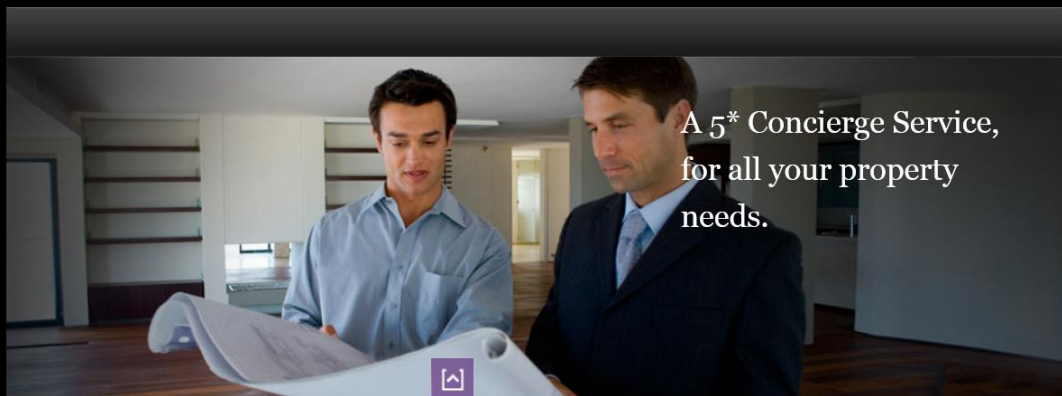


# Winsper

## Property Specialists

Sales | Lettings | Design | Build

## Project Management Project Modelling



As At  
22 October 2013

Author  
D Winsper

Consider the 'Project Environment'.

Reflect and give examples of 'Project Selection Models' and their advantages and disadvantages.

Contrast these models against value for money.

## Project Selection Models

1. 'Project Modelling' enhances any organisation, by maximising potential capital investment, whilst identifying and mitigating risk. For best effect, this 'Systems Process' should be carried out within the project pre-development phases, of the 'Project Life Cycle', namely the 'Initiation' phase.

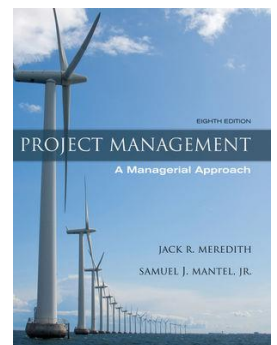
CIOB Code of Practice for Project Management for Construction and Development	Office of Government Commerce (OGC)	British Standards BS6079-4:2006	British Property Federation (BPF)	Royal Institute of British Architects (RIBA)
1 Inception	Gate 0 Strategic assessment	1 Conception	1 Concept	A Appraisal
2 Feasibility	Gate 1 Business justification	2 Feasibility	2 Preparation of the brief	B Design brief
3 Strategy	Gate 2 Procurement strategy Gate 3 Investment decision		3 Design development	C Concept
4 Pre-construction		3 Realisation	4 Tender documentation and tendering	D Design development E Technical design F Production information G Tender documentation H Tender action J Mobilisation
5 Construction	Gate 4 Readiness for service		5 Construction	K Construction to practical completion
6 Engineering Services Commissioning		4 Operation		
7 Completion, handover and occupation		5 Termination		L Post-practical completion
8 Post-completion review/project close-out report	Gate 5 Benefits evaluation			
	Disposal			

Fig 1. Industry Standard Project Life Cycles, Chartered Institute of Building (CIOB)<sup>1</sup>, Code of Practice 4<sup>th</sup> Edition.

