INSTRUCTOR'S MANUAL

for

ENTERPRISE Integrating Management Exercise

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# TABLE OF CONTENTS

## Chapter 1: WHAT IS ENTERPRISE?

- Flexible ....................................................................................................................................................... 1
- Easy to Use Software ................................................................................................................................. 2
- The ENTERPRISE Worlds .......................................................................................................................... 3
- Markets ....................................................................................................................................................... 3
- Balance ....................................................................................................................................................... 3
- Decisions .................................................................................................................................................... 4

## Chapter 2: LOADING THE INSTRUCTOR'S SOFTWARE

- Hardware Considerations .......................................................................................................................... 6
- Loading the ENTERPRISE Software onto your Hard Disk ................................................................. 7
- Backing Up Diskettes ............................................................................................................................... 7
- Running ENTERPRISE: The Instructor's Menu of Options ............................................................... 8
- Some Error Messages ................................................................................................................................. 8

## Chapter 3: INSTRUCTOR'S MENU OF OPTIONS

- The Main Menu ......................................................................................................................................... 10
- Setting Up ENTERPRISE Worlds ............................................................................................................... 10
- World name syntax .................................................................................................................................. 11
- Firm name syntax ..................................................................................................................................... 11
- Default firm names .................................................................................................................................. 11
- Transferring Files ................................................................................................................................... 12
- Demonstration mode ................................................................................................................................. 12
- Running the Market Simulation .............................................................................................................. 12
- Preview of student results ...................................................................................................................... 13
- Hard copies of student results ............................................................................................................... 13
- Reviewing Cumulative History .............................................................................................................. 13
- Strategies ............................................................................................................................................... 14
- Results .................................................................................................................................................... 14
- Example plot ......................................................................................................................................... 15
- Perceptual map evolution ....................................................................................................................... 16
- Tables of research selected and new product entry ............................................................................. 16
- Comparisons across market ................................................................................................................... 16
- Creating Summary Tables ....................................................................................................................... 17
- By variable ............................................................................................................................................. 20
- Names and Purposes of the Data Files .................................................................................................... 21

## Chapter 4: HOW THE ENTERPRISE WORLDS WORK

- .......................................................................................................................................................... 24
Chapter 1

WHAT IS ENTERPRISE?

ENTERPRISE is an integrating management exercise. This means that it provides a vehicle to illustrate concepts from competitive strategy, marketing, production, and statistics. But it illustrates these concepts in a flexible manner.

Flexible

Some instructors will want to use all of ENTERPRISE's capabilities to illustrate a variety of management concepts. Other instructors will want to illustrate specific concepts and keep the other concepts in the background. Still other instructors will see ENTERPRISE as a means to provide students with a rich background in which to practice general management skills.

ENTERPRISE can be extremely challenging. Student teams that understand the management concepts will do extremely well. However, even if a team muddles through, it will learn from its experience and gain a basic understanding of effective management in a complex environment.

ENTERPRISE can be used in a competitive strategy course, a marketing course, a production course, or an integrating course. It can be used also at the beginning or at the end of a management program as a "flight simulator" to give students experience and feedback on that experience. Its use depends upon the concepts that the instructor wishes to emphasize.

With ENTERPRISE you can assign four (or fewer) teams to a world. You can assign as many worlds as you want. You can assign names that are relevant to your students.

ENTERPRISE teams start more or less equally with counterbalanced advantages and disadvantages. The features of menu driven software and automated data transfer via diskette (or electronic mail) means rapid response to student decisions. You can run short simulations of only a few periods, say from one class session to the next, or extremely long simulations over a quarter or a semester.
Easy to Use Software

ENTERPRISE is menu driven and, from an instructor's viewpoint, automated. The student software reads the results of a previous period, displays those results, plots some key information, provides a "what-if" capability, and records student decisions. Students pass their diskettes to you which you then load and read with your ENTERPRISE software.

The Instructor's Menu of Options contains five software modules.

The **Setup** module allows you to name each ENTERPRISE world and to name the teams in each world. It then creates all of the data files necessary to start a competition.

The **File Transfer** module automates file transfer. You need only enter the world name at the prompt and ENTERPRISE indicates which diskettes to place in the diskette drive. Files are transferred automatically to and from the ENTERPRISE directory (EP) on your hard disk.

The **Market Simulation** module runs the market simulation. Once the student files are in the ENTERPRISE directory, you select this option and enter the world name at the prompt. ENTERPRISE reads the files, runs the market simulation, runs all research experiments that the students request, and prints all output files to your ENTERPRISE directory. A special feature allows you to review the results by market and by team. A printing menu enables you to get hard copy of the results of the simulation should you so desire.

As ENTERPRISE provides students feedback on their decisions they improve over the course of the competition. To see this evolution instructors will want to plot cumulative histories of a variety of input (student decisions) and output (sales, profit, etc.) measures. The **Cumulative History** module of ENTERPRISE provides these plots. One sub-menu allows you to plot any or all of the input measures, another allows you to plot the output measures, a third the perceptual map evolution, and a fourth gives summaries of who entered which market when and what research was used to make decisions. As an instructor you can keep these to yourself to develop an analysis of student decisions or you can provide copies to students to provide feedback and/or motivation.

In our experience we have found that at the end of an ENTERPRISE competition, students want summaries of how they did on average. That is, they want to know their average profit per period for each market and for each firm. They want average sales and average market share. Etc. The **Summary Tables** module gives you this option. It produces tables of average output measures (profit, share, sales, costs, inventory, etc.) and of average input measures (price, position, advertising, quantity produced, raw materials ordered, etc.). The module provides different formats for the tables so that you can use the format that best fits your needs.
The ENTERPRISE Worlds

The ENTERPRISE competition is divided into ENTERPRISE worlds. Each world consists of six markets in which four teams compete. Every ENTERPRISE world begins identically, except for its name. How they evolve depends upon the student teams.

You set up an ENTERPRISE world with the Setup module of your instructor's software. Its name and the names of the teams are the names you choose. (We provide some examples in Appendix 3.)

Markets. The six markets of an ENTERPRISE world are called robotics, sound equipment, wood stoves, detergents, facsimile, and razzlets. In many ways they operate like real markets. In some ways they are simplified to enhance the pedagogy. (For example, the prices, costs, etc. are of roughly the same magnitude across markets to allow you to compare and contrast performance. In this way bookkeeping does not interfere with pedagogy.)

Each student team begins with a product in each of two markets. Overall, the robotics, sound equipment, wood stove, and detergent markets begin with two products. The facsimile and razzlets markets begin with no products. They represent opportunities.

Balance. In any given market each student team faces certain advantages and disadvantages. Some of these advantages and disadvantages are due to their starting positions. Others are due to the underlying production cost structure which, for each team, favors different product formulations.

However, these advantages and disadvantages are balanced. Teams begin with approximately the same total profit and potential. How well they do at the end depends upon their management savvy. You can consider total profit as one means by which to measure performance.

Indeed, in beta tests of ENTERPRISE, the student teams that were judged by the instructors to be the better teams did achieve the higher scores.
Decisions. The marketing related decisions that students make are:

- Opposition -- the amount of benefits to offer customers, e.g., quality and versatility for the sound equipment market.

- Price

- Advertising spending

- Marketing research
  - Advertising experiments
  - New product concept tests.

The production related decisions that students must make are:

- Quantity to produce in each market

- Raw materials to order (overall -- materials are interchangeable between markets)

- When to order (students can carry inventory).

Additional strategic decisions are:

- Which markets to enter and when to enter

- How to read competitors’ intentions.

Naturally, all of these decisions are interrelated and, as a whole, set the strategy of the firm. Student pride gives them the incentive to manage profitably. Thus, the environment becomes complex as it evolves. Actions by one student team in one market can have repercussions for all of the teams in all of the markets of that world.

The worlds themselves are isolated. Actions in one world do not affect another world. Thus, you can expect that some worlds (and markets within worlds) will degenerate into
price/positioning/advertising/quantity wars while in other worlds firms will learn to live with one another and manage competitively but not destructively.

