Submission to Productivity Commission Inquiry into Infrastructure

An economic appraisal framework for evaluating financing alternatives for Public Infrastructure

By Liesel Henn[1], Keith Sloan[2], Michael Charles[3], and Neil Douglas[4]

Executive summary

This submission is in response to a draft report by the Productivity Commission, entitled "Public Infrastructure", and released in March 2014. It aims to inform the Commission of work being performed as part of research funded by the CRC for Rail Innovation. The research sets out to develop an appraisal framework to aid selection of a financing mechanism for public infrastructure megaprojects that is in the best interest of taxpayers. This appraisal framework may be useful in addressing some of the issues raised in the Productivity Commission's report, including the requests for information on the costs and benefits of a range of alternative financing instruments as set out in the draft report. The major rationale for developing the framework is address the many complexities involved in assembling financing mechanisms for large public infrastructure projects, including multiple financing alternatives, various economic, social and environmental factors, as well as a range of stakeholders with different and sometimes conflicting objectives to consider. The research aims to develop a comprehensive multi-criteria appraisal framework for financing alternatives, which combines elements of a Multi-Criteria Analysis (MCA) and Cost Benefit Analysis (CBA), and incorporates both objective and subjective impact measures. Such a framework will aid in the understanding, analysing and communication of the complexity of financing, and allows a comprehensive analysis of financing categories by delivery vehicle or funding source. The framework includes a taxonomy or database of the various positive and negative impacts being associated with each of the financing instruments, which can aid a balanced and rigorous appraisal. This taxonomy was developed following an expansive review of a large body of international knowledge on the financing of public infrastructure. The appraisal framework is at an advanced stage of development, with concepts clearly defined, categories developed in a systematic way, and appraisal criteria identified that would allow for a comprehensive appraisal. The next step with respect to finalising the framework involves the completion of the definition and selection of subjective impacts and its criteria, including suggested ways for operationalisation of all objective and subjective impacts. These results can be made available to the Productivity Commission should that be deemed helpful in its appraisal of the various alternative financing alternatives being proposed for Australian public infrastructure.

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[1] PhD candidate: Southern Cross University, Lismore NSW

[2] Adjunct Associate Professor, Southern Cross University, Lismore NSW

[3] Associate Professor, Southern Cross Business School, Southern Cross University, Lismore NSW

[4] Manager of Douglas Economics, Te Aro, Wellington, NZ

1. Introduction

The financing of public infrastructure has emerged as an increasingly topical issue in Australia. Hann and Mack (2005) commented that the financing aspect of public infrastructure is 'taking on an increasingly important role in the planning and identification of transport projects rather than just being left in a "black box" to be opened only when the planning decisions have already been made". The recent draft report by the Productivity Commission on Public Infrastructure dedicates a significant portion of its discussion to describing existing financing mechanisms. The report includes an expanded evaluation of a set of eight alternative financing mechanisms proposed by participants to increase private participation in financing public infrastructure. This follows a range of other studies grappling with proposing and assessing new ways to finance public infrastructure, especially in view of the current constraints on public finance, and limits placed on debt financing in particular. Examples include the Australian Government's formation of the Infrastructure Finance Working Group to examine possible reforms to access more private investment in public infrastructure given ongoing concerns regarding an infrastructure deficit in Australia (Infrastructure Australia 2011). This group proposed a range of reforms in 2012 (IFWG 2012), which include financing reforms relating to corporate bonds, in addition to attracting superannuation investment. The same applies to the debate on the proposed high speed rail (HSR) project for Australia, with the government-appointed HSR Advisory Group placing financing issues among the top seven important aspects to be addressed in the future (High Speed Rail Advisory Group 2013).

This submission introduces research which is currently under way, with the objective developing an appraisal framework of financing mechanisms for public infrastructure[5] megaprojects. The research plans to include an application to a potential high speed rail (HSR) project along the East Coast of Australia. However, the appraisal framework has application for any public infrastructure. This submission includes earlier work as represented in papers presented at the Australian Transport Australasian Transport Research Forums in 2012 and 2013 (refer publication website: http://www.patrec.org/atrf.aspx).

The submission is structured as follows: Section 2 summarises the research literature review, which lead to the research findings as presented in section 3, followed by an overview of the proposed framework (section 4), and ends with a conclusion and way forward in section 5.

2. Literature Review

A summary of a comprehensive literature review into the analysis of financing-related aspects of public infrastructure revealed the following:

[5]For the purposes of the research carried out, **public infrastructure** is defined to include **quasi-public goods** such as passenger rail. This means that it can be simultaneously a private market product (with the characteristics of excludability and rivalry in consumption), while also creating large positive or negative externalities (the justification for public intervention) (Vander Ploeg 2006; Ubbels *et al*. 2001; Gannon & Smith 2009).

The literature is not rigorous or careful in the use of the terms 'financing', 'funding' and 'delivery'. A review of a wide body of literature on various aspects of financing public infrastructure revealed significant inconsistencies in the use of terminology and classifications, which creates problems for how the literature then evaluates and compares alternatives that are deemed to be financing, but in fact includes funding and delivery aspects. Examples include: '... uses the term "innovative finance" to refer to any funding measure other than grants to states ... debt financing.... (the) term is used to contrast that approach with traditional methods of funding highway projects' (GAO 2002, p. 3) and "grant funding" listed as a category on a spectrum of "finance" alternatives (Gannon & Smith 2009, p. 5). This needs to be addressed so as to avoid an appraisal that is marred by inconsistencies, duplication and gaps.

