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USING DIS 'N DAT AS A DECISION SUPPORT SYSTEM FOR A MARKETING SIMULATION GAME

Alvin C. Burns, Louisiana State University
Ronald F. Bush, University of West Florida

ABSTRACT

The authors redefine Decision Support System (DSS) to fit the newest generation of business game which does away with hard copy and uses only disk file input and output. Their DSS includes a DIS which facilitates the team decision handling aspects of computer simulations, and it hosts a DAT which is a data base system utilizing Lotus 1-2-3 spreadsheets networked together with macros. Both DIS and DAT are described with examples. The authors conclude with a discussion of the benefits of DIS 'n DAT.

INTRODUCTION: PURPOSES OF THE PAPER

A decision support system (DSS) has been defined as,

...a coordinated collection of data, systems, tools, and techniques with supporting software and hardware by which an organization gathers and interprets relevant information from business and environment and turns it into a basis for...action (Little 1979).

Increased attention has been devoted to DSS's in the business literature recently, and they have been described as vital in business strategy decision making (see, for example, Churchill 1988, Dillon, et. al, 1990, Dressler, et. al, 1983, Kinnear and Taylor 1987, or Little 1979), appropriate to the high-technology contemporary business work environment, and their use is growing rapidly. The purpose of this paper, however, is not to chronicle the adoption of DSS's in industry. Rather, this paper is intended to describe how a DSS can be applied to batch-type simulation games. In fulfilling this goal, we reconceptualize the definition of a DSS with good reason, we believe, since the current generation of batch-play computer simulation games has a feature which permits this broadened definition. To be more specific, this paper will: 1) briefly describe batch simulation games and note the most recent generation available where traditional hard copy input and output been supplanted by files on diskettes; (2) define DSS for the purposes of this paper; (3) introduce and provide examples of DIS 'n DAT which constitute the DSS of a marketing management simulation game now available; and (4) summarize by extolling the benefits of MS 'n DAT accruing to both administrators and student-players. (Throughout, we confine our comments and examples to marketing management simulation games since this is the area with which we are most familiar.)

THE NEWEST GENERATION OF BATCH-PLAY COMPUTER SIMULATION GAMES

In a recent presentation sponsored by the American Marketing Association, Hi ms and Gentry (1990) reviewed twelve different "functional" batch decision marketing management games. By their definition, functional batch decision games are those where student teams compete as simulated companies in an industry, making their decisions for each period separately, but all processed in a single computer run. Similarly marketing management games are those which simulate the marketing environment for companies in a given industry where decisions on general marketing strategy such as product variation, price level, advertising, sales force size and allocation, research and development and marketing research, along with others are made each period. Burns and Gentry (1990) described the newest generation of marketing management simulation games as personal computer-based, using diskettes as the medium to accommodate inputs (decisions) and outputs (financial statements, marketing research results, etc.). in short, they proclaimed that batch- play computer simulations in marketing are out of the "hard-copy" business. No longer do students submit their decisions on forms to be keystroked by the game administrator into the program, and no longer are piles of computer paper output carried to class to hand out to teams. Now, each student teams hand in a team disk which contains a file holding their period decisions; the game administrator simply puts each team disk into his/her disk drive at the program's prompt; the simulation runs, and results are written onto each team disk as files to be printed out by the students later. While not all twelve of the marketing simulation games reviewed by these authors utilized the disk file exchange aspect totally, apparently enough did so to prompt the proclamation that there is a new era in this regard.

A REDEFINITION OF DSS CONSISTENT WITH THE NEWEST GENERATION OF BATCH-PLAY COMPUTER SIMULATION GAMES

Historically, it appears that the application of DSS to computer simulation games has been faithful to the definition of DSS noted earlier. That is, designer/authors such as (Markulis and Strang 1985, Fritzsche et. al. 1987, Krishnamoorthy et. al. 1987, Palia 1989, for instance) have enticed their student-participants to create their own DSS's using spreadsheet technology. With this approach, the students are typically responsible for the spreadsheet template and for inputting raw data from period to period. In a few instances (see Woodruff 1990, for instance), the template has been created by the instructor, and students simply need to maintain updated data in it in order to use it. Still another alternative in

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recent evidence (Bush and Burns 991) involves a data file which is compatible with a spreadsheet program being generated by the simulation program and provided to students who are responsible for using the data to make subsequent decisions.

