Contributing factors to optimal project portfolio selection

This thesis submitted as a requirement for the degree of

Master of Applied Science (Research)

Doug Wheeler
BE (Civil) GDSTT CPEng RPEQ CPPD

Civil Engineering and the Built Environment
Science and Engineering Faculty
Queensland University of Technology
Brisbane, Queensland

August 2013
Statement of originality

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Doug Wheeler

12th August, 2013
Acknowledgements

This thesis could not have been completed without the support of others.

I acknowledge Dr Bambang Trigunarsyah, my supervisor, who provided ongoing encouragement and crucial technical guidance, and proved to be a very caring and decent human being.

I acknowledge my family who put up with the time I spent away from them while undertaking this research, and for their ongoing support and encouragement. In particular I thank my wife for her tolerance and my daughter for her input and ongoing related discussions during her psychology studies.

I also acknowledge the crucial involvement of the nine practitioners who participated in the interviews and subsequent surveys.
Publications Arising

Abstract
The selection of projects and programs of work is a key function of both public and private sector organisations. Ideally, projects and programs that are selected to be undertaken are consistent with strategic objectives for the organisation; will provide value for money and return on investment; will be adequately resourced and prioritised; will not compete with general operations for resources and not restrict the ability of operations to provide income to the organisation; will match the capacity and capability of the organisation to deliver; and will produce outputs that are willingly accepted by end users and customers.

A modified Delphi approach has been applied in this study to investigate best practice and to determine the factors that contribute to optimal selection of projects, and the associated strategic level decision making.

There are various standards and practices that some may recognise as representing best practice in this area. Many of these have similar characteristics and this study has found no single best practice. Each of the participants in the study related to practices that are appropriate to the organisation, the size and nature of the candidate projects, the regulatory environment, its stakeholders, and the experience and capability of its personnel.

The study identified the factors that contribute to the optimal selection of projects as: culture, process, knowledge of the business, knowledge of the work, education, experience, governance, risk awareness, selection of players, preconceptions, and time pressures. All these factors were found to be significant; to be appropriate to public sector organisations, private sector organisations and government owned corporations; and to have a strong linkage to research on strategic decision making. These factors can be consolidated into two underlying factors of organisation culture and leadership.

The significance of the conclusions from this research is that organisations that do not give due consideration to the underlying drivers of organisation culture and leadership, will continue to make sub-optimal decisions on the billions of dollars they invest in projects each year.

**Keywords:** Project selection, portfolio management, project portfolio selection, strategic decision making, organisational culture, leadership
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Chapter 1 Introduction

1.1 Research Background & Problem Statement
All organisations, whether public sector, private sector or ‘not for profit’ undertake projects to support their operations; meet strategic objectives; respond to a need; solve a problem; develop an idea; or realise investment opportunities.

It is important for the project manager to understand why his or her project was selected for investment. However, these projects can be selected in an ad hoc manner, at the whim of a Government Minister, in response to a need or public pressure, or as a ‘sacred cow’ (Meredith and Mantel 2009). These projects draw on funds that other projects, which will have to undergo much more scrutiny, will have to compete for. It has also been commented that “there are usually more projects available for selection than can be undertaken within the physical and financial constraints of a firm, so choices must be made in making up a suitable project portfolio (Archer and Ghasemzadeh 1999)”.

State and Federal governments in Australia as well as other world funding bodies, have established frameworks for the evaluation and selection of projects. Examples are the Queensland Government PPP Guidelines (Queensland Government 2007) incorporating ‘Value for Money’ and ‘Project Assurance Framework’ processes, the Australian Government PPP Guidelines, and the Asian Development Bank ‘Guidelines for the economic analysis of projects’ (Asian Development Bank 1997). These frameworks incorporate rigorous financial and economic analysis of projects, supported by multi-criteria analysis, to appropriately determine the prioritisation of funding to schools, hospitals, roads, public transport, water and energy resources, or community facilities. All these are competing for the same limited funds. However, in the case of the Queensland Government, these processes are only applied to projects with a value in excess of $100 million. Therefore, there are thousands of equally worthy projects involving the expenditure of billions of dollars which do not undergo the same level of scrutiny.

The PMI standard for portfolio management (Project Management Institute 2008) suggests a process for portfolio governance involving the following steps: (1) Identify components (projects), (2) Categorise components, (3) Evaluate components, (4) Select components, (5) Prioritise components, (6) Balance portfolio, and (7) Authorise components.

This logical process is consistent with that proposed by others. An expanded view of this process has been developed as a ‘framework for project portfolio selection’ (Archer and Ghasemzadeh...
This integrated framework incorporated a sequence of phases: strategic consideration; project evaluation; and portfolio selection.

There are many different approaches or models for the qualitative and quantitative evaluation and prioritisation of projects involving numerical and non-numerical methods. There are well over 100 different techniques (Cooper 1993). Some comments on the range of techniques include: “There are many relatively divergent techniques that can be used to estimate, evaluate, and choose project portfolios. Many of these techniques are not widely used because they are too complex and require too much input data, they provide an inadequate treatment of risk and uncertainty, they fail to recognise interrelationships and interrelated criteria, they may just be too difficult to understand and use, or they may not be used in the form of an organised process (Archer and Ghasemzadeh 1999)”; “models do not make decisions, people do”; and “all models, however sophisticated, are only partial representations of the reality they are meant to reflect (Meredith and Mantel 2009).”

In their discussion on project selection methods DeMaio et al (1994, 184) suggests that “there is no optimal method: techniques must be evaluated and chosen according to the specific application; moreover, these methods should not be considered mutually exclusive but rather as complimentary techniques”.

Project portfolio selection is essentially about decision making by individuals and organisations. The effectiveness of this decision making can be influenced by human psychological factors, as espoused in the field of behavioural economics (Reeson and Dunstall 2009); organisational and cultural considerations (Brooks 1994); the quantum (too much and too little) and timeliness of information to assist the decision making (Katopol 2007); and the experience of the decision makers (Brockmann and Anthony 2002).

According to Ghasemzadeh and Archer (2000), “the difficulties associated with project portfolio selection result from several factors: (1) there are multiple of often-conflicting objectives, (2) some of the objectives might be qualitative, (3) uncertainty and risk can affect projects, (4) the selected portfolio may need to be balanced in terms of important factors, such as risk and time to completion, (5) some projects may be interdependent, (6) the number of feasible portfolios is often enormous. In addition to these difficulties, due to resource limitations there are usually constraints such as finance, work force, and facilities or equipment, to be considered. As some researchers have noted, the major reason why some projects are selected but not completed is that resource limitations are not always formally included in the project portfolio process.” Portfolio selection
becomes more complex when resource availability and consumption are not uniform over time (Ghasemzadeh and Archer 2000). This is a common dilemma for most organisations.

The problem is that there appears to be little consistency in approach to the selection of projects and that there are many factors that contribute to optimal project portfolio selection, and decision making in this environment.

1.2 Research Aim
The ‘problem’ as described above is very broad as it can be applied to: selection of projects for investment; prioritisation and balancing of projects in response to limited resources (time, money, people, materials, equipment and machinery); selection of projects to bid for (hard dollar contracts); selection of projects to bid for (contemporary approaches such as early contractor involvement, and alliances); or the financial management of projects during implementation.

Covering all these environments would be too broad for this research project. The first two of these (selection of investment projects and the prioritisation and balancing of resources) are inter-related. The required decision making is related and the people involved in this decision making would be at a similar high level in an organisation. The second two environments both involve bid decision making but the nature of contractual arrangements are entirely different. The nature and extent of stakeholders are also different as well as the approach taken. ‘Hard dollar’ contracting is traditional in nature and can be very adversarial, whereas more contemporary approaches are more ‘shared goal’ driven and require more of a relational approach. The last environment is about the ongoing decision making involved in managing the finances during implementation of a project. The decision making in this environment could be considered to be more ‘routine’ in nature, dependent upon the experience of the players and the governance systems in place.

The aim of this research was to focus on the selection of investment projects and the prioritisation and balancing of resources as these involve similar high level decision makers in organisations. The particular aims are to study the gap between current practice and best practice, and the contributors to the application of appropriate project selection practices and decision making, by managers and organisations, in order to achieve optimal project portfolio selection.

The research would not be restricted the type of project (IT, public infrastructure, business change, private infrastructure, research & development) and incorporated a survey of organisations in the private sector, public sector, and government owned corporations.
1.3 Thesis structure

Chapter 1 introduces the background to this research project and the extent to which the techniques and decision making in project selection is applied. The chapter highlights that despite a plethora of tools and techniques available, and the desire to achieve optimal project portfolio selection, there are many factors that contribute to the ability of individuals and organisations to achieve this goal. The problem statement is provided in the first part and the research aim is defined in section 1.2. It is important to note that the research aim is limited to studying just part of the broader work inferred by the problem statement.

Chapter 2 discusses the literature review on topics of project selection criteria, tools and techniques, project prioritisation and balancing, decision making and some of the parallels with human factors in the field behavioural economics. This literature review informed the design of the research questions which are defined in Chapter 3. Further literature review was undertaken following findings of the qualitative and quantitative surveys, and in support of the discussion in Chapter 5. This subsequent literature review extended into areas of organisational culture, strategic decision making, level of information for decision making, and the importance of experience and tacit knowledge.

In Chapter 3, the research method is described. Section 3.2 describes the research framework and how it is designed to address the research questions which are also defined in this section. Later in this chapter, there is a description of the research models considered for this research project, followed by further detail of the selected model. The selected approach utilises a modified Delphi technique.

Chapter 4 describes in detail the two study rounds and the findings from these. The first round was a qualitative survey involving recorded interviews, and the analysis of these was used to design a questionnaire in support of the second round. This study phase generated some findings on the gap between current and best practice and these findings are included. The basis for design of the questionnaire is included along with the profile of the participants in the study. The results from the second round (completed questionnaires) permitted some further interpretation, analysis and findings in relation to the contributing factors to optimal project portfolio selection, and the significance of industry types.

Chapter 5 provides a detail discussion on the findings of the survey and examines them against an extended literature review, as described earlier.
Chapter 6 presents the conclusions and implications from this research project. They are compared against the research questions. The limitations of the research are described along with suggestions on how this research can be extended.
Chapter 2 – Literature review

2.1 Introduction
This chapter discusses the range and content of the literature that was reviewed to formulate the research problem and the research questions. The review also informed some of the discussion in Chapter 5.

The review has been grouped into three areas. Section 2.2 explores the range of selection criteria proposed and adopted, Section 2.3 explores the range of tools and techniques available for analysing, ranking, prioritising and balancing component projects, and Section 2.4 explores some of the contributing factors to effective application of the various tools and techniques and the associated decision making.

The literature review was extended to support some of the findings and discussion. This is included in Chapter 5.

2.2 Project selection criteria
Suggested selection criteria that should be used as a basis for analysing and comparing projects include quantitative and qualitative, financial and non-financial, and authors have suggested the criteria differs for each industry sectors e.g. public sector, IT, research and development, defence, investment and construction.

The Standard for Portfolio Management (Project Management Institute 2013) represents a significant revision of earlier editions and includes a substantial and broad list of some examples of evaluation criteria. They include: organisational strategy alignment; goals and objectives; benefits, financial and nonfinancial; market share, market growth, or new markets; costs (lost opportunity costs); dependencies, internal and external; risks, internal and external; legal/ regulatory compliance; human resources capabilities and capacities; technology capabilities and capacities; and urgency.

It states that it is important to select evaluation criteria which best support the achievement of organisational strategy and objectives. Such criteria will allow measuring the benefits contribution of a portfolio component. Each identified portfolio component, along with the key descriptors, is compared to the categorisation criteria and is assigned to a given category for the purpose of scoring, ranking, evaluating, and selecting between similar portfolio components. The number of components is usually limited and examples include: increased profitability (revenue increase, generation, cost reduction and avoidance); risk reduction; efficiency improvement; regulatory/
compliance; market share increase; process improvement; continuous improvement; foundational (e.g. investments that build the infrastructure to grow the business); and business imperatives (e.g. internal toolkit, IT compatibility, or upgrades). (Project Management Institute 2013)

It suggests that this enables the measurement of the contribution of the candidate component project to the strategic business objectives. It therefore suggests a project governance test to ensure that there is a benefits contribution from the component project. The output is a value score for each component project which is a basis for the next stage of the process.

Meredith & Mantel (2009) propose criteria for choosing a selection model but suggest that the kinds of information required to evaluate a project can be listed under: (1) production; (2) marketing; (3) financial; (4) personnel; and (5) administrative and miscellaneous categories. These can be broken down further into project selection factors and are included in Table 2.1.

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<tr>
<td>Financial Factors</td>
<td>1. Profitability, net present value of the investment</td>
<td>2. Impact on cash flows</td>
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Jiang and Klein (1999) in their research into selection criteria for information systems (IS) projects have generated six sub-categories of evaluation criteria for these types of projects: (1) financial;
(2) organisational; (3) competing environment; (4) technical; (5) risk; and (6) management. Each of these is broken down into between four and seven criteria. The financial related criteria relate to financial analysis techniques and include benefit/cost ratio, rate of return, contribution of profitability, growth rate, and payback period. Organisation needs criteria include: contribution to organisational goals/objectives; aid the organisation in competing in the market; internal political decisions; importance to the organisation for future success; importance to the functioning of the organisation; public relation effect; and importance to the organisation’s critical success factors. The management support related criteria include: political acceptance; end-user understanding, cooperation, and commitment to the project; top management support; match with users’ interest/work load; and middle management support (Jiang and Klein 1999). Even though IS projects are technically driven, this criteria extends beyond that of Meredith and Mantel (2009) to include organisational and cultural influences into effective project portfolio selection. By including such things as clarification of need, linkage to organisational strategy, and management support, this range of criteria begin to align with the guidance in the Standard for Portfolio Management (Project Management Institute 2013).

In their study into strategic project selection for construction projects of the Ministry of Defence in Thailand, Puthamont and Charoenngam (2006) identified the wide range of project selection criteria for different types of projects. These are represented in Table 2.2. They also found that the most important factors are different for each phase of a project. For the concept phase, the most important factors are project objective, project rationale, and mission of the organisation. For the design stage they are readiness to implement, conformance to regulations and the law, and project budget. For the final approval stage they are project objective, action plan, and project rationale (Puthamont and Charoenngam 2006). This is not surprising but highlights that during the life of a project, the understanding of its scope, resource requirements, interfaces and risks is enhanced. The information at the initiation of a project can be relatively course and analysis against some of the criteria may be unreliable. This may require some sensitivity assessment of the assessment and this is discussed in the next section.
Table 2.2 Project selection criteria in different types of projects (Puthamont and Charoenngam 2006)

<table>
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<th>General project selection</th>
<th>Construction project selection</th>
<th>R&amp;D Project Selection</th>
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<tr>
<td>Intrinsic criteria</td>
<td>Availability of capital</td>
<td>Successful completion of the project</td>
</tr>
<tr>
<td>Project identification ability</td>
<td>Economic situation</td>
<td>Work related to existing products only</td>
</tr>
<tr>
<td>Resources requirements and availability</td>
<td>Profitability</td>
<td>New products/ processes</td>
</tr>
<tr>
<td>Past experiences of the organisation in managing projects</td>
<td>Political situation</td>
<td>Manufacturing plants association in selecting the research programs</td>
</tr>
<tr>
<td>Management attitudes</td>
<td>Benefit</td>
<td>Patenting</td>
</tr>
<tr>
<td>The time horizon of the project</td>
<td>Management</td>
<td>Publishing the work done</td>
</tr>
<tr>
<td>Extrinsic criteria</td>
<td>Competitive activities</td>
<td>Social objectives</td>
</tr>
<tr>
<td>The risk/ return ratio</td>
<td>Viability</td>
<td>Image of the organisation</td>
</tr>
<tr>
<td>The market environment</td>
<td>Uncertainty and risk level</td>
<td>Duration of the project</td>
</tr>
<tr>
<td>Government policies and regulations</td>
<td>Infrastructure project selection</td>
<td>Cost of the project</td>
</tr>
<tr>
<td>The socio-economic climate</td>
<td>(from World Bank, 2003)</td>
<td>Space availability</td>
</tr>
<tr>
<td>Legal and technological implications</td>
<td>Project development objective</td>
<td>Availability of executive manpower</td>
</tr>
<tr>
<td>IS project selection</td>
<td>Strategic context</td>
<td>Availability of technical support staff</td>
</tr>
<tr>
<td>Financial</td>
<td>Project description</td>
<td></td>
</tr>
<tr>
<td>Organisational needs</td>
<td>Project rationale</td>
<td></td>
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<td>Competing environment</td>
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<tr>
<td>Technical</td>
<td>Sustainability and risks</td>
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<td>Risk</td>
<td>Main conditions</td>
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<td>Management support</td>
<td>Readiness for implementation</td>
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<td></td>
<td>Compliance with bank policies</td>
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It has been suggested by Turner (2009, 45) that there are “insufficient resources, money, people and materials to fund all projects so the organisation must align priorities to select projects that are most beneficial” (Turner 2009). This again brings in the linkage to organisational benefits. He suggests that the two major criteria are benefit and risk but the others that may be included are strategic importance, opportunity for learning, and stakeholder acceptance.