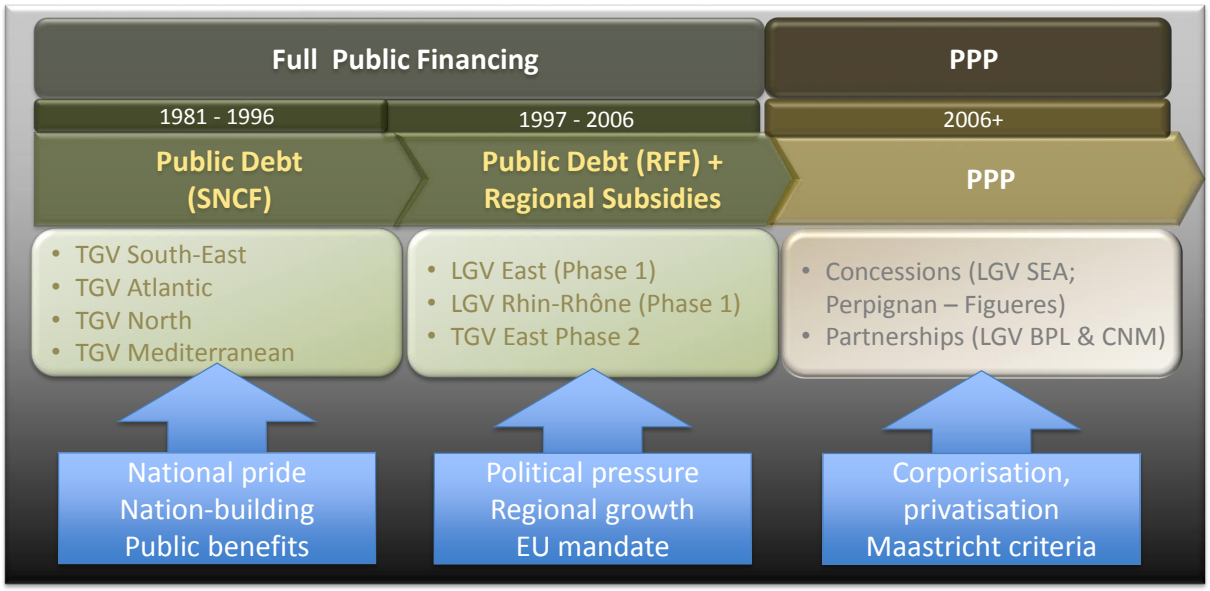
There is no readily available comprehensive appraisal framework for financing alternatives. The literature review also showed that there is no widely accepted approach for evaluating alternatives with a view to selecting the best alternative. The literature includes a range of evaluation methods, with the scope of studies ranging from those that provide an overview of alternatives (e.g., reviewing select aspects and considerations, without resulting in the selection of an alternative), to more in-depth qualitative and even quantitative evaluations – all designed to aid in the selection of an alternative, while a few focused on providing high level frameworks (Henn, Sloan & Douglas 2012).

Financing appraisals are less mature and developed than project viability and delivery appraisals. While the evaluation of financing is applied inconsistently, there are generally accepted economic appraisal methods for project viability and delivery of public infrastructure. Mainly two categories of project evaluation are evident in the public infrastructure space, these being Cost Benefit Analysis (CBA) and Multi-criteria Methods (or Multi-Criteria Analysis (MCA) or Multi-Criteria Decision Analysis (MCDA)) (Diakoulaki & Karangelis 2007). The choice of delivery mechanism, has similarly achieved an advanced stage, with well-articulated value-for-money appraisals, using the public-sector comparator to appraise the full economic impact of varying degrees of private, versus public involvement in delivery of public infrastructure. Although it is acknowledged that these methods are not always adopted consistently in practice and are not perfect or immune to external pressures, there is a general consensus within the economic discipline on the essential elements of such appraisals. Hann and Mack (2005), for example, remind us of the distorted public investment decision-making that often results from accounting pressures and limitations.

The choice of financing mechanisms appears to have evolved in response to the environment, as opposed to a conscious and rigorous economic appraisal. A case study review of HSR projects around the world confirmed earlier research findings that, while there are well-recognised methods for establishing the economic case, as well as the delivery model for public infrastructure projects, these processes are less well articulated when it comes to the

appraisal of financing methods. An excellent example is an in-depth comparison of economic project appraisals of international HSR projects by Steer, Davies and Gleave (2004). However, no evidence could be found of a rigorous appraisal of alternative financing mechanisms. Instead, it appears as if financing models often emerged in response to externally imposed long-term trends in financing and fiscal policy such as the EU debt limitations associated with the Maastricht criteria and a global move to PPP financing models. The example of the French case study is demonstrated in Figure 1 below:

Figure 1: Evolution of Financing French HSR



The French HSR case study is particularly interesting, not only since France was the first European country to invest in HSR, with one of the largest HSR networks, but also since the French applied a variety of financing models over time. They started off with full national public debt, driven by national pride to develop the first HSR network in Europe. Once the case for HSR was made following the success of the initial lines, national debt was augmented by regional subsidies (grants) in order to expand the benefits to regional areas. Finally, EU debt limitations associated with the Maastricht criteria, together with a global ideological shift towards corporatisation and privatisation, forced the adoption of PPP financing models. These financing models appear to have evolved to adjust to these external environmental impacts. In a comprehensive international review of financing mechanisms for public infrastructure, Chan *et al.* (2009) concurs that a government's choice of financing is often determined by various institutional constraints (including legal, tax, government structures) and views on the role of government in financing that are popular at the time (ideology). There is no clear indication that the selection of financing instruments is the product of a rigorous appraisal process:

> *Governments finance infrastructure with different degrees of dependence on particular vehicles, subject to numerous influences such as infrastructure characteristics, fiscal and macroeconomic conditions, institutional arrangements and prevailing views about the role of government.*
>
> Chan *et al.* 2009, p. 9

The Productivity Commissions' draft report (2014) also highlighted this aspect, in particular as it pertains to the treatment of government financing, and government debt in particular. Echoing the concerns of many commentators regarding Australia's "debt fetish[6]" and risk of movement towards "reverse crowding-out[7]", the draft report raises an important limitation in the balanced appraisal of financing alternatives, being government's self-imposed debt constraints.

> *Some valuable public infrastructure cannot secure sufficient private sector support, and governments appear reluctant to fund the gap, amid concerns about fiscal outcomes. This judgment may be open to question … to the extent that they replace a thorough assessment of the relative merits of public and private sources of finance, any self-imposed constraints on public financing risk generating second-best outcomes.*
>
> Productivity Commission 2014, p.173-5

This research agrees with the Productivity Commissions draft report findings, and argues for a systematic and balanced appraisal which includes the disadvantages and costs, as well as the merits of all financing instruments, including government debt, in order to make a rigorous assessment and allow a thorough justification of the selection made.