However, the revelation acknowledged by Burns and Gentry (1990), along with our own work on this generation of games, has led us to redefine DSS's in the current context. Specifically, for the purposes of this paper, we define a DSS to be:

a set of procedures which facilitates the updating of decisions from period to period, accommodates the reporting of results, and provides a decision analysis system for historical data.

The reader should note that our tact takes the currently in vogue definition (essentially the "decision analysis system" aspect of our definition and adds the "soft copy" features of the newest generation marketing simulation games noted above. To elaborate further on our thinking with respect to this definition, we envision a student team disk as the host of several different types of programs and files. In order to serve its updating of period decisions, the disk houses a program which generates screens which draw the students through all of the decisions which must be made; once they are updated for the current period, the program writes a decision file which can be read by the instructors master program as described by Burns and Gentry (1990). For the reporting of results, the team disk holds output files written onto it by the master program, and it has a printout routine so students can generate hard copy at its convenience. At the same time, we contend that the disk can hold an historical data base on previous decisions, results, and even competitor data. This data base should be amenable to access by (e.g.) a spreadsheet program, or, ideally, the disk will house a set of decision making tools itself.

DIS 'n DAT OUR DSS

Given this brief description of how we define a DSS, we will now the DSS which we simulation game we will provide simulation game description of how we define a provide specific examples of have created for our marketing (Bush and Burns, 1991). First, a thumbnail description of the and environment for background.

The game simulates marketing competition in the television industry. Up to 5 companies may compete in an industry with up to 4 models pr company. Marketing strategy involves targeting any or all of four demographic/benefits market segments, selecting the appropriate model] (out of 20 options) for each and making period-to-period decisions on: price, production, three types of advertising, sales promotion, sales force size, and type of outlet mix. R&D as well as marketing research decisions are also involved. Simulated periods approximate quarters, and the instructor has a variety of market growth/consumer response/technological factors as alternative environments from which lie/she can select a particular industry's climate. The game is entirely housed on personal computer, and only disks are used for team input and output.

In our student manual we consistently refer to the team I)SS disk, for it holds all features if the DSS in our definition. To separate the input from the output aspects of the operation of the DSS disk, we dreamed up the notion of

"DIS 'n DAT." These are acronyms: DIS stands for Decision Input System, and DAT stands for Decision Analysis Tools.

DIS

The DIS aspect of our DSS facilitates each team's period decision making by showing all of the previous period's marketing management decisions on a single screen. Figure I reveals what the screen looks like for a tea. who played

FIGURE 1 DIS SCREEN
MANAGEMENT DECISION FORM

Industry (Letter):	B				
Company (Number):	3				
		<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>
1. Model Code:	B	H	K	P	
2. Price:	100	200	250	800	
3. Units Produced:	2000	217	1557	700	
4. TV Advertising (000):	3	7	10	3	
5. Magazine Advertising (000):	1	15	15	1	
6. Newspaper Advertising (000):	2	20	20	2	
7. Sales Promotion (000):	2	2	2	2	
8. Sales Force: 10		9. Research and Development (000):		0	
10 Dealer Allocation	<u>Furniture Store</u> 20	<u>Specialty Store</u> 180	<u>Discount Store</u> 100	<u>Department Store</u> 150	

** Enter 1-10 to Change, (EX) it w/o Update, or <Enter> to Update **
<===== Turn Printer On and do Screen Print for Hard Copy =====>

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the game in a previous semester. As can be seen, the columns pertain to each TV model being marketed and model-specific decisions such as price or advertising are listed below in the appropriate column. Other decisions which cut across models such as sales force, channels of distribution mix or R&D are listed separately. To make new decisions, all the team need do is to identify the number of the decision noted on the decision form, and the cursor moves over the old decision. Keystrokes change the old values to new, and enter moves the cursor back to its original location indicating the beginning of another revision or enter to save the revised decisions. A second screen allows the team to make marketing research decisions in a similar menu-driven manner. Once the team has made all revisions it wishes for this period, it makes a hard copy with a simple print screen and turns in the disk to the instructor. (A print results option lets the team print financial statements and other output reports once the instructor returns the disk to the team.)

