USING VALUE MANAGEMENT TECHNIQUE WITH RISK ANALYSIS TO BUILD VALUE

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INTRODUCTION

Value Management can be successfully applied in risk analysis/management with powerful outcomes. It enables applying stimulating ideas thereby improving functionality. This in turn could have a multiplier effect resulting in building value and reducing costs.

RISK ANALYSIS / MANAGEMENT

In accordance with AS/NZS 4360 Standard of Risk Management, steps involved in risk management are:

a. Establish the Context
b. Risk Identification
c. Risk Analysis

The third stage in the process of risk management is risk analysis. The steps involved is risk analysis are

- Determination of existing controls
- Determination of likelihood
- Determination of consequences
- Combination of consequences and likelihood, within the context of existing controls, to yield a measure of risk (risk level)

d. Risk Evaluation

The fourth phase of risk management is prioritisation of risks. After risks have been identified and analysed a large list of risks and a measure of the severity of each of those risks has been established. In risk evaluation, the risks are prioritised; i.e. they are ranked in order of severity, using pre-agreed criteria.

e. Risk Treatment

Risk treatment options include:

- Risk avoidance
- Risk acceptance and establishment of a risk financing plan
- Reduction in the likelihood
- Reduction in the consequences
- Risk transfer
- Retention of residual risk

f. Action Planned, Monitoring and Review

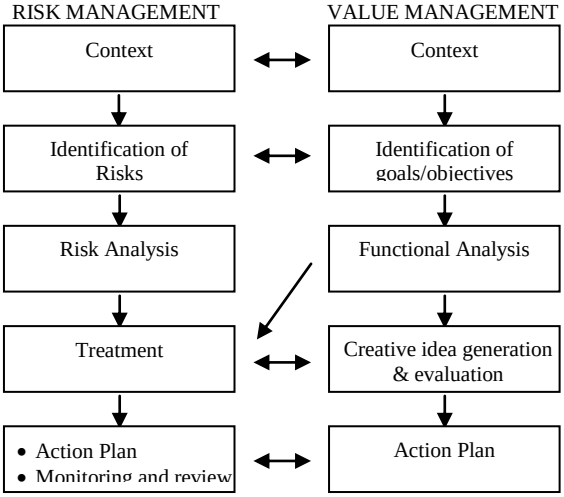
VALUE MANAGEMENT

Value Management is a structured, systematic and analytical process, which seeks to achieve value for money by providing all the necessary functions at the lowest total costs consistent with required levels of quality and performance. Methodology for Value Management following the Australian Standard AS4183 involves six steps, as follows:

1. **Information phase: Overview of the** context and goals
2. **Functional analysis:** Identification of key functions – the purposes of each component, why it exists, the cost of providing the function, the worth, what it must do, what can it do.
3. **Creative ideas and generation:** Generation of creative alternatives through brainstorming and other creativity techniques – can we simplify, combine or eliminate etc.
4. **Evaluation and development:** Comparison of ideas and short-listing the most promising for further investigation.
5. **Action plan:**
6. **Recommendations for implementation:**

USING VALUE MANAGEMENT IN RISK MANAGEMENT

The diagram below shows how the two can be linked together.



As can be seen from above, project context objectives and goals need to be common feature. Whereas in risk management, risks have to be identified in the context of project goals and objectives, these are important in value management for the purposes of functional analysis.

The greatest benefit of value management in risk management could come from applying it at the risk treatment stage. At this stage there could be a number of options for treating the risk but there would be only one option which is the "best", and for selecting that option, "value management" could be effectively applied. This is illustrated by a

case study below, which is just one example of how value management can build value in risk analysis.

CASE STUDY

A steel framework supports a multi storey brick and concrete car park over several freight train lines. There is a rail junction, crossover as well as several catch points under it. The car park structure is presently at risk of collapse over the train if a derailment occurs in or around the junction or crossover resulting in collision with the supporting column(s) of the car park structure. This Car Park is attached to the RSL Club, is hardly used because of its shaky structure, and is actually owned by the Railways.

The objective of the risk management plan was to identify and analyse the risks posed and recommend appropriate risk mitigation strategies.

A number of risk scenarios were identified as listed below:

- Driver jumps signal – runs through Up and Down catch points
- Roll back on Up Goods line – Down Goods catch point
- High speed train on the line
- Derailment due to wagon fault/screwed journal. (increases due to the project)
- Car falling from car park
- A vehicle falls from the bridge
- Train collision on the new crossover
- Track failure
- Signalling failure
- Vandalism or sabotage causing derailment – 1m high fence
- Vandalism or sabotage causing derailment due to easy access from the training school
- Container (out of gauge) hitting the columns
- Incorrect manual working directions from signaller to driver

Consequences of most of the above risk scenarios was the train hitting the columns supporting the car park structure with the result of the structure collapsing over the train.

