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INHIBITORS TO OPTIMAL PROJECT PORTFOLIO SELECTION

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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. Unfortunately, this is not always the case.

The paper represents progress findings from partial completion of a Master of Applied Science (Research) degree from the Queensland University of Technology, addressing the inhibitors to applying optimal project selection techniques.

Possible inhibitors to optimal project portfolio selection include: processes that are inconsistent with the needs of the organisation; reluctance to use an approach that may not produce predetermined preferences; loss of control and perceived decision making power; reliance on quantitative methods rather than qualitative methods for justification; ineffective project and program sponsorship; unclear project governance, processes and linkage to business strategies; ignorance, taboos and perceived effectiveness; inadequate education and training about the processes and their importance.

INTRODUCTION

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

According to Meredith & Mantel (2009), 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' (Meridith and Mantel 2009). These projects draw on funds that other projects, which will have to undergo much more scrutiny, will have to compete for.

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
7. Authorise components

This logical process is similar to many discovered through the preliminary literature search. An expanded view of this process has been developed as a 'framework for project portfolio selection' (Archer and Ghasemzadeh 1999).

The preliminary literature search has also indicated that there are many different approaches or models for the qualitative and quantitative evaluation and prioritisation of projects involving numerical and non-numerical methods. But, as stated in Meredith & Mantel (2009, 43):

- "Models do not make decisions, people do"
- "All models, however sophisticated, are only partial representations of the reality they are meant to reflect."

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".

There appears to be little consistency in approach to the selection of projects and it is hypothesised that: the project management community (project and program managers and their organisations) does not have sufficient understanding of the need for, or skills necessary for effective selection (including financial analysis) of projects, programs and portfolios.

The paper represents progress findings from partial completion of a Master of Applied Science (Research) degree from the Queensland University of Technology, addressing the inhibitors to applying optimal project selection techniques. Other questions addressed in this research are: What can be regarded as best practice in project portfolio selection? What is current practice in organisations? And what is the gap between current and best practice?

The paper starts with a summary of the literature review focusing in selection criteria, tools and techniques, project prioritisation, and inhibitors to applying project selection techniques. It continues with brief description on the research method. It then followed by discussion in the preliminary findings on the inhibitors. The final section of the paper summarises the findings and briefly explain the next step of the research.

LITERATURE REVIEW

Selection Criteria

The literature review has discovered many different approaches to the range of criteria that should be used as a basis for analysing and comparing projects. Some of these are summarised below.

The Portfolio Standard (Project Management Institute 2008) lists some example evaluation criteria as:

- General business criteria
- Financial criteria
- Risk-related criteria
- Legal/ regulatory compliance
- HR related
- Marketing
- Technical

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:

- Production
- Marketing
- Financial
- Personnel
- Administrative and miscellaneous categories.

These can be broken down further into project selection factors and are included in Figure 1.

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.

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| <p>Production Factors</p> <ol style="list-style-type: none"> 1. Time until ready to install 2. Length of disruption during installation 3. Learning curve – time until operation as desired 4. Effects on waste and rejects 5. Energy requirements 6. Facility and other equipment requirements 7. Safety of process 8. Other applications of technology 9. Change in cost to produce a unit component 10. Change in raw material usage 11. Availability of raw materials 12. Required development time and cost 13. Impact on current suppliers 14. Change in quality of output <p>Marketing Factors</p> <ol style="list-style-type: none"> 1. Size of potential market for output 2. Probable market share of output 3. Time until market share is acquired 4. Impact on current product line 5. Consumer acceptance 6. Impact on consumer safety 7. Estimated life of output 8. Spin-off project possibilities <p>Financial Factors</p> <ol style="list-style-type: none"> 1. Profitability, net present value of the investment 2. Impact on cash flows | <ol style="list-style-type: none"> 3. Payout period 4. Cash requirement 5. Time until break-even 6. Size of investment required 7. Impact of seasonal and cyclical fluctuations <p>Personnel Factors</p> <ol style="list-style-type: none"> 1. Training requirements 2. Labour skill requirement 3. Availability of required labour skills 4. Level of resistance from current work force 5. Change in size of labour force 6. Inter- and intra- group communication requirements 7. Impact on working conditions <p>Administrative and Miscellaneous Factors</p> <ol style="list-style-type: none"> 1. Meet government safety standards 2. Meet government environmental standards 3. Impact on information system 4. Reaction of stockholders and securities markets 5. Patent and trade secret protection 6. Impact on image with customers, suppliers and competitors 7. Degree to which we understand new technology 8. Managerial capacity to direct and control new process |
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Figure 1 – Project Selection Factors (Meridith and Mantel 2009)

Analysis 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).

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 basis for project selection (Gutjahr, Katzensteiner et al. 2008).

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.

Tools and techniques

The Portfolio Standard (Project Management Institute 2008) suggests the use of multi-criteria assessment and the incorporation of:

- Human resources capacity analysis – this is present as a constraint, similar to that suggested above (De Maio, Verganti et al. 1994)
- Financial capacity analysis – the capacity of the organisation to finance the selected projects
- Asset capacity analysis – physical needs to of the organisation to support the selected projects
- Expert judgement – applied to any technical and management details during the process.

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 along with others identifies the need for other considerations and that further work is needed in this area (Tian, Ma et al. 2004; Wenyi 2008).

