Chapter 1
The Novel Approach

ABSTRACT

This chapter presents the novel Six Sigma DMAIC generic approach to Risk Management. The method is introduced first. In The Generic Approach and Algorithms section, generic mathematical concepts are elaborated. Also, four generic classes of applications of the proposed method are identified including: 1) Portfolio Management; 2) Quality Management; 3) Project Management; and 4) Income Management. Furthermore, four generic algorithms are elaborated for the respective four classes of application of the method. The generic algorithms include description and process flow of the applications. Finally, the modelling tools used in the book's elaborations are detailed, as well as references for how to use these tools and run Simulation and Stochastic Optimisation step-by-step.

INTRODUCTION

Six Sigma is not specially utilised for Risk Management on ongoing projects for process improvements considering the objective function and associated specific risk factors. Inspired by Bernstein, "*the risk will always be there, so we must explore many interesting tools that can help us to control risks we cannot avoid taking*" (Bernstein and Damodaran 1998), a new practical Six Sigma generic and stochastic approach to Risk Management has been devised. Considering that Six Sigma DMAIC methodology and Risk Management are generic, and very compatible and complementary processes, the proposed approach merges the two processes resulting in a powerful synergetic tool.

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This approach tactically applies the DMAIC framework into Risk Management in order to improve the process focussing on the objective achievement and associated risk factors, which is a new concept. The approach applies the conventional stochastic methodologies within the DMAIC framework. The synergy of these complementary methodologies provides for an important systematic improvement to any Risk Management. In addition to conventional techniques, the new concept involves:

1. Stochastic measurement of any risk management process performance by using the Six Sigma process capability metrics considering the objective achievement and major risk factors; and
2. Continuous monitoring and control of process performance by iteratively and recursively applying the DMAIC framework in order to meet the objective and mitigate risks.

THE GENERIC APPROACH AND ALGORITHMS

Generic Mathematical Concepts

All the mathematical calculations in the book are industry/business specific so they are presented in the individual chapters of the book. However, there is only one exception, that is the calculation of the Six Sigma capability metrics, which is presented below.

In order to measure the process performance, the Six Sigma capability metrics, including *Process Capability* (*Cp*), *Process Capability Index* (*Cpk*) and *Sigma Level* (σ-*L*), are used. For this purpose, the following Six Sigma target parameters are specified for every measured attribute of the process: i) Lower Specified Limit (*LSL*); ii) Target Value (*TV*); and iii) Upper Specified Limit (*USL*). The definitions of *Process Capability* (*Cp*), *Process Capability Index* (*Cpk*) and *Sigma Level* (σ-*L*) are as follows (Montgomery 2004, Keller 2011).

- **Process Capability (Cp):** Estimates what the process is capable of producing if the process mean were to be centred between the specification limits. Assumes process output is approximately normally distributed. If the process mean is not centred, *Process Capability* (*Cp*) overestimates process capability. *Process Capability* (*Cp*) is calculated by the following formula.