# PERFORMANCE DASH BOARD: MEASURING AND MONITORING CONTRACT RISK STATUS BY USING 5X5 MATRIX

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**Abstract.**
Business Support group is one of a section under Maintenance Support Department that responsible to provide and to monitor contract to support field operation. A certain amount of budget has been approved and every three 3 years the contract should be renewal. The contract renewal or extension processes have to follow the standard serial process from start to end that need a certain time. Six months up to one year is needed to process a contract from start to end. There are 23 contracts that should be extended and monitored regularly to make sure the continuity of the program. The contract will be expired if budget that has been approved or time duration is expired.
A simple modified 5 x 5 priority matrix is developed to monitor the contract status by displaying the three variable relationship between current contract budget remaining , current contract time duration and renewal contract serial process status . Severity is considered to be the severity of the contract status. The purpose of a matrix is to identify the renewal contract process related to current contract status. This status is divided into three category that high priority, medium priority and low priority. These bands are often allocated colors such as red for the highest risks to green for the lowest. Sometimes each band in a matrix is allocated a numerical value or range. The multiplication of budget remaining or duration implies a quantitative basis. A shift of emphasis from the high priority assessment stage to the medium or low status may lead to better and more timely decision making and better use of resources. If the status is high a quick action must be executed.
The performance or of the up dated contract status or the severity is used as a simply indicator for performance dash board of business support group performance that responsible to provide contract continuously.

Key words: 5 x 5 Priority Matrix, Severity and Performance Dashboard.

## Introduction

Company using the balanced scorecard as the corner stone of a new strategic management system have two task: first, they must build the score card, and, second, they must use the score card.

There are four perspectives that should be measured such as:

| Perspective | Generic Measures |
|---|---|
| Financial | : Return on investment and economic value added |
| Customer | : Satisfaction, retention, market, and account share |
| Internal | : Quality, response time, cost and new product introduction |
| Learning and Growth | : Employee satisfaction and information system availability |

In the customer perspective of the Balanced Scorecard, companies identify the customer and market segment in which they have chosen to compete. These segments represent the sources that will deliver the revenue component of the company's financial objectives. The customer perspective enables companies to align their core customer outcome measures- satisfaction, loyalty, retention, acquisition, and profitability to targeted customer and market segment. All of above could be achieved if contract continuity could be continuously served the customer. The contracts have to be preserved all the time. If the contract is expired, the new contracts have to be ready to replace the previous contract. Monitoring is mandatory.

To develop a contract need serial proses from submitting the budget to CRC (Contract Representative Committee) , develop scope of work, invitation to the bidder , bidder selection and many other process that finally prepare notification for the winner. These processes some time need six up to one year period.So the contract status is a key factor. Budget remaining and time remaining should be monitored regularly to determine when the new contracts have to be started for renewal to maintain contract continuity. If the contract is expired and the new ones is being processed, no maintenance activities could be executed that will make the customer are disappointed

To keep it simple and risk could be identified in advance, a simple matrix was designed as a tools. The matrix is referred to Risk Matrices.

Risk matrices are very commonly used during hazard identification and risk assessment processes (Cook 2008). They are used to: articulate the level of risk associated with an identified hazard; to rank risks and thereby propose actions; to justify a proposal or action; and to re-assess risk to demonstrate the effectiveness of a control (residual risk) (Cook 2008; Cox 2008; Smith, Siefert and Drain 2008). Risk matrices provide a construct for people needing to display the two variable relationships between

Likelihood and consequence that are considered to be the elements of risk (Standards Australia 2004). A Risk Matrix is a tool used to allocate a level of risk to a hazard from a pre-defined set. An example is shown in Figure 1. Two dimensional matrices are most common but not exclusive (Hewett, Quinn, Whitehead and Flynn 2004) and are lauded as "simple, effective approaches to risk management" (Cox 2008). They are used in many countries (Papadakis and Chalkidou 2008) and promoted through international standards (Standards Australia 2004; Cook 2008)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Likelihood | Very likely | 5 | 5 Low | 10 Medium | 15 Medium | 20 High | 25 High |
| | Likely | 4 | 4 Low | 8 Medium | 12 Medium | 16 High | 20 High |
| | Possible | 3 | 3 Low | 6 Low | 9 Medium | 12 Medium | 15 Medium |
| | Unlikely | 2 | 2 Low | 4 Low | 6 Low | 8 Medium | 10 Medium |
| | Very Unlikely | 1 | 1 Low | 2 Low | 3 Low | 4 Low | 5 Low |
| RISK RATING MATRIX | | | 1 | 2 | 3 | 4 | 5 |
| | | | Minor | Moderate | Significant | Serious | Major |
| | | | Impact | | | | |

