Comprehensive Risk Abatement Methodology as a Lean Operations Strategy

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ABSTRACT

Conventional Analytical and Maintenance procedures are assimilated into a Comprehensive Risk Abatement Strategy comprising Process, Objectives, Balanced Progress Methodology and Lines of Communication between process and objectives. This Comprehensive Risk Abatement Strategy (Enterprise Wellness Way) is applicable to all types of enterprise (manufacturing, service and medical).

Keywords: Asset Management, Process Improvement, Quality Control, Reliability Optimization, Risk Abatement

INTRODUCTION

This paper is focused on: (1) developing a definition for Comprehensive Risk, (2) creating a Comprehensive Risk Abatement Strategy and (3) devising an organizational structure to execute that strategy. Most of the paper is directed toward item (2) because the creation of a Comprehensive Risk Abatement Strategy requires substantial innovation and change. Once the risk abatement process is explained, a case study is presented to show the application of this methodology.

Comprehensive Definition of Risk

By classical definition:

\[
\text{Risk} = \frac{\text{Cost}}{\text{Time}} = \frac{\text{Consequence}[\text{Failure Frequency}]}{\text{opportunities/time}(\text{failures/opportunity})}
\]

where

Consequence = cost/failure

Failure Frequency = \[\frac{\text{opportunities/time}(\text{failures/opportunity})}{\text{opportunities/time}}\]

Failures/Opportunity = 1 - Reliability

The equation Risk = \[\frac{\text{Consequence}}{\text{opportunities/time}(\text{failures/opportunity})}\]

is of the form \(c = xy\) and, taking risk as a constant, it comprises a family of hyperbolas each with a different value of risk. The hyperbolas all lie in the first quadrant with the x-y axes as asymptotes. The transformation from \(c = xy\) to \(\log(c) = \log(x) + \log(y)\) shows that \(\log(x)\) and \(\log(y)\) are linearly related with a slope of -1 and both \(\log(x)\) and \(\log(y)\) intercepts are equal to \(\log(c)\). In other words, the equation \(\log(c) = \log(x) + \log(y)\) represents a family of straight lines on a

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log-log plot; each line has the same intercepts on both axes. This algebraic concept is frequently represented graphically by the Classical Risk Matrix which is a useful tool to: (1) estimate the magnitude of a particular risk, (2) identify the consequences of asset failure, (3) match maintenance strategy to risk level, (4) identify risks you will not carry, (5) track the effectiveness of asset risk reduction steps and (6) determine the relative impact of multiple choices.

However, in recent years, the words risk, cost and failure have come to mean different things to different investigators. For example, in global supply chain management risk is often defined as the uncertainty of outcomes (Bauer, 1960; Taylor, 1974; Sheth & Parvatiyar, 1995) or unanticipated variation (Miller, 1992; Thompson, 1967). Risks are qualitative in nature and are compartmentalized in broad spectrums such as macroeconomics, policy, competition and resource (Ghoshal, 1987; Govindarajan, 1988).

Large manufacturing organizations frequently use a Classical Risk Matrix based on Consequence versus Failure Frequency but utilize only general consequence definitions such as no impact, slight impact and considerable impact (Kelly, 2006); numerical assessments are not viewed as essential.

For small manufacturing enterprises, failure frequently means unexpected equipment breakdown and cost means equipment replacement cost. This narrow definition of failure ignores the consequences of performance deficiencies for employees, materials and methods. It ignore the consequences of Traditional Waste comprising overproduction, wait time, transportation, processing, inventory, motion and defects (Dailey, 2003). It ignore the consequences of injury, litigation and damage to company reputation. This narrow definition of cost ignores the total, company-wide cost of failure.

The practitioners of Six Sigma quantify risk by means of a Risk Prioritization Number (RPN) defined by (severity)(occurrence)(detectability) to prioritize risks by importance (Martin, 2007). The RPN might be used to order risks by importance but it does not directly relate to cost per unit time.

The author proposes a return to the classical definition of risk but with the following comprehensive definitions of failure and cost applicable to any enterprise:

$$\text{Failure} = \text{"Failure to Add Value" at every aspect of the Value Stream}$$

$$\text{Cost} = \text{Total company wide cost of “Failure to Add Value”}$$

Using this comprehensive and inclusive definition, risk may be defined as the total company wide cost of “Failure to Add Value” per unit time. This comprehensive definition includes performance deficiencies for employees, equipment, material and method. It includes the types of “Failure to Add Value” comprising traditional waste such as overproduction, wait time, transportation, processing, inventory, motion and defects. It includes the cost of injury, litigation and damage to company reputation. It encompasses the total cost of failure and not just the cost of remediation.

The quantitative entity of comprehensive risk must be minimized to stay competitive. Risk is consuming the hidden wealth of every enterprise. It is disguised and concealed as the “cost of doing business.”

**Organizational Structure to Execute Comprehensive Risk Abatement Strategy**

Given the comprehensive and inclusive definition of risk as stated above, we need a strategy for Comprehensive Risk Abatement and an organizational structure to execute that strategy. Let us first focus on the organizational structure. Risk Abatement is an Essential Objective during all Pre-operational Phases of an enterprise from Design through Construction. After construction is complete and the plant is commissioned, that phase of the Life Cycle called “Operation and Maintenance” begins. The objective of traditional maintenance is to “prevent all equipment breakdown having serious consequences.” This narrow scope for traditional maintenance ignores the consequences of performance deficiencies for employees, materials and methods.
Theories Used in Information Security Research: Survey and Agenda
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