> *Accordingly, the policy making, provision and procurement of public infrastructure — seen as simple in some public contributions to the debate — encompasses a complex and politically perilous range of decisions. The issues need to be evaluated carefully to ensure that the long-term net benefits are not undermined to chase short-term benefits.*
>
> Productivity Commission 2014, p. 6

Despite these shortcomings, the existing body of knowledge is invaluable, and contributed the components of the proposed framework. While some studies provide clear definitions and distinctions between related concepts, others contribute robust categorisation methods, while still others assist by suggesting evaluation methods.

3. Research Findings

The research concludes from the findings above that there is a need for a **distinct, systematically consistent, comprehensive and multi-dimensional economic** framework for selecting the optimal financing solution for public infrastructure. These elements are discussed in more detail below.

The proposed finance appraisal framework should be distinct from existing appraisals, since the way that a public infrastructure project is funded; financed and delivered are distinct investment decisions. Figure 2 presents the major decisions involved in appraisal of a public infrastructure project. The definitions of each of these concepts, first reported in Henn, Sloan and Douglas (2012), are presented below:

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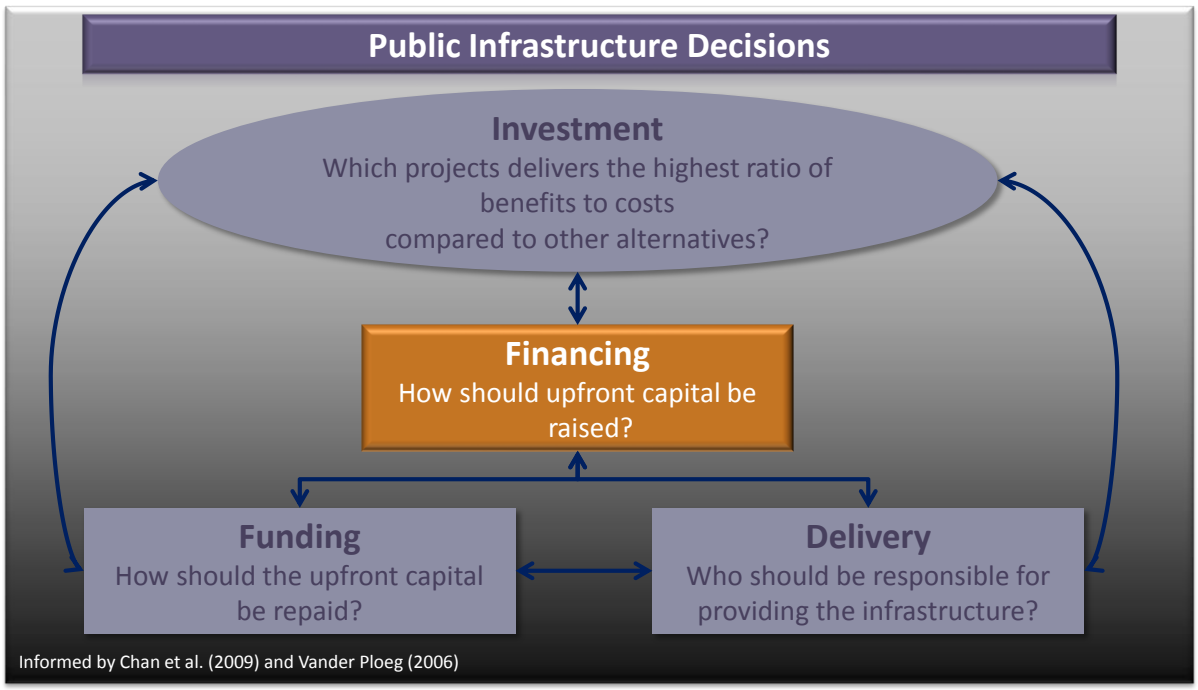
[6]A term coined by professor at Columbia University and a Nobel laureate in economics, Joseph Stiglitz who criticised Australian government's self-imposed debt limits (Stiglitz 2010). Other critics include Roger Wettenhall (2010), Australian Institute (2011), David Richardson (2011).

Figure 2 Decisions involved in appraisal of public infrastructure projects



- Productive investment decisions refer to selecting opportunities that maximise present value. For public infrastructure, this amounts to more than financial considerations. Instead, investments are expected to add to community welfare. Therefore, 'an investment is efficient in allocating resources if it delivers the highest ratio of benefits to costs compared to other alternatives. These alternatives include options such as expenditure on other public services or returning the funds to taxpayers' (Chan *et al*. 2009, p. XVIII). Investment, however, is distinct from financing. The Fisher Separation Theorem postulated in the 1930s holds that a firm can make the investment decision independent of its financing decisions, and that productive investment opportunities that maximise present value can be determined independently of the best way of financing (Fisher 1930 in Chan *et al*. 2009).

  Although investment and financing are two separate concepts, they are related. This is because cost savings associated with financing decisions may be substantial for large and complex infrastructure projects. The choice of financing vehicle also involves decisions about risk sharing and transfer. Beneficial risk sharing or risk transfer can be expected to reduce risk premiums, which in turn implies a reduction in the total cost of financing. Furthermore, 'the financing vehicle may provide information and create incentives that improve other aspects of an efficient investment decision' (Chan *et al*. 2009, p. 13).

- The financing of infrastructure is defined as selecting the immediate source of upfront capital to undertake capital investment (constructing a new asset, or renewing, rehabilitating or reconstructing an existing asset) (Chan *et al*. 2009, p. xxiii). Abelson (2011) explains the inherent link between ownership and financing, as the provision of capital often (not always) '… confers, or should confer, ownership or property rights which in turn have implications for the management of assets. The optimal method of raising finance is the method that delivers overall the best value for

money inclusive of the performance of the infrastructure. It is not necessarily the method that provides finance at least cost' (p.1).

- The funding of infrastructure is a separate matter. This refers to the revenue stream that repays or recovers that upfront capital costs (i.e., the allocation of ultimate cash flows to service the financing method of public infrastructure) (Ernst & Young 2011; Chan *et al*. 2009; Vander Ploeg 2006). An example would be a toll road that is financed through a mix of private sector debt and equity, with this private investment funded by toll charges from users of the asset (Ernst & Young 2011).