An approach of grouping selection methods into four sub-categories has been suggested (Hall and Nauda 1990): comparative approaches; scoring models; benefit contribution or economic models; and optimisation methods.

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 (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 will 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 but gives an indication of appropriate methods for different types of projects.

"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 is proposed along with the inclusion of qualitative criteria (De Maio, Verganti et al. 1994).

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' (Saaty 1980). It comprises 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 preliminary 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".

Project Prioritisation

This part of the project selection process involves the prioritisation and balancing of the desirable projects with the constraints of competencies and available resources (time, funds, people, materials, equipment and machinery).

The Portfolio Standard (Project Management Institute 2008) suggests the use of the multi-criteria assessment to determine the relative priorities of projects. This is then considered against the organisations financial, human and technical resources, as well as the organisation's ability to assimilate organisational change.

(Rosacker and Olson 2008) have studied the selection of IT projects in government agencies and have made some interesting observations including: "projects that are required will obviously be adopted" and "subjective base for project selection was intended as a catchall for lack of method". This has similarities to (Meridith and Mantel 2009) that talks about a rigorous 8 step process, similar to that in the Portfolio Standard (Project Management Institute 2008) but recognise the 'sacred cow' projects that will get up irrespective of their comparative viability.

Inhibitors

It appears that no individual or organisational competency criteria have been established around this area of project portfolio management. This is not surprising because it is a complex area dealing with "situational idiosyncrasies of internal and external dynamics, industries, governance types, and geographical location" (Muller, 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 (Meridith and Mantel 2009) and the 'projects that are required will obviously be adopted' (Rosacker and Olson 2008).

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 behavioural aspects in the application of appropriate risk management techniques in projects (Kutsch and Hall 2009) may also have parallels to the application of effective project selection techniques.

RESEARCH METHOD

Preliminary identification of barriers or inhibitors to effective practice in organisations was conducted through literature review, observation, and preliminary discussion with industry specialists.

Observation has been made through involvement in a project which entered the Queensland Government Project Assurance (PAF) process. This involved working with those who designed this process and provided an insight into how this project evaluation and selection process works.

Contact has been maintained with Mr Richard Senescall, an economist and recognised industry expert in project evaluation with Aecom, over a two year period. Questioning has included the approach to project selection by private and public sector organisations, the tools and techniques used, and the blockers to effective application.

INHIBITORS TO OPTIMAL SELECTION

Based upon observations, preliminary discussions with industry specialists and the literature review, possible inhibitors to optimal project portfolio selection have been identified.

Processes that are inconsistent with the needs of the organisation

In order to establish a rigorous process to ensure value for money and optimisation the resulting process may become too complex for the needs of the organisation, requires too much effort and therefore is expensive to use.

Reluctance to use an approach that may not produce predetermined preferences

A senior manager or director in an organisation may have a pet or 'sacred cow' project that they have been sponsoring. Because they have intellectual capital in this project they may influence the decision making process to ensure this project is prioritised irrespective of its relative merit for the organisation.

Loss of control and perceived decision making power

Some senior managers may believe that having a rigorous and independent process to evaluate and prioritise projects takes the decision making away from them. This can result in them resisting the use of the process, or softening its use.

Reliance on quantitative methods rather than qualitative methods for justification

Multi-criteria decision making processes generally involve both qualitative and quantitative criteria. Qualitative analysis may be considered to more difficult to justify if under scrutiny so some sectors may prefer to use primarily quantitative criteria for its defensibility.

Ineffective project and program sponsorship

Active and strong sponsorship of individual projects and programs of projects can facilitate their selection. Strong advocacy is not only about influencing the decision making process. It is also about assuring that the projects and programs are investigated and documented in a manner that best addresses the selection criteria and maximises the chances of success.

Unclear project governance, processes and linkage to business strategies

Selected projects should provide benefits that are consistent with the organisation's strategic objectives and business strategies. If these aren't clearly articulated or the governance process does not support them, selection of projects against this criteria will be problematic.

Ignorance, taboos and perceived effectiveness

The approach towards the use of a selection process may be influenced by ignorance about the purpose and benefits of a process; it could entail the disclosure of inconvenient information to project stakeholders (taboos); or it could be perceived as an administrative process so treat it as a 'tick box' process and use influence to achieve a predetermined preferred choice.

Inadequate education and training about the processes and their importance

A project evaluation and selection process needs to be developed, supported, maintained and training provided in its use just like any other critical business system. The education in the benefits, importance and use of this process may be restricted to just those on a 'need to know' basis, but not to the practitioners and teams that may be producing and assembling the information that is used for comparative evaluation and selection of projects.

CONCLUSIONS

To ensure best use of limited resources and funds and so maximise the benefits to organisations, organisations need to have effective project evaluation and selection processes. Most organisations will have a process in place but will vary in sophistication. The overall process is well understood and there are many tools and techniques available to aid this crucial decision making. However, what is the best approach for a particular organisation and its range of project types, is not so clear.

The research has identified some possible barriers or inhibitors to effective application of project selection processes.

The next step of the research is to develop a quantitative survey to establish of what is best practice in terms of the criteria for selection and approaches to analysis (tools and techniques); to understand the attitude of organisations to project selection and barriers or inhibitors to the use of optimal processes; and to identify the gaps in knowledge and application between current practice and best practice;

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