

# Simulations, Games and Experiential Learning Techniques:, Volume 1, 1974

## SIM<sup>Q</sup>, A BUSINESS SIMULATION GAME FOR DECISION SCIENCE STUDENTS: TOWARDS A TOTAL GAMING AND TEACHING PACKAGE

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### INTRODUCTION

The business simulation game, SIM<sup>Q</sup>, was especially designed for teaching applications of quantitative methods. For the past four years, this game has been used in the quantitative methods sequence in the MBA program at Georgia State University. The game has also been adopted at several other teaching institutions and used in a number of seminars and short courses. While this game has been used in certain cases for teaching general business policy and decision making, the focus of this paper will be on the originally intended use of SIM<sup>Q</sup> as vehicle for teaching applications of quantitative models.

In this paper, the manner in which the game is used to help meet the objectives of the quantitative methods sequence at Georgia State university will be explained. In addition, a gaming and teaching package, developed to assist instructors using SIM<sup>Q</sup> in the quantitative methods sequence will be described. This package consists of student assignments and related teaching materials, computer programs for quantitative applications, and a detailed instructor's guide.

### THE ROLE OF THE GAME IN THE QUANTITATIVE METHODS SEQUENCE

The game is employed in the second course of a two-course sequence required of all MBA students. This sequence is designed to familiarize students with a number of representative quantitative decision models, to provide insights into problems which arise in the development and use of quantitative models, and to increase the students general understanding of the role of quantitative analysis in business problems solving and decision making. Most of the quantitative techniques included as subject matter in the sequence are studied in the initial course. The second course in which the game is used is almost completely concerned with problems in the application of these tools. The focus is on the decision process and the way in which quantitative methods may aid the decision maker.

The game provides an environment in which students have the opportunity to experiment with the application of a number of models as aids to decision making. Teams of students serve as management teams for different companies in a single industry. Throughout the play of the game, the students are encouraged to apply a number of different quantitative decision tools for which the game was especially designed. This approach allows students to study many important aspects involved in the applications of quantitative techniques. Through the involvement in the game, students gain a better understanding of quantitative analysis, especially the subjective aspects of model development and use, than would be possible in a lecture/problem oriented class. Students are made aware of the major limitations and problems in the use of these techniques as well as the positive aspects.

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The major problems and concepts in estimating parameters, selecting relevant costs, defining objectives, and relating model results to the decisions at hand are easily brought out in the game environment. The necessity of the use of sensitivity analysis can be seen in almost every model the student encounters. Assumptions of the mathematical techniques and assumptions of the environment which are incorporated in the models become relevant to the students when they must use the models to arrive at decisions. The students are repeatedly confronted with the problem that most models incorporate a single objective but the results of the models are to be used to assist with decisions which must be made in light of multiple objectives. The game situation also enables students to see where a model utilized in one problem situation may yield peripheral results which shed light on seemingly unrelated problems.

### **STUDENT ASSIGNMENTS AND THE TEACHING PACKAGE**

The general teaching approach is to structure the course around a sequence of several assignments which are spread throughout the course and the play of the game. These assignments generally consist of applying particular quantitative techniques to assist the team in certain decision making areas. The use of assignments keeps the class together and leads to meaningful discussions since all members of the class are working simultaneously on the same decision problems.

The assignments include formulating company objectives, forecasting industry demand by methods of time series analysis, using linear programming to aid with product mix decisions, developing an economic order quantity model for ordering raw materials, developing a buffer inventory model to assist in determining economic levels of finished good inventories, analyzing relationships between demand, price, and advertising using multiple regression analysis, using simulation (Monte Carlo) to aid in the selection of an economic repair force size, and analyzing plant expansion from a capital budgeting point of view. Students are encouraged not to limit their analysis to those suggested in the formal assignments. Some analyses, such as forecasting cash flows, are suggested and expected of all student teams. Other more sophisticated models are often developed and used by the more interested and creative students.

These assignments are described and distributed in the teaching package, SIMQ Assignments and Related Materials. Also included in this package are the course syllabus and outline, material explaining quantitative techniques used in certain assignments, a list of related readings and references, material describing some of the computer programs available for student use, and a listing of an information file, assessable through remote time-share terminals, which contains historical data related to the game environment for use by the students in their analyses.

### **GAME SIMULATION PROGRAM**

The computer program for the business simulation game is written in BASIC for a time-share computer. At Georgia State University, students usually enter decisions and receive results via teletype terminals. The program

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has also been written in FORTRAN for batch processing. The FORTRAN version is readily available to faculty members at other institutions.

### COMPUTER PROGRAMS FOR QUANTITATIVE APPLICATIONS

An important benefit from using the game at Georgia State University has been that the students have become quite familiar with a large number of computer programs. For almost every major quantitative technique that the students are encouraged to use in the game, a computer program has been written which is easily accessible through a remote time-share terminal. Students are also encouraged to write their own programs for less complex analyses. The emphasis on the computer not only makes the game more exciting and interesting but also provides the students with an excellent understanding of the general role, advantage, and limitation of the computer in problem solving analysis.

Some of these programs are described in the teaching package SIMS<sup>Q</sup> Assignments and Related Materials. However most of the programs used by the student are explained in the computer application manual, Time Sharing System Applications in the Decision Sciences, developed by the faculty members of Department of Quantitative Methods at Georgia State University.

### INSTRUCTOR' S GUIDE

To assist instructors using SIM<sup>Q</sup>, a detailed instructor's guide has been developed. The guide presents a general approach for teaching the quantitative methods course at Georgia State University and gives suggestions for using the business simulation game as an instructional vehicle in this course. The general approach and specific suggestions are based on the experience of a number of instructors using the game at Georgia State University. This manual, Instructor's Guide to SIM<sup>Q</sup>, should also be quite helpful to instructors using SIM<sup>Q</sup> in quantitative courses at other institutions.<sup>1</sup> The guide explains the mechanics of using the required computer simulation program and gives suggestions pertaining to course outline, organization of teams, sequence of play of the game, general teaching approach, important topics and concepts to emphasize, student assignments, decision reports, board of directors meetings, examinations, and evaluation of students.

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<sup>1</sup> To obtain copies of the game simulation program, SIM<sup>Q</sup> Assignments and Related Materials, Time Sharing System Applications in the Decision Sciences, and Instructors Guide to SIM<sup>Q</sup>, write Arthur Nichols or Brian Schott, Department of Quantitative Methods, Georgia State University, University Plaza, Atlanta, Georgia, 30303. There is a \$25 handling charge for the game simulation program. The player manual (Nichols, Arthur C. and Schott, Brian, SIM<sup>Q</sup>: A Business Simulation Game for Decision Science Students, Dubuque, Iowa: Kendall/Hunt Publishing Company, 1973) must be ordered directly from the publisher.