Project portfolio selection based on financial and risk criteria are suggested by several authors (Lawson, Longhurst et al. 2006; Jafarizadeh and Khorshid-Doust 2008; Murray, Burgher et al. 2009).

For investment projects the economic life of a product can be an important consideration. This may not be a specific criterion but can be incorporated into the option pricing models selecting projects (Farrell 2002).

The consideration of critical resources (De Maio, Verganti et al. 1994) is proposed in conjunction with risk and project relevance. This acknowledges the fact that there are key people in an organisation who have involvement in most projects, and their availability will represent critical path for those projects. Therefore, their availability will be a major determinant to the projects that
can be selected. An advancement on this approach is the consideration of organisational and individual competency as a criterion in project selection as well as the economic benefits that come from competence development (Gutjahr, Katzensteiner et al. 2008).

As described earlier, the strategic orientation of projects is considered as important (Jiang and Klein 1999) and this is inherent in an ‘integrative’ approach (Kester, Hultink et al. 2009) which includes both quantitative and qualitative methods. Strategic alignment is aligned with requirements analysis (Bergman and Mark 2002) which helps define the initial project choices. Choosing the wrong projects or poorly defined requirements (or need) can lead to project failure or costly change management to these projects during implementation. Either way, the realisation of benefits can be severely impacted. An empirical study on 13 organisations showed that successful organisations have an organisation-level practice of selecting and prioritising projects in line with strategy (Müller, Martinsuo et al. 2008). The importance of strategic alignment and defined need are also emphasised by Murray, Burger et al. (2009) but for the public sector based public private partnership projects they studied, they also stress the inclusion of quality-of-life to the criteria in project selection.

The balancing act between quantitative and qualitative methods and criteria was examined in a case study (Jung 2009). The primary assessment utilised a quantitative method as it was seen to be an objective evaluation. The utilisation of qualitative or ‘abstract’ methods were seen as secondary, partly due to potential distortion by favoured ‘sacred cow’ projects from senior management. However, this is inconsistent with earlier comments in this section where a broad range of factors and methods appears appropriate in most situations. It is also recognised that even financial criteria are subject to assumptions due to the level of uncertainty and the time of project selection.

2.3 Tools and techniques

The Standard for Portfolio Management (Project Management Institute 2013) suggests a range of tools and techniques to optimise the portfolio i.e. create a list of portfolio components that will be considered for prioritisation. They include the use of scoring models such as multi-criteria analysis, to eliminate those candidate component projects not meeting threshold scores with respect pre-determined criteria and indicators. This process is not limited to the ‘value’ of individual components as they may be constrained by organisational capacity constraints. The standard suggests that the analysis for capability and capacity be broken down into three analyses: human resource capability and capacity analysis; financial capability and capacity; and asset capacity and capability.
It also suggests that the **quantitative and qualitative** analyses may include: cost-benefit analysis; quantitative analysis (use of spread-sheets or other tools); scenario analysis; probability analysis; SWOT analysis; market/competitor analysis; or business value analysis. The standard suggests the use of techniques for weighting and ranking portfolio components such as the single-criterion prioritisation model and multiple-criteria weighting ranking, and the multi-criteria scoring model.

A framework for project portfolio selection was developed by Archer and Ghasemzadeh (1999). This framework separates the work into distinct stages. Each stage accomplishes a particular objective and creates inputs to the next stage (Archer and Ghasemzadeh 1999). The framework is depicted in Figure 2.1 where the major stages are represented by the heavy outlined boxes, the ovals represent pre-process activities, and post-process stages are shown in the lightly outlined boxes.

![Figure 2.1 – Framework for project portfolio selection (Archer and Ghasemzadeh 1999)](image)

In a subsequent paper by the same authors (Ghasemzadeh and Archer 2000), they further developed this process into an organised framework for project portfolio selection through a decision support system (DSS), which they called Project Analysis and Selection System (PASS). They surveyed potential users, and “although the test results suggest that PASS is a useful tool, users will not adopt and use PASS unless they perceive it as a useful and easy to use tool”.

A more extensive approach is proposed by Murray et.al. (2009), in their study into selection criteria for ‘public private partnerships’ projects. It includes a link to needs identification and in
response to the nature of public sector economic development projects, the community. This approach is represented in Figure 2.2, and like the framework by Archer and Ghasemzadeh, includes continuous refinement and feedback loops.

![Figure 2.2 – Project selection approach (Murray, Burgher et al. 2009)](image)

In this approach the community has a significant involvement in steps 1 to 3. Step 5, economic analysis incorporates both quantitative and qualitative analysis. Step 6, portfolio selection, the Analytical Hierarchy Process (AHP) is used to compare the remaining projects and rank them according to selected weighted attributes. This process (AHP) is also suggested by Archer and Ghasemzadeh (1999) for use in the project selection stage of their process. The AHP process (Saaty 1980) includes three major steps: (1) identify and select criteria; (2) weight the criteria and build consensus about their relative importance; and (3) evaluate the project proposals using the weighted criteria. Step 8, portfolio refinement, is an important step in this iterative process where the views and decisions of the community are reflected upon.

In their study into the selection of government investment projects in China, Yu et.al. (2008), proposed an extension to the Standard for portfolio management to include a stronger link to the strategic objectives of the government. They proposed an eight step iterative process: (A) Identify the government strategic objectives; (B) Identify and categorise components; (C) evaluate and select components; (D) identify and analyse portfolio risks; (E) Prioritise components; (F) Balance portfolio; (G) Monitoring and controlling process group; and (H) Closure (Yu, Wang et al. 2008). The suggested refinement in this process is now reflected in the third edition of the Standard for Portfolio Management (2013), as described earlier.

De Maio et.al. (1994) in studying product development projects, has divided the methods for project selection into three groups: financial; operations research; and strategic. The aim of the
Financial techniques is to appraise the economic effectiveness of a project, evaluating incremental discounted cash flow deriving from the investment. The operations methods aim at expressing variables, relations between variables, constraints and utility functions analytically. Risk minimisation, therefore, can be viewed as an additional goal to achieve greater utility. The strategic methods are aimed at evaluating the impact of the project on the position of the firm in the competitive context (De Maio, Verganti et al. 1994). Another grouping of project selection methods has divided them into four sub-categories: comparative approaches; scoring models; benefit contribution or economic models; and optimisation methods (Hall and Nauda 1990). While these groupings have different titles, there are similarities between them. In relation to the use of models for selection of IS projects, it has been stated: “However, none of these has achieved even limited use in industry. Even though complex computer models were seen to have more desirable features, their use is not well accepted….as a result, IS professionals often adopt the analytical hierarchy process” (Jiang and Klein 1999).

Financial considerations have been a major component in project selection because it is all about putting limited finances where they will provide the optimum value for money for organisations. Wenyi (2008, 289) proposes a financial evaluation method for project investment but identifies the need for other considerations and that “further work is needed” in this area (Wenyi 2008).

The classic financial analysis models of payback period; return on investment (ROI); and discounted cash-flow methods including net present value (NPV) and internal rate of return (IRR) are well described in texts such as (Burke 2006).

Others have developed tools for the inclusion of non-financial criteria (Halouani, Chabchoub et al. 2009). They aim for better inclusion of qualitative information and have developed a model for this based on Multi Criteria Group Decision Making (MCGDM). They call it a PROMETHEE-MD-2T method but it is very complex and may have difficulty in application. The difficulty in application was discovered by Lawson (2006) when they tested a selection model they had developed for Small – Medium Enterprises (SMEs). Feedback was that while the model had merit it was unlikely to be used due to the cost of running it, the closeness of management to the business, and the specialisation required. A tool for project selection based on competence has also been developed, but needs to be extended into multi-criteria decision analysis (Gutjahr, Katzensteiner et al. 2008), and it appears mathematically complex which may restrict its use to most industries.
Another approach has been proposed (Lee, Kang et al. 2008) which makes use of road maps to investigate certain types of projects. It integrates with strategic planning from a time perspective but doesn’t yet incorporate costs and benefits. It requires further development. An interesting piece of research was undertaken where the selection and evaluation method was compared against success metrics such as time, cost, use, impact, and overall success (Rosacker and Olson 2008). This was restricted to IT projects in a public sector state government environment, but comparison with findings for other sectors was provided. It concluded that the use of cost benefit analysis, net present value, payback period, and probability techniques are not well supported. Budget constraints as the basis for project selection, as well as requirement for the project, top management support, and subjective considerations were found to be more significant.

“The balancing act between qualitative and quantitative methods” has been highlighted (Jung 2009) and other authors talk about three categories of techniques including financial, variables and strategic. The variables category is where the use of multi criteria decision making (MCDM) is proposed along with the inclusion of qualitative criteria (De Maio, Verganti et al. 1994). Both Jung (2009) and De Maio, Verganti et.al. (1994) emphasise that projects should be compared against relevance, risk and critical resources.

The incorporation of risk and uncertainty into project portfolio selection has been expanded by Jafarizadeh and Khorsid-Doust (2007). An optimal portfolio involves a trade-off between risk and expected return. In virtually all literature about investment, risk is defined as the volatility of returns, measured by standard deviation (or variance) of the probability distribution of return of the project or portfolio of projects (Jafarizadeh and Khorshid-Doust 2008). They studied the use of capital asset pricing methodology and concluded that they have an advantage over previous methodologies because they take into account the recognition of market assessed risk of both projects and the firm itself (reflected in the price of equity). To some extent, this is consistent with the intent of the current risk management standard AS/NZS ISO 31000:2009 (Standards Australia 2009) which requires an enterprise wide approach to risk and opportunity.

The utilisation of a consistent approach or method to project portfolio selection appears to be supported along with the inclusion of both qualitative and quantitative criteria into some form of multi-criteria decision making that incorporates all criteria. However, an emphasis on subjective data can be seen as “a catchall method for lack of method” and be used to justify projects that are considered to be required and may be considered differently under objective scrutiny (Rosacker and Olson 2008), or the ‘sacred cow’ projects (Meredith and Mantel 2009). It should also be borne
in mind that numerical financial analysis may appear objective, but it is based on assumptions and therefore has a subjective component. Wenyi (2008) proposes the inclusion of sensitivity analysis into the models used for project portfolio selection.

The Project Assurance Framework (PAF) as used by the Queensland Government for projects over $100 million has multi-criteria decision analysis (MCDA) as a key component in the process (Queensland Government 2007). While Treasury would appear to have a strong influence on the decision making process and therefore place an emphasis on financial and economic analysis (quantitative), the underlying principle of best value from a whole of government’ perspective as well as social and political perspectives make a numerical MCDA process attractive due to its defend ability and independence.

A MCDA process is consistent with the analytic hierarchy process (AHP) (Saaty 1980). Both comprise the three steps: (1) Identify and select criteria; (2) Weight the criteria and build consensus about their importance; and (3) Evaluate the project proposals using the weighted criteria.

While some form of the use of multi-criteria decision analysis (MCDA) and the inclusion of both qualitative and quantitative criteria is a common thread from this literature review, the method used for analysis can become quite complex. In their discussion on project selection methods DeMaio et al (1994, 184) suggests that “there is no optimal method: techniques must be evaluated and chosen according to the specific application; moreover, these methods should not be considered mutually exclusive but rather as complimentary techniques”. It has also been suggested that “while earlier normative portfolio management literature has promoted a variety of portfolio selection, prioritisation, reporting and decision-making systems…none of them alone can serve the multidimensional performance interests of organisations…..supports holistic and integrated frameworks of portfolio management that take into account the organisational context and different practices of portfolio control simultaneously” (Müller, Martinsuo et al. 2008).

2.4 Contributing factors to effective application
The application of effective project portfolio management in organisations is a complex area because it is dealing with “situational idiosyncrasies of internal and external dynamics, industries, governance types, and geographical location” (Müller, Martinsuo et al. 2008). This complexity is also exemplified by the political imperatives and drivers that can influence project prioritisation in public sector organisations, the ‘sacred cow’ projects (Meredith and Mantel 2009) and the ‘projects that are required will obviously be adopted’ (Rosacker and Olson 2008).
Organisational context

This complexity could be partly explained by the three different types of responses based on organisation type (Kester, Hultink et al. 2009): formalist-reactive firms (quantitative); intuitive firms (qualitative); and integrated (qualitative and quantitative), and the importance of effective executive and project sponsorship (Crawford, Cooke-Davies et al. 2008). The sponsor may need to emphasise a more governance perspective if: the parent organisation has a high level of risk exposure to the consequences of failure of a project; the project is persistently performing poorly against the parent organisation’s expectations; the parent organisation faces rapidly changing market conditions; corporate governance requirements have drawn attention to the particular project; there is a suspected illegal or non-compliant behaviour on the part of the project team; or the project is mission critical or has a high level of exposure. Similarly, a sponsor may need to emphasise a support perspective if: the parent organisation is failing to provide sufficient resources to the project; some parts of the parent organisation are resisting the project’s implementation; different stakeholders in the parent organisation are seeking to impose on the project team conflicting definitions of its objectives or scope or to impose untenable constraints; the parent organisation is failing to provide the project with the decisions that are necessary to maintaining planned progress; the project manager and/or the team are known to be inexperienced or weak; or there are early signs of difficulty with the project such as possible shortfall in benefits realisation (Crawford, Cooke-Davies et al. 2008). While these comments are directed at the management of projects and programs, because of the iterative nature of optimal project portfolio selection, they are equally relevant to project portfolio selection. For example, Rosacker and Olson (2008) state that many IT projects will not proceed without the presence of a project champion who is generally a member of top management, and “has the influence to ensure that the project has sufficient priority to enable success” (Rosacker and Olson 2008).

Surveys on IS project selection have indicated that: “public sector organisations are extremely risk averse, subject to divided authority, experience short term rather than strategic budgets, and utilise a highly regulated procurement process; public sector organisations exhibit greater interdependencies, leading at least in part, to increased accountability, procedural delays, and red tape; and economic issues are more significant within private sector organisations” (Rosacker and Olson 2008).

It has also been demonstrated that successful organisations firstly, have an organisation-level practice of selecting and prioritising projects in line with strategy. Secondly, they have a shared reporting approach to channel information flows from projects to the portfolio level. Thirdly, they
share responsibility for decisions at the portfolio level (Müller, Martinsuo et al. 2008). This has some parallels with the controversial ‘behavioural theory of the firm (BTF)’ which rejects the conventional wisdom (assumption) that all choices should be seen as acts of constrained optimisation. While in the BTF, the organisation is seen as having a set of goals, the individuals in it are striving to attain their own ‘sub-goals’. As a collection of individual agents with different aspirations and different things to offer, the firm is best seen as a coalition of different interest groups and sub-groups. This coalition includes not merely managers and line workers (in different departments) but also shareholders, bankers, supply chain partners and regular customers (Earl 2012). This will have a bearing on the effectiveness of project portfolio decision making.