DAT

The DAT aspect of the DSS is the Decision Analysis Tools part, and it is a series of Lotus 1-2-3 templates networked together along with the continually updated data files which the templates load in. The entire DAT system is driven by macros; all students need to do to use the DAT is to load Lotus 1-2-3. (They may do so by selecting an option on the DSS master menu, assuming that Lotus 1-2-3 is available on the machine they are using.) The DAT contains a myriad of graphical, analytical, and other templates. With the exception of the forecasting module, the analytical routines are idiosyncratic to our simulation, so we will not describe them in this paper. The relevant options currently available on the DAT include: (1) history of decisions and results period by period such as dealer allocation, sales force expenditures, total promotion expenditures, R&D investments, advertising by type, gross and net income, financial ratios such as earning per share, unit sales, gross margin by product, percent sales accounted for by product, and several others; (2) sales analysis data by submarket (i.e., model) including unit sales by type of outlet, price levels, market share and others with explicit comparisons to competitors' sales performance; (3) Inventory analysis which graphs beginning and ending inventory as well as scheduled production for each period by model; and (4) a forecasting module which uses historical sales data for any product in the line and applies straight line or exponential smoothing trend analysis and projection to the data.

The DAT is programmed so a user can move from option to option with the use of a Lotus 1-2-3-like menu system; that is, by either placing the cursor over the selection and pressing return or by keystroking the first letter of the option. In this way, depending where in DAT the use is at the time of selection, he/she goes deeper into the menu system for that routine, selects an option within the routine, or exits the routine for a master menu which permits subsequent movement to another module or exiting DAT. To minimize frustration that might occur when inexperienced

(or curious) fingers hit inappropriate keys and inadvertently force Lotus 1-2-3 out of macro mode, a simple restart of that module is effected by pressing Alt-R. Students are instructed in this restart option before using DAT, and reminders are embedded in the DAT to remind them while they are using it.

As was noted, most of the DAT's power lies in its graphical displays of historical data which can facilitate the identification of patterns or otherwise help students to visualize their company's situation. For most of these graphs, the DAT affords the option of saving a graph file which can be later accessed with Lotus PrintGraph for hard copy. Length constraints prevent a complete set of examples; consequently, Figure 2 offers several examples of different graphs which were generated from a team in its ninth quarter of play. We have selected an example from each of the four categories of DAT routines just described. First, Figure 2a illustrates the historical decisions module with the company's earnings per share record. Figures 2b demonstrates the sales analysis DAT module by showing department store unit sales for model K by company. Figure 2c shows how one feature of the DAT portrays inventory decisions for one model in that company's line. (Please note, the simulation allows for sale of all ending inventory to the institutional market at the end of each year, so quarters 4 and 8 show now ending inventory.) Finally, Figure 2d reveals the actual sales figures, smoothed trend line, and forecast for a one of a company's products.

It is perhaps obvious that DAT embraces a tremendous number and variety of graphs. To be exact, no less than fifty different graphs are available in any given period of play. Of course, this number represents a form of double counting since there are four models and the same type of graph (e.g. sales by type of outlet) is available for each model. Nevertheless, DAT represents a fairly complex information load management problem. However, this is not unlike the same task confronting real world managers as they interact with their company's DSS which typically has multiple options and a multitude of ways to "slice" the data.

BENEFITS OF DSS

We have not had the opportunity to subject our DSS to extensive empirical scrutiny; nevertheless, it does seem reasonable to identify the important advantages of the DSS concept as we have applied it to the newest generation of computer simulation games. In our discussion below, we rely, at times, on some of the points made by Burns and Gentry (1990).

Advantages of the DSS to the Student team: DIS Advantages

1. Minimizes paperwork. There is no need for forms to be filled out and turned in to the Instructor. The team disk is copied and becomes available to all team members to be used at their leisure. Similarly, financial forms and other output is printed out at the team's convenience.