2. As per Meredith 2000<sup>2</sup>, 'Project Modelling' consists of both 'Numeric' and 'Non-Numeric' modelling, consisting of the following vignettes;

### Non-Numeric Modelling

- a. **The Sacred Cow**<sup>3</sup>. 'We've always done it that way', 'The Boss said so' versus 'If it's not broken, don't try and fix it'. Whilst 'Sacred Cows' are no longer desirable within an organisation, they must be interrogated for their origins, as these models were not born as 'Sacred Cows', but have evolved from all the alternative models and reached their own culminating point, as a product of their own success, never to be expanded on further.
- b. **The Operating Necessity**. This type of 'Project Modelling' is embedded within the organisational structure and facilitates business function. If this modelling is wrong, or non-profitable, then the organisation or system will fail.
- c. **The Competitive Necessity**. Competition within the market place is fierce and organisations strive to remain at the 'Sharp End' of business. To achieve this aspiration, organisations develop and constantly evolve systems, through modelling, to remain competitive and drive business.
- d. **The Product Line Extension**. This type of modelling allows organisations to expand and grow within their own structure, through the successful implementation of existing



models, expanded and evolved to encompass growing trends and needs, akin to the organisations 'Business Model'.

- e. **The Comparative Benefit Model.** Various models are undertaken and viewed / contrasted against each other, weighted against outcomes. A selection committee

## Numeric Modelling

- a. **Simple / Discounted Payback Method.** Payback methods consider the initial investment costs and the resulting annual cash flow. The payback period is the amount of time (usually measured in years) to recover the initial investment in an opportunity. Unfortunately, the payback method doesn't account for savings that may continue from a project after the initial investment is paid back from the profits of the project, but this method is helpful for a 'first-cut' analysis of a project, in conjunction with 'Risk' and 'Inflation'.
- b. **Average Rate of Return.** This is the ratio of the average cash inflow to the amount invested.
- c. **Discounted Cash Flow.** More commonly known as the 'Net Present Value' or NPV, addresses inflation and the required rate of return;

$$NPV(\text{project}) = A_0 + \sum_{t=1}^n \frac{F_t}{(1+k)^t}$$

where

$F_t$  = the net cash flow in period  $t$ ,

$k$  = the required rate of return, and

$A_0$  = initial cash investment (because this is an outflow, it will be negative).

To include the impact of inflation (or deflation) where  $p_t$  is the predicted rate of inflation during period  $t$ , we have

- d. **Equivalent Annual Cost Method.** EAC is the cost per year of owning, operating, and maintaining an asset over its lifetime. Thus its calculation is;

$$EAC = NPV / A_{t,r}$$

where  $A$  = the present value of an annuity factor

$t$  = number of periods

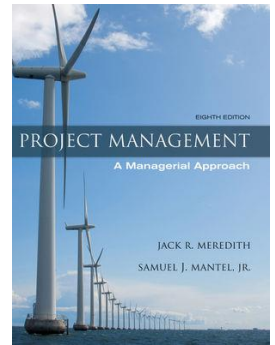
$r$  = interest rate

In other words, EAC is calculated by dividing the NPV of a project by the present value of an annuity factor.

- e. **Internal Rate of Return.** This equates to cash flows in and out of the organisation and is calculated as;

$$A_0 + A_1 / (1+k) + A_2 / (1+k)^2 + \dots + A_n / (1+k)^n = R_1 / (1+k) + R_2 / (1+k)^2 + \dots + R_n / (1+k)^n$$

- f. **Profitability Index.** Also known as the 'Benefit Costs Ratio', this is simply the NPV of all capital, divided by the initial investment. Obviously if this is greater than 1, then the project may be accepted.





## Modelling Criteria

3. Both 'Non-Numeric' and 'Numeric' modelling are overarched by criteria, which influences organizations, in their selection process, some of which can be found below;

- **Realism.** Reality of manager's decision.
- **Capability.** Able to simulate different scenarios and optimize the decision.
- **Flexibility.** Provide valid results within the range of conditions.
- **Ease of Use.** Reasonably convenient, easy execution, and easily understood.
- **Cost.** Data gathering and modeling costs should be low relative to the cost of the project.
- **Easy Computerization.** Must be easy and convenient to gather, store and manipulate data in the model.

## Industry Exemplars

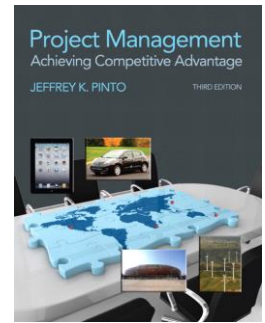
4. The following Industry Exemplars are taken direct from 'Project Management: Achieving Competitive Advantage', Second Edition, by Jeffrey K. Pinto<sup>4</sup>.