**Decision making**

Project portfolio selection has decision making at its centre. This decision making can be individual or it can be collaborative, depending upon the time available, the organisation, but also the experience and capability of the decision makers/ players in the project portfolio selection process. There is a close link between the extent of a person’s time-horizon (the length of time they can hold a work intention) and the type of mental processing people do in conceptualising and solving problems. The capacity of each individual to use their judgement to make decisions grows over time at broadly predictable rates. For people to reach their potential, their natural capability to exercise judgement must be paced with the growth in responsibility. “The nucleus at the core of any effective organisation is sound judgement” (McMorland 2005). It is suggested that if young managers arrive at positions of responsibility before gaining the necessary intellectual capability to handle the required level of complexity, being over-stretched in highly demanding jobs, they are unable to exercise a level of judgement that older, wiser heads might have discerned. “This is about the mental aspects of managing – the capacity to process complexity under situations of uncertainty or ambiguity” (McMorland 2005). This is supported by the suggestion that decision makers show a natural tendency to categorise every managerial problem in terms of their previous experiences (De Maio, Verganti et al. 1994).

It has been suggested by Kester, Hultink et.al. (2009) that there are three genres of portfolio management decision making: *formalist-reactive, intuitive; and integrative*. Strategic decision-making literature shows the prevalence of two dominant streams: synoptic formalism and incrementalism. Synoptic formalism emphasises procedural rationality in decision making and argues for a comprehensive generation of alternatives and the evaluation of all relevant information to arrive at an optimal decision. This corresponds well with the *formalist-reactive* genre. The incrementalism perspective treats strategic decision making as an adaptive, incremental
Contributing factors to optimal project portfolio selection and complex learning process. This corresponds with the *intuitive* genre. An integrative approach is promoted in that it induces awareness of how people make decisions in practice, as well as prescribing rigid rules to control for limitations in human decision making. This corresponds with the *integrative* decision making genre. “Firms employing an integrative approach towards portfolio decision making are most likely to have an easier time being successful in the long run, because they manage to integrate their strategic considerations into their portfolio decision making, while still considering quantitative criteria” (Kester, Hultink et al. 2009).

Heard (2005), has investigated the human factors in decision making in the health sector. Her paper is based in the anaesthesia area which has been described as “a highly dynamic, complex and tightly coupled activity, similar to aviation”. It is suggested that a modern approach to error considers that most errors are the result of an interaction between the design of activities, procedures and objects (such as equipment), with known patterns of human behaviour. These behavioural patterns include well-known cognitive limitations of human beings. The psychological precursors of an error (distraction, preoccupation, forgetfulness, fatigue, stress) are often the last links in the chain of events leading to an accident or an adverse event. Some of the myths about errors include: (1) bad people make errors; (2) errors are random; (3) the errors of highly trained professionals are very rare; and (4) the errors of highly trained professionals are usually sufficient to cause bad outcomes. However, errors are actually very common, but are mainly inconsequential, and professionals make frequent errors, yet rarely have bad outcomes. The biases which affect the way errors are viewed are: (1) outcome bias – the tendency to attribute blame more readily when there has been a serious adverse outcome, than if the same set of circumstances had occurred but the outcome was relatively minor in severity; and (2) hindsight bias – for those analysing another’s errors or disasters, blessed with the benefits of hindsight, it is tempting to ask how could the person who made the error have been so blind, so stupid, or so ignorant? (Heard 2005). As in project portfolio decision making, a systems approach can be seen as an answer to human fallibility. It has been suggested that a misunderstanding of taking a *systems approach* to errors is that it absolves the individual of any responsibility. In so-called ‘high reliability organisations’ there is not only a consistent emphasis on addressing systemic factors to reduce errors, but individuals working in those organisations are acutely aware of their own *individual contributions and responsibilities.*

*Human factors in decision making*

It has been suggested that the field of psychology, already very present in organisational psychology and decision-making, is slowly opening up applications in corporate financial decisions and more specifically in corporate finance techniques. Among these corporate financial
decisions is the project evaluation decision or the investment decision (Ashta 2009). Ashta (2009) found that a wide range of human factors can influence the calculation of subjective risk estimates. Therefore, quantitative financial evaluation of projects which may be expected to be objective in nature, are actually subjective due to all the human factors and behavioural biases that affect individual players and the organisation.

These influences have relevance in the field of behavioural economics. Neo-classical economists use a normative theory about perfect rationality in human behaviour. They base their models on the way rational people are expected or should behave according to economists’ models of rationality. However, human beings do not think and act in a purely rational way. We have emotions, prejudices and biases that determine our behaviour in fundamental ways (Sylvan 2010). Reeson and Dunstall (2009) have grouped these factors into psychological anomalies, social preference and norms, heuristic and bounded rationality, and the things people do. The psychological anomalies group include: (1) risk aversion – most people are risk averse to some extent; (2) loss aversion – people tend to give potential losses greater weight than potential gains; (3) mental accounting – people put money into different ‘accounts’ and are reluctant to move money between them; (4) hyperbolic discounting – in economic models future benefits are discounted at a constant rate, but human decision makers apply a much higher rate in the short term than long term; (5) probabilities – under risk, human decision makers will overweight certainties and small probabilities compared to intermediate probabilities, as a result many people purchase insurance to protect themselves from small risks even though they could readily absorb; and (6) anchoring – people will focus on an initial piece of information, even if it is uninformative. In summary, people are fearful of losses, handle risk inconsistently, are prone to procrastination, tend to stick with the status quo and are easily swayed by irrelevant numbers.

The social preferences and norms group include: (1) conditional cooperation – people are often prepared to sacrifice their own interests for the sake of the greater good, however, people typically do not cooperate unconditionally; and (2) equity – fairness and reciprocity prove particularly strong motivators.

The heuristics and bounded rationality group include: (1) optimising vs satisficing – the expectation is that people optimise each and every economic decision – for the simplest of decisions people do optimise by trading off the various attributes, but as complexity increases they are more likely to use heuristics, and this can lead to conformity; (2) the adaptive toolbox – evolved capacities, including capacities to learn, that form the building blocks of heuristics –
Decision making takes place in the human mind, which is a product of biological evolution rather than a strictly logical mathematical machine; and (3) rationally irrational – heuristics should not be regarded as irrational as they enable people to make rapid, effective decisions – bounded rationality recognises that people have limited cognitive resources and many decisions to make, and heuristics frequently produce good decisions – true intelligence is perhaps as much about selecting the best method of making a decision as being able to apply more complex decision-making methods.

The things people do group includes: (1) if in doubt, don’t do anything – fear of loss makes people stick to the status quo – people have a systematic tendency towards inertia and procrastination; (2) choice overload – as tasks become more complex (too much choice) people are more likely to procrastinate, or just keep doing what they are doing – too much choice is costly to decision makers; and (3) uncertainty aversion – people are uncomfortable with uncertainty and can be reluctant to make a decision when they know they don’t have all the information, even if the information they lack is irrelevant to the decision (Reeson and Dunstall 2009).

Satisficing, which was mentioned earlier (heuristics and bounded rationality), is about searching for satisfactory-looking solutions to past or anticipated failures to meet performance targets or aspirational levels. The rational view would be that an organisation that uses simple decision rules would be expected to be wiped out by a rival with more sophisticated processes. However, organisations with simple rules and procedures for dealing with changes in their environments or internal difficulties may respond very quickly, whereas organisations that gather as much information as possible and then carefully process it may achieve inferior performances since, by the time they have worked out the best response to the original problem, further changes could have taken place (Earl 2012). A rational view when faced with ambiguity (not having a conceptual framework for interpreting information) or equivocality (having several competing or contradictory conceptual frameworks) is to gather more information. However, when faced with knowledge based indeterminism, interpretation and/or knowledge acquisition is required. It is argued that human contact is best in situations where knowledge is the issue: “Ambiguity is not resolved by gathering more facts. It typically requires cycles of interpretation, explanation and social ratification ... Ambiguity and equivocality are best managed by face to face communication among a network of personal contacts that serves as a source of knowledge and expertise...” (Zack 2007). This has similar characteristics to the earlier discussion on the organisation as a coalition of individual agents, where success is achieved through cooperation and collaboration.
2.5 Chapter Summary

In the first part of this chapter a wide range of practices and research were examined to gain an insight into what might be considered as best practice in project portfolio selection, and how it may be applied. This study included the review of a range of selection criteria used, including financial and non-financial, organisational and strategic; various frameworks utilised by funding agencies, governments and the private sector; and a range of tools and techniques involving quantitative and qualitative methods, and multi-criteria analysis. This part of the literature review lead to the development of the first three research questions: (1) Do leading practitioners have a view on what represents best practice?; (2) Is there a difference between their current practice and what they regard as best practice?; (3) How does this view compare with what is generally regarded as best practice?

In the second part of this chapter, previous researches into possible contributors to the effective application of these practices were reviewed. This review identified broad topics of organisational context, identifying the importance of sponsorship and linkage to strategy; decision making, identifying the link between project portfolio selection and critical decision making; and human factors in decision making, examining parallels with research into the field of behavioural economics. This part of the literature review contributed to development of the fourth research question: (4) Are there common contributors to the achievement of optimal project portfolio selection?. This literature review was extended to assist with the discussion in Chapter 5.
Chapter 3  Research Method

3.1  Introduction
This chapter builds on the literature review and research aims to develop the research framework. This framework links the research aims to the research questions. This chapter also describes the five research models considered and why a Modified Delphi technique was adopted. The remainder of this chapter describes the details of the research method.

3.2  Research framework
The two specific aims of this research project were to: (1) study the gap between current practice and best practice in relation to the selection, analysis, prioritisation and balancing of project portfolios; and (2) identify the common contributors to the application of appropriate project selection practices and decision making, by managers and organisations, in order to achieve optimal project portfolio selection.

In relation to the first aim, in the introduction and in the literature review in Chapter 2 it has been highlighted that are a very large number of methods, tools and techniques available for use in project portfolio selection. Some people may regard the processes set out in documents such as the Portfolio Management Standard (Project Management Institute 2013), as well as government and international banking frameworks would represent best practice. For those operating in those environments, it probably does. However, while the principles and the general approach may have some similarities, their appropriateness to any organisational context (complexity and cost), the knowledge and experience of the players, and how it is applied can vary widely.

This discussion generates the first three research questions:

RQ1 – Do leading practitioners have a view on what represents best practice?

RQ2 – Is there a difference between their current practice and what they regard as best practice?

RQ3 – How does this view compare with what is generally regarded as best practice?

In relation to the second aim, some factors and considerations were mentioned in the introduction and this has been expanded upon in Chapter 2 with a particular focus on some of the human psychological factors that impact decision making. There are some parallels with the field of behavioural economics to understand why individual and group decision making is not always rational. Financial models, quantitative risk analysis and other tools and techniques can assist in numerical analysis in an apparent rational way, providing numbers and scores that can provide the
appearance of reliability. However, the research on the human psychological factors such as risk aversion, loss aversion, mental accounting, status quo bias, anchoring, optimising vs satisfying, choices overload (Reeson and Dunstall 2009), as well as politics (Eisenhart 1999), indicate that there are other factors that contribute to decision making in the project portfolio selection context.

This discussion generates the fourth research question:

RQ4 – *Are there common contributors to the achievement of optimal project portfolio selection?*

The research framework is represented diagrammatically in Figure 3.1. This figure represents the linkages between the research aims, the scope of literature review and the consequential research questions. Thus, the research questions are designed to meet the research aims.

![Research Framework Diagram](image)

**Figure 3.1 – Research framework**

### 3.3 Selection of research method

Research is undertaken in a broad number of fields of endeavour, from marketing to psychology, science, and management. The paradigmatic issues were considered in determining suitable research methods. These are represented in Table 3.1
Table 3.1 – Paradigmatic issues in research approaches (Veal, 2005)

<table>
<thead>
<tr>
<th>Paradigmatic issues</th>
<th>Positivist - Critical/ interpretive</th>
<th>Critical/ interpretive</th>
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<tbody>
<tr>
<td></td>
<td>Positivist:</td>
<td>- researcher seeks objectivity/ detachment</td>
</tr>
<tr>
<td></td>
<td>- researcher accepts subjectivity</td>
<td>- researcher engages with research subject</td>
</tr>
<tr>
<td></td>
<td>- world to be researched is ‘external’</td>
<td>- inductive, qualitative methods common</td>
</tr>
<tr>
<td></td>
<td>- deductive, quantitative methods</td>
<td>- generally does not involve numerical analysis</td>
</tr>
<tr>
<td></td>
<td>common – similar to natural science model</td>
<td>- generally involves small numbers of cases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- findings generally not generalisable</td>
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</table>

<table>
<thead>
<tr>
<th>Paradigmatic issues</th>
<th>Quantitative - Qualitative</th>
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<tr>
<td></td>
<td>Quantitative:</td>
</tr>
<tr>
<td></td>
<td>- involves numerical data</td>
</tr>
<tr>
<td></td>
<td>- often involves large numbers of cases</td>
</tr>
<tr>
<td></td>
<td>- seeks to generalise to the whole population</td>
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<table>
<thead>
<tr>
<th>Paradigmatic issues</th>
<th>Induction – Deduction</th>
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<tbody>
<tr>
<td></td>
<td>Deduction:</td>
</tr>
<tr>
<td></td>
<td>- begins with hypothesis/ theory and gathers data to test the hypothesis/ theory</td>
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<table>
<thead>
<tr>
<th>Paradigmatic issues</th>
<th>Experimental - Non-experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experimental:</td>
</tr>
<tr>
<td></td>
<td>- research conducted in an environment (eg. laboratory) in which the researcher has control over the limited number of variables</td>
</tr>
</tbody>
</table>

With reference to Table 3.1 the research approach had to match an interpretive, qualitative, induction and non-experimental paradigm. The five research methods considered to match this paradigm are described below (Veal 2005).

**Qualitative methods**

Qualitative approaches are used when the researcher accepts that the concepts, terms and critical issues should be defined by the subjects of the research and not by the researcher: they are often used for the study of groups, particularly when the interaction between the group members is of interest. They are also used when the exploratory theory building, rather than theory testing, is undertaken. Qualitative techniques are also useful when the focus of the research is on people’s attitudes and the meanings they attribute to people and events, although these can also be studied quantitatively. Qualitative techniques are not appropriate when the aim of the research is to make general statements about large populations. Five approaches to qualitative research include: informal and in-depth interviews; group interviews or focus groups; participant observation; ethnography; and biographical research. The use of in-depth interviews is appropriate for this research.
Questionnaire based survey

Questionnaire based surveys are the most commonly used approach in management research. They come in a variety of forms. This diversity is partly because the basic concepts are easily understood and mastered, but also because much management research calls for general quantified outcomes. These surveys have to be very specific about their data requirements early in the research, unless a modified, almost iterative approach is taken with a simpler start.

Questionnaire based surveys also depend on the respondents’ own accounts of their behaviour, attitudes or intentions. In some situations this can raise questions about the validity of the approach, since accuracy and honesty of responses may be called into question. Consequently, these surveys should only be used when quantified information is required concerning a specific population and when individuals’ own accounts of their behaviour and attitudes are acceptable as a source of information. On this basis, this would be an appropriate approach for this research.

Meta-analysis

The meta-analysis technique combines the feature of literature review and secondary data analysis and involves quantitative appraisal of the findings of a number of projects on the same topic. This is suitable for the sort of research where findings are directly comparable from one study to another. The use of this technique for this research may be limited by the availability of suitable reference research projects.

