Technical, etc.) | 8,607 | 8,607 |

| | | |
|---------------------------------------|---------|--------|
| Building & Construction project firms | 34,250 | 34,250 |
| Materials and Products Supplies | 41,352 | 18,608 |
| Machinery and Equipment Supplies | 4,312 | 2,803 |
| Total | 110,419 | 86,166 |

Source: AEGIS 1999: 57.

Table 3. Employment in the B&C Product System by Segment 1995-96.

| Industry Segment | Total Employed |
|--|----------------|
| On-site Services (Trade Services) | 220,000 |
| Client Services (Engineering, Technical, etc.) | 102,000 |
| Building & Construction | 108,000 |
| Materials and Products Supplies | 222,000 |
| Machinery and Equipment Supplies | 30,000 |
| Total | 682,000,000 |

Data sources for Tables 2 and 3: ABS Private Sector Construction Industry 1996-97, Cat No 8771.0. (Preliminary). ABS Real Estate Agents Industry: Australia, 1995-96, Cat No 8663.0. ABS Selected Technical Services: Australia, 1992-93. ABS Consultant Engineering Services: Australia, 1995-96, Cat No 8693.0. ABS Business Operations and Industry Performance: Australia, 1995-96, Cat No 8140.0. ABS Manufacturing Industry: Australia, 1995-96, Cat No 8221.0. Source: AEGIS 1999: 58.

From a cluster perspective the problem with productivity measurement is the narrow focus on the most inefficient, part of the process, which is on-site work. That is also the part of the process that is the least capital intensive, or is much less capital intensive than the Materials and Products Supplies and the Machinery and Equipment Supplies segments identified above. It is also likely to have lower R&D expenditure, as the emphasis is on process innovation rather than product innovation.

Response 3: The differences between the two building sectors and engineering construction suggest the need for a reclassification into a new sector in ANZSIC. The Commission might consider recommending the ABS separate engineering construction from building in ANZSIC, which would then allow productivity analysis on the sector to be done.

CHAPTER 11

Information request 11.1: The Commission seeks evidence on the skills of public sector clients to manage contracts for major infrastructure projects. Is there evidence that a relative lack of skills has led to systematic cost overruns during the delivery phase? How does this compare to the performance of private sector clients?

Two of what might be described as the peak bodies in the infrastructure industrial cluster are:

1. COAG established the Standing Council on Transport and Infrastructure, with Ministerial membership, in 2011 to develop a co-ordinated and integrated national transport and infrastructure system. SCOTI has been given oversight of the Infrastructure Working Group, the National Transport Commission and the Transport and Infrastructure Senior Officials Committee.
2. The Australasian Procurement and Construction Council (APCC), whose members are responsible for procurement, construction and asset management policy for the Australian, State and Territory Governments and the New Zealand Government. APCC is made up of 15 member agencies.

Membership of SCOTI's Officials Committee and the APCC's Executive Committee overlaps, with a number of State Government Department Heads on both.

The best evidence in recognition of the problem of public sector skills are the recent initiatives by these organisations to improve them. The Infrastructure Working Group's Contract Management Forum and National Leadership Academy were announced by SCOTI in May 2013. Similarly the APCC Procurement Capability Development Working Group strategy was published in December 2012. Procurement capability development is a major focus for APCC and six MBA-type courses are now running at Australian universities. Whether this training based approach is the solution remains to be seen, it is however a medium-term strategy at best. These are not new problems. Love et al. (1998: 228) found a general lack of expertise in Australian public clients.

There are three ongoing issues for public sector clients. The first is the difficulty of keeping competent staff, who tend to get recruited by industry after they get some experience with major projects. The second is the difference in the level of expertise that inevitably exists between the public sector client group and the private sector suppliers they contract with. The third is the generally risk averse nature of public sector organisations. Quoting the submission from Infrastructure Australia:

While reform 'design' for transport is considered difficult, much greater challenges arise in implementing reforms. To be successful, reform design will need to address such challenges conclusively. Reform designs that overlook implementation issues may fail. Among the challenges are cultural and experience factors. Generally, larger agencies appear averse and inexperienced in timely implementation of initiatives identified by others or initiatives aimed at improving the climate for private investment into road infrastructure. (p. 16)

The evidence on this from other submissions the Commission received indicates the need for some lateral thinking on the problem. If public sector clients do not or cannot employ and retain skilled staff and are reluctant to implement reforms then the solution has to be through contracting out, by hiring project managers (or procurement manager, or client representative – the term is less important than the role) at an early stage of a major project. This should be seen in the context of the different project types set out below.