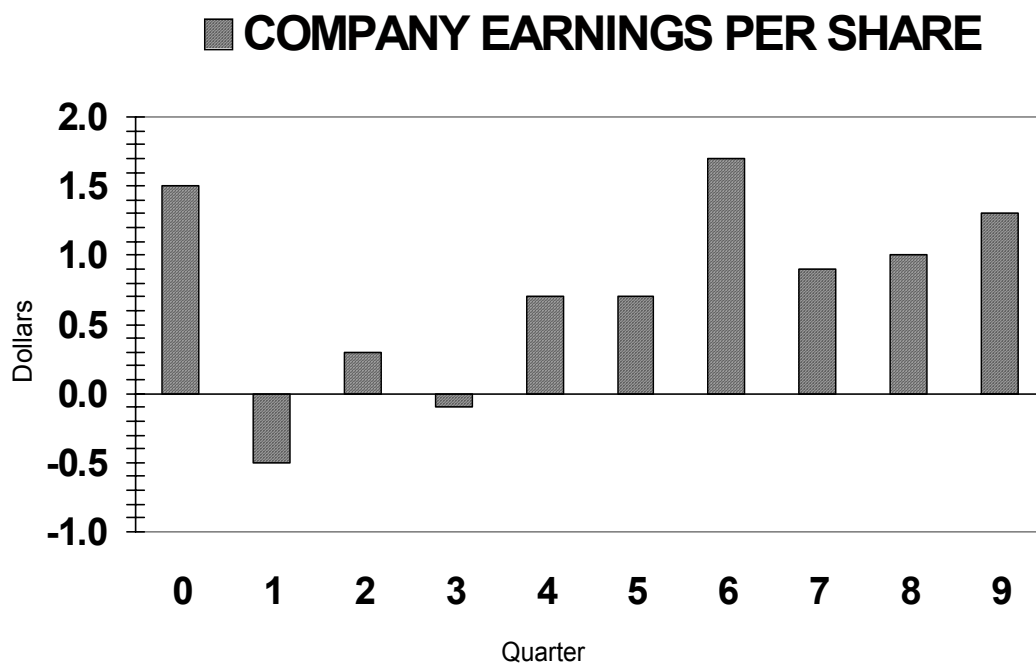


FIGURE 2B
Model K
Department Stores

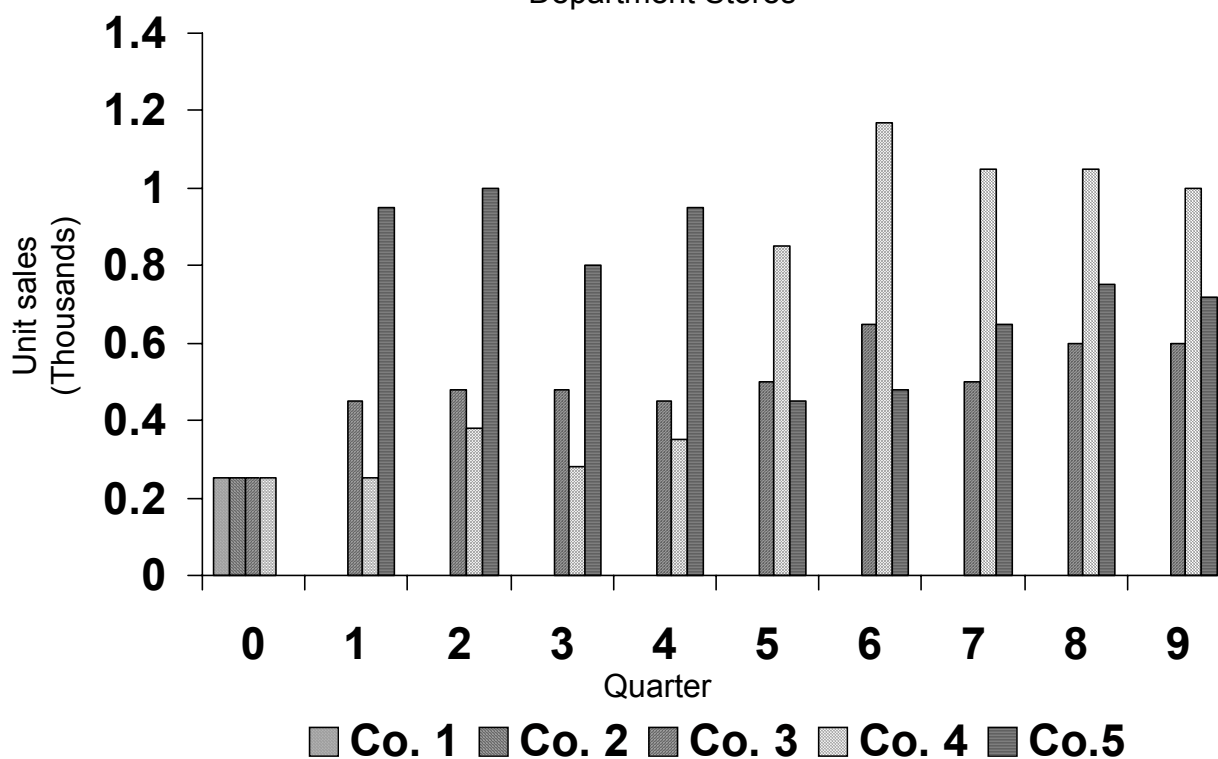