- Finally, a related term that consistently comes into play in the literature reviewed is delivery mechanisms. Delivery is defined as making a decision about who should be responsible for providing the infrastructure and encompasses the end-to-end process of infrastructure delivery, from developing the specifications, procurement, obtaining finance, construct, to operating, funding and overseeing delivery (Vander Ploeg 2006). Vining and Boardman (2008) identifies three major categories for infrastructure delivery: Direct public provision, contracting-out to the private sector (i.e., design, build, transfer), or public–private partnerships (PPPs). Public sector comparators play an important role in the appraisal of these alternative delivery mechanisms.

The definitions applied in our research are considered to be consistent with the use of terminology applied in the Productivity Commission's draft report (2014).

The financing decision is equally important and warrants a comprehensive appraisal process, similar to economic appraisal of project and delivery vehicles. The financing aspects of public infrastructure is taking on an increasingly important role in the planning and identification of transport projects (Hann & Mack 2005). The importance of the financing decision is also reflected in the recently released Productivity Commission draft report on Public Infrastructure, which allocates a significant portion to financing aspects. The same applies to the proposed Australian HSR project, for which the financing issues were placed among the top seven important aspects to be addressed (High Speed Rail Advisory Group 2013). Selecting the right finance mechanism for upfront financing costs is extremely important for large public infrastructure projects, owing to the vast amounts of construction capital often required compared to operating costs. The choice of financing mechanism also results in a range of significant differential impacts. These include total costs, how it is spent over time and the sharing of cost between finance partners, as well as who bears the risks associated with an investment (GAO 2002).

Need for a multi-dimensional economic appraisal framework. Assembling financing mechanisms for large public infrastructure projects poses many complexities, with multiple financing alternatives, various economic and social and environmental factors, in addition to a range of stakeholders with different and sometimes conflicting objectives to consider. Economic project viability incorporates not only financial and commercial aspects, but also includes externalities or benefits to third parties in its appraisal (Hann & Mack 2005). The research described herein proposes that the same multi-dimensional appraisal, which includes such

externalities, is required for appraisal of financing alternatives. There is a clear need for a consistent and multi-dimensional framework for selecting the optimal financing solution, similar to what has evolved for project appraisals, which involve not only objective cost-benefit analysis, but also subjective measures for various stakeholders incorporated in Multi-criteria Methods (Multi-Criteria Analysis (MCA) or Multi-Criteria Decision Analysis (MCDA)), which relies on expert judgements, as explained below:

> *integration of the heterogeneous and uncertain information demands a systematic and understandable framework to organize the technical information and requires expert judgment. Multi-criteria decision analysis (MCDA) provides a systematic methodology to combine … inputs with cost/benefit information and stakeholder views to rank project alternatives. MCDA is used to discover and quantify decision maker and stakeholder considerations about various (mostly) non-monetary factors in order to compare alternative courses of action.*
>
> *Huang, Keisler & Linkov (2011), p.3579*

> *Multi-criteria assessment (MCA) … allow the decision-maker an explicit consideration of people's opinion about certain aspects, such as the social importance of visual intrusion, for instance. It must be mentioned that CBA is indeed a MCA method itself. The main difference with respect to the proper MCA approaches, is that CBA uses money values (private, public or a combination) as the aggregation unit, whereas MCA uses a set of weights based upon people's responses. These people might be common citizens, experts or political actors.*
>
> *Huang, Keisler & Linkov (2011), p.3579*

Multi-Criteria Methods usually encompass the following five phases (Huang, Keisler & Linkov (2011) :

- Definition of the project
- Definition of evaluation criteria
- Analysis of the impacts of the project
- Evaluation of the effects of the project in terms of each of the selected criteria.
- Aggregation of evaluations (or judgements)

Multi-criteria appraisal (MCA) is increasingly being adopted in appraisal of transport infrastructure projects around the world, whether it be formalised or inherent in the decision-process. **We propose to adopt a similar multi-dimensional or multi-criteria approach for appraisal of financing alternatives.** Its particular strength lies in including stakeholder views and different objectives in decision-making, especially when we deal with criteria that are difficult to quantify (Suksri, Raicu & Yue 2012). The main risk associated with MCA is the operationalisation of subjective criteria. However, methodologies can be applied to introduce rigour, objectivity and transparency in the process

4. Proposed Finance Appraisal Framework

The definitions, categories and selection criteria which make up the proposed economic appraisal framework are presented below. These elements were specifically selected with the intent of compiling an appraisal framework which is **systematically consistent, comprehensive and multi-dimensional.** This section briefly outlines how the research set out to achieve these aims.

Need for systematically consistent definitions and categories. A clear set of definitions and categories are required to ensure that the appraisal is systematically consistent and neither duplicates (or "double counts") aspects covered in project or delivery appraisals, nor leaves important gaps in the process. Best practice in **categorisation** is also to ensure that categories are mutually exclusive and collectively exhaustive (the MECE principle). This concept holds that when we separate a set of items into subsets, we need to ensure that there are no overlaps (mutually exclusive) or gaps (collectively exhaustive) in the categories (Minto 1996). Following a systematic and robust categorisation approach is particularly important with respect to ensuring that the full spectrum of alternatives is initially identified before an evaluation or assessment. This is necessary to ensure that the optimal alternative is selected. It also forces a rigorous evaluation approach by instilling the discipline of identifying all possible alternatives upfront, all before a robust justification for the elimination of alternatives based on objective criteria takes place. The following set of categories emerged following this process:

Figure 3: First level categorisation by investment aspects

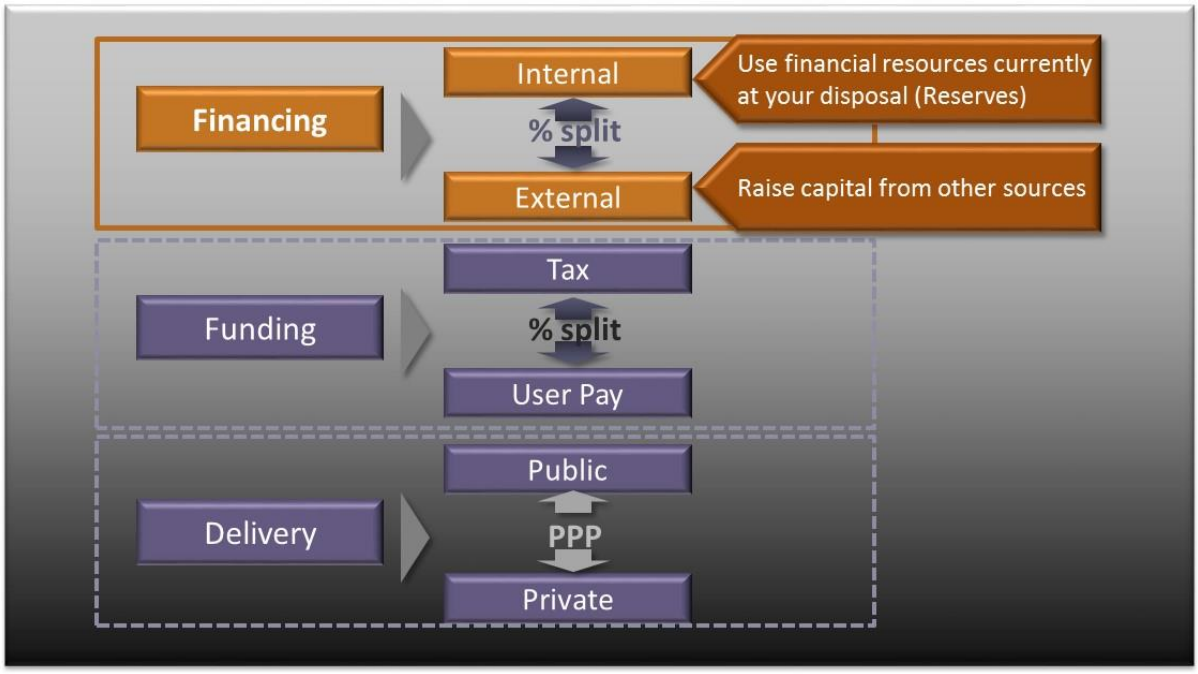


Figure 3 illustrates the highest level of classification for financing, within the context of the other infrastructure decisions of funding and delivery. Two broad categories are recognised, these being internal and external finance. **Internal financing** includes those categories of financing where the developer constructs capital assets from financial resources currently at their disposal, while **external financing** entails those mechanisms employed when the developer raises capital from other sources (adapted from Vander Ploeg 2006).This classification contains the boundary classes for the purposes of analysis, with the highest level of classification taking precedence. However, there are many variations and combinations within these categories, as well as a multitude of options within each category. When it comes to financing, for example, Vander Ploeg (2006) identifies six traditional and thirteen innovative pay-as-you-go (PAYGO) financing sub-categories. Furthermore, methods are often

combined to raise capital for a large project. By way of example, the Gold Coast Rapid Transit project developed a financing "cocktail, consisting of a mix of bank debt, equity and contributions from the federal, state and local levels of government (Ernst & Young 2010, PWC 2011). Financing might also change during the lifecycle of infrastructure. For any large public infrastructure project, it might start out as internal financing but end in the financing authority having to issue bonds (external financing) to cover a deepening budget deficit situation, as was the case for HSR in Greece. Public infrastructure projects in Australia must also deal with the federal/state issue, i.e., determining the proportion of what would be federally financed and what would be financed by the state government. The states and the federal government could very well adopt different financing positions. In Europe, governments have sought external financing for HSR. The same issues appear here with states seeking federal financing.

This high level classification was arrived at following a literature review of eminent international literature on the financing of public infrastructure. In particular, classifications offered by Vander Ploeg (2006), Chan *et al*. (2009) and Kitchen 2004 shaped the first order categories adopted for the research. The method followed, together with the contributions of each source, are outlined below:

The definitions used in the literature reviewed were compared to definitions adopted for our study and then further considered in view of MECE best practice for categorisation. The comprehensive study by Vander Ploeg makes a clear distinction between the dimensions of "financing", "funding" and "delivery" models that all meet the MECE requirements:

> *It is true that the methods of infrastructure finance cannot be expanded. The triple-two rule asserts that there are only two ways to finance, two ways to fund, and two ways to deliver infrastructure. In terms of financing, governments can either borrow or use pay-as-you-go. In terms of funding, governments can either use taxation or user pay. In terms of delivery, infrastructure can be provided publicly through government or through non-governmental actors such as the private or nonprofit sector. However, while the basic methods are limited, the range of tools available to implement them is broad.*
>
> Vander Ploeg 2006, p. 2

Kitchen (2004) introduces a classification by internal versus external financing sources. This notion was adopted for the present research, although in a slightly different context as originally adopted by Kitchen[8]. Chan *et al*. (2009) offers a similar classification for financing vehicles, although the study introduces the notion of capital markets (as opposed to term "borrowing" offered in Vander Ploeg 2006) to allow for equity contributions from the private sector (p. 9):

> *Governments have employed a variety of financing vehicles. They fall into two broad categories: 'pay-as-you-go' (cash flow) financing — based on current revenues or savings within the public sector (and) capital-market financing — based on borrowings or equity contributions from private sources.*

In summary, the categorisation of Vander Ploeg (2006) to distinguish between finance, funding and delivery was adopted for our study, although was further refined so as to incorporate the concept of

[8] Kitchen (2004) applied this classification within the context of municipal financing; therefore, federal grants fell within the external category, yet would fall within our internal category, which is from the taxpayer perspective.

capital markets, as offered by Chan *et al*. (2009), together with the internal-external distinction suggested by Kitchen (2004), as indicated in Figure 3.

Internal and external financing mechanisms were further categorised by financing instrument categories, as indicated in Figure 4, which includes sample instruments.