Delphi technique

The Delphi technique is a procedure involving the gathering and analysing of information from a panel of experts on future trends in a particular field of interest. The experts in the field complete a questionnaire indicating their views on the likelihood of certain developments taking place in the future. These views are then collated and circulated to panel members for further comment, a process that may be repeated a number of times until the final results are collated. The use of this technique for this research has some limitations due to the availability of a panel for an uncertain number of rounds.

The classical Delphi method is characterised by four key features: (1) anonymity of participants allows them to freely express their opinions without undue social pressures to conform from others in the group (decisions are evaluated on their merit, rather than who has proposed the idea; (2) iteration allows the participants to refine their views in light of the progress of the group’s work from round to round; (3) controlled feedback informs the participants of the other participant’s perspectives and provides the opportunity for Delphi participants to clarify or change their views;
and (4) statistical aggregation of group responses allows for a quantitative analysis and interpretation of data (Skulmoski 2007).

A typical three round Delphi process would involve the following steps: (1) develop the research question; (2) design the research; (3) research sample – selecting research participants; (4) develop round 1 questionnaire – broad questions similar to brainstorming; (5) Delphi pilot study; (6) release and analyse round 1 questionnaire; (7) develop round 2 questionnaire – based on responses from round 1 questionnaire; (8) release and analyse round 2 questionnaire – participants can review their round 1 responses; (9) develop round 3 questionnaire – additional questions to verify the results, to understand the boundaries of the research, and to understand where the results can be extended; (10) release and analyse round 3 questionnaire – the process stops if the research question is answered; (11) verify, generalise and document research results (Skulmoski 2007).

**Modified Delphi technique**

Another option considered is a modification of the Delphi technique. While a three round Delphi is typical, single and double round Delphi studies have also been completed (Skulmoski 2007). A further method is to use an iterative approach which could be considered to be a combination of a qualitative approach using in-depth interviews followed by a questionnaire based survey to provide some data that can be interpreted and analysed, and provide verification of earlier findings. In this method, some of the rounds associated with a classical Delphi are effectively combined. Skulmoski et al (2007) also suggest “the Delphi method is well suited to rigorously capture qualitative data. It may be seen as a structured process within which one uses qualitative, quantitative or mixed research methods”.

It is well suited to situations where there is incomplete knowledge about a problem or phenomenon, and where there are a limited number of experts available. Rather than relying on a large sample size to produce data, a small number of experts can be engaged in a collective and iterative journey. This requires a greater time commitment but the trade-off can be high quality and reliable findings. Okoli and Pawlowski (2004) have compared the sample size for statistical power and significant findings, between traditional survey methods and Delphi. For traditional surveys “because the goal is to generalise results to a larger population, the researchers need to select a sample size that is large enough to detect statistically significant effects in the population”. Whereas, “the Delphi group size does not depend on statistical power, but rather on group dynamics for arriving at consensus among experts; and studies have consistently shown that for questions requiring expert judgement, the average of individual responses is inferior to the
averages produced by group decision processes; research has explicitly shown the Delphi method bears this out” (Okoli 2004).

The criteria used in selecting the preferred method are described in Table 3.2.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Description</th>
<th>Comment on this research project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 The research question</td>
<td>Much of the decision on the method is bound up in the basic research question. This will direct the range of data sources.</td>
<td>Information from literature reviews and from practitioners is required.</td>
</tr>
<tr>
<td>2 Previous research</td>
<td>If the research is closely linked to the literature and previous research, this may dictate the choice of method. The aim may be to replicate the method in previous studies to achieve comparability, to improve on the methods used, or to deliberately adopt a contrasting method.</td>
<td>There is no preceding or parallel research. However, literature review is an important source design of the surveys and discussion on findings.</td>
</tr>
<tr>
<td>3 Data availability/access</td>
<td>In some cases obvious existing data source presents itself, and may even prompt the research in the first place. Access to a sample of people can be seen as an opportunity too good to miss. In other cases, lack of access shapes the research – for example, ethical or practical issues may preclude research on some people.</td>
<td>Experienced practitioners from a range of industries are required to provide valid data. These are limited in number and generally very busy. Use of focus groups will not be possible their time will have to be respected. Some views expressed will reflect confidential information, so ethics clearance will be required.</td>
</tr>
<tr>
<td>4 Resources</td>
<td>The human and monetary resources will affect the type and scale of the research.</td>
<td>There is a sole researcher on this project who also has to maintain a small business to fund his time. This is a restriction.</td>
</tr>
<tr>
<td>5 Time</td>
<td>This is also a restriction.</td>
<td>There is a timing limitation on this research.</td>
</tr>
<tr>
<td>6 Validity, reliability and generalisability</td>
<td>Validity is the extent to which the data collected truly reflect the phenomenon being studied. Reliability is the extent to which research findings would be the same if the research were to be repeated at a later date or with a different set of participants. Generalisability refers to the probability that the results of research findings apply to other subjects, other groups and other conditions.</td>
<td>Validity and reliability are important criteria for this research project. Generalisability is not important for this research.</td>
</tr>
<tr>
<td>7 Ethics</td>
<td>Ethical issues can limit choices for research method.</td>
<td>Ethics risk is low but ethics clearance is required due to involvement of participants. No minors are involved.</td>
</tr>
<tr>
<td>8 Uses/ users of the findings</td>
<td>These are often taken for granted, but they are an important factor in shaping research.</td>
<td>It is important that the research findings are considered to be of value to practitioners and provide a platform for further research.</td>
</tr>
</tbody>
</table>

A comparison of these methods against the criteria in Table 3.2 is depicted in Table 3.3.
Table 3.3 – Comparison of research methods against criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Qualitative</th>
<th>Questionnaire based</th>
<th>Meta-analysis</th>
<th>Delphi technique</th>
<th>Modified Delphi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acceptable but limited</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>2</td>
<td>Source for literature review</td>
<td>Source for literature review</td>
<td>Not suitable – no replicable research</td>
<td>Source for literature review</td>
<td>Source for literature review</td>
</tr>
<tr>
<td>3</td>
<td>Access to suitable participants is acceptable</td>
<td>Access to suitable participants is acceptable</td>
<td>Limited due to availability of participants</td>
<td>Access to suitable participants is acceptable</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>5</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>6</td>
<td>Reliability limited due to lack of quantitative assessment</td>
<td>Validity and reliability limited by lack of refinement</td>
<td>Not suitable – no replicable research</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>7</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
<tr>
<td>8</td>
<td>Limited</td>
<td>Limited</td>
<td>Very limited</td>
<td>Acceptable</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>

Only the Modified Delphi technique is acceptable for all criteria with no limitations. Consequently it was considered to be the most appropriate approach for this research project. A more detailed explanation on the application of this approach follows in section 3.4.

3.4 Description of selected method

The research method utilised two rounds with the first being ‘qualitative’ and involving in-depth interviews with experienced practitioners. Subsequent thematic analysis of the interview content allowed research questions RQ1 to RQ3 to be addressed, and identification of factors for further study in Round 2. The second round utilised a questionnaire which was completed by the same participants as in the first round, therefore exhibiting similarities to the Delphi technique. Interpretation and analysis of the data from the questionnaires allowed research question RQ4 to be addressed. In combination with a thematic analysis of the responses from the participants, findings could be made to support the research conclusions. A more detailed explanation of each round follows and is represented diagrammatically in Figure 3.2.

Round 1 – Qualitative survey

The input for this round was the literature review.

The outputs of this round addressed the questions of: what represents best practice project selection (RQ1); the differences between current and best practice (RQ2 and RQ3). Another output
was the identification of potential factors that contribute to project selection to inform design of the questionnaire in round 2.

The work required to achieve the round 1 outputs included: development of survey questions for use in the interviews; commitment of nine participants (experienced practitioners); undertaking of in-depth interviews with the participants; recording and subsequent transcribing of interviews; collation of this data; and thematic analysis of data with respect to research questions RQ1 to RQ3 and forming of common factors in project portfolio selection decision making.

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**Figure 3.2 - Inputs, Research Activities and Outputs**
Round 2 – Questionnaire

The inputs for this round were the literature review and findings from the previous round, particularly the common factors.

The outputs of the round included addressing the research question on the contributing factors in project portfolio selection (RQ4), and other key findings and recommendations from this research project.

The work required to achieve the round 2 outputs included: development of questionnaire; distribution of questionnaire and management of participants to obtain responses; interpretation and thematic analysis of data; development of findings.

More detail on the design of each Round, profile of the participants, analysis and findings are included in Chapter 4.

3.5 Chapter summary

Four research questions have been identified as:

RQ1 – *Do leading practitioners have a view on what represents best practice?*

RQ2 – *Is there a difference between their current practice and what they regard as best practice?*

RQ3 – *How does this view compare with what is generally regarded as best practice?*

RQ4 – *Are there common contributors to the achievement of optimal project portfolio selection?*

A modified Delphi research approach was selected incorporating detail interviews with nine leading industry practitioners followed by thematic (qualitative) analysis to identify contributing factors. A survey questionnaire would then be developed to permit further analysis and extraction of findings. The same nine participants would complete the survey questionnaire.
Chapter 4 Findings

4.1 Introduction

In Chapter 3 the broad research method was described. In this chapter the detail design of each of the two rounds is described, based upon the findings of preceding work. The analysis and findings from each round are also included.

4.2 Round 1 – Qualitative survey

4.2.1 Overview of Round 1

This Round primarily involved the undertaking of detail interviews with nine leading practitioners to examine their experiences in project portfolio selection and decision making; ascertain their views on what may represent best practice; and what they consider are the major contributors to effective project selection and decision making.

Prior to undertaking these interviews, guiding questions were developed that would address the research questions and the gaps identified through the literature review. Other preceding activities were the obtaining of QUT ethics clearance and the securing of suitable participants (leading practitioners) to be interviewed. It was also important that these participants completed the ethics consent form, and were prepared to be involved in both Rounds.

The nine participants were selected based upon their experience, recognition in their fields, availability and that they presented no conflict of interest with the researcher or the research project.

The profile of the participants is summarised in Table 4.1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>All male</td>
</tr>
<tr>
<td>Median years of experience</td>
<td>21-25 years</td>
</tr>
<tr>
<td>Current industry sector</td>
<td>Private (5); Public (2); Government owned corporation GOC (2)</td>
</tr>
<tr>
<td>Range of industries</td>
<td>Oil and gas; energy (power stations); consulting (to all sectors); medicine; IT; public utilities (water, waste water and electricity distribution).</td>
</tr>
</tbody>
</table>
The number of participants in a Delphi study is not definitive with 10-18 being suggested by Okoli and Pawlowski (2004) and 10-15 by Skulmoski et al (2007) when the group is homogeneous, as in this study. A greater number is suggested when the group is heterogeneous. Just like the number of rounds can be anywhere between one and four, although mostly two or three are utilised, the number of participants can be anywhere between three and more than a hundred, for PhD level research (lower numbers are suggested for Masters level research). Two rounds with less than 10 participants is appropriate where availability of experts is an issue, and there is a homogeneous sample, as in this study (Skulmoski 2007).

A thematic analysis of the comments from the interviews was undertaken in order to develop a list of factors that have a bearing on project selection and critical decision making. These factors were refined to eleven. They are considered to comprehensively represent the range of comments but of a number that could be managed in the second round.

4.2.2 Round 1 research design

The interview questions were designed to address the research questions and the gaps identified through the literature review. They were guiding questions, as the participants were from very different backgrounds and some have had involvement in more than one sector. Therefore, the questioning and discussion had to be flexible and adaptable, while still addressing the research questions, and very importantly trying to extract their views on the most important individual and organisational factors that contribute to or inhibit effective investment decisions and decision making. The general questions are described in Table 4.2.

The interviews were generally of 50 to 60 minutes duration. All except one were undertaken at the participant’s workplace and in a quiet environment to minimise interruption and distraction. They were all recorded and transcribed to assist in the analysis of information gathered.

The extent of notes taken during the interviews varied based upon the level of interaction with the participant. Going back through the recordings and the transcriptions (92 pages) was necessary to extract valuable comments and develop findings from the interviews. The extent of this work could be regarded as being equivalent to the first two rounds in the typical Delphi approach discussed in Section 3.3. This enabled the round 2 questionnaire based survey to permit verification of the findings from the first round.
### Table 4.2 Round 1 interview questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What industry and sector are you involved in?</td>
<td>Some participants may be involved in more than one which may present different perspectives.</td>
</tr>
<tr>
<td>2</td>
<td>Are you involved in selection decisions for your organisation or do you just provide advice as in the role of a consultant?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>What is your role and level of authority with respect to decisions?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>What do you regard as best practice in project portfolio selection for your organisation?</td>
<td>This could involve the use of tools and techniques. For some participants this may focus on critical decision making.</td>
</tr>
<tr>
<td>5</td>
<td>Do you believe that your organisation follows best practice?</td>
<td></td>
</tr>
<tr>
<td>5A</td>
<td>If yes, what does the organisation do to facilitate such practice, and what are the threats to this?</td>
<td>A supplementary question – of these inhibitors / contributors which do you think are most important?</td>
</tr>
<tr>
<td>5B</td>
<td>If no, what are the inhibitors or barriers to providing better practice? Alternatively, what could be done to facilitate better practice?</td>
<td></td>
</tr>
</tbody>
</table>

#### 4.2.2 Round 1 findings

**Findings relating to best practice**

During the interviews all participants were asked about their view on best practice in project portfolio selection. Only two of the participants referred to practices which they considered could be regarded as representing best practice. These related to the selection of large scale public infrastructure projects, and they considered them to be robust and sound, with inclusion of financial and non-financial criteria with provision for appropriate weightings, depending upon the nature of the competing projects, analysed using some form of analytical multi-criteria analysis. However, while they referred to the practices being adopted by various agencies, they didn’t consider that they were being applied well. This was due to the competency and experience of the agency staff, the preponderance of pre-determined preferred projects, lack of independence in the process, and the preparedness to modify subjective ratings. When relating their experiences in
private sector examples, the same participants found a stronger emphasis on the financial assessment but adaptability of any process to suit the strategic fit, urgency, the stakeholders (their needs and risk profile) and other constraints. However, both sectors can suffer from inadequate definition of the problem and the need, and subsequent identification and comparative analysis of options. Without sufficient diligence in these steps, sub-optimal solutions can be justified and implemented, leading to less efficient use of limited resources and in some cases, negative benefits.

Other participants in the interviews made reference to the use of some financial analysis tools such as discounted cash flow (net present value), and cost benefit analysis. Some also made reference to the inclusion of non-financial criteria into some form of multi-criteria analysis, but none could suggest what best practice could be. There were short and long term financial views; different drivers and stakeholders; different project contexts; different cultures and players; and for some private sector organisations there are community and legacy projects undertaken which have no short term financial benefit, but being seen as a good citizen can be crucial to gaining community support for future projects. The organisations to which the participants related, have or are developing approaches for project portfolio selection which may not exhibit all the features of what may be considered best practice. However, the participants have indicated that these practices sometimes have to be flexible, and being appropriate to the context of candidate projects and programs, the organisation’s culture, the experience and competency of the players, the internal and external drivers, the effectiveness of governance and sponsorship, the extent of change, and appetite for risk and process, they generally work. These practices also need to be adapted if there is a change to any of these circumstances because a balance between process rigor, enforcement, the project portfolio context, the organisation’s culture and its players needs to be maintained in order to achieve optimal results.

Project portfolio selection is ultimately about high level decision making. It is about attempting to select a mix of projects and programs which have the best chance of success, realising benefits and achieving strategic objectives for the organisation. For those participants who have had a low exposure to project selection but high exposure to critical or strategic decision making, the above findings are consistent with their observations and experiences, as expressed through the interviews.
Findings relating to identification of factors for round 2 survey

The interviews identified a large number of factors and considerations due to the wide range of experiences of the participants, and that most could relate their experiences to several industry sectors. After detail thematic analysis of all the comments a list of eleven factors was developed. This involved iterations of analysing interview notes, the recordings and transcriptions. It is inclusive of all the significant comments, but of a manageable number to be incorporated into the round 2 survey. These factors and supporting descriptions follow.