By comparing and contrasting the profitability of different worlds, the creative instructor can reinforce issues related to the interdependencies among firms (and nations).
Chapter 2

LOADING THE INSTRUCTOR'S SOFTWARE

Hardware Considerations

ENTERPRISE is designed to run on any IBM or IBM-compatible personal computer with at least 128K of memory and running under DOS 2.0 or later. Because the ENTERPRISE instructor's software (automatically) reads or writes 33 files for every ENTERPRISE world, we strongly recommend that the instructor use a system that has a hard disk. This includes personal computers similar to the PC/XT, the AT, and the PS/2. ENTERPRISE will draw positioning maps and taste diagrams and plot cumulative histories, but these plots do not require a graphics card or a graphics monitor.

ENTERPRISE will run on either a regular monitor or a color monitor. If you have a color monitor, answer Y to the first prompt, and subsequent screens will be in vivid colors. For your convenience, each market appears in a different color during the market simulation.

The cumulative plots will run on either a regular monitor or a color monitor, but we recommend a color monitor. Each team is plotted in a different color. Thus, you can see at a glance the relative standing of each team. (For monochrome monitors, each team is plotted with a different symbol. The information is still there but it doesn't leap out at you.)

ENTERPRISE is available in either a 5 1/4" diskette format or a 3 1/2" format. Because you will be transferring files to and from your students it is a good idea to check whether the diskette drive(s) on your machine are compatible with the diskette drives on their machines. You should check both the size of the diskette and whether it is high or low density.
Loading the ENTERPRISE Software onto your Hard Disk

First back up your instructor's diskette and your copy of the student diskette as described in the next section. Then:

1. Create an ENTERPRISE directory. Change to the root directory by typing `CD \` and pressing enter. Make a directory by typing `MD EP` and pressing enter. Change to that directory by typing `CD \EP` and pressing enter.

2. You should now be at the prompt `C:EP>` (A few machines will not display the directory. To check the directory type `CD` and press enter.) Place the instructor's diskette in the A: drive of your machine.

3. Copy the instructor's software to your ENTERPRISE directory by typing `COPY A:*.* C:*.*` and pressing enter.

4. Remove the instructor's diskette from the A: drive and place your copy of the student diskette in the A: drive. Copy the student program to your ENTERPRISE directory by typing `COPY A:E.EXE C:E.EXE` and pressing enter. (The .ENT and the .EPB files on the student diskette are the same as those on the instructor's diskette. You need not recopy them.)

The instructor's software will now run whenever you invoke it by entering `EMENU`. The students' software requires a copy of the student diskette in the A: drive.

Backing Up Diskettes

The instructors' software is not copy protected. The student software is copy protected.

The student software is not necessary for you to administer an ENTERPRISE competition. However, you may want to run the student software to see what your students experience. The student software is copy protected. You will need to have the original student diskette in the A: drive in order for the student software to run on your machine.

It is important that you back up your copy of the student diskette in case any of its files are inadvertently damaged. If this should happen, try copying the damaged files back onto the original diskette.

Do not use the DOS command `DISKCOPY` on the original student diskette; `DISKCOPY` formats the diskette and will destroy it. To copy all files, use the command, `COPY *.*`, which is equivalent to "Copy all files with all extensions."
To make a backup copy, place the ENTERPRISE diskette in the A: drive and place a formatted diskette in the B: drive, type **COPY A:*.* B:*.***, and press enter. If you have a one-disk system, the prompts will ask you to alternate diskettes.

Remember that you will not be able to use the backup copy of the student diskette to run the student programs. The original student diskette has a "fingerprint" for which the software looks before running the student program. If the fingerprint is damaged or erased, you will have to get a new student diskette.

You can back up the instructors' programs in the same way. Because the instructor's programs are not copy protected, you can use the backup copy to run the instructor's software. You do not need a diskette in the A: drive to run the instructors' software.

It is also a good idea to back up student files. This could save you some embarrassment in the unlikely event that you inadvertently erase their work. After you have used the file transfer module to read all of their files to your hard disk you can back up their files by returning to DOS and typing **COPY *.ENT *.n** where n is the number of the period you have just loaded.

**Running ENTERPRISE: The Instructor's Menu of Options**

For details on how to run the instructor's software including setting up ENTERPRISE worlds, transferring files to and from students, running the market simulations, and analyzing cumulative results, see chapter 3.

**Some Error Messages**

There are three types of error messages that you are likely to encounter.

**Redo from start.** This is a message to tell you that you have entered a name when you should have entered a number or a number when you should have entered a name. It may also appear when you try to enter too many or too few data items. (Data items are separated by commas.) Just re-enter the name or number in the appropriate format. You do not have to restart ENTERPRISE.

**Input past end at address ...** This message means that ENTERPRISE expected more information from a file than was available. It means that the file was damaged. If this happens, it may mean that a student team has given you a damaged file.
File not found in module E... at address ... This message means that ENTERPRISE could not find an input file. It occurs if you enter a name for a world that you have not yet created. If you made an input error, type EMENU, press enter, and try again. If this does not work, check to be sure that the input files are available on your default drive (type DIR and press enter). Copy them to the default drive or change the default to the drive that they are on. If all else fails, you can always use the setup module to create a new world.

The system hangs. We have tried to anticipate potential errors. The software contains a number of built-in error trapping routines. In most cases, any errors that we have not anticipated should simply place you at the DOS command level. In this case type EMENU and press enter. In rare cases the system might hang, that is nothing will happen and the system will not respond to prompts. You can get out of this situation by either re-booting or turning the machine off then on. You should not lose data files if you do this.
Chapter 3

INSTRUCTOR'S MENU OF OPTIONS

This chapter describes how to use the ENTERPRISE instructor's software. Chapter 4 gives details on how the ENTERPRISE worlds work and chapter 5 gives hints on pedagogy. Chapter 6 answers questions on why certain decisions were made in the design of ENTERPRISE.

The Main Menu

To begin the Instructor's Menu of Options first change to the ENTERPRISE directory by typing `CD \EP` and pressing enter. Next type `EMENU` and press enter. ENTERPRISE will load and execute the main menu.

To select any of the options simply strike the number of the indicated option. ENTERPRISE will load and run that option.

After you have completed running the chosen option, ENTERPRISE will return to the main menu. You can run an option as often as you like and you can run the main menu as often as you like. If, inadvertently, you return to a DOS level command, simply restart the main menu by entering `EMENU`.

Setting Up ENTERPRISE Worlds

Select option 1, SETUP, from the Instructor's Menu of Options. ENTERPRISE will load the setup programs and describe the syntax for selecting world names and firm names. Enter the names at the prompts or choose the defaults. You can create as many ENTERPRISE worlds as you want as long as they have different names. Each time you create a world, you must run the setup program.

World name syntax. You can select any name that you want for the name of an ENTERPRISE world as long as it is twelve letters or less. You can use any combination of letters and numbers but please avoid spaces, commas, periods, or special characters that DOS will not accept for file names. The first three characters of a world name must be unique because ENTERPRISE stores the
cumulative history of a world in a file that is based on the first three characters of the world name.

**Firm name syntax.** You can select any name that you want for the name of an ENTERPRISE firm as long as it is seven letters or less. You can use any combination of letters and numbers but please avoid spaces, commas, periods, and characters that DOS does not accept.

ENTERPRISE firms must have unique names. The names of the data files are based on the firm names. If you have two firms with the same names, even if they compete in different worlds, the data files will have the same names. ENTERPRISE will not be able to distinguish between the firms.

**Default firm names.** ENTERPRISE will create default firm names based on the first three letters of the world name. For example, if your world name is FLATLAND then the default firm names will be FLASTAR, FLAINC, FLAWIZ, and FLACOM. You can accept these defaults if you like by pressing enter at the prompt. If you want to select different names, simply type them and then press enter.

There is an advantage to selecting the default firm names. Every ...STAR firm, every ...INC firm, every ...WIZ firm, and every ...COM firm will start in the same position and have the same inherent advantages and disadvantages relative to the other firms in their world. This gives you a natural way to compare student teams during the running of the competition and in any post mortem. (You can also compare teams across worlds if you keep track of which teams were the first, second, third, and fourth teams in their worlds.)