### PROJECT PROFILE

#### Project Selection Procedures: A Cross-Industry Sampler

The art and science of selecting projects is one that organizations take extremely seriously. Firms in a variety of industries have developed highly sophisticated methods for project screening and selection to ensure that the projects they choose to fund offer the best promise of success. As part of this screening process, organizations often evolve their own particular methods, based on technical concerns, available data, and corporate culture and preferences. This list gives you a sense of the lengths to which some organizations go with project selection:

- Hoechst AG, a pharmaceutical firm, uses a scoring portfolio model with 19 questions in five major categories when rating project opportunities. The five categories include: probability of technical success, probability of commercial success, reward to the company, business strategy fit, and strategic leverage (ability of the project to employ and elevate company resources and skills). Within each of these factors are a number of specific questions, which are scored on a 1 to 10 scale by management.
- The Royal Bank of Canada has developed a scoring model to rate its project opportunities. The criteria for the portfolio scoring include project importance (strategic importance, magnitude of impact, and economic benefits) and ease of doing (cost of development, project complexity, and resource availability). Expected annual expenditure and total project spending are then added to this rank-ordered list to prioritize the project options. Decision rules are used (e.g., projects of low importance that are difficult to execute get a "no go" rating).
- The Weyerhaeuser corporate R&D program has put processes in place to align and prioritize R&D projects. The program has three types of activities: technology assessment (changes in external environment and impact to the company); research (building knowledge bases and competencies in core technical areas); and development (development of specific commercial opportunities). Four key inputs are considered when establishing priorities: significant changes in the external environment; long-term future needs of lead customers; business strategies, priorities, and technology needs; and corporate strategic direction.
- Mobil Chemical uses six categories of projects to determine the right balance of projects that will enter its portfolio: (1) cost reductions and process improvements; (2) product improvements, product modifications, and customer satisfaction; (3) new products; (4) new platform projects and fundamental/breakthrough research projects; (5) plant support; and (6) technical support for customers. Senior management reviews all project proposals and determines the division of capital funding across these six project types. One of the key decision variables involves a comparison of "what is" with "what should be."
- At 3M's Traffic Control Materials Division, during project screening and selection, management uses a project viability chart to score project alternatives. As part of the profile and scoring exercise, personnel must address how the project accomplishes strategic project objectives and critical business issues affecting a specific group within the target market. Projected project return on investment is always counterbalanced with riskiness of the project option.
- Exxon Chemical's management begins evaluating all new project proposals in light of the business unit's strategy and strategic priorities. Target spending is decided according to the overall project mix portfolio. As the year progresses, all projects are reprioritized using a scoring model. As significant differences between projected and actual spending are uncovered, the top management group makes adjustments for next year's portfolio.<sup>1</sup>



## Advantages & Disadvantages

5. Meredith 2002<sup>2</sup> purports the following advantages and disadvantages of modelling;

1. The undiscounted models are simple to use and understand.
2. All use readily available accounting data to determine the cash flows.
3. Model output is in terms familiar to business decision makers.
4. With a few exceptions, model output is on an "absolute" profit/profitability scale and allows "absolute" go/no-go decisions.
5. Some profit models can be amended to account for project risk.

The disadvantages of these models are the following:

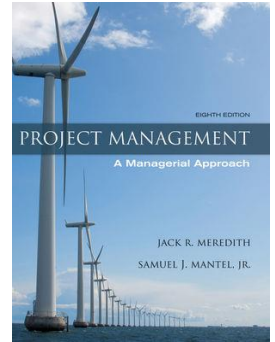
1. These models ignore all nonmonetary factors except risk.
2. Models that do not include discounting ignore the timing of the cash flows and the time-value of money.
3. Models that reduce cash flows to their present value are strongly biased toward the short run.
4. Payback-type models ignore cash flows beyond the payback period.
5. The internal rate of return model can result in multiple solutions.
6. All are sensitive to errors in the input data for the early years of the project.
7. All discounting models are nonlinear, and the effects of changes (or errors) in the variables or parameters are generally not obvious to most decision makers.
8. All these models depend for input on a determination of cash flows, but it is not clear exactly how the concept of cash flow is properly defined for the purpose of evaluating projects.

