Measuring Company Performance by Simulation

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Abstract: Simulation is the most widely used management science and operations research technique employed by industry and government. In its broadest sense, computer simulation is the process of designing a mathematical-logical model of a real system and experimenting with this model on a computer. This paper is based on the system simulation of a company in which several kinds of electronic instruments are repaired. Working system of the company is modeled and simulated by the ARENA software for academic purposes. Simulations for alternative models are run several times in order to improve system performance. Impressive improvements in system operations have been obtained by employing the simulation model for planning purposes.

Key-Words: Simulation, System Performance, ARENA, System Cost.

1 Introduction

Simulation is a technique that has been employed extensively to solve problems. Simulation models are abstractions of systems. They should be built quickly, explained to all project personnel, and changed when necessary. The implementation of recommendations to improve system performance is an integral part of the simulation methodology [1]. Simulation has been used to study such wide ranging topics as urban systems, social systems, transportation systems, health care delivery systems, and many more. Simulation is the most widely-used management science and operation research technique employed by industry and government. Some references to papers by areas of application can be given below.

The relation between capacity of deterministic models and the original stochastic models from which they are derived was first examined by Rybko and Stolyar and Dai [2, 3]. The use of continuous model techniques has been an active area of research over the past several years; see, for example, the work of Avram et. al. [4], Bramson [5], Chen [6], and Maglaras [7]. An extensive list of references may be found in Dai [8] and Pritsker.

There is a significant and growing literature for problem of server assignment to queues (both static and dynamic). Mandelbaum and Stolyar [9] examine a queuing system with flexible servers operating in parallel and show that for a strictly convex cost function (of the queue lengths),

a generalized $c\mu$ rule is asymptotically optimal. Squillante et al. [10] use simulation to study threshold policies for systems that consist of parallel queues. Laws [11] appears to be the genesis of most of the heavy-traffic related activity in this area, and study a dynamic routing problem.

As the use of modeling and simulation has increased, the need for languages oriented to specific problem types and industries has increased. Many special purpose simulation languages have been developed to meet these needs. It is known that there are distinct advantages to using simulation language. In addition to the savings in programming time, a simulation language also assists in model formulation by providing a set of concepts for articulating the system description. Pritsker and Happ [12] developed GERT, Harry Markowitz [13] developed SIMSCRIPT then SIMSCRIPT II.5, Pritsker and Pedgen [14] developed SLAM, then SLAMSYSTEM and TESS, Pedgen [15] developed SIMAN, then XCELL+ and WITNESS and so on.

In this paper, simulation model of a real company in which sort of defective instruments are repaired in seven departments is built, and then obtained system is analyzed by using ARENA software.

2 Methodology

In this paper, working system of a company where electronic instruments are repaired at seven departments