**Transferring Files**

To transfer files to and from student diskettes select option 2, FILE MANAGEMENT, from the Instructor's Menu of Options. ENTERPRISE will begin the file transfer option.

After you are asked whether you want to transfer files from student diskettes or to student diskettes, you will be asked to indicate the letter of the diskette drive you will use. In most cases this will be the A: drive and you will enter A. If you are using another drive enter its letter.

If you enter a letter for which you do not have a drive, the program may hang. If this happens you may need to re-boot or restart your machine. No files will be lost. (We have built in two fail-safes. [1] ENTERPRISE echoes your choice and gives you a chance to try again before searching for the drive. [2] If you enter a wrong drive number, ENTERPRISE will try to return you to the main menu.)

Place the diskettes in the drives as indicated by ENTERPRISE. File transfer is automatic. For your convenience, ENTERPRISE will echo the files transferred.
For a description of the purpose of each data file, see the last section of this chapter.

**Demonstration mode.** You may wish to practice with ENTERPRISE before running a real competition. In this case do the following. (1) From the C:\EP> prompt, create a practice directory with the command, MD TEST. (2) Copy data files to that directory with COPY *.ENT \EP\TEST\*.ENT. And (3) when you run the FILE MANAGEMENT option strike the **spacebar** at the prompt for a disk drive letter. (In this case the enter key is not equivalent to the spacebar. If you inadvertently strike the enter key rather than the spacebar, ENTERPRISE will prompt you. Just strike the spacebar to continue.)

**Running the Market Simulation**

Once you have loaded the relevant student files, select option 3, MARKET SIMULATION, from the Instructor's Menu of Options. ENTERPRISE will load and execute the market simulation program.

At the prompt, enter the name of the world whose markets you wish to simulate. ENTERPRISE will read the input files and run the simulation.

The market simulations do not take long to run. For each market a simulation takes less than a second on a PS/2-80, a few seconds on a PC/AT, and about 10 seconds on a PC/XT. Market simulations are run for all six markets and for each concept test that students request. (You can skip the latter in demonstration mode.)

After running the simulations, ENTERPRISE will print the results to the student files on your hard disk. You will need to use the FILE MANAGEMENT option to transfer these files to student diskettes.

You will need to run a market simulation for every ENTERPRISE world in your class.

**Preview of student results.** After the simulations are run, ENTERPRISE gives you the option to view any or all of the student results. Just indicate the market(s) and firm(s) you wish to review.

**Hard copies of student results.** ENTERPRISE gives you the option of obtaining hard copies of the student results. This option is useful if you want to obtain a permanent record for class discussion. You can obtain up to nine copies if you wish to hand them out to the teams.

**Reviewing Cumulative History**
ENTERPRISE is a competition that is run over a number of periods. As students learn about the ENTERPRISE markets and about one another, their strategies will evolve. Past history will influence future moves.

Tracking the student's cumulative experience is a key part of the ENTERPRISE pedagogy. With cumulative histories you can see one team respond to another, you can see teams adjust inventories and/or marketing variables, you can uncover multi-period strategies. To assist you in this task, ENTERPRISE provides a program to record and plot cumulative histories.

To review and plot the student strategies and the market simulation results for all periods, select option 4, CUMULATIVE HISTORY, from the Instructor's Menu of Options. ENTERPRISE will load and execute the cumulative history program.

At the prompt, enter the world name. You can then select those teams and those markets you wish to view. (All teams and all markets is an option.)

The following menu then will be displayed.

SELECT THE TYPE OF INFORMATION YOU WISH TO REVIEW.

(You will be returned to this menu after you have finished reviewing the type of information selected.)

1. PLOTS OF STRATEGIES SELECTED BY TEAMS.

2. PLOTS OF RESULTS (profits, sales, revenue, inventory levels, costs).

3. PERCEPTUAL MAP EVOLUTION.

4. TABLES OF RESEARCH SELECTED, NEW PRODUCT ENTRY.

5. Quit.

To select an option, simply strike the number of the option you wish.

Strategies. You can obtain cumulative history plots for price, position (either or both axes), quantity, material orders, and advertising spending.

Results. You can obtain cumulative history plots for production costs, inventory levels (for
finished products), inventory levels for materials, sales, revenue, profit for each market, and total profit.

**Example plot.** An example plot of profit for the robotics market is given in figure 1. Notice that the plot runs for five periods and includes all firms. Each firm's profits are indicated by the firm's number. See the key at the bottom of the plot. (If you have a color monitor, each firm would be plotted in a different color.)

If you want to hand these out to your students or post them on your office door use the PRINT-SCREEN option on your personal computer. (On some computers you can print what is on the screen by pressing the "Print Screen" key. On other computers you must press the "Prt Sc" key while holding down the shift key.)

**Figure 1. Example Cumulative History Plot of Profits**
**Perceptual map evolution.** This option will plot a perceptual map (also known as a value map) for each market selected. Points are plotted in the following format:

A, B, C, or D indicate the firm (if it is in the market)
0, 1, 2, 3, ... indicate the time period.

For example, A0 indicates the opening position of the --STAR firm, say ENTSTAR. A1 indicates its position in the first period.

ENTERPRISE will draw the axes and place the firms period by period on the map. If a firm keeps the same position only the latest period will be shown. See figure 2. (ENTERPRISE pauses between periods, you must strike a key to continue.) If you have a color screen each firm will appear in a different color.

If you want to avoid the pauses between periods select the fast plot option by striking F at the appropriate prompt.

**Tables of research selected and new product entry.** This sub-option prints a table which indicates when a firm entered a market and which research (advertising and/or concept tests) were selected and when. You can use this table to (1) determine quickly how crowded are markets, (2) identify teams which are aggressive in new product development, and (3) identify teams which under-utilize or over-utilize market research.

**Comparisons across markets.** In worlds with four active teams, all "A" teams, all "B" teams, all "C" teams, and all "D" teams start with the same positions and resources. Some instructors may wish to compare these teams across markets. The plots of strategies, results, and perceptual maps allow this comparison to be made easily.
Creating Summary Tables

At the end of an ENTERPRISE competition or at key points throughout the competition, you will want to analyze the student decisions and the results of those decisions. For example, you might want to see if a team tended to choose low prices and modest positions or high prices and quality positions. Were they aggressive in their advertising strategy? Did they carry too much or too little inventory? Did they choose a broad appeal to capture a large market share, or did they attack the market with a profitable niche strategy? Did their positioning match the positioning favored by the cost structure?

To address these questions you need succinct summaries in tables that are easy to read. The Summary Tables option creates these tables.

In beta tests of ENTERPRISE, we found that there were two types of tables necessary. One type of table summarizes a key variable, say price, for all markets and teams. These tables allow you to compare strategies across teams and, for a given team, to compare strategies across markets.
We also found that it was useful to focus on a single market to identify why one team did well and another did not. To do this requires another type of table, a summary by market of nine key variables for all teams. With these tables you can identify coordinated strategies (say high price, positioning, and advertising) and compare these coordinated strategies across teams.

To create the summary tables select option 5, SUMMARY TABLES, from the Instructor's Menu of Options. ENTERPRISE will load and execute the summary table program.

At the prompt, enter the world name. The following menu will be displayed.

YOU CAN TABLE KEY MARKET VARIABLES IN ONE OF TWO FORMATS.

1. MARKETS one at a time for all variables and teams.
2. VARIABLES one at a time for all markets and teams.
3. Quit.

PRESS THE NUMBER OF THE OPTION YOU WANT. IF YOU PRESS 2, YOU WILL BE SHOWN ANOTHER MENU TO SELECT VARIABLES.

If you select option 1, MARKETS, you will be shown six tables such as the following (one for each market). If you want to create handouts for your students, use the print screen option of your computer.
All of the strategies and outputs in table 1 are averaged over the periods in which the team was in the market. Most of the entries are self explanatory except for the three positioning summaries, the angle of attack, the best angle, and the radius.

