WELCOME TO THE RISKNZ LUNCHTIME SEMINAR SERIES 2019

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Quantitative Risk Assessment: what, why, when and how.

A lunch time presentation for RiskNZ

Chris Nicholls, Ascent Business Consulting

2 July 2019

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Purpose of today's session

- What is a Quantitative Risk Assessment (QRA)
- To understand why and when to use a QRA
- To understand the basics of how a QRA is performed.

What is a QRA?

- A definition
  - use of measurable, objective data to determine asset value, probability of loss, and associated risk(s) (businessdictionary.com)
- NZ Govt
  - a modelling technique that makes risks, and the financial impact of those risks, more explicit to decision-makers when considering the business case (treasury.govt.nz)

What is a QRA?

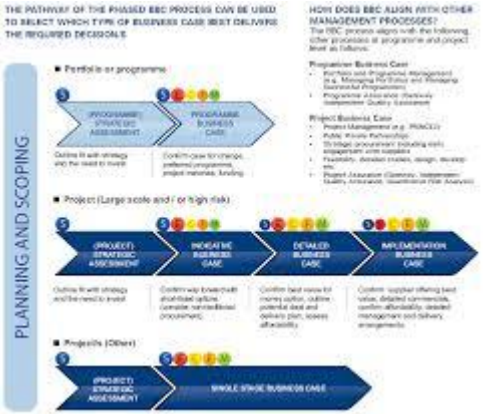
- A QRA seeks to assess what is the risk to investors of something
  - costing more than expected
  - taking longer than expected
  - having less benefits than expected, or
  - some combination of these factors.

Why use a QRA?

- Investor assurance …
  - Gives investors a better understanding of the likely range of costs and benefits
  - Greater transparency between modelling input assumptions and their impact on the outcomes, leading to greater understanding of risk and better ability to manage risk(s)
  - Contingency management: being able to give contingency back to the “pool” instead of holding onto it till the end of a project (cost-to-complete accuracy increases over time)
  - Leveraging a portfolio of projects to create a more accurate view of enterprise risk.
- Generally, a quantitative risk analysis approach is considered to be superior to an approach that solely relies on a simple estimated contingency.

When to use a QRA

- QRA can be applied to any industry, for almost any process or investment decision that can be modelled using a spreadsheet (eg, MS Excel).
- QRAs are able to be applied to both smaller and larger scale investments.
- Govt business case (BBC) compliance - QRA of costs is mandatory as part of the development of a Detailed Business Case for ‘significant’ projects or programmes monitored by the Treasury.



How a QRA works

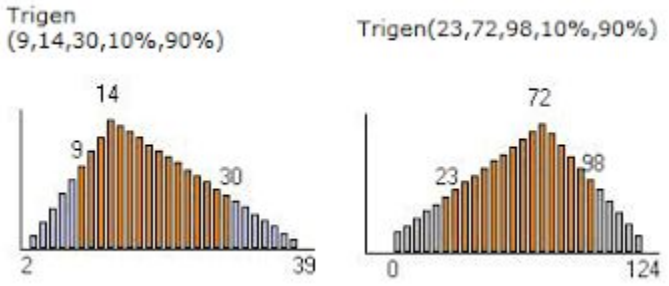
- QRA requires calculations of two components of **risk**: the **magnitude** of the potential loss, and the **probability** that the loss will occur.