The client's project manager (PM) can take on two roles: as chair of the project control group and as client representative with contractors and suppliers. A project control group will typically have over a dozen members from across the public sector, most with little experience and conflicting aims.

Discussions with contractors and suppliers on a number major projects indicates that the poor functioning of these groups is a real problem and significantly affects cost and performance. As chair the PM can get agreement on key issues from the group and then act as the client representative when dealing with tenderers and suppliers. Thus suppliers will deal with one decision-maker rather than a committee, or more likely the PM plus a project control group member, and this will avoid some of the implementation issues raised above.

Response 4: The project manager acting as client representative for a major project should be recruited at the early stage of project development. This PM can chair project control group meetings and take those decisions to suppliers. The PM brings the necessary experience to the project that is often lacking in public sector clients.

A national major projects agency or expansion of Infrastructure Australia's (IA) role to include preparation and release of alternative major project proposals and the possibility of IA carrying out performance evaluation were in the Comments on Draft Recommendation 7.1 above. IA is currently limited to giving advice, but could also be involved in the selection and hiring of the client PMs discussed above in Response 4.

Information request 11.2: The Commission seeks evidence on the potential benefits of creating special-purpose agencies in each jurisdiction to conduct infrastructure procurement on behalf of government clients that do not frequently procure infrastructure or where combined purchases across a range of government might lead to savings.

Before responding to the request it is necessary to outline the seven specific characteristics of complexity used in the scheme presented here because of the fundamental role complexity plays in the selection of appropriate procurement options. While there may be other sources of complexity in projects these are taken as the factors with sufficient potential impact to determining outcomes, or more often where the interplay between these factors is the determining factor.

1. Project definition: this reflects the extent to which the project is well-defined and detailed in the documentation. For example, with conventional procurement of a design-bid-build project these would be available, but a request for expression of interest (EOI) in a project might only have the purpose of the project and no details on design or size.
2. Technology to be used and/or incorporated in the project: this is an important risk factor, with established technology that has previously been successfully used a low risk but new technology can have implementation, performance and reliability issues, particularly in its early stages of use .
3. Materials, components and handling systems to be used on the project: as with technology, well-understood materials with established performance and characteristics are low risk, while new materials, components or handling systems are higher risk.
4. Project organization and project management: the traditional form of organisation is hierarchical and has a client who contracts with suppliers, whether through a PM or a lead

contractor, and the project is managed in a conventional, top-down manner through budgets, schedules and breakdown structures. At the other extreme are varied forms of project networks, where organizational boundaries can be crossed by the project and coordination requirements become extensive. On complex projects the management of interfaces between suppliers is the key role of the PM.

5. Supply chain characteristics: these tend to reflect the technology and materials used in the project, so simple supply chains are mainly local and deliver established materials and technologies. With new materials or components the supply chain becomes more vulnerable to disruption, for example due to late delivery or poor performance. With the combination of new technology and new material the supply chain becomes genuinely complex, in the sense of being unpredictable and difficult to manage. International supply chains are also vulnerable to delay and can be affected by a wider range of factors.
6. Site issues: there are two main concerns with building and construction sites. The first is physical, the geological features of soil, rock, water and drainage are sometimes not discovered until excavation has begun. The second is access to the site for trucks, including time restrictions, and space for sheds, equipment and deliveries.
7. External environment: these are factors outside the control of the PM, and include legislators, regulatory authorities, business conditions such as the availability of skills and resources, and stakeholders such as interest and community groups.

In the table below these seven factors change as the type of project moves from simple to standardised to complicated to complex. Therefore simple, standardised projects are the baseline, with the degree of complexity gradually increasing, rising from those commodity projects (e.g. car parks, industrial building) to complicated projects (e.g. high-rise buildings) until the level of complex projects (e.g. airports) is reached. The key feature of complex projects is the high level of services and equipment involved. Most infrastructure projects would be standardised (roads) or complicated (utilities) rather than complex.

Table 2. Complexity Factors and Project Types

| Factor | Simple | Standardised | Complicated | Complex |
|----------------------|---------------|---------------------|--------------------|----------------|
| Project definition | Complete | Complete | Incomplete | Sparse |
| Technology | Established | Possible new | Possible new | New |
| Materials | Understood | Understood | Probable new | New |
| Organisation | Conventional | Conventional | Non-conventional | Networked |
| Supply chain | Simple | Simple | Vulnerable | Complex |
| Site issues | None | None | Possible | Probable |
| External environment | Certain | Uncertain | Certain | Uncertain |

These project types can then be assigned procurement options. Albano et al. (2006) discuss three categories of contracts. Fixed-price contracts are “appropriate for projects involving little complexity and uncertainty” such as standardised products or services. They do not advocate cost reimbursement contracts for straightforward projects, and their key points are:

- Cost reimbursement contracts lack incentives for the contractor to contain costs, although the contract can be capped;
- They may not select the most efficient supplier because “the prospect of being fully reimbursed ... provides the least efficient supplier an extra incentive to bid aggressively for the contract (2006: 89); and
- Where contract flexibility is important cost reimbursement contracts can be suitable because they reduce the cost of renegotiating the contract in the case of “design failures, unanticipated site and environmental conditions, changes in regulatory requirements”.