Firms enter their positions as the amount of each of two benefits, say Quality and Versatility, that they offer to the market. To compare positions among teams, it is often best to think in terms of angles and radii. Suppose that you draw a line from a firm's position to the origin. The "angle of attack" is the angle (in degrees, say $10^\circ$) that that line makes with the horizontal axis. You will find that teams will tend to differentiate by finding an angle of attack and then moving in or out along that angle. For example, one team might choose an angle that favors quality, another team an angle that favors versatility, with the third and fourth teams somewhere in between.

The "best angle" refers to the cost structure. As explained in the next chapter, for each team and for each market the cost structure favors one direction. Naturally, teams will tend toward this best angle. However, they need not be right on it. Competitive considerations could force them off of it. On the other hand, if they are far from the best angle, you can infer that they did not understand the cost implications of positioning.

The "radius" refers to how far they are out along the angle of attack. Larger radii are more
aggressive and more costly. However, the largest radius does not always mean the largest market share. Market share depends on the "per dollar" position which is reflected by the radius divided by the price.

By variable. If you select option 2, VARIABLES one at a time for all markets and teams, you will be shown a menu such as the following. To select one of the ten variables that are available, press the number of the variable. You can return to this menu as often as you like to create tables for any or all of the variables. If you want to create handouts for your students use the print screen option of your computer.

Please press any key when ready.

0. Average price
1. Position (angle of attack)
2. Position (radius)
3. Market share
4. Average inventory of finished goods
5. Average production cost
6. Average advertising
7. Total sales
8. Total profit by market
9. Total profit and average material inventories
Q. Quit

For example, if you select option 7, Total Sales, you will be shown a table such as the following.
SALES (MM)

<table>
<thead>
<tr>
<th></th>
<th>ENTSTAR</th>
<th>ENTINC</th>
<th>ENTWIZ</th>
<th>ENTCOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROBOTICS</td>
<td>13.68</td>
<td>13.00</td>
<td>20.10</td>
<td>2.36</td>
</tr>
<tr>
<td>SOUND EQUIPMENT</td>
<td>35.50</td>
<td>22.59</td>
<td>11.05</td>
<td>2.70</td>
</tr>
<tr>
<td>WOOD STOVES</td>
<td>12.26</td>
<td>0.00</td>
<td>18.17</td>
<td>23.05</td>
</tr>
<tr>
<td>DETERGENTS</td>
<td>4.00</td>
<td>22.55</td>
<td>10.87</td>
<td>22.63</td>
</tr>
<tr>
<td>FACSIMILE</td>
<td>11.31</td>
<td>35.70</td>
<td>23.74</td>
<td>28.61</td>
</tr>
<tr>
<td>RAZZLETS</td>
<td>45.50</td>
<td>4.09</td>
<td>13.96</td>
<td>64.48</td>
</tr>
</tbody>
</table>

Table 2: Example VARIABLES Summary Table for Sales

Most of the variables that can be plotted are self explanatory. The position variables, angle of attack and radius, are explained in the section on the MARKETS Summary Tables.

The Summary Tables are designed to complement the Cumulative History plots. The Summary Tables give averages and are thus most useful for reviewing or analyzing a firm's overall strategies. The Cumulative History plots give period-by-period results. They are best for spotting trends and for understanding the evolution of the markets.

Names and Purposes of the Data Files

Most ENTERPRISE data files have the extension .ENT. We have tried to write the software so that you do not have to be aware of the detailed files. However, should a file get lost or damaged, you will be better able to correct problems if you know the names of the files and their functions.

Suppose that a world's name is ENTERPRISE, then the file that contains the name of all of the firms in that world is ENTERPRIENT. If a world's name is WORLD1, then the file will be named WORLD1.ENT. You get the idea. Your students will need this file to select their strategies. It will be created with the setup option and transferred to the students' disks with the file management option.

The results of a period's competition will be contained in three files. For example, if a firm's name is Entity, ENTITY1.ENT will contain that firm's strategy as well as resulting costs, sales, and profit, ENTITY3.ENT will contain the results of any advertising tests, and ENTITY4.ENT will
contain the results of any new product concept tests. (If the firm's name is FIRMABC, then these files will be called **FIRMABC1.ENT**, **FIRMABC3.ENT**, and **FIRMABC4.ENT**.)

These files will be created whenever you run the market simulation. After you run the simulation you will need to use the file management option to transfer the files to the student diskettes. (You can do this without worrying about the detailed names of the files. ENTERPRISE will keep track and transfer the correct files automatically.)

The students' strategies are contained in two files. If a firm's name is Entity, **ENTITY2.ENT**, will contain that firm's strategy (advertising, price, quantity, position, research requests, new product entry, etc.) and **ENTITY5.ENT** will contain the positions and prices of the concepts if the student team requests new product concept research.

These files will be on the diskettes that the students turn in to you. They can be transferred to your hard disk (automatically) by the file management option and will be read as input by the market simulation.

If a world's name is ENTERPRISE, then the cumulative results for that world are contained in the file named **ENTCUM.ENT**. If the world's name is WORLD1, then the cumulative file will be called **WORCUM.ENT**. Only one cumulative file is needed for each world. You can see by the syntax why the first three letters of a world name must be unique.

The cumulative history option will read the cumulative file automatically. The market simulation will update this file after each running of the simulation.

You will also find files with the extension **.EPB**. These are backup files for the files that are read by the student program. For example, **ENTITY1.EPB** is a backup file for **ENTITY1.ENT**. Its purpose is to allow the students to re-enter ENTERPRISE at any time to update their strategies. The **.ENT** file is updated, but the **.EPB** file is not. Thus, if the students want to reset their strategies they can do so. When they select the reset option, ENTERPRISE will read the **.EPB** file rather than the **.ENT** file.

Because the **.EPB** file is a true backup, it can be used by the students should the **.ENT** file become damaged.

All of the above **.ENT** and **.EPB** files will be created automatically for a world when you run the setup option.
Chapter 4

HOW THE ENTERPRISE WORLDS WORK

Before you read this chapter, please review chapters 4 and 5 of the student manual. The student manual gives the basics of the ENTERPRISE worlds. This chapter reiterates some of the key structure and provides details that are not available to the students. Appendices to this instructor's manual give key equations for the ENTERPRISE worlds.

How a Product's Sales are Determined

One of the decisions that the students must make is the quantity to produce. If a team produces less quantity than it can sell, then the "excess demand" will be reallocated to those teams that have the capacity to meet the demand.

We begin by explaining the basic method of determining the demand for a team's product. In this description we will assume that every team produces at least as much as is demanded. We will then explain how excess demand is reallocated.

Sales equation. To enhance pedagogy, in particular to make it easier to teach response analysis, ENTERPRISE is based on a separable sales response. That is, sales are given by:

\[ \text{sales} = (\text{market volume}) \times (\text{adv. response}) \times (\text{positioning effect}) \]

This sales response simplifies some analysis, but it is not unrealistic. For example, see discussion in Little (1979)\(^1\). There are a large number of competitive interactions in ENTERPRISE so the separability of the sales response seems justified.

To make the market simulations more realistic, a random error of up to \(\pm 20\%\) is added to the

sales. This error represents events that were not forecast such as the impact of economic trends, presidential elections, foreign policy, OPEC, etc.

**Advertising response.** The advertising effect is based on a response function as illustrated in figure 1 of the student manual. We have built in a lagged response. That is, the advertising response is based on "goodwill" which is built up based on previous advertising spending. In particular, the goodwill in this period is an average of the goodwill in the previous period and the advertising spending in this period. That is,

\[
(1) \quad \text{goodwill} = \frac{\text{previous goodwill} + \text{adv. spending}}{2}
\]

The advertising response is then an index based on the goodwill. That is,

\[
(2) \quad \text{advertising response} = f(\text{goodwill})
\]

For example, if the advertising index is 1.20 then this means sales that are 20 % higher than some base level. If the index is 0.90, then sales will be 10 % below some base level. The exact equations are given in the appendix. In general, they are negative exponential for markets 1, 3, and 5; they are logarithmic for markets 2, 4, and 6. (Notice that each team begins with a product in one of each kind of market. The two new markets consist of one of each type of curve.)