Figure 4: Financing Instrument Categories

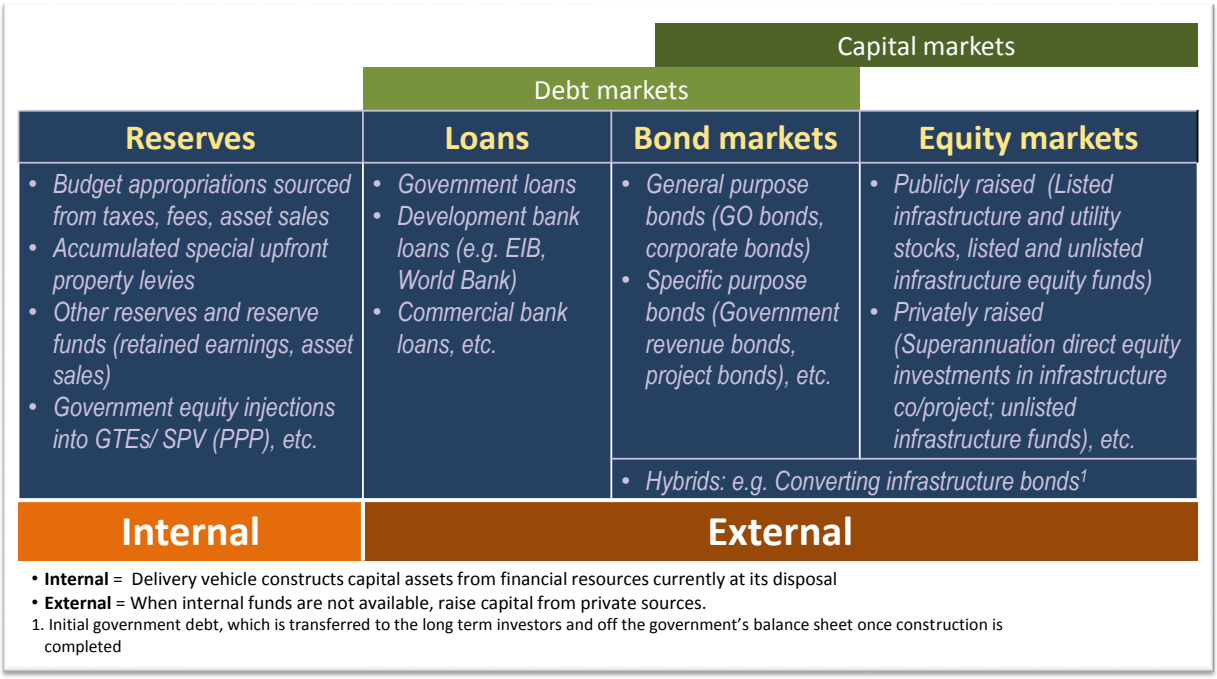


Figure 4 represents the financing categories adopted for analysing the differential impacts of financing instruments in the thesis. Four main categories of financing instruments for large public infrastructure were adopted. These are broadly defined as follows:

> **Reserves.** This category refers to the financing of public infrastructure from internal financial resources currently at the developer's disposal.
>
> **Loans.** Financing by way of loans has a long history in public infrastructure, especially loans by development banks. It became more prominent since the GFC owing to constraints in the capital markets. This financing is mainly sourced externally from government, and commercial or development banks (such as the World Bank, or the European Investment Bank financing of HSR in Europe).
>
> **Bond market** and **equity market** financing**.** Lastly, these two capital market financing categories were found to each have very different impacts. This group of financing mechanisms is also externally sourced and include general obligation bonds, revenue bonds, tax exempt bonds and equity market financing, both publicly and privately raised (Kitchen 2004).

A large number of sources contributed to this categorisation, including GAO (2002), Kitchen (2004), vander Ploeg (2006), Chan *et al*. (2009) and Abelson (2011), as well as the Productivity Commission (2014). A review of the literature indicated that different financing mechanisms have very different

impacts, both in terms of financial and commercial terms, and other economic and social terms. Some of the more objective impacts in terms of costs and benefits are presented in Figure 5 for illustrative purposes:

Figure 5: Sample costs and benefits

Reserves	Loans	Bond markets	Equity markets
• **Potential benefits:** – Full claim on potential future project revenues remains with taxpayer – Preserves / improves credit rating (lower gearing)	• **Potential benefits:** – Full claim on potential future project revenues remains with taxpayer	• **Potential benefits:** – Access to future project returns (less for revenue bonds)	• **Potential benefits:** – Preserves / improves credit rating (lower gearing)
• **Potential costs:** – Opportunity cost of funds no longer available to finance other projects[1] – Full contingent liability[2] (financial claims of investment) remains with taxpayer – Cost of delay – Admin costs	• **Potential costs:** – Cost of servicing finance (interest rates) – Credit rating downgrade (increase gearing) – Full contingent liability (financial claims of investment) remains with taxpayer – Transaction costs	• **Potential costs:** – Cost of servicing finance (bond yields) – Credit rating downgrade (increase gearing) – Full contingent liability[1] (financial claims of investment) remains with taxpayer – Transaction costs – Any taxes foregone on corporate bonds	• **Potential costs:** – Forego some/ all potential future project revenues – Reduced contingent liability[1] to taxpayer – Transaction costs

Informed by Chan *et al*. 2009
1.When funds are no longer available to finance other projects
2.Arising from financial claims associated with infrastructure investment, such as construction cost overruns

These objective measures lend themselves more to measurement or quantification. In addition, there are a range of subjective criteria, which are equally important in decision-making and the selection of the optimum financing mechanisms from the taxpayer perspective. Some of the subjective measures that the framework aims to incorporate after a rigorous process of eliminating possible duplication and omissions has been completed are as follows:

- **Effectiveness (certainty)** - To mobilise sufficient finances for investment in infrastructure, and to do so in a timely manner (adapted from ACG 2003, p.103).
- **Efficiency** - Refers to the impact of financing alternative upon wellbeing in general: 'It essentially asks the question does the measure make people, the community at large or the environment better or worse off?' (ACG 2003 p.103); 'resource efficiency is achieved where marginal costs equals price because this is the point where society secures the greatest net gain from the consumption of this service' (Kitchen 2004, p. 8).
- **Equity (e.g. intergenerational) -** 'the fairness or otherwise of an instrument ... sharing the burden of revenue raising fairly between individuals who have differing abilities to pay' (ACG 2003, p. 103). 'Fairness ... is achieved (when) those who consume public services pay for them' (Kitchen 2004, p. 9).
- **Stability -** Refer to an alternative's ability to 'provide steady and reliable access to capital' (ACG 2003, p. 59).
- **Simplicity** – Approaches adopted have to be practical, greater simplicity makes it cheaper for government to collect or raise the funds required. (ACG 2003), 'the easiest financing system

to administer is the one that is not confusing for taxpayers to understand and does not require an unnecessary amount of time and effort in administering it' (Kitchen 2004, p. 8-9).