Culture
Organisational culture was not specifically mentioned by all the participants, but it was a theme in many of the comments made. Some of the comments and interpretations in support of this are: this is about ownership of decisions; collaboration between players as “you can’t know everything”; extensive, ongoing and effective mentoring and coaching to develop competency of the players; effective sponsorship by senior management, meaning the organisation needs to encourage sponsorship and the sponsors need to be competent; the organisation’s strategy needs to be clear as well as a linkage to the decision; a ‘no fear’ environment that is conducive to timely and considered decision making, utilising collaboration, tacit knowledge (one participant referred to the use of ‘sixth sense’ which is related to intuition and draws on tacit knowledge), process and governance with the knowledge that with the benefit of hindsight, wrong decisions can be made.

Process
Again, process was not necessarily mentioned by all participants but is an alternative to practices, approaches and frameworks. Comments and interpretations included: having a clear policy that is relevant to the situation; processes, procedures and protocols that provide sufficient consistency and rigour but are also flexible and adaptable to accommodate variable circumstances and competency of players; and having tools and techniques that can be utilised an understood, are appropriate to the situation, and can be adapted should the urgency, risk and maturity/ competency of the players demand it.

Knowledge of the business
The comments from the participants required a separation of knowledge and education, and a further break-down of knowledge into that of the business and the specific nature of the work in projects and programs. Knowledge of the business is seen as being about: corporate knowledge both in depth and years; knowledge of players in the business and who the influencers are; knowledge of the market, stakeholders, trends and the environment.
Knowledge of the work
This is seen as comprising: knowledge of technical components of the work and the deliverables; knowledge of the end product or asset, how it works, its strengths and shortcomings, and how to maintain it; knowledge of the various standards, processes or legislation that are a basis for the work, the creation of the outputs, or regulatory environment that frames the work and timing.

Education
This is seen as comprising: the level of education, skills, qualifications and professional certification of the decision makers and players that can influence the decisions. This is separate to the experience, maturity or competence of the players involved. Therefore, they are identified as separate factors.

Experience
All participants mentioned the importance of experience in analysis and decision making. This is seen as comprising: the years of experience and the experiences that players have had with the work or situation which is the basis for decision making, including the decision makers as well as stakeholders; the extent, breath and nature of this experience; the extent of coaching and mentoring previously received and the personality of the decision maker as this can influence the maturity, competence, tacit knowledge and therefore the decision making ability of the individual. This experience also enhances the awareness of potential risks and opportunities, appropriate responses and the need for collaboration or review.

Governance
This was stated or inferred by most participants and is about having: clear governance structures and roles and responsibilities; clear linkage between organisational strategy and decisions; effective sponsorship that ensures advocacy of candidate projects as well as compliance with governance processes; appropriate use of project or program management offices; and appropriate processes, procedures and practices that are conducive to timely and effective flow of crucial information.

Risk awareness
Risk was identified by the participants as a crucial component of any decision making. Risk appetite of the organisation and individuals has been incorporated into the ‘culture’ and ‘selection of players’ factors. Risk awareness is seen as a separate consideration and incorporates the awareness of potential organisational, reputation, financial, project and task risks by the board, senior management, program managers, stakeholders and all other players and decision makers. Effective decision making is based upon the knowledge of risks and their associated likelihood,
consequence, responses and opportunities. This awareness can be framed from some of the other factors, but can still be considered as a stand-alone factor in decision making.

**Selection of players**
People were seen as being at the centre of project portfolio management and decision making by all participants, irrespective of the efficacy of any process. This factor incorporates some of the intrinsic and individual capabilities that can impact the decision making by individuals and groups. It includes risk appetite (this is generally individual but can be framed by organisational factors); leadership capability; strategic perspective; effective communication with all players involved with the decision; management of relationships with players; being political and risk savvy; and identification and embracing of influencers.

**Preconceptions**
This was discussed with all participants and seen as comprising: bias, pre-determined solutions, and ‘sacred-cows’ which tend to discount or modify the information, facts or proposal presented in order to support a preferred or pre-ordained direction.

**Time pressures**
The participants saw that some contexts are more time critical than others but is often a driver in decision making. This factor comprises the timeframes imposed by agreement, decree, regulation or opportunity, all of which can control how much work can be done in preparation for decision. It can also be interpreted as urgency.

**4.3 Round 2 – Questionnaire**

**4.3.1 Overview of Round 2**
In this round the participants from Round 1 were asked to complete a questionnaire in which they were asked to rate the proposed factors and provide supporting comment. These responses were collated and analysed, and findings on the importance of these factors to project selection were derived.

**4.3.2 Round 2 research design**
This Round utilised a modified Delphi approach (see Chapter 3). The participants from Round 1 were asked to complete a questionnaire. This questionnaire (see Appendix A) was designed to obtain participant profile information (Table 4.1) as well as their ratings on the importance of each of the contributing factors identified in Round 1. A five point Likert scale was adopted with ratings as set out in Table 4.3.
Table 4.3 Five point Likert Scale Ratings

<table>
<thead>
<tr>
<th>Rating</th>
<th>Very Important</th>
<th>Quite Important</th>
<th>Undecided</th>
<th>Not Very Important</th>
<th>Not at all Important</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(5)</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
<td>(1)</td>
</tr>
</tbody>
</table>

Respondents were asked to provide which of the three sectors (public, government owned corporation (GOC), and private) was the basis of their rating. They were also asked to provide comment on the importance of these factors in other sectors. This was appropriate as most of the participants have experience in more than one sector.

4.3.2 Round 2 research analysis and findings

The mean rated importance and standard deviation for each of the factors across all industry sectors, are set out in Table 4.4, and in graphical form in Figure 4.2. The collated responses are included under Appendix B.

With the lowest mean being 3.33, these results indicate that all the factors are significant. While the range is not large, these results indicate that the most significant factors are culture, knowledge of the business, knowledge of the work, selection of players, and process. However, the means for experience and governance are only 0.11 lower. The least significant factors are preconceptions and time pressures. Interestingly, the standard deviations are lowest for the most important factors indicating a consistency in opinion, and verification of identified factors.

Table 4.4 Mean rated importance and standard deviation (all sectors)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean rating</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Process</td>
<td>4.33</td>
<td>0.47</td>
</tr>
<tr>
<td>Knowledge of the business</td>
<td>4.44</td>
<td>0.5</td>
</tr>
<tr>
<td>Knowledge of the work</td>
<td>4.38</td>
<td>0.48</td>
</tr>
<tr>
<td>Education</td>
<td>3.89</td>
<td>0.74</td>
</tr>
<tr>
<td>Experience</td>
<td>4.22</td>
<td>0.42</td>
</tr>
<tr>
<td>Risk awareness</td>
<td>3.89</td>
<td>0.74</td>
</tr>
<tr>
<td>Governance</td>
<td>4.22</td>
<td>0.92</td>
</tr>
<tr>
<td>Selection of players</td>
<td>4.44</td>
<td>0.68</td>
</tr>
<tr>
<td>Preconceptions</td>
<td>3.33</td>
<td>0.82</td>
</tr>
<tr>
<td>Time pressures</td>
<td>3.78</td>
<td>0.92</td>
</tr>
</tbody>
</table>
Table 4.5 breaks down the mean ratings into each sector (private, public and GOC), and Figure 4.2 represents the ratings graphically. As indicated by the standard deviations, there is strong consistency across the sectors for those factors with a mean importance rating of greater than 4 (culture, process, knowledge of the business, knowledge of the work, and experience) with the exception of governance and selection of players. Due to the small sample sizes for the public (2) and GOC (2) sectors (see Table 4.1) it is difficult to determine strong trends just from the analysis of the data. However, the small standard deviation for the more important factors (mean > 4), and the greater standard deviation for the four factors with an mean importance rating of less than 4, are consistent with the findings from the interviews with the participants as they discussed their experiences and observations across the sectors. Based upon these comments, it is not surprising that: experience is rated slightly higher than education and that the private sector puts a greater emphasis on education; risk awareness is rated higher in the public and GOC sectors due to propensity to be more risk averse in these sectors; governance is rated higher in the public sector due to the stronger emphasis on probity in response to public, political and media scrutiny; selection of the right players is rated higher in the public and GOC sectors because of the difficulty in managing the demanding, risk averse environment whilst managing multiple interfaces and stakeholders and milestones; preconception is a factor but less important at this level of decision making because they involve critical and strategic decision making that can have catastrophic consequences for organisations and individuals; and timing or urgency is a more important factor for the public and GOC sectors because the actions players are often driven by community and
political timing expectations (even if unrealistic), whereas the private sector is more driven by value which allows time to sometimes be varied.

### Table 4.5 Mean ratings for each sector

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean rating (All sectors)</th>
<th>Mean rating (Private)</th>
<th>Mean rating (Public)</th>
<th>Mean rating (GOC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Process</td>
<td>4.33</td>
<td>4.4</td>
<td>4.4</td>
<td>4.25</td>
</tr>
<tr>
<td>Knowledge of the business</td>
<td>4.44</td>
<td>4.4</td>
<td>4.6</td>
<td>4.25</td>
</tr>
<tr>
<td>Knowledge of the work</td>
<td>4.38</td>
<td>4.5</td>
<td>4.25</td>
<td>4.5</td>
</tr>
<tr>
<td>Education</td>
<td>3.89</td>
<td>4.2</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Experience</td>
<td>4.22</td>
<td>4.2</td>
<td>4.2</td>
<td>4.25</td>
</tr>
<tr>
<td>Risk awareness</td>
<td>3.89</td>
<td>3.6</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Governance</td>
<td>4.22</td>
<td>4</td>
<td>4.4</td>
<td>4</td>
</tr>
<tr>
<td>Selection of players</td>
<td>4.44</td>
<td>4</td>
<td>4.2</td>
<td>4.75</td>
</tr>
<tr>
<td>Preconceptions</td>
<td>3.33</td>
<td>3.2</td>
<td>3.6</td>
<td>3</td>
</tr>
<tr>
<td>Time pressures</td>
<td>3.78</td>
<td>3.2</td>
<td>3.4</td>
<td>4.25</td>
</tr>
</tbody>
</table>

The data was analysed further in order to discover any causation factors. This included analysis of the mean importance factors for experience (< 26 years and > 26 years), and by ranking of the factors for importance across the sectors. Table 4.6 provides the mean rated importance for the two experience groups of less than 26 years and greater than 26 years. This division was chosen as the mean experience of the participants is (26 – 30 years) with median of (21 – 25 years). This analysis is across all sectors. These results are represented graphically in Figure 4.3. While there are some small variances for the factors, the overall mean rating for the (< 26 years) group was 4.15 and for
the (>26 years) group, 4.20. The results were further investigated for any correlation between the experience groups and sector, and none was found. This indicates that there is no significance of experience to the findings. However, the participants are all experienced practitioners.

Table 4.6 Mean rated importance for experience

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean rating (&lt; 26 years)</th>
<th>Mean rating (&gt; 26 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Process</td>
<td>4.4</td>
<td>4.25</td>
</tr>
<tr>
<td>Knowledge of the business</td>
<td>4.6</td>
<td>4.25</td>
</tr>
<tr>
<td>Knowledge of the work</td>
<td>4.25</td>
<td>4.5</td>
</tr>
<tr>
<td>Education</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Experience</td>
<td>4.2</td>
<td>4.25</td>
</tr>
<tr>
<td>Risk awareness</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>Governance</td>
<td>4.4</td>
<td>4</td>
</tr>
<tr>
<td>Selection of players</td>
<td>4.2</td>
<td>4.75</td>
</tr>
<tr>
<td>Preconceptions</td>
<td>3.6</td>
<td>3</td>
</tr>
<tr>
<td>Time pressures</td>
<td>3.4</td>
<td>4.25</td>
</tr>
</tbody>
</table>

Figure 4.3 Mean rated importance for each experience group

The factors were ranked from 1 (most important) to 11 (least important) for each of the sectors and overall. Factors share a similar ranking when their rating is the same. These results are represented in Table 4.7 and graphically in Figure 4.4.
Table 4.7 Ranking of factors for all sectors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Ranking (All sectors)</th>
<th>Ranking (Private)</th>
<th>Ranking (Public)</th>
<th>Ranking (GOC)</th>
<th>Standard Deviation (o’ll rating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culture</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Process</td>
<td>5</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>0.47</td>
</tr>
<tr>
<td>Knowledge of the business</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Knowledge of the work</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>3</td>
<td>0.48</td>
</tr>
<tr>
<td>Education</td>
<td>8</td>
<td>5</td>
<td>11</td>
<td>8</td>
<td>0.74</td>
</tr>
<tr>
<td>Experience</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>0.42</td>
</tr>
<tr>
<td>Risk awareness</td>
<td>8</td>
<td>9</td>
<td>4</td>
<td>8</td>
<td>0.74</td>
</tr>
<tr>
<td>Governance</td>
<td>6</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>0.92</td>
</tr>
<tr>
<td>Selection of players</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0.68</td>
</tr>
<tr>
<td>Preconceptions</td>
<td>11</td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>0.82</td>
</tr>
<tr>
<td>Time pressures</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>3</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Figure 4.4 Ranking of factors for all sectors

Due to the range of mean ratings being relatively small (from 3.33 to 5) and several factors sharing ratings, the ranking can be distorted. Taking this into account, for the more important factors (low ranking), the range of rankings is relatively small and consistent with the overall standard deviations for each factor (from Table 4.4 but included in Table 4.7). Further, for the less important factors (higher ranking) which have generally a higher standard deviation the range of rankings is also greater. This particularly relates the education, governance, risk awareness, selection of players, preconceptions and timing factors. These findings are consistent with the earlier discussion on the values in Table 4.5.
Based upon the responses to Question 7 in the questionnaire, seven of the nine participants indicated that they believed that there is a difference in the ratings for other industry sectors. This further supports the finding that there are differences between the industry sectors in the relative importance of the factors, but due to the small sample size, no quantified conclusion can be made.

4.4 Chapter summary

Interviews were designed and undertaken to study ‘best practice’ in project portfolio selection. The finding was that there is no single recognised best practice, as it needs to match the culture of the organisation, its environment, the context of the projects, programs and its players. These findings are discussed further in Chapter 5 with respect to an expanded literature review.

Thematic analysis of the interviews identified eleven factors that were considered to contribute to both project portfolio, and critical or strategic decision making. The factors were: organisational culture; process; knowledge of the business; knowledge of the work; education, experience; governance; risk awareness; selection of players; preconceptions; and time pressures.

Round 2 comprised the analysis of data from questionnaires completed by each of the participants who were involved in Round 1. The questionnaire (see Appendix 1) was developed around the eleven factors identified in Round 1 and utilised a five point Likert scale. The key findings were that all eleven factors identified in Round 1 are significant with the lowest mean importance rating (across all sectors) being 3.33; the most important factor is culture; there are some differences across the sectors and it appears to be stronger in the lesser important factors (explanation for these is included in this Chapter), but due to the sample size no conclusion can be drawn; and there is consistency across all experience groups. These findings are discussed further in Chapter 5.
Chapter 5 Discussion

5.1 Introduction
This chapter builds on the findings in Chapter 4, incorporating substantial additional commentary from the survey participants, and the literature review (Chapter 2), to provide detail discussion on the research questions, listed below.

RQ1 – Do leading practitioners have a view on what represents best practice?

RQ2 – Is there a difference between their current practice and what they regard as best practice?

RQ3 – How does this view compare with what is generally regarded as best practice?

RQ4 – Are there common contributors to the achievement of optimal project portfolio selection?