Figure 1 example of risk matrix

We cannot always decide upon the activities with which we are involved. In the many sector, high impact/high likelihood risks can be avoided by opting out of that part of the business. Risk management therefore plays an important role in helping to manage risks and opportunities in a practical and cost effective manner. Some risks will require very little management whereas others will require a more managed and structured approach. This toolkit is designed to help in this process and describes a simple methodology to maximise the opportunity to achieve expected results.

This toolkit will work through the following questions:

- **What do you want to achieve?**
- **How big is the risk?**
- **What has been done about it?**
- **What else do you need to do about this?**

## The basis of risk matrices

Risk matrices are tools that allow the categorisation of risk using, for example, "high", "medium" or "low". The definition of risk in the OHS discipline is not universally agreed and this, in itself, presents difficulties in the communication of the outcomes of risk assessment (Cowley and Borys 2003; Viner 2003). However, a widely accepted definition in Australia is the "effect of uncertainty on objectives"

(Standards Australia 2009 p1).

A further definition that is of particular use with regard to work place safety is that of Rowe (1988) who defines risk as the "potential for the realisation of the unwanted, negative consequences of an event." Risk is generally considered to be derived from an estimate of probability or likelihood and consequence or severity (Cagno, DiGiulio and Trucco 2000; Health and Safety Executive 2001; Middleton and Franks 2001; Bender 2004; Cox 2008). Viner (1996) proposes that risk is a function of frequency (probability x exposure) and consequence (the unwanted negative or adverse result of the event). Herein risk will be considered to be the generally accepted function of likelihood and consequence (Donoghue 2001; Cox 2008; Smith, Siefert et al. 2008) i.e. $R = f(L,C)$, where L and C can be quantified on ratio scales making the multiplication operator meaningful (Martin and Pierce 2002; Standards Australia 2004).

Thus, most matrices employ likelihood and consequence as their x and y axes and therefore it is generally accepted that Risk = Likelihood x Consequence (R=L x C) (Donoghue 2001; Standards Australia 2004; Cox 2009). The purpose of the matrix is to reduce the continuum of risk into ranges or bands of equal risk e.g. high, medium or low risk. These bands are often allocated colours: red for the highest risks to green for the lowest giving rise to the term 'Heat Map'. Each band in a matrix and the allocated risk level is sometimes given a numerical value or range. However, quantifiable data is often unavailable and so semi quantifiable or qualified arguments are used (Clemens and Pfitzer 2006). Whether or not numerical scales are used the qualitative risk scale implies the existence (at least in principle) of an underlying quantitative risk scale that it maps to (Cox 2009). Knowledge about hazards and their effects is required for effective estimates of risk based on qualitative parameters (Donoghue, 2001, p. 121). Decision Matrix / Selection Matrix Evaluating Alternative Choices A decision matrix is a chart that allows a team or individual to systematically identify, analyse, and rate the strength of relationships between sets of information. The matrix is especially useful for looking at large numbers of decision factors and assessing each factor's relative importance. A decision matrix can be used for multiple purposes. It may be used when trying to identify what decisions or solutions are the most viable, or it may be used to help select a problem to work on. It is frequently used during quality planning activities to sect product or service features and goals and to develop process steps and weigh alternatives. For quality improvement activities, a decision matrix can

be useful in selecting a tsk and in evaluating which solutions or decisions are the most viable .A decision matrix or selection matrix is essentially an array that presents on one axis a list of alternatives, options or solutions. These are evaluated with respect to a list of criteria which are weighted by their respective importance in the final decision. These criteria and their weights are shown on the other axis.

| BUDGET REMAINING | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 % | 5 | 5 Low | 10 Medium | 15 Medium | 20 High | 25 High |
| | 25 % | 4 | 4 Low | 8 Medium | 12 Medium | 16 High | 20 High |
| | 50 % | 3 | 3 Low | 6 Low | 9 Medium | 12 Medium | 15 Medium |
| | 75 % | 2 | 2 Low | 4 Low | 6 Low | 8 Medium | 10 Medium |
| | 100 % | 1 | 1 Low | 2 Low | 3 Low | 4 Low | 5 Low |
| | | | 1 | 2 | 3 | 4 | 5 |
| RATING | | | 100 % | 75 % | 50 % | 25 % | 0 % |
| | | | NEW CONTRACT PROCESS IN PERCENT OF COMPLETION | | | | |