- **Flexibility -** Flexibility includes the ability to renegotiate the terms of a financial instrument to adjust to the projects requirements over time, such as renegotiating repayments and loan restructuring (Chan *et al*. 2009, p. 85). It matters as there can be costs associated with the need to change financing arrangements as market conditions or project requirements change (Chan *et al*. 2009, p.18).
- **Accountability** - Accountability of an alternative 'is enhanced when the design ... is clear to taxpayers' (Kitchen 2004, pp. 8-9); 'Public infrastructure initiatives should have clear lines of responsibility and accountability, rigorous and transparent reporting and oversight requirements, and clear, measurable performance measures' (Ministry of Public Infrastructure Renewal 2004, p. 9).
- **Transparency** - 'is an extension of the accountability argument (and)...is enhanced when citizens/ taxpayers have access to information and decision-making forums so that the general public is familiar with the way in which (alternatives) are set' (Kitchen 2004, pp. 8-9); 'Transparency is a key means of reducing uncertainty as it facilitates an understanding of the process and issues that need to be dealt with.' (ACG 2003, p. 103).
- **Stakeholder support (political impact)** - 'Governments are reluctant ... to pursue change that has no support, or apply measures that fall predominantly upon influential stakeholders. Governments typically give consideration to stakeholders' reaction to ... options' (ACG 2003, p. 103).
- **Market and other disciplines -** the benefits arising from the introduction of capital market and governance disciplines into the project from the financiers (Wellman & Spiller, 2012, p. 75).
- **Appropriate degree of public control/ownership** - "Retention of public ownership of strategic government assets" (Chan *et al*. 2009, p. 209).

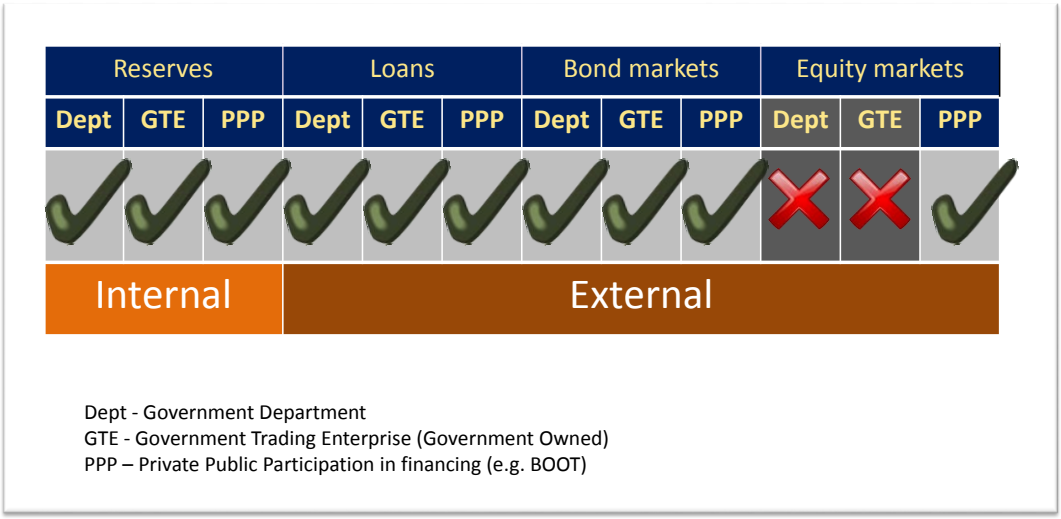
An example of how these criteria might apply to the financing aspect of a public sector infrastructure project, is the argument that the use of long-term debt creates better **intergenerational equity**; as it synchronises costs and benefits of long-lived infrastructure assets, resulting in those who benefit from the facility, also paying the costs of the project (Kitchen 2004, Chan et al. 2009, Vander Ploeg 2006; ACG 2003).

These criteria were applied to varying degrees by the literature on public infrastructure finance which was reviewed (including Hann & Mack 2005), and are also fairly consistent with those commonly used in Public Economics textbooks to evaluate tax systems (Abelson 2008, Baily 2002, Rosen & Gayer 2008). Our research has reviewed and documented a large body of literature on the various positive and negative impacts being associated with each of the financing instruments in the context of public infrastructure, which will be incorporated into the framework to

aid a balanced and rigorous appraisal. However, a degree of duplication appears to remain with some of the objective measures, as well as possibly among the subjective measures. These duplications will be reviewed and removed before proceeding to incorporate these measures into the appraisal framework.

The evolving appraisal framework is helpful in understanding, analysing and presenting the complexity of financing. The financing categories can be analysed by delivery vehicle or funding sources. An example of using the framework to present financing instruments by delivery vehicle is presented in figure 6, which shows that the financing categories do not all apply to every delivery vehicle.

Figure 6: Categorisation of financing instruments by delivery vehicle



Eight objective impacts were identified for financing instruments. These are as follows:

- **Finance servicing cost -** The interest rate on debt required by investors (Chan *et al*. 2009, p. 213).
- **Claim to project revenues –** The provision of capital often confers, or should confer, ownership or property rights, which in turn has implications for any claim on project revenues during operation (Abelson 2011).
- **Opportunity costs of funds1 -** Any opportunity costs when funds are no longer available to finance other projects (Chan *et al.* p. 213).
- **Contingent liabilities -** Liabilities arising from financial claims associated with the infrastructure investment, such as the need to fund cost overruns on construction, and/or shortfalls in operating accounts (Chan *et al.* 2009, p. 213).
- **Cost of project delay -** Financing from accumulated funds may impose high transactions costs should projects be *delayed* as a result of constraints on cash-flow. The resultant inflation could offset interest savings (Chan *et al*. 2009; Vander Ploeg 2006). Other costs associated with delays include the cost of bridging finance, or the value of lost services arising from slower delivery of projects (Chan *et al*. 2009, p. 214).