Section 5.2 focusses on best practice in project portfolio selection, reinforcing the findings and literature review, and providing additional comments from the survey participants to examine the first three research questions (RQ 1 – 3).

Section 5.3 focusses on the contributing factors in project portfolio selection, again building on the findings (Chapter 4), the literature review in Chapter 2 and extends literature review to support discussion on organisational culture, and the relationship of project portfolio selection to strategic decision making. This section also provides relevant additional comments from the survey participants to examine the fourth research question (RQ 4).

Section 5.4 consolidates the discussion in the previous section due to the interrelationship between these factors. This section, in combination with Section 5.2, provides a sound basis for the research conclusions in Chapter 6.

5.2 Best practice in project portfolio selection
The interviews with the research participants drew extensive and detail comments on what they regard as best practice in project portfolio selection. An extract of the transcribed comments are included under Appendix C as they are too voluminous to include in this section.

The Round 1 findings in Chapter 4 (Section 4.2.2) align with the Chapter 2 literature review on project selection criteria (2.2) and tools and techniques (2.3), whereby there is a broad spectrum of criteria (consideration of need and strategy, and not just financial); some of form of multi-criteria analysis covering qualitative and quantitative criteria; the use of financial tools and techniques such as cost benefit analysis and discounted cash flow; a collaborative approach; an understanding
of the risk; respect for time constraints; effective sponsorship; and the involvement of competent players. Generally, they do not see that there is one best practice but rather a range of practices that can be utilised and adapted appropriate to the context and the organisation. Two exceptions were two participants (economist backgrounds) who have developed and guided the use of project portfolio selection for large scale public sector projects. They made reference to the Australian Transport Council Guidelines and the Queensland Government Project Assurance Framework as representing possible best practice. However, their comments on the application of these practices, particularly in the public sector, supports the broader view that there is no one best practice.

This is consistent with the findings of DeMaio et al (1994, 184) on project selection methods: “there is no optimal method: techniques must be evaluated and chosen according to the specific application; moreover, these methods should not be considered mutually exclusive but rather as complimentary techniques”.

The participants generally considered that the practices they followed were appropriate to the organisations, the organisational and individual maturity, and the context of the candidate projects and programs. However, they acknowledged that there are other practices, tools and techniques that could be used, and that these may be considered in the future or in different contexts. Therefore, there is a difference between current and what could be regarded as best practice.

An example of a consistent finding was a pilot study where the use of a selection model in Small to Medium- sized Enterprises (SME) indicated that organisations of this size saw some benefit from using a consistent approach but would be unlikely to use it consistently because of the model complexity and cost to use it (Lawson, Longhurst et al. 2006).

The literature review has indicated that there is no one best practice, and this is consistent with the findings in Chapter 4. Some may regard international banking and national government practices as representing best practice. While there are some similar features in these practices none are regarded greater than others, except by the users who are familiar and comfortable with the individual practices and find they meet their needs. Some may regard the PMI Portfolio Standard as representing best practice. However, the Third edition of this (Project Management Institute 2013), does not use the term ‘best practice’. Section 1.1 of the document states: “…Third Edition identifies portfolio management processes generally recognised as good practices. “Generally recognised” means that the knowledge and practices described are applicable to most portfolios most of the time, and that there is widespread consensus about their value and usefulness. “Good practice” means there is general agreement that the application of the skills, tools, and techniques
can enhance the changes of success over a wide range of portfolios. Good practice does not mean the knowledge described should always be applied uniformly to all portfolios; the organisation and portfolio manager are responsible for determining what is appropriate for any given portfolio.”

The view of the participants as to what is best practice is framed by their knowledge and experiences, as well as the practices of the organisations they have worked in. Only two of the participants have had exposure to what some may regard as ‘best’ or ‘good’ practice and there view of what is best practice aligned with such practices and frameworks. However, the other seven participants had a view of best practice that is less sophisticated and less inclusive (in range of criteria and methods) than the other two. Therefore, with some exceptions, there appears to be a gap between current and best practice.

Knowing the existence of practices and how they work may be one thing, but the literature review and findings indicate that the effective application of these practices is another. Many factors have been identified that affect the application of these practices and these are discussed in Section 5.3.

5.3 Contributing factors
In Chapter 4, eleven contributing factors were identified and through interpretation of the responses from a questionnaire based second round survey, all were found to be significant. In this section, each of the factors is discussed in relation to literature review and comments made by the nine participants in the research.

The literature review in Chapter 2 investigated the factors associated with the organisational context and decision making including the human factors in decision making. The literature review, as well as the thematic and quantitative findings in Chapter 4, identified the importance of organisational culture and that project portfolio selection could be associated with strategic decision making. This literature review has been extended in this section to further investigate factors associated with strategic decision making.

The discussion on the contributing factors is arranged into five groupings: (1) organisational culture; (2) players (decision makers), leadership, and tacit versus explicit knowledge; (3) risk awareness; (4) governance; and (5) timing and information overload.

The contributing factors were analysed in relation to the three industry sectors represented by the participants namely, private, public and government owned corporations (see Chapter 4). Seven of the nine participants believed that there is a difference in the ratings for other sectors. The analysis
of the ratings indicated that for most of the factors, particularly for the more important ones, there was very little difference between the sectors. However, the sample size was very small.

5.3.1 Organisation culture

Culture was rated as the most important factor and attracted the most comments from the survey participants. These comments included: it drives how all the other factors are approached/implemented; ownership and sponsorship by senior management aligned to clear strategy is the most important factor in decision making; selection & prioritisation can only be made with business outcomes in mind; a strong culture can off-set some weakness in other areas. The other factors support the culture of “getting it right”. Without the culture, the other factors diminish in importance; having a relaxed and content workforce is critical; without good culture businesses cannot perform at their peak efficiency. Other factors can be controlled quickly but destroyed culture takes many years to repair; a “no fear” environment is a key; a good culture supports a sound risk appetite; collaboration is a key – accept you can’t know everything; good to be parochial to look after customers but need to also consider the greater good, and; if the ‘need’ is not defined and necessary resources are not committed for the entirety, benefits will not be realised.

Organisation culture can be defined as what is typical of the organisation, the habits, the prevailing attitudes, and the patterns of accepted and expected behaviour (Al-Yahya 2008). Four major elements of organisational culture have been identified as being: teamwork; climate-morale; involvement; and management-supervision (Glaser, Zamanou et al. 1987). A more simplistic definition of organisation culture is that: “it tells us how the organisation appears or feels to those on the inside…the culture tells us what is important to teach new members, so that they too act in the ‘right way’; that is, the way of the specific organisation” (Katopol 2007).

An article by Hadfield (2006) reported that based on a survey by the Chartered Management Institute of 2,820 managers, “effective decision making by IT managers is being hampered by their employers’ organisational culture (Hadfield 2006).

The need for the right culture to support problem-solving and decision making has also been highlighted by Brooks (1994) wherein it was recognised that: “managerial problem-solving and decision making processes are driven by non-rational cultural forces”. Based upon this study into an agency he recommended an alternative or ‘model’ culture as depicted in Table 5.1. Some observations were made: managers, particularly senior personnel, might be advised to pay attention to the role that their organisation culture plays in problem solving and decision making;
Contributing factors to optimal project portfolio selection

and; by adopting a cultural perspective we can see that problem solving and decision making are intensely ‘human’ activities which reaffirm that non-rational influences are ubiquitous.

<table>
<thead>
<tr>
<th>Actual state</th>
<th>Alternative state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid facing others with issues</td>
<td>Appropriate confrontation</td>
</tr>
<tr>
<td>Directed staff</td>
<td>Self-motivated staff</td>
</tr>
<tr>
<td>Investigating errors and apportioning blame</td>
<td>Investigating success and apportioning praise</td>
</tr>
<tr>
<td>Compartmentalise problems, segmentalism</td>
<td>See problems as integrated wholes</td>
</tr>
<tr>
<td>Reluctance to grasp ownership</td>
<td>Identification with change</td>
</tr>
<tr>
<td>Subservient to external forces</td>
<td>Assertiveness</td>
</tr>
<tr>
<td>Discourage risk taking: encourage caution</td>
<td>Willingness to take risks; enterprising</td>
</tr>
<tr>
<td>Exercise deliberation; reasons for saying “no”</td>
<td>Positive; reasons for giving approval</td>
</tr>
<tr>
<td>Inward looking</td>
<td>Look within and outside for scope for change</td>
</tr>
</tbody>
</table>

The work by Human Synergistics (McCarthy 2011) investigated the ideal and actual state of organisations in Australia and New Zealand using their Organisational Culture Inventory® OCI. The OCI measures twelve styles around three general types: constructive styles (achievement, self-actualising, humanistic-encouraging, and affiliative); passive / defensive styles (approval, conventional, dependent, and avoidance); and aggressive / defensive styles (oppositional, power, competitive, and perfectionist). The preferred culture was assessed based on a sample size of 24,584 with the ‘constructive’ cluster being the strongest. There was a moderate amount of ‘oppositional’, indicating behavioural expectations associated with questioning, pointing out flaws and looking for mistakes. The features of a constructive culture are described in Table 5.2.

<table>
<thead>
<tr>
<th>Style</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achievement</td>
<td>Members should be encouraged to establish challenging but realistic goals, develop plans to reach goals and pursue them working with enthusiasm. They are expected to pursue a standard of excellence. Work for a sense of accomplishment.</td>
</tr>
<tr>
<td>Self-actualising</td>
<td>Members should be encouraged to maintain their personal integrity, enjoy their work, think in unique and independent ways, and take on new and interesting activities.</td>
</tr>
<tr>
<td>Humanistic-encouraging</td>
<td>Members should be encouraged to be supportive, to resolve conflicts constructively, and be open to influence their dealings with one another.</td>
</tr>
<tr>
<td>Affiliative</td>
<td>Members should be expected to deal with others in a friendly, pleasant way and be sensitive to the satisfaction of their workgroup.</td>
</tr>
</tbody>
</table>
These features are consistent with the ‘model’ state in Table 5.1. However, based on a sample size of 410,894 the actual operating culture was found to be strongest in styles within the aggressive/defensive and passive/defensive clusters. The features of these styles are described in Table 5.3.

Table 5.3 – Features of styles in ‘aggressive/defensive’ and ‘passive/defensive’ cultures (McCarthy, 2011)

<table>
<thead>
<tr>
<th>Style</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aggressive/Defensive</strong></td>
<td>Members are encouraged to gain status and influence by being critical, opposing the ideas of others and making safe decisions.</td>
</tr>
<tr>
<td>Oppositional</td>
<td>Members are expected to operate in a win-lose framework and believe they must work against (rather than with) their peers to be noticed.</td>
</tr>
<tr>
<td>Competitive</td>
<td>Members are expected to avoid all mistakes, keep track of everything and work long hours to attain narrowly-defined objectives.</td>
</tr>
<tr>
<td>Perfectionist</td>
<td>Members are expected to conform, follow the rules and make a good impression.</td>
</tr>
<tr>
<td><strong>Passive/Defensive</strong></td>
<td>Members are expected to shift responsibilities to others and avoid any possibility of being blamed for problems or errors.</td>
</tr>
<tr>
<td>Conventional</td>
<td>Members are expected to shift responsibilities to others and avoid any possibility of being blamed for problems or errors.</td>
</tr>
</tbody>
</table>

The conclusion of this study is that cultures in Australia and New Zealand are much more ‘passive/defensive’ and ‘aggressive/defensive’ than constructive (McCarthy 2011). This has a significant impact on the ability of an organisation to effectively apply appropriate and good project portfolio selection practices. The Portfolio Management Standard (Project Management Institute 2013) refers to the need for ‘organisational maturity’ to accommodate effective portfolio management. It suggests that: “the organisation as a whole should understand the organisation’s need for portfolio management and commit its leadership, resources (capital, people and equipment), processes, and tools to make it successful. It is important that the philosophy of portfolio management permeates the entire organisation”.

The organisation culture will also determine the extent of participation in decision making. This in turn has an impact on the efficacy of decisions. Organisations that centralise authority and decision making and invest heavily into process or rule based rational decision making, not only disenfranchise their personnel but also limits the ability of the organisation to respond creatively to strategic issues at hand (Al-Yahya 2008), (Ashmos, Duchon et al. 1998). This strategic based decision making requires a combination of the rational analysis based on explicit knowledge (techniques and tools as well as corporate knowledge), and the experienced based intuition (tacit knowledge) of decision makers. The organisational culture is crucial to how this knowledge is extracted and utilised to achieve timely and effective decisions. Otherwise, analysis-paralysis, poor
decision making, repeated mistakes, miscommunication, and low morale can ensue (Brockmann and Anthony 2002), (Hodgkinson and Starbuck 2008).

Hodgkinson and Starbuck (2008) suggest that: “people need a technology of foolishness to supplement the technology of rationality. Sensible foolishness (or playfulness) enables people to experiment and discover but it requires a loosening of the requirement to behave consistently”. The rational theory assumes that every decision maker: knows all the alternatives; knows all the consequences of every action; has a consistent preference ordering for alternative courses of action; and uses decision rules that can select a single action to take (March 1997). This may be true for less critical, micro-decisions that happen frequently, but not so for major strategic decisions, such as project portfolio selection, which occur less frequently. The environment within which the latter decisions are made is time and resource constrained (limits the amount of data and analysis), iterative and complex, punctuated by digressions, and warped by biases and misperceptions (Mintzberg, Raisinghani et al. 1976).

The comments on culture from the survey participants align with the literature review which highlighted the importance of organisational culture in: (1) achieving effective sponsorship; (2) inviting participation in decision making; (3) a collaborative approach to learning and socialisation of this knowledge; (4) providing an environment that is conducive to the integrated utilisation of explicit knowledge (rational approaches using data and analysis) and intuition which draws on tacit knowledge; (5) the development and implementation of appropriate practices, rules and techniques which are contextually adaptable; (6) the selection of players with appropriate experience and leadership capability; and (7) appropriate pacing of decision making.

However, most organisations do not have an organisational culture that matches the ideal situation, as measured using the OCI (McCarthy 2011). Therefore, organisations wishing to improve their performance in project portfolio selection and strategic decision making, are not only developing their systems and practices, and their people, but also undertaking the much more difficult organisational development.

5.3.2 Players, leadership and tacit versus explicit knowledge
Comments from survey participants in relation to process included: results in robust evidenced based decision making; inadequate problem definition, and; if the need is not defined, benefits will not be realised.

From the discussion in Section 5.2, it is evident that there is a gap between current and what could be regarded as ‘best’ or ‘good’ practice. Consistent with the above statements by participants,
having appropriate and adaptable practices are important to achieving the business benefits that come from effective project portfolio selection.

These practices are a reflection of the explicit knowledge that the organisation holds and will manifest itself in the extent of data gathering and analysis that will be undertaken. Unless balanced with intuition from the executives and decision makers: (1) the ‘need’ or problem may not be adequately defined; (2) too many or invalid options may be considered, leading to analysis paralysis; (3) the process will not be well paced, and; (4) the important considerations may be missed. This can result in opportunities being lost or sub-optimal decisions. The term explicit knowledge can be extended to the use of rational, deliberate or micro decision making terminology, and the term intuitive can be extended to the use of judgement (Simonson 2007).

The survey participants rated **selection of players** as one of the more important factors to ensure a quality process in project selection. Their comments related to this factor included: *people deal with people and they make decisions, and; it comes down to the people. It is people who shape and influence the culture of an organisation; support any processes in place; collaborate with others to develop organisational knowledge; utilise collective intuition; provide effective sponsorship; stimulate conflict and use it appropriately; possess the tacit knowledge desired by the organisation; develop and analyse data; drive a decision making process at an appropriate pace, and; ultimately make the decisions. Consequently, it is crucial for optimal decision making that an organisation selects players, executives and decision makers who are sufficiently qualified, have the desired experience, and have the intuition and personal qualities for leadership and collaboration.*

Steptoe-Warren et al (2011) have suggested that: “managerial cognition, corporate value as well as individual values and beliefs can have an influence on the strategic decision making choices”. This ‘managerial cognition’ refers to: “the capacity and inclination to attend to analytical detail and to cut through that detail by the use of intuitive processing strategies” (Steptoe-Warren, Howat et al. 2011). This suggests that players in the project portfolio and strategic decision making environment (generally senior managers) need to be carefully selected and that they need to apply intuition to their decision making.