**Advertising experiments.** Students should be encouraged to use the data from the advertising experiments to estimate the advertising response. The advertising experiments give them 15 observations with which to estimate equation (2). In markets 2, 4, and 6 a logarithmic transformation is necessary for the regression. In markets 1, 3 and 5 they will need an exponential transformation. There is also the weighting parameter that they must find by trial and error to minimize $R^2$. (That is, they know that goodwill is a weighted sum of last period's goodwill and this period's spending. They do not know that the weights are 0.50.)

You have the flexibility, you can tell them nothing and hope they realize the need for transformations. You can tell them they need transformations. Or you can give them the transformations. Similarly, you can exercise flexibility on the weighting parameter. See appendix for specific equations.

**Positioning/price response.** The positioning/price response is based on the value maps (also known as perceptual maps).
We assume that each customer maximizes utility where utility is based on positions in the value map. For example, suppose that a customer assigns weights to the two benefit dimensions, quality and versatility, and that these weights are $w_q$ and $w_v$, then his (her) utility would be:

\[
\text{(3) utility} = w_q \ast \text{(quality per dollar)} + w_v \ast \text{(versatility per dollar)}
\]

In the ENTERPRISE worlds different customers place different weights on the benefit dimensions. Some place high weights on the first dimension, quality in equation 3, some place high weight on the second dimension, and some place weight on both dimensions.

The variation in weights is given by a "taste diagram" as illustrated in figure 4 of the student manual. (In the ENTERPRISE worlds the taste diagram for the market is flat meaning that tastes are spread more or less equally over the two benefit dimensions.)

ENTERPRISE computes the positioning effect by dividing the market into 90 segments. Each segment corresponds to an angle, $\alpha$, from $0^\circ$ to $90^\circ$. The tastes of a segment are given by the slope of a line which makes an angle of $\alpha^\circ$ with the vertical axis. For each segment ENTERPRISE uses the corresponding weights to compute the utility for each product in the market. The higher the utility of a product, the more likely that segment's customers are to buy that product. (There is also a "reservation price effect." If all position/price combinations give low value, then many customers will choose no product.) The positioning effect is then computed by summing these probabilities across segments. Detailed equations are given in the appendix.

The previous paragraph is a bit technical. What it means is that products that are positioned further out on the value map will get a larger share of the market. (Further out will mean a larger radius to price ratio. See description in the Summary Tables section of chapter 3.)

Positioning relative to competition is important. For examples, read the discussion following figure 2 in the student manual.

Once ENTERPRISE computes this positioning effect, which is known in the marketing literature as the "unadjusted share," it multiplies the share times the advertising response and market volume as given by equation 1.

**New product concept tests.** ENTERPRISE uses the same computation method for the new product concept tests (and the "what-if" analyses.) The product concepts are placed on the value map one at a time and the above computations are carried out. Thus the predicted sales for the new product are the sales that it would attain if (1) it were the only new product in the market, (2) competitors do not change their positions, and (3) the advertising response were 1.00.
By selecting the six concepts carefully, students can get reasonable estimates of the response to positioning of demand and of cost. If they understand how to use positioning maps -- position with value better than competition for one or more market niches -- then they will choose the concepts intelligently. For example, they should spread the concepts out according to the angle of attack (see chapter 3). Concepts with angles of 0°, 15°, 30°, 45°, 60°, and 75° are one way to spread the concepts around. They might also want to vary the radii to find out how the cost structure varies with distance from the origin.

As in real markets the cost information may prove to be easier to use than the demand information. An error is built into the cost estimates, but this error is only ± 20%. No errors are built into the demand estimates other than those due to competition. But the errors due to competition are much more difficult to predict. If a competitor does not produce enough to meet its demand, a concept's sales can be much larger than estimated. If a competitor makes an aggressive change in positioning, price, or advertising, a concept's sales can be much lower than estimated.

Be careful, students may be frustrated by this uncertainty. It is natural and it is real. It represents what happens in real markets. If you monitor student reaction, any frustration can be turned to your advantage as you direct the frustration to help the students understand better the caveats of forecasting.

Once their product is in the market, the students can get a better understanding of the positioning effect by using the "what-if" feature as described below. However, the "what-if" analyses are subject to the same caveats.

**Market volume.** By market volume we mean the sum of all the sales that the firms would obtain if all had advertising indices of 1.00. Thus, if they advertise less, total sales will be less. If they advertising more, the market will expand beyond its nominal volume.

In the ENTERPRISE worlds, robotics, sound equipment, wood stoves, and detergents all have market volumes of 10 MM units. Facsimile and razzlets have market volumes of 20 MM units. These volumes are selected to make the "new" markets more attractive. Those student teams that identify these larger market volumes through the new product concept tests will gain a competitive advantage.

**Reallocating "excess demand."** Suppose that one firm has a good position on the value map and that it has enough goodwill and advertising spending for a good advertising response. But suppose that the production department does not produce enough quantity. Then this firm will have excess demand. Customers who would have purchased this firm's product had it been available will now purchase the best available product.

In the ENTERPRISE worlds we reallocate this excess demand to the other firms in the market
in proportion to the demand they would have realized had they been the only firms in the market. We continue reallocating demand until either all demand is met or all available quantity sold.

In order to prevent unrealistic behavior where students set a very high price to sell one unit of excess demand, we limit student prices to $100.

**How Production Cost is Determined**

Production cost (per unit produced) is based on the benefits that the product offers. For example, if a team offers more quality and more versatility in sound equipment, then the cost of producing a unit of the sound equipment will increase.

All firms face increasing marginal costs. That is, two units of quality cost more than twice as much to produce as one unit of quality. (The equation is quadratic.) Thus students will not be led to produce increasingly high levels of quality.

Costs also vary by the tradeoffs made between the two benefit dimensions. For example, in the sound equipment market the \(\text{INC}\) firm will find that its costs favor quality and the \(\text{WIZ}\) firm will find that its costs favor versatility.

The \(\text{STAR}\) firm has costs that favor a tradeoff between quality and versatility that is given by a \(70^\circ\) line with the origin. We refer to this \(70^\circ\) as the "best angle." (Technically, the isocost curves favor a ratio of versatility to quality given by the tangent of \(70^\circ\), \(2.747\).) The costs of the \(\text{COM}\) firm favor a \(20^\circ\) tradeoff.

The cost tradeoffs by team and market are given in table 3.

Notice the balancing of the teams. Each team starts with one product on a benefit axis and one product \(20^\circ\) away from a benefit axis. (\(70^\circ\) is \(20^\circ\) away from the vertical axis.) The cost structure is also balanced for those teams without products in the "existing" markets and for the "new" markets.

In the course of an \textsc{Enterprise} competition it will be extremely important for student teams to recognize that there are differential cost advantages. To drive this lesson home, \textsc{Enterprise} only allows a firm to reposition a produce by at most 20 \% per period. Thus, if a team chooses a poor initial position, they will place themselves in a hole from which it will take a number of periods to recover.

Teams can get an initial idea of their cost structure by ordering new product concept tests for the markets that they are not now in. If they spread the concepts out on the value map, they can identify the general area of the value map that is favorable from a production cost standpoint.
TEAM

<table>
<thead>
<tr>
<th>MARKET</th>
<th>...STAR</th>
<th>...INC</th>
<th>...WIZ</th>
<th>...COM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROBOTICS</td>
<td>90°</td>
<td>50°</td>
<td>20°</td>
<td>0°</td>
</tr>
<tr>
<td>SOUND EQUIP.</td>
<td>70°</td>
<td>0°</td>
<td>90°</td>
<td>40°</td>
</tr>
<tr>
<td>WOOD STOVES</td>
<td>40°</td>
<td>90°</td>
<td>0°</td>
<td>70°</td>
</tr>
<tr>
<td>DETERGENTS</td>
<td>0°</td>
<td>20°</td>
<td>50°</td>
<td>90°</td>
</tr>
<tr>
<td>FACSIMILE</td>
<td>90°</td>
<td>30°</td>
<td>60°</td>
<td>0°</td>
</tr>
<tr>
<td>RAZZLETS</td>
<td>60°</td>
<td>0°</td>
<td>90°</td>
<td>30°</td>
</tr>
</tbody>
</table>

Table 3: Favored tradeoffs for Production Costs
(Firm's starting positions are given in boldface type.)