6. Overarching all of the above is the main disadvantage of modelling, that of market uncertainty, in the guise of Inflation, GDP, RPI, CPI, Austerity, Crash etc.

## Analysis

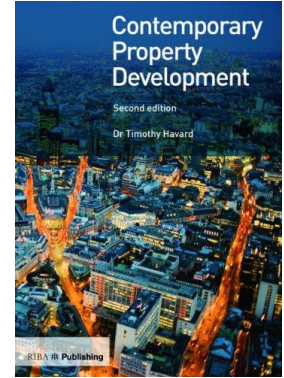
6. The following analysis can be drawn;

- '*Project Modelling*', whilst ever evolving is encountered at the '*Project Pre Development Stage*' of the Life Cycle. However, this does not necessarily mean that the process is extant in that location. Once modelling is '*live*', variables should be constantly re-inputted throughout the duration of the project Life Cycle.
- Whilst CIOB<sup>1</sup> '*Best Practice*' varies across the Construction Industry, the '*Project Pre Development Phase*' is easily identifiable.
- '*Non Numeric Modelling*' is open to human bents and as such should be subject to '*Due Diligence*'.
- Whilst '*Numeric Modelling*' produces viable data, that can be equated and weighted across the spectrum of models, it is reliant on correct and substantiated data input, to produce a true reading.
- All modelling is only current in that point of time, as predicting future market variations, is at best a '*Guestimate*'. Hence Risk.
- To be in tune with Havard 2008<sup>5</sup>, the profitability Index acceptance level should be raised from 1 to 1.2, to encompass the meaning of a '*successful*' development that of



20% profit margins.

- Payback can be a quick method for comparing alternatives.
- Net Present Value (NPV) offers the advantage of accounting for the time-value of money.
- The predictability of Inflation (RPI / CPI) and Interest Rates over time, is not guaranteed and is fluid. Who would have successfully predicted the world economic downturn, at the latter end of 2008 (Less BRICs), whilst all knew the 10 – 15 year property boom and bust cycle, through recent history, the late PM (Great Britain – Gordon Brown), reassured all, as chancellor and then PM that ‘Boom and Bust’ had ended, hence, Property Developers that had convinced investors over the viability of ‘Docklands’ style developments in Liverpool and Manchester soon became unstuck. It seems, Inflation and Interest Rates are very fluid variables and hard to predict. Projecting this current stagnation forward again may be folly, as the 0.5% enjoyed now, will only increase once the economy gains momentum. How do we predict exponential growth, if any, a la 1991 (Historically 1970’s / 1930’s etc) onwards?
- The present and future value of capital is not as clear cut as projecting forward and back. Yes £1000 pounds today may be worth more in the future and hence investment capital in real terms has a less Net Present Value, but there is a correlation to products. In 2008 £1000 would have bought you 1 DFS sofa, however in today’s economic climate it will buy you three. A flippant example, but true. Therefore, whilst Capital Values in property stagnate or increase, other sectors experience differential economic conditions and thus what really is the true capital value of £1000 in any space or time and is it sector specific?
- Value For Money. There is an obvious trade-off between investment capital required for modelling, versus the potential margins to be gained on completion of the project.



## Summary

15. ‘Project Modelling’, in all guises both ‘Numeric’ and ‘Non-Numeric’ require resources in time, man-hours and capital, but if utilised correctly can benefit any organisation through identifying, achieving and possibly surpassing project margins, again in the resources of time, man-hours and ultimately capital. This modelling process, which is only as good as its inputs, should be established within the ‘Project Pre Development Phase’, but should not be tied to this and should remain ‘Live’ throughout the duration of the project and revisited with all variations and ‘live’ figures, projecting forward always. Concurrent and feeding the modelling process is ‘Risk’ acceptable or otherwise, which is subject to unpredictable market conditions.

## [E Signed]

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