Brockman et al (2002) has provided a working definition of tacit knowledge as: “the work-related practical know-how that is acquired through direct experience and instrumental in achieving goals important to the holder”. This tacit knowledge is used to fill in gaps of missing information, make sense of the complex and the abstract, distill numerous alternatives, and provide structure (Brockmann and Anthony 2002). It is very different to explicit knowledge which is in our active
consciousness, is well known, available to those who need it, and generally in the form of documents, processes, tools and techniques. The analytical approaches and rational decision making is based on this explicit knowledge. Tacit knowledge sits deeper in our minds and cannot be easily accessed. Faster and higher quality decisions are made when managers rely on their intuition. Intuition is the means by which we tap into our tacit knowledge and we rarely recognise when we are using it (Brockmann and Anthony 2002).

Applying both intuition and rational or analytical input to decision making to the complex and iterative strategic and project portfolio environment described earlier utilises the ‘dual-process’ theories (Hodgkinson and Starbuck 2008) wherein two modes of processing are necessary for many tasks: both automatic processing that is beyond conscious control and conscious control. The former, automatic mode, which draws on tacit knowledge, enables people to cut through vast quantities of information rapidly, while the latter, conscious mode entails more analysis (draws on explicit knowledge). This is consistent with the findings of Brockman et al. (2002) that tacit knowledge is: “beneficial in the early stages when identifying alternatives as well as aiding the in the acceleration of the whole process. Ultimately, through the use of a combination of tools incorporating the analysis referred to rational with tacit knowledge, decision making can become more potent and lead to more effective implementation and better firm performance”.

Collective intuition (Eisenhart 1999) and collective problem solving (Brooks 1994) can be used to support better decision making. Collective intuition is gained from frequent high intensity interaction with other executives in meetings. From extensive, real-time information, these executives build a collective intuition that allows them to move quickly and accurately as opportunities arise, rather than waiting for analysis of data after the opportunity has gone. Eisenhart (1999) suggests that: “when intense interaction focusses on the operating metrics of today’s businesses, a deep intuition, or ‘gut feeling’ is created, giving managers a superior grasp of changing competitive dynamics”; and when relating this to research on champion chess players: “these players develop their so-called intuition through experience. Through frequent play, they gain the ability to recognise and process information in patterns or blocks that form the basis of intuition. This patterned processing (what we term ‘intuition’) is faster and more accurate than processing single pieces of information…many effective decision makers were described by their colleagues as having “an instinctive feel”, a “high quality of understanding”, and “an intuitive sense of the business”. This intuition gives managers a head start in recognising and understanding strategic issues”. Similarly, it is suggested that problem solving and decision making are intensely ‘human’ activities, and our cultures tend to put the onus on individual managers to resolve these
matters. However, in our complex and dynamic cultural and political network, collective problem solving and decision making processes can prevail in practice (Brooks 1994). This is similar to ‘participation’ discussed with respect to organisational culture earlier in 5.3.1.

Eisenhart (1999) also suggests the stimulation of quick conflict rather than avoiding it. Conflict stimulates innovative thinking, creates a fuller understanding of options, and improves decision effectiveness. Aggressive, destructive conflict needs to be avoided but without it, opportunities to question assumptions are missed and key elements of the decision may be overlooked. “Effective strategic decision makers in rapidly changing markets not only tolerate conflict, they accelerate it” (Eisenhart 1999).

Intuition and tacit knowledge can be gained through one’s experiences, through conflict, and through socialisation of knowledge. The concepts of a collaborative culture and the need for competent leaders (Anantatmula 2008), collaborative learning (Ali, Pacoe et al. 2002), socialisation of knowledge (Brockmann and Anthony 2002), and collective intuition (Eisenhart 1999) all recognise the importance of interaction between people to provide the participatory environment where this knowledge can be developed and stored. A similar environment is required to later utilise this knowledge and then share or socialise the knowledge to support superior strategic decision making.

There were no specific comments from the survey participants in relation to knowledge of the business. While this is regarded as an important factor, based on its mean importance rating of 4.4, it is difficult to separate it from consideration of explicit and tacit knowledge that supports the culture and the experience of the players.

Again, there were no specific comments from the survey participants on the knowledge of the work factor. This specific and technical knowledge and could be associated predominantly with explicit knowledge, and provides crucial input into the decision making process. One of the related comments from a participant was: “it is not an exact science – it is an art, to which science has been applied”. This point highlights that this knowledge has to be balanced with tacit knowledge, and can be associated with experience, which develops our intuition and tacit knowledge, and; education, through which we gain explicit knowledge and the ability to critically analyse.

The education factor achieved a mean importance rating of 3.9, which, although significant, was one of the lower ratings. A comment from one of the survey participants, relating to this factor was: “insufficient training and skills of people involved in decision making”. The context of this
statement was the competent application of a rigorous project selection framework, where people involved in the process did not understand it, its purpose, nor had the experience to draw on to add value to the process. Consequently, it is difficult to separate this factor from experience, and the selection of players.

**Experience** was rated as one of the more important factors. Related comments from the survey participants included: “young ones have technical knowledge but lack common sense and leads to promotion to incompetence”. The context of this comment was an organisation that has lost some very experienced key personnel through voluntary redundancy, and have been replaced by equally academically qualified but less experienced people. The mean experience of the participants was (26-30 years) which means that they have witnessed the performance of many people in workplaces, and well developed intuition and tacit knowledge.

This comment, along with the context of the experience of the participants, relates to the research that highlights the importance of experience in development of tacit knowledge that is drawn on when using judgement. Anecdotal evidence also indicates that the less experienced decision makers are more likely to embrace frameworks and processes to support their decision making, whereas the more experienced decision makers are more likely to embrace fast paced, collaborative decision making balanced with analysis. The latter utilises collective intuition and is more likely to result in the realisation of opportunities and optimal decision making.

### 5.3.3 Risk awareness

The comparative risk profile of candidate projects, and the risks they place on the organisation (financial and reputation) are important considerations in project portfolio decision making (Jafarizadeh and Khorshid-Doust 2008). Some of the risks can be quantified in terms of the probability of occurrence as well as financial consequence of a risk event. Therefore, risk can be represented in both qualitative and quantitative criteria when using a multi-criteria assessment method. Chapter 2 also highlighted the importance of human factors in decision making with psychological anomalies such as risk aversion, probabilities and anchoring (Reeson and Dunstall 2009), and the use of judgement (McMorland 2005).

Related comments from the research participants included: *the project must be prudent and efficient, required by the community and be valued, and; pre-supposing a good awareness across all areas, I believe risk awareness is most important in effective project selection. In its broadest sense, portfolio optimisation mitigates risk to an ideally acceptable level.*
The consideration of risk is important in the evaluation and selection of projects in terms of the risk level of each candidate project. However, strategic level decision making and effective project portfolio selection requires an awareness of the organisation or corporate level risks, and the relationship to strategic objectives. This approach is consistent with current Risk Management Standard (Standards Australia 2009), which emphasises an enterprise wide approach to risk and opportunity management. Therefore, the awareness and application of enterprise wide approaches to risk management is crucial to the identification and realisation of business opportunities and benefits. Consequently, the factor of risk awareness has an interrelationship with organisational culture, organisational explicit knowledge, and the experience and capability of executives to draw efficiently on their tacit knowledge.

5.3.4 Governance
A related comment from one of the survey participants in relation to governance was:
“governance drives accountability and process, and supports a collective approach to achieving best outcomes”.

There is a strong overlap between this factor and: (1) organisational culture, which provides effective sponsorship and supports appropriate practices and processes; (2) process, which ensures that all candidate projects meet a need, match corporate strategy, and there is sufficient rigour in evaluation and prioritisation; and (3) the selection of players who are competent in the use of the framework, and have the experience to apply judgement and intuition.

‘Preconceptions’ was rated as the least important factor, but is still a valid contributor to project portfolio selection. A related comment from one of the participants was that: “preconceptions are dangerous”. Preconceptions manifest themselves in ‘sacred cow’ projects where the process is manipulated to justify a pre-ordained solution. Preconceptions are associated with bias, and in Chapter 2 the biases of: (1) outcome bias; and (2) hindsight bias were outlined (Heard 2005).

Preconceptions has been grouped with governance because preconception and bias can present themselves when there is insufficient governance in place, both in process and rigorous enforcement of it; there is insufficient availability of experienced people; or the culture of the organisation is not supportive of participation or collaboration.

5.3.5 Timing and information overload
‘Time pressures’ was rated as the second least important factor. Related comments from survey participants included: rapid early cost benefit analysis can result in reluctance to go back and
reconsider something, and; time is always a factor. This importance of this factor had the greatest difference across the industry sectors, a reflection of the different drivers for these sectors.

Considering that every strategic level decision is unique, and that each requires its own analytical approach and each unfolds in its own way, decision makers often seek to make the decision as quickly as possible. Eisenhart (1999) suggests that decision makers avoid this dilemma by focussing on maintaining decision pace, not pushing decision speed. They launch the decision making process promptly, keep up the energy surrounding the process, and cut off debate at the appropriate moment. “They drive decision making momentum”.

The right information makes for informed decisions but decisiveness makes for timely actions. A decision maker can have information but without the determination to execute the decision, analysis-paralysis can result and it may come too late. At the same time, if important information is ignored in the desire to make a decision, a poor outcome can result (Useem 2004). Consistent with this concept of timely decision making, a study involving the U.S. Marine Corps (Freedman 2000) found that it warns its officers that bureaucratic and autocratic leadership styles get in the way of swift action, and it trains its officers to do the following: (1) seek a “70 percent” solution rather than one with 100 percent certainty or consensus; (2) distribute decision making authority among subordinates; (5) tolerate mistakes and even encourage them if learning from errors will result in better decisions next time; and (6) view indecisiveness as a fatal flaw, one that is even worse that making a mediocre decision because a suboptimal action, if swiftly executed, stands a chance of success, whereas no action stands no chance. Useem (2004) suggests that company environments are less forgiving and the stakes are less consequential, but these principles are can apply to organisations where timely decision making is required. However, appropriate leadership and organisational culture is required to accommodate them.

Hodgkinson et al. (2008) suggests that due to large amounts of information and distractions, decision makers can suffer from information overload. One effect of this is that it changes how people infer what they need to interpret, which tells them what they need to decide. That is, interpretation dominates deciding (Hodgkinson and Starbuck 2008). Katopol (2007) suggests that: “a complex, time driven environment with frequently changing priorities often requires that the information needed for the decision making be “just enough” to inform the decision”. The primary reason shaping the preference for “just enough” information – getting the minimum amount of information necessary to complete a task – is organisation culture (Katopol 2007).
There can be applied urgency and time constraints applied to decision making. How this impacts on the decision making process depends upon: the importance and consequence of the decision (routine or strategic); the drivers (regulatory, contracted, political, or inferred); the organisation culture (supportive or ‘blame’), and; access to organisational knowledge and experienced players. Sometimes the time frame can be an artificial construct and generates speed rather than pace (Eisenhart 1999), resulting in sub-optimal decision making. Applying ‘pace’ requires the right organisational culture, courage by the decision makers, the right players who can influence the process to be more focussed on the drivers.

5.4 Overview of contributing factors
The discussion in Section 5.3 has highlighted that even though all eleven factors are significant, there is a strong interrelationship between them. These interrelationships are mapped in Figure 5.1.

Contributors to project portfolio selection such as: the development and use of processes and frameworks; the application of governance practices; the provision of effective sponsorship; the development and socialisation of organisational knowledge; the selection of people with the experience, education and behaviours; support and development of these players; the support for participation and collaboration; and appropriate pacing are all dependent upon the culture of the organisation.

Figure 5.1 Contributing factors mapping
Similarly, leadership by senior management, executives and key decision makers is needed to provide the environment within which people are encouraged, and not afraid, to: participate in decision making processes; enter into positive ‘quick’ conflict; utilise their intuition to draw on tacit knowledge; collaborate and socialise knowledge; effectively communicate; apply pace rather than react to urgency with speed. Effective leadership will also support: selection of the right players who possess the desired knowledge, experience and people skills; an increased awareness of project, program and organisational level risks and appropriate application of risk and opportunity management techniques; the appropriate use of processes and frameworks for project portfolio selection; the appropriate application of governance; and enhance the performance and happiness of people.

From the strong interrelationship between these factors and the underlying determinants of the organisation and people in the adoption and application of any project portfolio selection framework, and the effective utilisation of both rational analysis (explicit knowledge of the organisational and individual) and intuition (individual tacit knowledge) in this level of decision making, the eleven contributing factors can be consolidated into two underlying driving factors of: (1) organisational culture; and (2) leadership.

The identification of these two underlying drivers is consistent with the findings of Human Synergistics International Ltd in their work on organisations, where their conclusion is that leadership drives culture, culture drives leadership, and they both drive performance (McCarthy 2011). This is represented in Figure 5.2

![Figure 5.2 The culture leadership loop (adapted from McCarthy, 2011)](image)

The discussion in Section 5.3 has also highlighted the strong connection between project portfolio selection and strategic decision making. The identified contributing factors are appropriate to this level of decision making where there is more ambiguity and equivocality (Zack 2007). However, more routine decision making, consistent with the literature review in Chapter 2, does not have the same amount of rigour and comparatively lessor consequences for the organisation. This type of decision making is more likely to be influenced by the factors associated with behavioural
economics such as: risk aversion – most people are risk averse to some extent; loss aversion – people tend to give potential losses greater weight than potential gains; mental accounting - people put money into different ‘accounts’ and are reluctant to move money between them; hyperbolic discounting – in economic models future benefits are discounted at a constant rate, but human decision makers apply a much higher rate in the short term than long term; and anchoring – people will focus on an initial piece of information, even if it is uninformative (Reeson and Dunstall 2009).
Chapter 6 Conclusions

6.1 Conclusions on research
The aims of the research project were to: (1) study the gap between current practice and best practice in relation to the selection, analysis, prioritisation and balancing of project portfolios; and (2) identify the common contributors to the application of appropriate project selection practices and decision making, by managers and organisations, in order to achieve optimal project portfolio selection.

Conclusion 1
It has been concluded that there is no single recognised best practice in project portfolio selection, as it needs to match the culture of the organisation, its environment, the context of the projects, the programs and its players. However, there is a gap between the current practice of practitioners and organisations, and what would be regarded as appropriate good practice for the organisation.

Conclusion 2
Eleven contributing factors to optimal project portfolio selection were identified and found to be significant: (1) culture; (2) process; (3) knowledge of the business; (4) knowledge of the work; (5) education; (6) experience; (7) governance; (8) risk awareness; (9) selection of players; (10) preconceptions; and (11) time pressures. These factors are significant for all three studied industry sectors of private, public and government owned corporations.

These factors can be consolidated into two underlying driving factors of: (1) organisational culture; and (2) leadership.

Conclusion 3
There is difference in the relative importance of these factors for the three industry sectors (private, public and government owned corporations). Based upon the survey, this was less significant for the more important factors of culture, selection of players, knowledge of the work, knowledge of the business, process and experience but the reliability of this part of the conclusion is limited by the small sample.

Conclusion 4
There are different contributing factors for routine (minor) decision making, and strategic level decision making which is associated with project portfolio selection. There is a strong connection between project portfolio selection and the strategic level of decision making, and therefore the associated contributing factors to optimal decision making. These factors do not apply to more routine decision making where the frequency is greater but the consequences much less.
6.2 Limitations of research
The most significant limitation of this research project was the number of available expert participants. This does not affect the reliability of Conclusions 1 and 2, as the adopted modified Delphi approach was sound. However, a larger sample size would permit extension of Conclusions 3 and 4.

