

Application of Benefit-Cost-Risk Formula and Key Change Indicators to Meet Project Objectives

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Abstract

An approach to facilitating the definition, selection and achievement of the quantitative objectives (e.g. cost, benefit, time, quality, functionality) and qualitative objectives of a software project is proposed. It is designed to be

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1.0 Introduction

The software industry is a large, growing and evolving industry which has encountered numerous problems with delivering projects that meet their original quantitative and qualitative objectives for software development and maintenance and the expected benefit to the organisation.

The aim of the proposed approach is

- The ratio based on division can indicate the following projection or progression: less than 1 not feasible, 1 breakeven, and the greater than 1 the better

A diagrammatic convention is proposed to visualise changes and their relationships.

This approach provides a formal, effective, efficient, and adequate means of managing

				human)		
	Organisation al policy / direction	Methods / methodology / techniques / standard	Governance / organization al structure		etc	
Columns: objectives include, but is not limited to	Cost	Benefit	Time	Quality	Functionality	etc

Rows: external
context that can
give rise to
changes in
objwws: e ws: external

The maturity of this process can result in:

- Improved performance, effectiveness, and efficiency of measures respond to changes
- More accurate estimates based on benefit-cost-risk formula (point 4)

The supporting approaches that can be used include interviews with experts, workshops, historical information investigation, research, modelling, scenario analysis and prototyping that can be performed in combination. If there is more than one stakeholder they should be involved. Factors such as divergence between opinions of experts, inadequacy of information and inherent problems with the modelling technique used should be considered.

The level of detail performed for each step and the type of supporting approach used can depend on criteria such as requirements, resource availability, capability and nature of change.

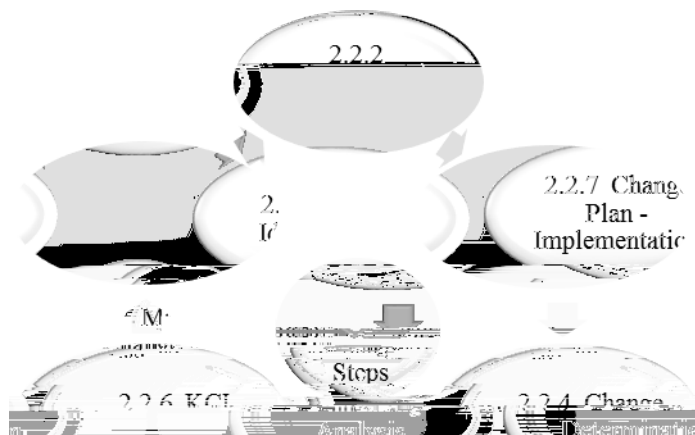


Figure 1: Managing change steps

2.2.2 Establishing the Context

The internal and external context of the organisation project should be adequately known. Where possible, feasible actions can be undertaken to ascertain unknown information

2.2.3 Change Identification

The purpose of this step is to reveal what, where, when, why and who related to a change.

The following are the recommended steps for identification:

- Identify the changes in each cell of Table 1 (2.1)
- Identify the known characteristics (e.g. source, destination, cause, negative/positive effect, timing, purpose, scope, frequency, probability/qualitative likelihood) and related factors (e.g. stakeholders, existing response measures, resource allocation) for each change
- Identify the relationships between changes where relevant

The lack of identification of changes does not preclude the occurrence of that change.

2.2.4 Change Analysis

The purpose of this step is to develop a more detailed understanding of the change under consideration

The following are the recommended steps for quantitative analysis of the change

- To calculate the direct financial cost and/benefit for a change
- If possible
 - The improvements in quality and functionality and reduced time should be converted into a financial benefit
 - The diminishment in quality and functionality, and increased time should be converted into a financial cost
- For each change

- If there is more than one cause and/or effect, multiplication can be considered on a case by case basis. A simple approach is to use the highest probability and for financial cost and/or benefit to be accumulated

The total financial cost and/or benefit for a change portfolio of an option (e.g. phase, project) is the accumulated cost and/or benefit individual changes multiplied by their respective probabilities, taking into account relationships (e.g. combination, effect) between changes.

Provided the benefit can be represented financially the benefit-risk formula (point 4) can be used to facilitate evaluation of one or more options. Where benefit is partially or wholly nonfinancial approaches such as effectiveness analysis can be used. The financial benefit and/or cost may be adjusted for present value based on nominal or real interest rate.

A diagrammatic convention (point)5

The results can be incorporated in the benefit-risk formula (point 4) to facilitate selecting the most appropriate measures

The information in the plan can include:

- Objective/strategy
- Resource requirements

4.2 Descriptive Definition of Benefit-Cost-Risk Formula

The values for the following formula are based on a given point in time over a period of time

$$\text{Ratio} = \frac{A + B + C}{D + E}$$

A: Accumulated value for the actual financial benefit Each financial benefit is multiplied by probability where probability = 1.

B: Accumulated value for the probable financial benefit Each financial benefit is multiplied by probability where $0 < \text{Probability} < 1$.

C: Option saving with relation to the difference between the highest financial cost for an option and the financial cost of option under consideration. This is not relevant if no alternative options are available.

D: Accumulated value for the actual financial cost Each financial cost is multiplied by probability where probability = 1.

E: Accumulated value for the probable financial cost Each financial cost is multiplied by probability where $0 < \text{Probability} < 1$.

Ratio can indicate the following projection or progression: less than 1 not feasible, 1 breakeven, and the greater than 1 the better. A ratio greater than 1 is not indicative that is desirable or acceptable. low financial return, too much risk exposure. For this purpose the ratio for full or subset of values can be compared to a predetermined single or range of ratios with respect to a given point in time or over a period of time

4.3 Mathematical Definition of Benefit-Cost-Risk Formula

The following equation has been provided to illustrate the mathematical foundation of the proposed approach.

$$R = \frac{D + E[B] \sum_{i=1}^n B_i P_i}{E[C] \sum_{i=1}^n C_i P_i}$$

R: Ratio

" X S S H U F D V H G H O W D 7 Ratio by D P r e Q This Aspect D Q H L Q
formula is optional.

D: Option saving

E[B]: Expected benefit

E[C]: Expected cost

i: counts the number of item

$B_i P_i$: Each financial benefit item multiplied by respective probability

$C_i P_i$: Each financial cost item multiplied by respective probability.

$\sum B_i P_i - \sum C_i P_i$

- Addition of all $B_i P_i$ items
- Addition of all $C_i P_i$ items

5.0 Change Implementation Diagram

The aim of this diagram is to visualise change

6.0 Summary

Global expenditure on software production and maintenance is significant
relatively large number of software projects failing to meet their original
quantitative and qualitative objectives

Given change has been described as any change in circumstance including events
that can or do invariably effect the objectives the proposed approach describes a
managing change process including key change indicators, benefit-cost-risk

1 ISO 31000 Risk management – Principles and guidelines 2009