Figure 2 Budget Remaining vs New contract Process

## How To Use the matrix.

Matrices are typically an array of cells presented as squares or rectangles in rows and columns representing risk categories or levels. The number of risk categories within a matrix is determined by the organisational requirement for specific actions with respect to the risk category (Smith et al., 2008, p. 2). For example, within a matrix having three categories of risk, the organisation may dictate that work must cease when a hazard is categorised as high-risk but proceed when categorised as low-risk. Some predetermined actions may be required if the risk is categorised as “moderate”.

In this matrix using a 5 x 5 matrix that having such as: percentage of new contract process and five level of budget remaining in per cent. (For example, low, moderate, high, very high and extreme) a range of additional actions may be included compression’, where risks with significant variation in likelihood and or consequence might become grouped into the same category (Cox, 2009, p. 101) (Hubbard,2009, p.130). The parameters applied to the x and y axes also vary and some matrices illustrate risk increasing from left to right and bottom to top. Others represent the reverse with increasing risk towards the left or top down (Alp, 2004, p. 36).Some matrices are purely qualitative and use words to express likelihood and consequence (Bender, 2004, p. 2) (Standards Australia 2004). Qualitative analysis is used when quantitative data is not available or when the more onerous quantitative methods are impractical. (Standards Australia 2004).Semi-quantitative and quantitative risk matrices incorporate in the likelihood or consequence arguments, data derived from injury statistics or epidemiological studies, for example. Use of historic data may however be problematic as incident rates vary over time and data collection may be biased (Donoghue 2001; Gadd, Keeley and Balmforth 2004; Hopkins 2004; Hopkins 2005; Smith, Siefert et al. 2008). The number of incidents and injuries within organisations is usually too low to provide a basis for quantification of risk (Health and Safety Executive 2001). If the numerical value of both likelihood and consequence are known, then the quantitative measure of risk is also known based on R = L x C. In this case, a Risk Matrix is not required to rank hazards as this will be self evident. Consequence values in quantitative matrices are often represented by ranges because they are dependent on conditional factors. This lack of ‘point value’ is considered to be a weakness (Smith, Siefert et al. 2008). Establishing this ‘point value’ through accuracy in

the estimation of likelihood and consequence is impractical in most cases. Despite it representing objectivity, the expense in time and resources for investigation, testing and analysis exceeds the capability of the organisation and the time frame of the project (Smith, Siefert et al. 2008.

In this application using new contract process and budget remaining as a hierarchy of criteria. Place new contract process on axis and budget remaining on ordinate.

Example is using new contract process in per cent. Absis is divided in to five groups.

0 % of new contract process is equal to five.

25 % of new contract process is equal to four.

50 % of new contract process is equal to three.

75 % of new contract process is equal to two.

100 % of new contract process is equal to one.

Develop another hierarchy of criteria such as budget remaining and place on ordinate. Example is using budget remaining in per cent. Ordinate is divided in to five groups.

0 % of budget remaining is equal to five.

25 % of budget remaining is equal to four.

50 % of budget remaining is equal to three.

75 % of budget remaining is equal to two.

100 % of budget remaining is equal to one

| TIME REMAINING | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0 % | 5 | 5<br>Low | 10<br>Medium | 15<br>Medium | 20<br>High | 25<br>High |
| | 25 % | 4 | 4<br>Low | 8<br>Medium | 12<br>Medium | 16<br>High | 20<br>High |
| | 50 % | 3 | 3<br>Low | 6<br>Low | 9<br>Medium | 12<br>Medium | 15<br>Medium |
| | 75 % | 2 | 2<br>Low | 4<br>Low | 6<br>Low | 8<br>Medium | 10<br>Medium |
| | 100 % | 1 | 1<br>Low | 2<br>Low | 3<br>Low | 4<br>Low | 5<br>Low |
| | | | 1 | 2 | 3 | 4 | 5 |
| RATING | | | 100 % | 75 % | 50 % | 25 % | 0 % |
| | | | NEW CONTRACT PROCESS IN PERCENT OF COMPLETION | | | | |

Figure 3 Time Remaining vs. New contract Process

In this application using new contract process and budget remaining as a hierarchy of criteria. Place new contract process on axis and budget remaining on ordinate.