Once a team has a product in a market, they can use the "what-if" feature to map costs in the neighborhood of their current position. Naturally, if they reposition, they can map costs in the neighborhood of their new position.

If you want to plot isocost curves for the students in the course of a lecture or a discussion, the isocost curves are ellipses with principle axes in the directions given by table 1. The ratios of the axes are 3:1.

For an example of a plot of an isocost ellipse, see figure 3 in the student manual. For examples of the equations see the appendix to this instructor's manual.

Inventories and Ordering Costs

Finished products. If a firm produces more product than it can sell, the excess products are placed in inventory for the next period. ENTERPRISE keeps track of these inventories automatically.

The inventory carrying cost is $0.15 per unit per period and does not vary across market.
If students improve their product by repositioning their product with increased benefit levels, then the products in inventory will not be as valuable to customers as those products produced with the higher benefit levels. On the other hand, the old inventory will not be worthless.

To simulate this effect, ENTERPRISE penalizes the existing inventory when a firm brings out a "new, improved version." The penalty is to reduce existing inventory by 15%. If we did not have such a penalty then students could use a strategy of building up low cost inventory and selling it as a high benefit product. This will not work in the real world and, hence, does not work in ENTERPRISE worlds.

**Materials.** The amount of materials used depends upon the quantity of finished goods produced. In particular, every finished product uses 1 unit of M1 and 2 units of M2.

The decision of how much of M1 and M2 to order is a decision left to the students. Thus, students can order more M1 and M2 than they need and hold it in inventory for future periods. Whether or not they do this depends upon the tradeoff they make between inventory carrying costs and ordering costs.

In ENTERPRISE if students order raw materials for the next period, then those materials arrive in time for production in that period.

The cost of carrying inventory is $0.10 units per period for M1 and for M2. The cost of ordering and transportation of the raw materials is $2 MM. It is independent of how much they order. They must also pay for the materials. The cost for M1 and for M2 is $300,000 for 1 MM units.

Sophisticated students will use an EOQ (Economic Order Quantity) analysis to decide when and how much to order. In the beginning sales of finished products are about $6 MM units, thus carrying enough inventory for 1 period's production will be about $600,000 for M1 and $1,200,000 for M2. For both M1 and M2 this is less than the ordering cost of $2 MM. Students should find it in their interest to develop stocks of these materials.

Notice that although the inventory and ordering costs for M1 and M2 are the same, the 1:2 ratio in production means that an EOQ analysis will give different ordering quantities and times.

As the ENTERPRISE worlds evolve, teams will be in more markets and sales will rise. Some teams will find that a JIT (Just in Time) strategy will become optimal.

Material decisions are related naturally to marketing decisions. The amount to order will depend upon projected demand. However, the amount to order for a given period is more under the control of the student teams because material use is dependent upon production quantity and production quantity is a decision under the control of the student teams.
If the teams recognize this interdependency, then they can avoid emergency orders which cost twice as much, $4 MM, as regular orders. ENTERPRISE will place an emergency order automatically if material needs exceed material availability (inventory plus quantity ordered). It is meant to be a stiff penalty.

**Other Costs**

There is a fixed cost of $1 MM for every market in which the students have a product. This cost is meant to cause them pause before entering a market that may be unprofitable. Once in, they can not exit.

There is a cost of $500,000 for every set of advertising experiments and for every set of new product concept tests that they order. These costs are not substantial. It should be in their interest to order the research. On the other hand, the costs are substantial enough to prevent frivolous orders.

There is a cost of $500,000 every time the students reposition their product. This level of cost is reasonable with respect to the real world and is included in ENTERPRISE to encourage them (1) to think long and hard about the position that they select for a new product entry and (2) to prevent frivolous repositioning. This cost should encourage heavy use of the "what-if" feature. The inventory penalty of a 15 % decline in old product inventory whenever the product is improved gives them another reason to be sure of any repositioning decision.

There are no costs for the use of the syndicated data and the "what-if" capability. The lack of costs should encourage the use of these features. Pedagogically, the "what-if" feature is a useful learning tool.

"What-if" Analyses

If students select the "what-if" feature, ENTERPRISE will run a market simulation for the strategy being considered. In other words, if they have already changed the price, position, or advertising using the ENTERPRISE market menu, then the market simulation will be run for that price-position-advertising strategy.

The "what-if" calculations of sales and production costs are done in the same manner as for the actual market simulation. However, to make life interesting an error of up to ± 20 % is added to the production cost estimates. (These errors are set each time the program is run, not each time the "what-if" analyses are run. Thus, students can not run the "what-if" analyses over and over to get an estimate of the true value. They can do this only if they restart the program each time.)

The "what-if" analyses will prove extremely value to the student teams, but the analyses will not replace good decision making. There are two important caveats that students must understand when
using the "what-if" analyses.

First, the "what-if" analyses assume that competition will do next period what it did last period. This will be true only if the other student teams are napping or if the market has reached equilibrium. In the early periods of a competition, other teams should have the incentive to improve their profitability. This is likely to mean changes in the price and the positions of existing products and the entry of new products. If competitors are aggressive, then this caveat should lead to an overestimate of sales potential. Only in the late periods of a competition is the market likely to reach an equilibrium where all teams are satisfied with their strategies.

The second caveat is that the "what-if" analyses assume that everyone produces enough quantity to meet demand. If competitive teams misjudge demand and produce too little, then the "what-if" analyses will underestimate sales.

Note that these two caveats may mean that a "what-if" analysis may not reproduce the sales that the team earned, even if the "what-if" analysis is run on the same strategy that they used. You may need to reinforce these caveats should the students ask you about this difference.

There is another caveat. The "what-if" analyses are based on an average of this period's goodwill and next period's planned advertising. This period's sales were based on an average of last period's goodwill and this period's advertising. However, unless they have been rapidly increasing or decreasing advertising, this caveat will not have a strong effect.

Together these caveats should lead students to a more mature view of the benefits and the disadvantages of "what-if" analyses. Used correctly, the "what-if" analyses lead to tremendous insight into the workings of the ENTERPRISE markets. Used incorrectly, the students could get burned.

To use the "what-if" analyses correctly, student teams should make estimates of how they believe that competition will set prices and positions in the next period. They can then make judgmental corrections in the sales forecasts.

At first, some of the caveats may not be understood by students. They may come to you complaining that sales (or costs) are not the same as the "what-if" analyses forecast. At this time you should lead them through the caveats. For example, ask them if competition improved positions or lowered price and ask them if any new products entered the market. Explain the advertising caveat if it is relevant to their situation.

You can get an idea of whether or not a competitor produced enough to meet demand by examining the inventory of that competitor. If it is 00, then demand may have exceeded supply and the excess demand may have been reallocated.

Revenue, Profit, Etc.
Once ENTERPRISE calculates sales, production costs, inventories, and material orders and makes note of fixed costs, ordering costs, and repositioning costs, revenue and profit calculations proceed in the obvious manner. Revenue is just price times sales. The profit for a market is the revenue minus production costs and other relevant costs. The total profit is just the sum of the profits over the markets minus any materials related costs.

ENTERPRISE does all the bookkeeping to keep track of these revenues and profits. Students can access them with their program and you can access them (1) when you run the market simulation and (2) when you plot cumulative histories. You can also access averages with the summary tables option.
Chapter 5

HOW TO PROCEED, WHAT TO SAY

With the ENTERPRISE integrating exercise students learn by experience. On one hand the ENTERPRISE markets are sufficiently complex to challenge students. On the other hand some aspects have been simplified so that complexity does not interfere with pedagogy. In many ways the best way to proceed is to trust the students. Pride, if nothing else, will motivate them to do well. As they compete, they learn about the marketing and production aspects and they learn about what it means to set strategy in the face of competitive response.

Feedback Sessions

However, the ENTERPRISE experience can be enhanced greatly by instructor intervention. Students want to do well and will come to you with questions. You should schedule discussion sessions between you and your students or between your teaching assistant and your students.