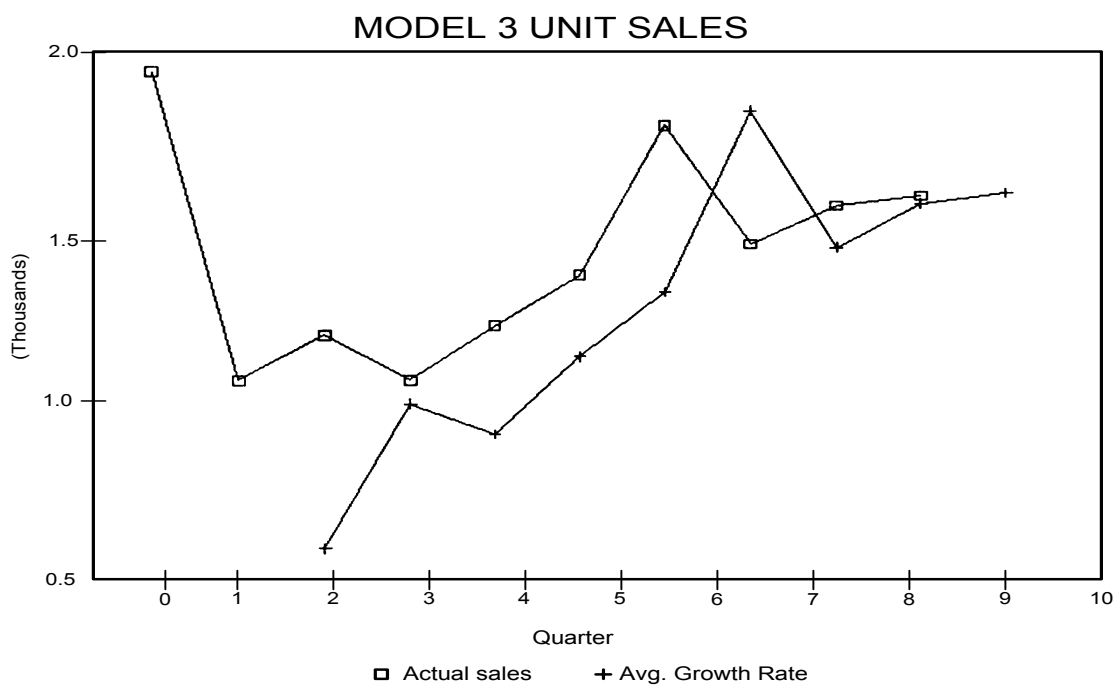
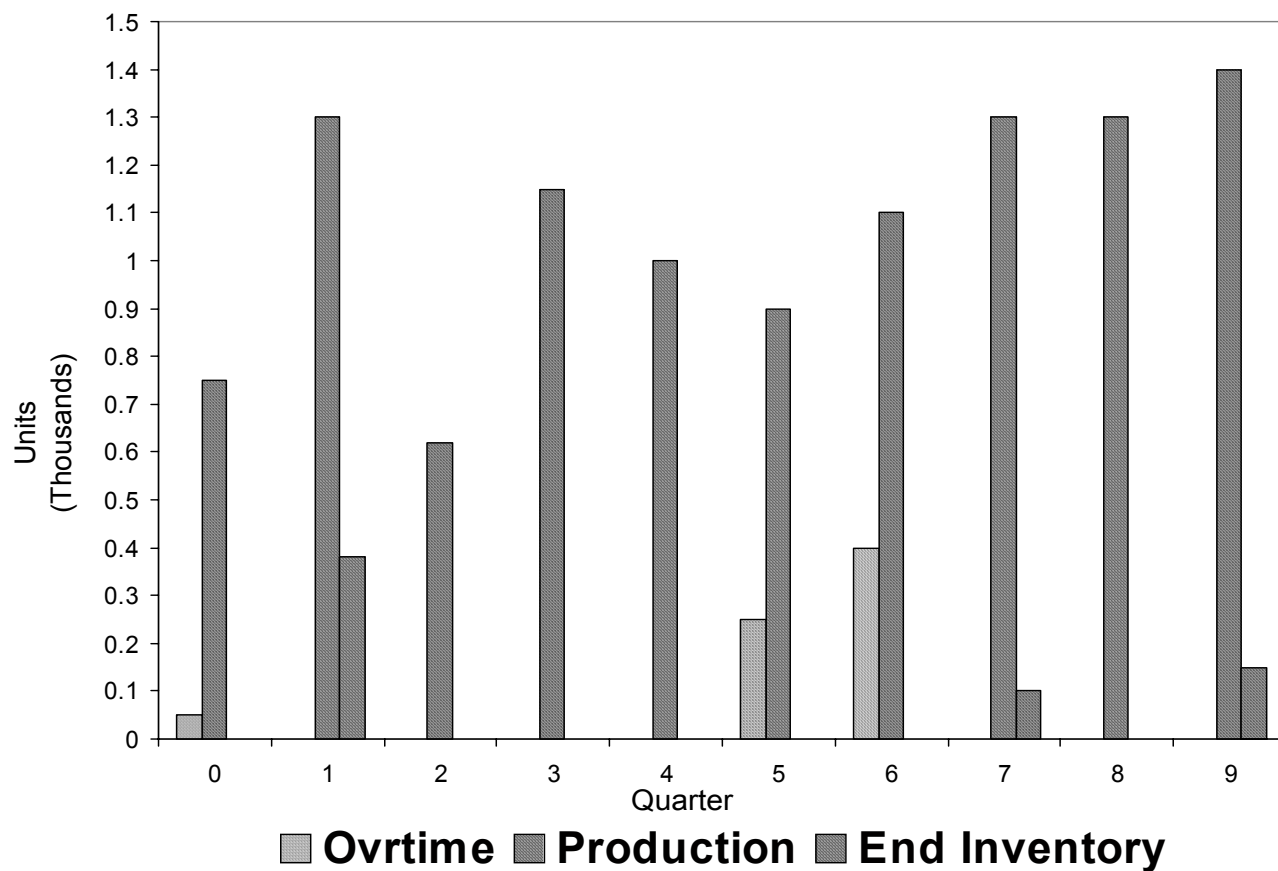