In their view incentive contracts lie between fixed-price contracts and cost reimbursement contracts, and are target cost contracts with a profit adjustment formula. These contracts have higher transaction costs for both the contractor, who has to estimate production costs, and the client, who has to measure quality levels.

Research on the choice between auctions or negotiation in construction has been done mainly by Bajari and his colleagues:

Should the buyer of a customized good use competitive bidding or negotiation to select a contractor? To shed light on this question, we consider several possible determinants that may influence the choice of auctions versus negotiations. We then examine a comprehensive data set of private sector building contracts awarded in Northern California during the years 1995-2000. The analysis suggests a number of possible limitations to the use of auctions. Auctions may perform poorly when projects are complex, contractual design is incomplete and there are few available bidders. Furthermore, auctions may stifle communication between buyers and sellers, preventing the buyer from utilizing the contractor’s expertise when designing the project. (Bajari, McMillan and Tadelis 2008: 372).

In earlier related work Bajari and Tadelis (2006) derived a series of conclusions on the relationship between the extent of project specification and procurement options. Their contracting framework starts with what they call contractual incompleteness, that the design and specifications are not a complete description of the project. Therefore “this is the procurer’s first dimension of contractual choice: how much design costs to invest at the outset A more detailed and accurate design of a project reduces the need to renegotiate changes ...” (2006: 125). The second dimension is the choice of a fixed-price or cost-plus payment structure. Their conclusions on procurement options are:

1. For simple well specified projects (where contractual incompleteness is negligible and performance is easy to verify) favour fixed-price contracts awarded by competitive tender;
2. For complex and incompletely specified projects favour a cost-plus contract awarded using negotiation with a reputable supplier; and
3. For moderately complex projects that can be specified at moderate costs favour a more complete design, selective tender and fixed-price contract. If potential suppliers are scarce then save on design costs with a cost-plus contract.

Traditional forms of project organisation and PM are well designed for delivering simple and standardised commodity projects and making repetitive decisions in relatively stable, predictable environments. The over-arching argument put forward here is that these projects, defined as well

documented with little uncertainty about what is to be produced and how it is to be done, should be awarded through competitive tendering on a fixed-price contract.

By contrast, complicated projects are not fully documented and have a small amount of design completed. These will have significant uncertainty about their final form, and should be awarded through negotiation with a qualified supplier on some form of cost-plus contract. Complex projects have limited design and scope information at inception and should be developed collaboratively then delivered under an incentive contract such as target cost.

While the alignment of complexity and collaboration is well-known, the scheme presented here makes clear the further requirements of a contract based on negotiation and a commitment to a non-adversarial relationship. Although the focus of procurement in building and construction is often on project characteristics and contracts, the solutions to procurement’s twin dilemmas of information asymmetry and uncertainty lie with tender methods and management approach.

Table 3. Project Types, Procurement Options and Contracts

| Factor | Simple | Standardised | Complicated | Complex |
|---------------|---------------|-----------------------------------|-----------------------------------|----------------|
| Contract type | Transactional | Transactional | Transactional | Relational |
| Tender method | Bidding | Bidding plus external negotiation | Bidding plus collaborative design | Negotiation |
| Relationship | Adversarial | Adversarial | Collaborative | Collaborative |
| Contract | Fixed price | Fixed price | Capped cost plus | Target cost |

On the issue of special purpose agencies, there are good grounds for proposing a national transport infrastructure agency given the number of projects under consideration. This agency could establish criteria for Commonwealth support, such as payment contributions, and operate under a version of road fund model recommended by the Commission. This agency could also take responsibility for payment decisions for Commonwealth and State contributions.

Response 5: Procurement of commodity projects (i.e. simple and standardised projects) can be left with the agency or organisation responsible if they have qualified procurement managers. However complicated and complex projects need more resources. In many cases hiring of the client PM discussed above would suffice on a complicated project, and a national major projects agency could be responsible for hiring of PMs. Complex projects should be developed collaboratively then delivered under an incentive contract such as target cost. A system where the type of contract used is tied to the characteristics of a project should be implemented.

Response 6: A national major projects agency would be better than several State based ones, and a separate transport infrastructure agency should be recommended.

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