By asking questions of students you can lead them to consider how competitive response affected outcomes, how they can interpret competitive motivation, how they can use new product concept tests intelligently, how they can overcome past mistakes, etc. Without such feedback sessions students could become frustrated when the outcomes do not match expectation.

You should also be aware of the video game effect. ENTERPRISE is designed to be easy to use. Sometimes it is too easy to use. Students can set strategy with little thought. In most cases they will be outwitted by competitive teams and will be forced to come to grips with the workings of the markets. However, in some cases they will muddle through. By giving them feedback and by challenging them to explain their strategies you can force more active learning.
Length of Time For the Competition.

Because ENTERPRISE is designed to be used with electronic files and personal computers, you can run a market simulation in minutes. The length of time between periods is thus dictated entirely by the pedagogy that you choose and your belief about how long it will take students to make decisions.

On one hand, a number of ENTERPRISE sessions can be run between class periods. In such an accelerated mode, you can use ENTERPRISE to demonstrate specific topics or to give students a chance to compete against one another.

At the other extreme, ENTERPRISE can be used over the course of a quarter or a semester. You can schedule one decision period per week and allow students to come to grips with all of the aspects of ENTERPRISE. As you cover price, positioning, advertising, production costs, inventory management, JIT, competitive reaction, new product development, response analysis, statistical estimation, etc. in your course, you can use the ongoing ENTERPRISE competition to highlight certain issues.

ENTERPRISE can also be used for an intensive orientation session of a few days or as a module in a longer course.

Here are a few considerations. If ENTERPRISE is used within a course, it is reasonable to assume that students have other courses and that they have assignments in those courses as well. In such cases, it is probably better to have at most one decision per day. Three decisions per week, Monday, Wednesday and Friday, may be more relaxed.

If ENTERPRISE is used in an executive program or an intensive module where you can assume that you have the students' undivided attention, then two decisions per day is quite reasonable.

Number of Periods: Openings, the Middle Game, and the Endgame

The ENTERPRISE software allows you to run the competition for any number of periods.\(^2\) Thus, the choice of the number of periods should be selected to match the needs of your pedagogical goals. There are some considerations.

The opening. Each firm can enter at most one market per period. Thus, in the opening periods

\(^2\)However, the cumulative history program will plot only the twenty most recent periods due to the memory limitations of most computers.
of the competition the firms will be most concerned with new product entry. Product development is encouraged by the structure of ENTERPRISE, thus the teams should enter the markets rapidly. Soon after the fifth period, the opening should be complete.

If students approached the new product positioning carefully, then they should gain a cost and position advantage that endures over a number of periods.

You should also see a lot of experiments in strategy during the opening periods as the student teams learn the rules of the game.

**The middle game.** Once the flurry of new product development subsides, the student teams must come to grips with competing in the maturing markets. Each team will seek to optimize its strategies with respect to competition.

If they ignore competitive response, they could ultimately reach an equilibrium. If they become too aggressive, the market will deteriorate into price-positioning wars. If they make rational conjectures about how competition reacts, the market will trend toward a more cooperative equilibrium. In any case you can develop lively class discussions -- especially if some worlds tend to be more cooperative than others.

During this phase of the competition students should understand the workings of the market and the marketing and production concepts that it represents. Their main focus will be competitive response.

**The endgame.** If you announce in the beginning that the competition will run a fixed number of periods, then the competition will enter an endgame stage as this end approaches. In this stage teams will run down inventory. The markets are likely to become less cooperative when teams cease to have long term incentives.

Some instructors will welcome the endgame because it gives them a chance to discuss endgame phenomena and relate such phenomena to incentives that managers face at the end of their tenure in a

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³For the mathematical model underlying the ENTERPRISE worlds it is possible to show that such a Nash equilibrium will exist in prices. For the price-positioning equilibrium it is less clear. There are incentives to differentiate, but the markets can deteriorate into price-positioning wars. See John R. Hauser (1988), "Competitive Price and Positioning Strategies" and John R. Hauser and Birger Wernerfelt (1988), "Existence and Uniqueness of Price Equilibria in Defender," both in *Marketing Science*, 7 (Winter), 76-91 and 92-93.
position.

Other instructors will wish to avoid the endgame. There are at least two ways to avoid the endgame. One method is to have a random end to the game. After each period (beyond a certain point) you select a random number. If the random number exceeds a cutoff, stop the game. As long as the probability of continuing is sufficiently large, the endgame effects should disappear. See Axelrod (1984). Another way to avoid endgame effects is to announce a game of a fixed length, but stop it a number of periods early.

**Rewards: How to Set Student Goals**

ENTERPRISE is balanced in terms of initial position and potential. Thus, total profit is one way to judge outcomes. Certainly students will use this metric as one way to judge themselves.

There is an issue of how to weight time periods. Some instructors will want to use a discount rate. The logic behind such a discount rate is that net profits earned in early periods could be invested at \( r_1 \) \% interest and grow over the course of the game. By the same token, if a team runs at a loss for a given period they would need to borrow funds and pay interest on those funds at a rate of \( r_2 \) \%. For simplicity you can use the same discount rate for profits as for losses.

You can then use the standard formula to weight profits over the periods of the competition. That is,

\[
(4) \quad \text{Total profit at } T = \sum_{t} (\text{profit in period } t) \times (1 + r)^{T-t}
\]

where \( r \) is the discount rate, say 0.10, and \( T \) is the length of the game.

If you set \( r = 0 \), then this is equivalent to using the sum of total profits as a criterion by which to judge the teams.

No matter which discount rate you use to judge the competition, it should not be the only criterion. (It may be a large criterion or a small criterion.)

There are many opportunities in ENTERPRISE for the learning of important qualitative lessons. You should encourage students to talk about and internalize these lessons and you should consider basing any evaluation on how well they come to grips with those lessons.
Chapter 6

ANSWERS TO A FEW QUESTIONS YOU MIGHT HAVE

The design of ENTERPRISE is based on extensive interviews with instructors in a variety of functional areas. Some of these instructors had experience with management games; others did not. A "beta" version was made available and used with different student groups. Version 1.0 represents a number of tradeoffs that were made to satisfy the needs of instructors and to react to student comments on the beta version.

The source code is flexible. New features will be added as ENTERPRISE evolves. When these features are added we will include switches in the instructor's software that will allow you to turn the features on or off. In this way you can tailor ENTERPRISE to your specific needs.

If you want us to add (or delete) features or if you want us to modify how ENTERPRISE works, please write to the author. To the greatest extent possible we want ENTERPRISE to enhance your pedagogy. We will try to respond.

So that you might understand our perspective, the remainder of this chapter addresses some of the design tradeoffs that were made in ENTERPRISE. If your students raise these questions, you can use this chapter to formulate a response.

Why are the Units Similar Across Markets?

Industrial goods like robots can cost hundreds of thousands of dollars. Detergents cost only a few dollars. In ENTERPRISE the prices are all in the range of a few dollars.

In demonstration tests it seemed that if the units varied widely, then there was unnecessary confusion as the users tried to translate between markets. Since we wanted to focus on more strategic issues, the units were standardized.

Because the code is flexible, version 2.0 of ENTERPRISE may allow you to select among sample markets that represent real markets. Work is now underway on this option.

Why are Teams Limited to one New Product per Period?
Originally we allowed teams to enter all markets at once. Since new product entry is encouraged by the structure of the ENTERPRISE worlds, this led to market entry that was too rapid.

The restriction to one market per period spreads out new product development over a number of periods. Students get feedback on earlier decisions and thus more opportunities to learn from experience. Hopefully they will internalize the lessons more effectively.

The cover story is realistic. New product development takes significant resources. The teams have only enough resources for one new product per period.

**Why Emergency Orders?**

If teams plan to produce more finished products than are possible with their supplies of raw materials, ENTERPRISE automatically increases the material orders. Teams are penalized by an emergency ordering cost that is twice the normal cost.

