Developments In Business Simulation & Experiential Exercises, Volume 19, 1992

A GRAPHICS APPLICATION EXTENSION FOR A SIMULATED DECISION SUPPORT SYSTEM ENVIRONMENT

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ABSTRACT

A procedure is described whereby a structured set of graphics produced by the Harvard Graphics personal computer software package was interfaced with the Business Management Laboratory (BML) business game simulation. BML was modified to produce data records for a data base schema of 108 variables which was maintained in both Lotus 1-2-3 and dBASE III Plus formats. An interface was developed to import data into Harvard Graphics from the Lotus 1-2-3 spreadsheet database to produce 28 graphs for a competitive analysis and 18 graphs for a firm analysis.

The graph parameters (e.g., graph type, color/pattern selections, data ranges) were specified so that the graphs could be easily updated from the most current data changes contained in the database. Individual graphs then were displayed on a color monitor while hard copies could be produced by a variety of personal computer interfaced printers and plotters.

TEACHING STRATEGIC MANAGEMENT ANALYSIS USING A BUSINESS GAME SIMULATION

The author is a teacher of a graduate business policy course who wished to create a course environment which approximated the analysis and decision making conditions that a business manager might expect to encounter in a typical business firm. A decision was made to utilize a business game simulation to generate data to be analyzed and engender managerial decision-making. The Business Management Laboratory (BML) business game of Jensen and Cherrington which simulates a firm that manufactures stainless steel flatware and kitchen aids was selected as the underlying structure for the competitive environment of the course. Three functional areas encompassed included: (1) marketing and sales, (2) plant and production, and (3) finance and administration. BML was modified to produce a data record containing 108 variables for each of eight firms each decision cycle. These data records were used to maintain a database in both Lotus 1-2-3 and dBASE III Plus formats. Two major analysis projects were outlined for the students: (1) a competitive analysis and (2) a firm analysis.

Identifying and assessing significant strategic factors that explain the nature of the competitive forces existing among the firms was the principal focus of the competitive analysis. From the data available in the database, a well-prepared analysis can clearly delineate the strategies pursued by each competing firm. The competitive analysis was performed after four of the eight total decision cycles.

Strategic factors for the individual firms were the core of the firm analysis. The analysis procedure utilized the concepts upon which the well-known Dupont formula is predicated. The firm analysis was performed at the conclusion of the simulation.

PROBLEMS ENCOUNTERED IN USING THE DATA BASE

Two problems in particular emerged as students utilized the database. The first problem concerned the inability, both human and computer hardware, to focus on large quantities of data. Although the query capability of dBASE III Plus performed as specified, monitor displays tended to he somewhat burdensome to assimilate. The second problem concerned the difficulty in interpreting values of dependent or related variables as they changed from one decision period to another. For example, trend analyses tended to be difficult to assess from the data base queries.

In addition, difficulties increased as the size of the database increased. This was certainly the situation for the two problems above. Maximum data base size for (he entire simulation was 108 variables for each of 8 firms for a total of 8 decision cycles.

ROLE OF THE DECISION SUPPORT SYSTEM

The evolving technology of decision support systems (DSS) offers: significant potential as a method to teach the fundamental tools of information management to business decision-makers; in this case, to business students. Primarily, the strengths of DSS lay in its capability to deal with semi-structured decision settings, settings characterized by the competitive environment of the game decision making as well as by the two analysis projects; a learning by doing approach.

One may define the technical components of DSS in terms of a black box which is opened successively to reveal mutually supporting subsystems and their interconnections. The inside of the box typically contains a model base. a data base, and the software systems which provide the linkages to each by the user.

For this student environment the model base software was provided by the STORM personal computer software package which offers numerous quantitative models, e.g., linear programming, investment analysis, forecasting, statistical tools, etc. What if scenarios were provided for by a Lotus 1-2-3 spreadsheet template developed especially for the BML constructs. Students were encouraged to utilize the DSS tools.

Notwithstanding, the focus of this dialogue is on the design and operation of the graphics application and its interface with the database.

PROVIDING GRAPHICS SOFTWARE CAPABILITY

Graphics had been incorporated previously into both the competitive analysis and the firm analysis at the time the database was developed initially. However, since no provision was made for a direct graphics interface, prior students queried the data base for the needed data and conveyed such data to an independent means of producing graphics, e.g., manual, various outside computer graphics software packages with drivers for plotters, printers, etc.

The graphing capability of Lotus 1-2-3 (version 2.1) was eliminated for several reasons. First, Lotus 1-2-3 permits a maximum of six data series (i.e., A, B, C, D, E, and F) while the maximum number of BML firms is eight; all BML firms could not be plotted. Second, Lotus 1-2-3 is limited to five graph types (i.e., line, bar, XY, stacked bar, and pie). Third, Lotus 1-2-3 provides no color selection; it is difficult to distinguish individual line graphs that are clustered. Fourth, Lotus 1-2-3 does not permit mixed graph types (e.g., stacked bar mixed with line graphs).

Two earlier attempts were undertaken to provide a computer graphics interface. The first attempt used the limited capabilities of the BASIC programming language to produce the individual graphs. The second attempt used a PASCAL programming language shell. Both attempts were abandoned due to the programming complexity and lack of flexibility when modifications were required for individual graphs.

Harvard Graphics software was selected to be interfaced with the Lotus 1-2-3 database. Selection was based on the capability of the package to produce the desired graphs, ease of providing and maintaining the interface with the data base, and the degree of user friendliness of the graphics package itself (e.g., ease of learning).

Students were furnished a floppy disk (one for the competitive analysis, one for the firm analysis) which contained a chart record for each graph. The parameters in the chart record included such specifications as graph type, color/pattern selections, data ranges, titles and variable names, etc. Individual students were encouraged to supplement the specified graphs with customized graphs derived from the database for their competitive analysis and firm analysis.

Computer generated graphics can significantly enhance the decision maker's understanding of the numerous relationships reflected by the data typically captured in a data base from a business game simulation. This is certainly evident as the number of decision variables increases and the nature of the relationships increases in complexity.