This research has been limited to investment type projects.

6.3 Future research
Opportunities for further research include: (1) extended research into the relative of importance of the contributing factors for each industry sector, utilising a larger sample size; (2) study into the differences between strategic and routine decision making; and (3) study into the contributing factors for bidding and other types of strategic level decision making involving selection of options.
References


Reeson, A. and S. Dunstall (2009). Behavioural economics and complex decision-making, CSIRO.


Appendices
Appendix A – Stage 2 Questionnaire

Question 1
How many years of professional experience do you have? (Please select one)

6 – 10 years 1  11 - 15 years 2
16 – 20 years 3  21 - 25 years 4
26 – 30 years 5  31 - 35 years 6
36 – 40 years 7  Greater than 40 years 8

Question 2
What is the current industry sector you primarily work in? (Please select one)

Private 1  Public 2  Govt. Owned Corporation (GOC) 3

Question 3
In which industry sector have you had most of your professional experience (worked in, or consulted to)? (Please select one)

Private 1  Public 2  Govt. Owned Corporation (GOC) 3

Question 4
From the interviews with you and other participants in this research, a list of factors that may be important to the effective selection of projects, the prioritisation of projects, and other critical project decision making, has been developed. These are described below.

Culture - ownership, collaboration, mentoring / coaching, sponsorship by senior management, clear strategy, ‘no fear’ environment

Process – clear policy, process, procedure, protocols, tools and techniques

Knowledge of the business – and the market

Knowledge of the work – or asset (technical, process, standard or legislation)

Education – training, skills, qualifications and professional recognition.

Experience – of the players with the work, the stakeholders or customers, risk and opportunity

Governance – use of a program management office, clear linkage to strategy, communication of information
**Risk awareness** – *by the board, senior management, program managers, project managers and task managers*

**Selection of players** – *risk appetite, leadership capability, strategic perspective, effective communication, relationship management*

**Preconceptions** – *bias, pre-determined solutions, ‘sacred-cows’*

**Time pressures** – *imposed timeframes*

Based on your experience, how would you rate each of the following factors in terms of importance?

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rating (Please select one for each factor)</th>
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<td>Process</td>
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<td>Knowledge of the business</td>
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<td>Knowledge of the work</td>
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<td>Preconceptions</td>
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<td>Time pressures</td>
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**Question 5**

Were your above ratings of importance based primarily on only one specific industry sector (Private, Public or GOC)?

Yes 0  No 1
Question 6
If yes, which sector were your ratings for? (Please select one)

[ ] Private
[ ] Public
[ ] Govt. Owned Corporation (GOC)

Question 7
Based on your professional experiences, do you believe there is a difference between industry sectors (Private, Public, or GOC), on the importance of the above factors in project decision making?

[ ] Yes
[ ] No

Question 8
Which of the above factors is the **most** important factor to you in project decision making, and why?

________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________

Question 9
Which of the above factors is the **least** important factor for you in project decision making, and why?

________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________
________________________________________________________________________________________________________
Question 10

Are there any other factors that you believe are important in project decision making that should be included in this list, and why?

________________________________________

________________________________________

________________________________________

________________________________________

Any final comments?

________________________________________

________________________________________

________________________________________

________________________________________
## Appendix B – Responses to questionnaire

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### Contributing factors to optimal project portfolio selection
Appendix C – Comments on best practice extracted from interview transcriptions

Fit for purpose

Financial model is based on my estimate of when things are going to happen.

Sensitivity analysis is going on to give some comfort.

I’ve got project managers as well as finance guys doing things like benefit realisation, you know net present value you know time value of money, discounted cash flow, doing all those sort of analysis on an investment or on projects is considered best practice. You know I suppose we’ll come to the gaps in a moment but you know in practise that’s not always the case but it is considered best practice to use those kinds of tools at your disposal. So that’s generally the most practical from an expanded point of view what is considered best practice.

Prioritisation matrix.

I don't think to give you a scale of 1 to 10 and I'm thinking across a number of projects I think it sort of, there’s limited success. I wouldn’t say that it has been very effective but primarily because I think that’s been very much an economic decisi on more than anything else in most cases. So I’d say you know somewhat effective and I can certainly give you examples of one or two that were sadly ineffective but overall I would say at best it would be limited success based on you know using the rigid standards of best practice.

I don't think they were looking at the whole picture. And I reckon the reason, the contributing factor to not being successful is to, is not to have what I consider ..is to make a decision in context of a portfolio of projects. They tend to look at them in isolation at times, which can, to me has cost not only time and energy but also money by not doing that. So it’s ..it is I believe is not a holistic approach to investment, selection of investment projects.

Sometimes the criteria could be just the customer wants it.

This requires more of a holistic or multi criteria type assessment which has some non-financial criteria which is not adequately always understood or considered. ‘Sacred cow’ projects.

So really you bring me down to the point I want to make in answer that question of yours is that to me the underlying foundation that I’ve discovered that every single one of them were enormously successful came down to just two words, change management.
Value for money.

When you’re looking at best practice to me the Board plays a big role in it.

More needs than financial.

Sometimes projects are done for reputation or legacy.

Network need.

Risk rated.

The other large group of programs are the liability style programs that are based on age profile and performance history and likelihood scenarios. So that tends to be more flexible in terms of the definite need date that they need to be delivered by. So the programming, those program style deliverables will tend to be a casualty if the connection, if there’s a large volume of connection we’ve brought forward. So it almost then becomes a choice of do you build infrastructure to allow a new customer to be connected or do you use those same finite resources to reduce the risk of liability problems? So if there’s a conflict, if you haven’t got enough resources both internally and market supply then you tend to favour the growth related projects.

There are policy guidelines but that tends to be an indicator of the way that the decisions are made against our policy, it tends to be the outcome. But each case is taken on its merit. For example if there is a definite safety issue with a piece of equipment and it’s a program, then that clearly would get priority.

There’s a set of protocols we work to, but it’s not a perfect world, there’s always shades of grey where decisions are made about resource allocation. …there’d be subjective decisions based on the best information at that time.

Very much resource and need driven.

Often for infrastructure projects and especially since Infrastructure Australia has taken a lead on prioritising of projects, cost benefit analysis has come to the fore in that and you’ve got to have, every large project has to have a CBA (cost benefit analysis) done. Whether or not the CBA results are actually considered though is a different story. I’d say when it comes to IA definitely they are looking at say the benefit cost ratio and how they rank and prioritise their projects as a...criteria, one of many criteria. When it comes to state government sometimes it’s probably less so. You feel
like you do, you are just providing a cost benefit report so that it can go into the business case because it’s in the template.

AusRoads provide guidance for road projects and the Australian Transport Council provide guidelines for more urban public transport projects. And within those guidelines there’s also standard unit rates to use to monetise certain benefit items, and that’s become sort of fairly well standard in Australia and consultants and everyone use those unit rates because they’re agreed set. And it would represent best practice internationally as well. There’s been a lot of research in this field so when it comes to doing a transport/cost benefit analysis there is a fair degree of confidence in the accuracy of the results. Saying that though it comes down to say a lot of the time say the traffic or transport modelling. That’s where you can get some concern because often the modelling may be being done for a different purpose rather than feeding into an economic analysis. And a whole range of theoretical issues to that. But generally yeah the method is quite sound and accepted by most people, the majority.

The biggest flaw in a lot of the stuff that gets done is ..the consideration or lack of consideration of other options.

Yeah I’m not a fan of labels such as best practice. I believe there’s always room for improvement, always can be better targeted for outcomes. But certainly these protocols represent a major leap forward in terms of decision making, stringency within the public sector in particular…. So these protocols represent a major leap forward from the point of view of being able to smooth the investment, maintain the asset to a service level through the peaks and troughs of its service life. That’s achieving what would be considered to be a better outcome for the decision makers. So whether or not it’s best practice, probably not. Better than it was? Definitely.

The objective of the protocols from the whole of government point of view, from a Treasury point of view was to establish a method of assessment that removes the unique factors of the asset in question and standardises them to a financial measure. The purpose therefore was to enable constrained decision making and the primary constraint was finance and the outcome intended from the protocol was to be able to measure alternative draws or alternative claims against government financial resources for disparity opportunities. So you should theoretically under this protocol be able to directly measure for example a bridge against a hospital against a school against a police station against anything else that they’re considering building.
The primary failure of the process tends to be a lack of up front definition of the required outcome. So the protocol as an example the decision making protocols of the (PAF) require a stage one assessment which is a review of the problem. So it’s an analysis of what the problem might be. The outcome of that assessment therefore is a definition of the problem. Obviously if you don't define the problem adequately you can’t define the solution and that’s where the failure tends to occur, the definition of the problem becomes the most difficult part of the assessment.

The reason in my observation that it becomes the most difficult part is the cultural behaviours within the bureaucratic organisations where they tend to focus on small or relatively small relatively insignificant issues with respect to the problem itself. So a decision maker relatively modest decision maker, perhaps a director or executive director within the Department will receive an instruction to consider some, in the case of Roads some service level complaints from the general public. They will then assess the maintenance requirement or the requirement to intervene in that matter against the level of complaint rather than against the service anticipation of the road. Whereas the overall organisation has to compare that service provision of that road against the service provision of all other roads and the government as a whole has to compare the service provision of the road against service provision of any other asset such as schools and hospitals and so forth. So the director or executive director will seek to take remedial action within their range of decision making which will be severely constrained by the determination of their job which is maintain that section of road. That claim will then go up chain through the department and be compared against claims of other individuals responsible for other sections of roads. The measure or the comparator between the various claims from the various sub sections within the department then has no specific equalising factor to make them directly comparable. So one section of road might get ... might build a case for intervention or maintenance or improvement of the road based upon the number of deaths occurring on that section of road and another one, another section of road might put up a claim for the same money based on a service provision or a network flow efficiency measure. And it’s very difficult for the Department to compare a death measurement against a service efficiency or traffic flow measurement. These protocols are designed to incorporate these matters in the assessment and convert them into a comparable measure so that they can be effectively measured. The casual observation as to why the protocol sometimes fails is the tenacious maintenance of that cultural set where people inside government departments who for example, are concerned with safety consider that to be the single most important thing in the world and people inside the Department concerned with traffic flow think that’s the single most important thing in the world and so forth. So you get a lot of push back or a lot of non-compliance
in stringent conversion of the available data to an assessment tool. And consequently the protocol sometimes doesn’t make the like for like comparison that it’s designed to do. That’s the primary failure at stage one, so you get disparate measures of what is the problem.

Because the Minister theoretically determines the performance criteria of the assets and it should flow from the Minister down to all the other levels of decision making. But it tends to go, reverse tends to flow up so that the relatively junior decision makers tend to influence the outcomes at the higher levels rather than the other way around. There’s probably some sort of mix in between that’s most suitable. But if the problem definition is not clear then the rest of the protocol will not target an outcome that is satisfactory. Stage two of the protocol then measures alternative interventions that may suitably address the defined problem. So stage one has defined the problem, stage two is consider alternatives that may or may not address that problem. And in that process there’s a whole heap of course filters designed to eliminate unsatisfactory solutions and preserve potentially satisfactory solutions. Within that stage two, within the protocol we introduce non-financial criteria into the assessment. So in the case of a road for example the problem definition may be a safety matter and in stage two we will introduce financial, social, economic and other assessment tools to consider alternative solutions to address the safety negative. Stage three is selecting the preferred solution of the identified options against all of the criteria and then build a business case to demonstrate the viability of that solution. And that business case under the protocol is not a commercial business case so it considers sorry starting again; it assumes that the application of the solution will in fact solve the problem because the stage two assessment has determined that it is a viable solution. So the stage three assessment, the business case is to determine if it’s an economically and financially viable solution. And the process or the structure under which that solution may be best applied so it builds for example whether it’s a PPP delivery compared against a traditional delivery or compared against some other sort of...

Absolutely there’s a whole heap of measurables and unmeasurables. The economic analysis is you know more or less a statistical test; it’s a measure of cost against benefits more or less. The financial measure is pretty straight forward, it’s cash flow taken to present value.

…the weightings have to be determined in stage one of the problem definition as well. Because part of the problem definition is what are the triggers that will determine a decision to address that problem. And if financial constraint is the main trigger then finance is weighted high, if community satisfaction is the main trigger then community measures such as severance or amenity
or whatever, comfort, noise things like that will be weighted very high and hence the MCA becomes more important in that analysis.

So typically the private sector will have a clear outcome in mind or the vast majority of their activities are on the back of commercial viability. They’re very clearly aligned to profit generation. Therefore they consider their expenditure alternatives on the back of financial considerations primarily. As the world becomes more complex though they also have to consider other things.

So I guess as the world gets more complex the clear decision protocols of the traditional private sector are getting muddied by the requirement to keep non-financial criteria on deck. And in the government world, in the public sector world I think it’s getting more confusing for them because their non monetary criteria are diminishing in importance and is being slowly overtaken by financial criteria.

But the primary thing to remember in my mind is what you’ve just said which is, it’s people still. Companies make decisions but it’s not a company, a company is just an artificial construct of convenience for legal and taxation purposes basically. It’s still people, people make decisions, people deal with people and if you don’t have that experience and acuity for people then the decision process is not going to be optimised.

It depends. Some projects do require a lot of background analysis to ...even before you take any real decisions on whether you’re going to pursue it or not and other ones are quite simply clear you know. If it’s our business and we’ve got a need for it and therefore the initial sort of work won’t be as rigorous.

It’s got to have that natural fit.

All the technical and legal is at the back end.

Because they are large infrastructure projects typically you do a DCF a discounted cash flow analysis. And so there’s key components in that, one is understanding what the market is, so where you’re going to get your revenue from. We put a significant amount of effort into understanding what the future process might be, and because that will support any of the evaluation that you are prepared to pay.

Probably the biggest impediment is that the knowledge base of the shareholders is not consistent.
Because there’s no point in carrying forward a project which you love and put a lot of work into but it’s never going to make it because in the end you don't add value to your business and you very quickly go out of business. And that’s what we try to instil you know it’s just trying to get that right information so we can make the correct decision. And the correct decision might be not to proceed once we have a clear understanding of what we’re doing. And that’s the only way you can sort of go forward.

you get caught up in the project and that’s part of the checks and balances going through is..and that’s also, that’s a bit of a..of a defining point, bringing your shareholders and other people along with you is that getting them too involved that they also don't have the final objective view. So it’s getting that right balance where you can maintain the objectivity but give them enough information that they understand exactly what they’re getting into.

all its decisions are based on values, the company values.

It’s not even financial value, it’s also social value. So where we are at the moment we have a strategy and we have a strategic goal and from that strategic goal comes objectives and that’s where we link in our projects, so projects to achieve an objective. The way we value those projects depends on particular drivers for the project and a case in time.

getting a whole portfolio ranking system in place and you’ve got a whole range of things you know, NPV, timeframe for return, long term, short term investment, cash flow of course, community and how it affects the community and environmental effects and all those different elements and we would select those different elements where they are applicable to a project and valuation for the project.

We can be a strategy to grow, we can be a strategy to sell you know we can be a strategy to maximise return, be it short term, long term so each area of our business could have a slightly different focus and that will change in time.

they support their people and they support the communities and they understand that they...they don't try to get into a dependency situation but there’s a legacy there that they have to honour if you like, you know what I mean? And decisions like that and particularly community partnerships and the way they work within, with communities will hold them and that’s again where the values come in. Will hold them to doing some investments where otherwise it could be not the best bang for your buck type of thing.
I suppose there are points in time where you stop and say let’s revalue this. Is this an investment worth continuing with.

Communication and empowerment I suppose are two things you know. Getting the right information to the right people and empowering people to make a decision around that, it’s always difficult.