Example is using new contract process in per cent. Absis is divided in to five group.

0 % of new contract process is equal to five.

25 % of new contract process is equal to four.

50 % of new contract process is equal to three.

75 % of new contract process is equal to two.

100 % of new contract process is equal to one.

Develop another hierarchy of criteria such as time remaining and place on ordinate. Example is using time remaining in per cent. Ordinate is divided in to five group.

0 % of time remaining is equal to five.

25 % of time remaining is equal to four.

50 % of time remaining is equal to three.

75 % of time remaining is equal to two.

## Calculation of Risk Score

The score levels assigned to the “new contract process” and “budget remaining or time remaining” is multiplied to provide the risk score:

Risk Score = value on absis criteria times value on ordinate.

## Purpose of Risk Assessments

A risk assessment is nothing more than a careful examination of what could cause harm to operational condition, so that enough precautions or an action could be executed to prevent harm.

Some organisations use one matrix for assessment of risk associated with business risk and a different matrix to assess risk associated with exposure to work place hazards.

## Monitor and Review

The scale of many hazards will be familiar to those undertaking the work activity but a simple 5x5 scoring system can be used to help identify the high risk activities.. Hazards can be ranked listing those control measures are already in place. (Theoretically, in the case of new activities there may be no or few control measures.) Score the risks using the 5x5 matrix. Then examine whether the risk is adequately controlled or whether additional control measures are needed. The second round of scoring should indicate whether the risk has been further controlled and whether the additional control measures have really made any difference.

It is inevitable that different individuals will allocate different scores to hazards. Minor variations are not a problem and the scoring is intended to be a quick and easy ranking system not requiring intense debate or weighing up – what is important is that priority is given to the highest risks. Local variations may be acceptable to accommodate aspects such as reading ability of users of this information. Examples may be use of ‘low’, ‘medium’ and ‘high’ terms as well as descriptions of particular hazards such as ‘slightly harmful’, ‘harmful’ and ‘extremely harmful’. As a guide to using the scores arising from risk assessments the following action is likely to applicable to risks falling in each colour band

• **Low** – monitor workplace arrangements to ensure that the risk is adequately controlled. Special measures may not be necessary;

• **Medium** – actions to be taken in proportion to the risks;

• **High** – activity may need to be stopped, reduced in some way or a range of control measures put in place to maintain a safe workplace.

## What is a risk?

Wherever there is a decision or action to be taken, there lies a risk potential.

There are many definitions for 'risk' of which the following is just one example:

"Risk is the chance of something happening that will have an impact on objectives"

This means that risk can be seen as a negative threat or a positive opportunity .A threat is anything that could hinder the achievement of business goals or the delivery of customer / stakeholder expectations. It's not always a bad thing, as there is no activity without risk, it's in the very nature of things. What is bad is when it's a surprise and has an adverse impact on the whole enterprise or where there is an event that seriously affects a stakeholder. Opportunities are often described as the added benefits arising from the implementation of the opportunity – benefits that are over and above the achievement of the original objective. Opportunities may be wider than this and encompass the opportunity to add benefit by deliberately taking risks through choice.

Some people confuse risk and hazard. A hazard is the source or origin of the event. For example, a swimming pool filled with sharks is a hazard. It's only when someone might fall in does it become a risk. There can be many hazards around but it is only when people, systems, property etc are exposed to them that they become risky.

## Working through the risk assessment process

Identifying the risk

In order to manage risk it is necessary to know what risks exist or might occur. Understanding where risks might exist and how to deal with them helps to ensure that all the positive things we plan do happen and that we identify and prevent any of the negative things from occurring that could stop or cause us to revise these plans or cause harm. When thinking about risks you can look at events such as the failure of a database, criminal prosecution, increase in demand for services or a process such as the management of health and safety, financial control or client care management. First, set out the objectives of the activity to be examined. It may help to have key documents available such as the current annual business operating plan, medium term plan, project brief, performance indicators etc. Using these documents you can start to identify your risks.

You should think about risks in terms of

Event = Consequence times Impact or absis times ordinate

Having compiled a list of risks it is necessary to assess which of these are going to pose the greatest threat (or opportunity) and this is done by looking at both impact (what harm might result from the risk) and likelihood (chance of the risk occurring).