FIGURE 2C
INVENTORY ANALYSIS: MODEL 1



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2. Minimize errors. Specific locations for decisions are easily identified on the decision screen, and the location of the cursor indicates where the decision is being input.

3. Increases students' familiarity and comfort level with computer technology. We proclaim in our student manual that an important motive for the DSS is to

Advantages of the DSS to the Student Team: DAT Advantages

1. Provides for easily accessible data base. The DAT represents an automatically-updated historical and competitive data base. Essentially all relevant information provided in the income statement, sales analysis data, inventory figures and important competitor monitors such as market share, prices, etc. are contained in the DAT's data base.

2. Affords error-free graphical representation of data. The DAT has a multitude of Lotus 1-2-3 graph routines in its various modules, and it is programmed to draw the proper data from the data base for each graphic requested. It guarantees to the students that the spreadsheet programming is correct, rather than forcing them to fabricate their own, which may: (1) be correct; (2) be erroneous, or (3) never happen.

3. Represents a competitive tool with increasing value as the game is played. The worth of a data base is largely dependent on its historical dimension. That is, as the data base grows with each period's addition of data points, patterns and anomalies become more vivid. Thus, as the team becomes more proficient in the mechanics of the game and gains experience in the strategic aspects of the simulation plus becomes more knowledgeable in the DAT's many options, its value as a decision making tool chest increases.

Advantages of the DSS to the Instructor: DIS Advantages

1. Minimizes input time and eliminates its error. Elimination of the keystroke entry phase for the instructor greatly reduces the keyboard time requirements of the game administrator, and since student team disk files are being read by the simulation game, there is no opportunity for instructor keystroke error.

2. Greatly reduces printout time, cost, and hassle. The DIS completely does away with the need for hard copy of each team's output to be printed out and distributed by the instructor. With our game, the instructor has the option of printing out or perusing on his/her computer screen a confidential diagnostics form, individual team print files, or the complete industry's print files for the current period.

Advantages of the DSS to the Instructor: DAT Advantages

1. Enhances the teaching of DSS (traditional definition) concepts. While the need to teach decision support system concepts is clear, without one, the instructor is at a disadvantage. The DAT is preprogrammed and ready to go from day one, and we provide a practice data base for students to experiment with before simulation game play begins.

2. Makes students aware of information as a competitive tool. Because the DAT is so extensive, students must learn which information is relevant for what decisions. The successful real world companies, we are told, are those who are on top of the relevant information about their environments; while the unsuccessful ones are often portrayed as ignorant of the important trends in their markets and strategic positioning of their competitor. The DAT is an open invitation to experience the realization that relevant information, analyzed in the proper fashion, can become an extremely valuable strategic decision making asset.

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