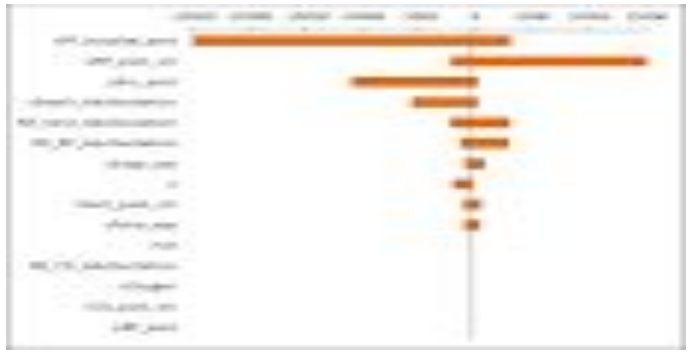
How a QRA works

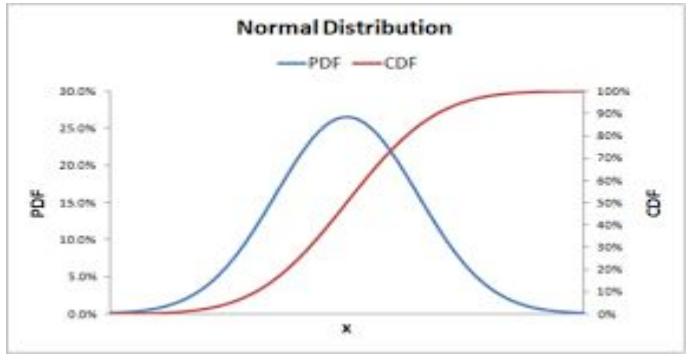
- In practical terms, what I do is:
  - create a probability distribution around each of the key input risks to my financial model
  - run a Monte-Carlo simulation (repeated statistical sampling using the probability distributions I created).
  - create a probability density function for the key outcomes such as one time costs, longer term annual operating costs, and whole of life costs.
  - PTO for the picture version of this !

How a QRA works

Input Assumptions	Monte Carlo Analysis of Financial Model	Analysis of Results and Reporting





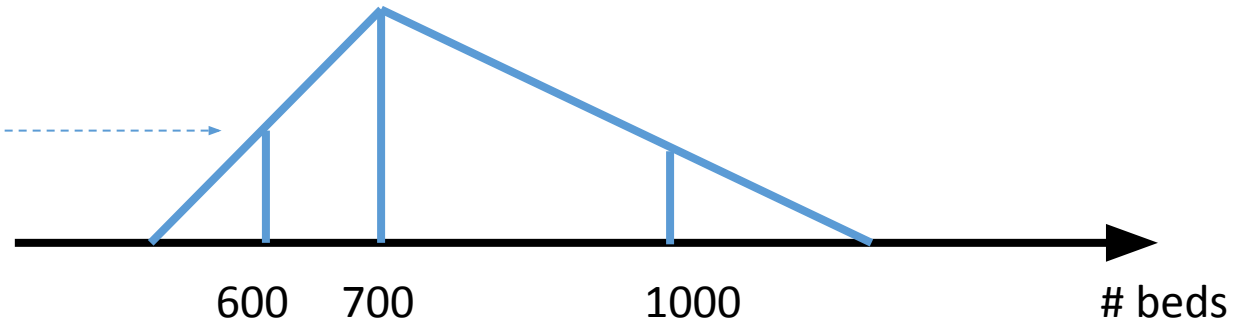


QRA - an illustrative example

- Estimating one time costs for a new hotel
  - Build 10 year cash flow template
  - Identify key input assumptions
- Workshop input assumptions and risks with key stakeholders to derive distributions (note the importance of getting the right people)
  - Implement the distributions in the model
- Financial modelling
  - Monte Carlo analysis using special software
  - Reporting and interpretation of inputs and results

QRA - an illustrative example – input ranges

Input Assumption	Optimistic (P10)	Expected (P50)	Pessimistic (P90)
Room size (double) (sqm)	10	12	16
Number beds	600	700	1000
Cost per sqm ($)	5,500	7,000	11,000
Build Phasing (months)	18	24	36



QRA - an illustrative example – outputs

- P50 = $75m
- P85 = $115m

= approx. 55% contingency if we assume P50 is the project estimate.

But let's say in this situation project estimate was closer to $50m.

Ie, the project estimate was too low due to optimism bias.

Observations

- Getting the right people in the room
- Focussing on the assumptions that matter
- What to do when project estimates are different to P50
- The value of an Independent QRA
- Effort Required

Contact details for your presenter

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Thank you 😊

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