When assessing risks you are simply looking at what might happen, the chances of it happening and when. This assessment can be achieved through rating each risk. A 5x5 matrix is used for this purpose. By considering these factors and giving each risk a score you will quickly be able to rank these and identify which need early and closer attention.

## Early warning indicators

The sooner you know something is not going to plan or events are happening around you that will impact upon objectives the quicker you will be able to take corrective action and get back on target or amend your course of action / priorities to reflect changing circumstances.

Early warning indicators are used as a way of measuring change in local critical areas so that if pre-defined levels (tolerance levels or appetite) are reached, corrective action will be triggered. To be effective they need to be monitored on a regular basis and the findings presented in such as way that the information can be quickly assimilated. Early warning indicators should be specific to the risk and should not be confused with Key Performance Indicators. Indicators should be reviewed and updated to ensure they remain appropriate. When establishing an indicator you should establish from the outset what information is to be collected, the reporting frequency and trend or tolerance thresholds.

Early warning indicators can be applied to strategic and operational risks

**CONTRACT MONITORING STATUS**

| Description | Budget Remaining | Time Remaining | New Contract Process | Budget VS Contract Process | Time VS Contract Process | Highest Risk |
|---|---|---|---|---|---|---|
| Contract no 1 | 3 | 4 | 4 | 12 | 16 | 16 |
| Contract no 2 | 4 | 3 | 3 | 12 | 9 | 12 |
| Contract no 3 | 3 | 3 | 4 | 9 | 12 | 12 |
| Contract no 4 | 4 | 4 | 5 | 16 | 20 | 20 |
| Contract no 5 | 3 | 3 | 4 | 9 | 12 | 12 |
| Contract no 6 | 3 | 3 | 4 | 9 | 12 | 12 |
| Contract no 7 | 4 | 4 | 3 | 16 | 12 | 16 |
| Contract no 8 | 2 | 3 | 3 | 6 | 9 | 9 |
| Contract no 9 | 3 | 2 | 3 | 6 | 6 | 6 |
| Contract no 10 | 3 | 3 | 4 | 9 | 12 | 12 |
| Contract no 11 | 3 | 3 | 3 | 9 | 9 | 9 |
| Contract no 12 | 3 | 2 | 3 | 6 | 6 | 6 |
| Contract no 13 | 4 | 4 | 5 | 16 | 20 | 20 |
| Contract no 14 | 4 | 4 | 4 | 16 | 16 | 16 |
| Contract no 15 | 3 | 2 | 3 | 6 | 6 | 6 |
| Contract no 16 | 4 | 4 | 4 | 16 | 16 | 16 |
| Contract no 17 | 3 | 3 | 4 | 9 | 12 | 12 |
| Contract no 18 | 4 | 4 | 3 | 16 | 12 | 12 |
| Contract no 19 | 2 | 3 | 3 | 6 | 9 | 9 |
| Contract no 20 | 3 | 2 | 3 | 6 | 6 | 6 |
| Contract no 21 | 3 | 3 | 4 | 9 | 12 | 12 |
| Contract no 12 | 3 | 4 | 3 | 12 | 12 | 12 |
| Contract no 23 | 3 | 4 | 4 | 12 | 16 | 16 |

Figure 4 Result of contract monitoring

## Summary

Risk Matrices are used to categorise and prioritise risks. However, there appears to be little scientific analysis of their value in improving risk related outcomes. The lack of specifications for Risk Matrix

design may cause confusion through the variations in the number of rows and columns, the values on the x and y axes and the direction of risk scaling within the matrix.

A widely used definition of risk involves the multiplication of likelihood and consequence. In this application 5 x5 matrix is design to monitor contract status.

Figure 4 is the actual status of contract monitoring. Some of them are high risk with the value of 16 and higher. Some of them are medium risk having value 5 up to 15 and the remains are low risk.

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## References

Dermawan Wibisono , Konsep,Design, dan Tkenik Meningkatkan Daya Saing Perusahaan (2006)

Robert S Kaplan , David P .Norton , The Balanced Scorecard (1996)

Risk Matrices: implied accuracy and false assumptions .by Alexander Pickering ,Stephen P Cowley1 Journal of Health & Safety Research & Practice volume 2 issue 1 october 2010

Cox, L. A. (2008). What's Wrong with Risk Matrices? Risk Analysis: An International Journal 28(2)

Cox, L. A. (2009). Risk Analysis of Complex and Uncertain Systems, Springer, New York