- **Administration and transaction costs -** Transactions costs of negotiating, contracting and managing the financial vehicle (Chan *et al*. 2009, p. 214).
- **Credit rating impact –** 'An important prerequisite for accessing capital through bond markets is securing an investment-grade credit rating from an agency such as Standard & Poor's or Moody's' (WEF 2014). Member capital and callable capital allow it to maintain a high credit rating (currently AA+) and hence to borrow at favorable interest rates' (Lucas 2013, p. 26).
- **Taxes forgone -** Any foregone revenue associated with tax advantaged financing vehicles, such as tax exempt bonds. (Chan *et al*. 2009, p. 214).

By taking the analysis of financing instruments by delivery further, the financing alternatives can be appraised in terms of its objective costs (minuses) and benefits (plusses) as shown in Figure 7.

Figure 7: Costs and benefits of financing instruments by delivery vehicle

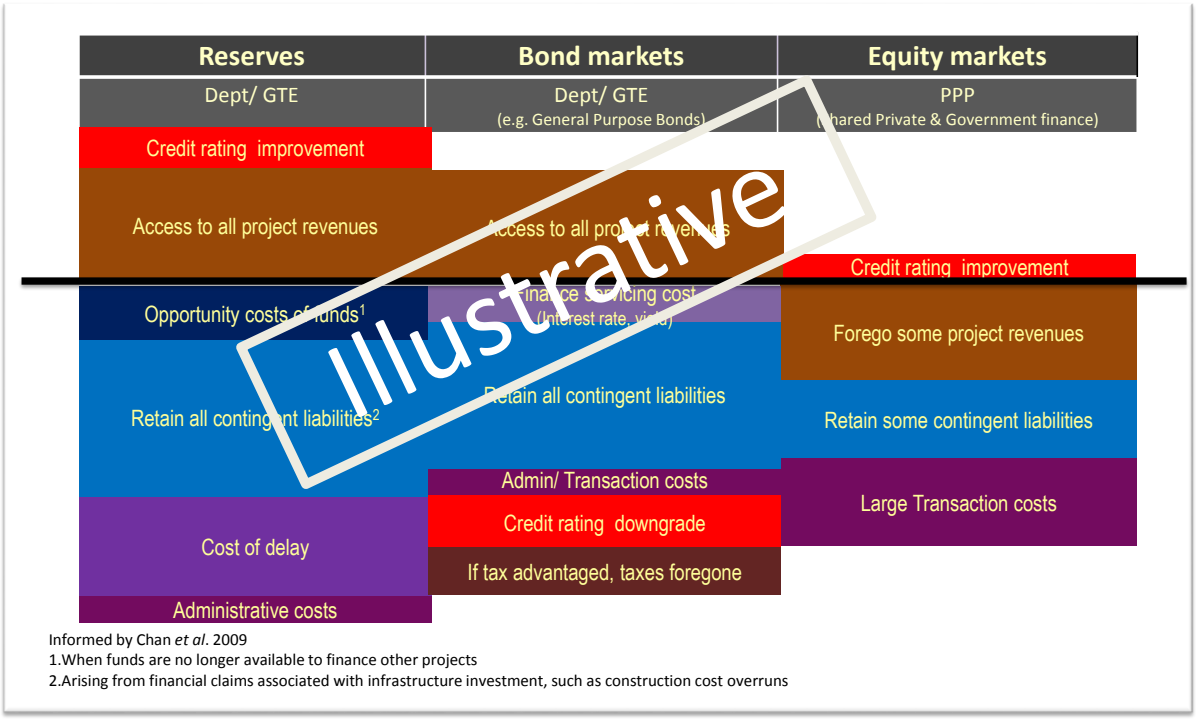
Potential Objective Impacts *(Taxpayer perspective)*	**Financing:** How capital is raised to construct Public Infrastructure											
	Reserves			Loans			Bond markets			Equity markets		
	Dept	GTE	PPP	Dept	GTE	PPP	Dept	GTE	PPP	Dept	GTE	PPP
Finance servicing cost	0	0	0	-	-	-	-	-	-	N/A	N/A	0
Claim to project revenues	+	+	+	+	+	+	+	+	+	N/A	N/A	-
Opportunity costs of funds[1]	-	-	-	0	0	0	0	0	0	N/A	N/A	0
Contingent liabilities[2]	-	-	-	-	-	-	-	-	-	N/A	N/A	-
Cost of project delay	-	-	-	0	0	0	0	0	0	N/A	N/A	0
Admin/ transaction costs	-	-	-	-	-	-	-	-	-	N/A	N/A	-
Credit rating impact	+	+	+	-	-	-	-	-	-	N/A	N/A	+
Taxes forgone	0	0	0	0	0	0	-	-	0	N/A	N/A	0

Informed by Chan *et al*. 2009
1.When funds are no longer available to finance other projects
2.Arising from financial claims associated with infrastructure investment, such as construction cost overruns

Figure 8 shows how these objective costs and benefits may be appraised, following a process of operationalisation in order to measure the objective impacts. Examples of possible operationalisation of these objective impacts include the interest rate on loans, or bond yields for the 'finance servicing costs' criteria, and the Internal Rate of Return (IRR) of another public project may serve as a metric for the 'opportunity cost of funds' criteria[9].

[9]Martin (1997) argues that when a HSR project is financed by cancelling already approved public projects, the cost of funds is the Internal Rate of Return (IRR) of those projects. If only marginal public projects are cancelled, the cost of funds does not change. But, if ongoing programs have to be cancelled because of the disruptive effects, the opportunity cost is increased (therefore a higher discount rate should be applied).

Figure 8: Costs and benefits by financing instrument



5. Conclusion

This submission aims to inform the Commission of CRC for Rail Innovation research which may be helpful in ongoing work on the topic of raising private finance for public infrastructure. It outlines findings and conclusions to date of ongoing research. The proposed appraisal framework is at an advanced stage of development. The framework sets out to enable a selection process which is in the best interest of taxpayers. The major benefit of the framework is that it brings together a myriad of objective and subjective impacts, which includes both costs and benefits to taxpayers associated with financing alternatives. The submission outlines the research rationale, objective and findings. It presents a summary of the framework definitions, categories, and criteria. Further details and final results can be made available to the Productivity Commission should that be deemed helpful in its inquiry into public infrastructure in Australia.

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