Each of these risk scenarios were then subjected to a risk analysis that involved:

- Looking at the likelihood using an agreed probability rating scale
- Looking at the consequence scenarios for each risk scenario (in other words what would happen if risk scenarios was to eventuate)
- Working out a consequence rating for each consequence scenario using an agreed rating scale
- Working out an overall risk level for each consequence scenario.
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- Table 1 shows the likelihood of risk scenario 1: Driver jumps signal – runs through Up and Down catch points. This table also shows the various consequence scenarios associated with this risk, consequence ratings and overall risk level.

TABLE 1

No	Risk Scenarios / Factor	Likelihood		Consequence Scenario	Consequence		Risk Level	
		Rank	Rated		Rank	Rated	Rank	Rated
1.	Driver jumps signal – runs through Up and Down catch points	M-L	0.3	Down Goods – SPADS and doesn't derail	N	10	N	3
				Down good – SPADS and derails, structure collapses	E	160	E	48
				Up Goods – shunts across, doesn't derail (new)	N	10	N	3
				Up Goods – shunts across and does derail, hits structure or other train	E	160	E	48
				Up Goods – shunts across 788C and derails (new)	L	20	N	6

N= Negligible, L= Low, M= Medium, E= Extreme

In the case of this risk scenario, there were two consequence scenarios with "extreme" risk levels, namely Down Goods train derails and hits the columns collapsing the car park structure and Up Goods train shunts across, derails and hits the column collapsing the car park structure.

Table 2 shows the risk mitigation strategies that were thought to be pertinent for one of these consequence scenarios.

TABLE 2

Consequence Scenario	Risk Mitigation Strategies	Further Action Required
Down Goods – SPAD and derails structure collapses	• Driver training	• Bring to the attention of operators new signals
	• Lower train speeds	• Put in Speed boards
	• Selective protection of columns - deflection wall - beams that would allow some columns to be taken out	• Investigate options in this regard
	• Install guard rails	• Investigate
	• Demolish car park	• Investigate
	• Full column protection	• Investigate

As is obvious that there were four risk mitigation options recommended for further investigation. Similarly for other risk scenarios and resulting consequence there were risk mitigation options recommended. In general, it was found that selecting one of the following four risk mitigation options, mitigated most of the risks consequences with high or above risk levels:

- Selective protection of columns – Option 1
  - put in a deflection wall as well.
  - put in beams that would allow some columns to be taken out
- Install guard rails – Option 2
- Demolish car park – Option 3
- Full column protection – Option 4

With the overall goal being to avoid train accident and objective(s) being to mitigate the associated risks, these options were evaluated using value management technique.

Value Management calls for a six-stage process beginning with the definition and agreement of the problems and the gathering and sharing of all available information prior to creatively exploring new or alternative solutions. Ideas are generated and then carefully evaluated by the stakeholder in a workshop situation.

In summary, the VM process that followed RM exercise in this case was:

An evaluation criteria as follows, was agreed in a stakeholder workshop:

- Ensure safety of train operations and public safety.
- Solution should be cost-effective.
- Solution must provide smooth and efficient train operations.

1. Using paired comparison technique and value judgement weightages were applied to the evaluation criteria on a scale of 1 to 10, with 10 being the most preferred criteria.

2. Options were then evaluated in the workshop, against the evaluation criteria on a scale of 1 to 10, with 10 marks being given if that Option fully satisfies that criterion.

3. Option 4 was rated the highest at 94 marks out of 100 marks followed by Option 3 with 80 marks.

"Demolish Car Park" therefore came out to be the most preferred Option. I might add here that in absence of the VM Study site engineers were planning to go for Option 4 – Full Protection of Columns, because as engineers this appeared to them to be the best "engineering solution".

CONCLUSION

This case study established how value management technique can be used successfully in risk management to build value. In this case, the result was:

Reduced - *safety risks*
- *Capital cost*
- *Design and construction time*

Increased - *Safety of train operations*
- *Functional efficiencies (speed restrictions of trains done away with)*

Ensured - *input by all stakeholders*
- *acceptance by train operators*
- *optimisation of resources to be used*

Clearly, using value management with risk management enabled applying stimulating ideas, improved functionality and resulted in building value and reducing cost.