Chapter X
A Cognitive Machine in the Organization of Study

INTRODUCTION

Chapter X is concerned with the design of a management control system whose functional elements execute cognitive tasks of analysis, decision and control of the organization process performance. The management control system works in the form of an Adaptive Learning Cycle (ALC) whose principles of operation are based on single-loop and double-loop learning. Among its elements, it includes the participation of a cognitive machine whose responsibility involves the evaluation of the organization process performance through the tasks of analysis and decision. The design of the cognitive machine is reinforced with a set of criteria along with qualitative and quantitative analysis. Chapter X is complemented with Appendixes F, G and H. Appendix F defines the state variables (X) which are used in the management control of the organization process performance. Appendix G presents linguistic descriptions of the mental models which were designed and written for the cognitive machine. Appendix H demonstrates theorem proof as part of the quantitative analysis of the cognitive machine.

OBJECTIVES

The proposal of the management control system in this chapter is motivated in order to:
a. Provide managers and stakeholders with data about the organization process performance, including information about quality and customer satisfaction.

b. Support managers in the analysis, decision and control of the organization process performance.

c. Reduce intra-individual and group dysfunctional conflicts which arise from managerial decision-making.

d. Enhance actions for continuous process improvement.

e. Improve the cognitive processes and thus the degree of cognition of the organization of study.

**SCOPE OF THE APPLICATION**

As a participant of NEC of Brazil (NOB) in the period between 1997 and 2000, the first author designed a management control system for the organization of study, and in particular, for the Telecommunications Management Networks (TMN) Section of the Engineering Department of the Radio Systems Division of NOB. Among the elements of the management control system, he introduced a cognitive machine which was responsible to evaluate the software process performance of the TMN Section through the tasks of analysis and decision. Therefore, in this particular application, the organization process performance was reduced to, and synonymous with, the TMN Section’s process performance.

The engineering of the cognitive machine, as demonstrated later in this chapter, was supported with criteria of design and analysis, and it was implemented in a personal computer through MATLAB software programs (Gilat, 2008). Through this approach, the first author simulated the participation of the cognitive machine in the management control system of the TMN Section of the Engineering Department of the Radio Systems Division of the NEC of Brazil (NOB).

**THE PURSUIT OF INNOVATION IN THE ORGANIZATION**

During the 1990’s, NEC of Brazil (NOB) was living in a climate for technological and organizational innovations in the sector of telecommunications and software business. Late in 1998, NOB was benefiting from its apogee in software and organization process improvement. It was at that period that NOB was promoting incentives to its employees through reward systems and awards such as The Industrial Director Honour Prize for innovators and contributors in the areas of organization process improvement, quality management, productivity growth, technology innovation,
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