Because quantities produced is a decision under the control of the student teams, they should have no trouble avoiding emergency orders. On the other hand, should they make a bookkeeping mistake, we wanted them to get feedback on their other decisions. The feature of emergency orders allows the game to continue and thus provides this feedback.

Some student teams felt that raw material orders in one period should not be made available until the following period. In version 1.0 of ENTERPRISE they are available in the period in which they were ordered. Version 1.0 emphasizes marketing aspects of management. As ENTERPRISE evolves we hope to achieve the same realism in production aspects.

**Why Repositioning Costs?**

There are two types of costs to repositioning products. Both are realistic.

The first cost is a fixed fee of $500,000 for a change in position. This penalty corresponds to costs that might be incurred in product redesign and in changing the advertising copy.

The second cost is that existing inventory suffers a penalty of 15% when a product is improved. This penalty corresponds to the observation that it will now be more difficult to sell the old, unimproved products.

The pedagogical motivation behind these costs is to cause the students to think long and hard when they consider repositioning their product. It also puts a large premium on careful product design. If you "get it right the first time," then you will not need to reposition to improve costs.
The inventory penalty prevents unrealistic strategies of producing low quality products in one period and selling them at a premium in the next period.

An issue related to positioning costs is the fact that if a product is positioned on one of the axes it will stay on the axis. Products can be repositioned by at most 20%. However, 20% of 00 is still 00. Students are warned about this issue and encouraged to choose new product positions that are flexible. In existing markets each team has exactly one product on a benefit axis. This should reinforce the lesson of flexibility.

Why no Diffusion Phenomena?

We expect that durable products such as wood stoves would go through a product life cycle of diffusion, saturation, and decay. This phenomenon could be added to the simulations.

We did not do so because we wanted students to focus on competitive issues of mature products rather than the transient issues of growing vs. declining markets.

You can tell students that the market is predominantly a replacement market which is less likely to be described by a Bass-like diffusion curve. Indeed, this is not an unrealistic description of many durable markets.

By the same token, we could have added market growth or seasonality. In general, ENTERPRISE is already quite complex. The addition of these phenomena runs the risk of unnecessary complication that would interfere with the pedagogy rather than enhance it.

If we have enough requests to add these phenomena as options we will do so in future versions.

Other Questions?

As you run ENTERPRISE, you may encounter questions that this manual does not answer. We will attempt to answer pedagogical questions and other software related questions. Write down your questions and describe your student situation. -- How many students? At what level? How many periods? In which course? Etc. Mail these to the author. He will try to answer your questions as rapidly as is feasible. If you need a very rapid response, the author's BITNET address is JHAUSER@SLOAN.
Appendix 1

COST SUMMARIES

Production Cost: Depends upon market and chosen position.

Advertising Cost: You select the amount to spend.

Repositioning Cost: $500,000 for a change in position. If a product is improved, the inventory of unimproved products is reduced by 15%.

Fixed Cost: $1 MM per market per period.

Research Costs

New-product concepts: $500,000 for a set of six concepts.

Advertising experiments: $500,000 for a set of sixteen.

Inventory

Finished products: $0.15 per unit per period.

Materials (M1 or M2): $0.10 per unit per period.

Ordering Costs

M1: $2 MM per order

M2: $2 MM per order

Emergency orders: Twice the above ($4 MM)
Materials

**M1:** $300,000 per 1 MM units.

**M2:** $300,000 per 1 MM units.

**Syndicated Data:** No charge per use. Part of overhead.

"What-if" Analyses: No charge per use. Part of staff overhead.
Appendix 2

FILE NAME SYNTAX

Default Firm Names

The default firm names are created by combining the suffixes, STAR, INC, WIZ, and COM, to the first three letters of the world name. If the world name is ENTERPRISE, the firm names are ENTSTAR, ENTINC, ENTWIZ, and ENTCOM.

Data Files for Each Firm

The data files are created from the firm names by adding a one digit number plus the file extension, .ENT, to the firm names. For example, if the firms name is ENTITY, then the data files will be ENTITY1.ENT, ENTITY2.ENT, ENTITY3.ENT, ENTITY4.ENT, and ENTITY5.ENT.

The one digit number indicates the following.

1. Student input files.
2. Student output files.
3. Advertising research results (if any).
4. New product concept test results (if any).
5. Advertising and new product concept test requests (if any).

The student input files are backed up with an .EPB extension. For example, ENTITY1.ENT is backed up as ENTITY1.EPB. This backup is necessary so that students can update and/or reset their strategies.

Data Files for Firm Names and Cumulative Histories

The name of the file that contains the firm names is the first eight letters of the worldname with
the .ENT extension. The name of the cumulative history file is the first three letters of the world name with a suffix of CUM.ENT. For example, if the world name is ENTERPRISE, then these files are named ENTERPRI.ENT and ENTCUM.ENT.
Appendix 3

SUGGESTIONS FOR WORLD NAMES

You can choose any name for an ENTERPRISE world up to twelve characters as long as it does not contain spaces, commas, periods, or special characters that DOS does not recognize. However, the first three letters should be unique to avoid two cumulative history files of the same name.

Here are a few suggestions.

<table>
<thead>
<tr>
<th>EUROPE</th>
<th>USA</th>
<th>CHINA</th>
<th>INDIA</th>
<th>AUSTRIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARS</td>
<td>VENUS</td>
<td>MERCURY</td>
<td>SATURN</td>
<td>PLUTO</td>
</tr>
<tr>
<td>BOSTON</td>
<td>CHICAGO</td>
<td>SEATTLE</td>
<td>DALLAS</td>
<td>NEWYORK</td>
</tr>
<tr>
<td>OAK</td>
<td>ELM</td>
<td>ASH</td>
<td>PINE</td>
<td>HEMLOCK</td>
</tr>
<tr>
<td>BLUE</td>
<td>RED</td>
<td>YELLOW</td>
<td>BLACK</td>
<td>GREEN</td>
</tr>
<tr>
<td>COFFEE</td>
<td>TEA</td>
<td>MILK</td>
<td>WATER</td>
<td>WINE</td>
</tr>
</tbody>
</table>
Appendix 4

ADVERTISING, POSITIONING/PRICE, AND COST EQUATIONS

Advertising Equations

(A1) \( \hat{a}(t) = 0.50 * \hat{a}(t-1) + 0.50 * a(t) \)

where \( \hat{a}(t) = \) advertising goodwill in period \( t \)

\( a(t) = \) advertising spending in period \( t \)

(A2) \( R(t) = 1 - \exp\left[-(k_1\hat{a}(t) + k_2 + \varepsilon)\right] \)

(A3) \( R(t) = \log (k_3\hat{a}(t) + k_4 + \varepsilon) \)

where \( R(t) = \) the advertising response in period \( t \)

\( \varepsilon = \) zero mean error

\( k_1, k_2, k_3, \) and \( k_4 \) are constants which vary by market

Advertising response equation A2 applies to markets 1, 4, and 5. Advertising response equation A3 applies to markets 2, 3, and 6. The values of the constants are \( k_1 = 0.21, \) \( k_2 = 1.55, \) \( k_3 = 0.20, \) and \( k_4 = 1.5. \)
Positioning/Price Equations

The heterogeneous tastes of customers are divided into 90 segments where each segment corresponds to an angle, $\alpha$, that varies from $1^\circ$ to $90^\circ$. This angle represents the tradeoffs that segment makes among the two benefit dimensions. Define the following variables for each market and for each time period.

\[ x_i = \text{position of firm i on horizontal dimension} \]
\[ y_i = \text{position of firm i on vertical dimension} \]
\[ p_i = \text{price of firm i's product} \]
\[ u_i(\alpha) = \text{utility of firm i's product for the segment with tastes } \alpha \]
\[ P_i(\alpha) = \text{probability a customer in segment } \alpha \text{ chooses firm i's product} \]

Then

\[(A4) \quad u_i(\alpha) = w_x(\alpha) * (x_i/p_i) + w_y(\alpha) * (y_i/p_i)\]
\[(A5) \quad P_i(\alpha) = \exp[\beta(\alpha) * u_i(\alpha)] / \{\Sigma_j \exp[\beta(\alpha) * u_j(\alpha)] + \exp[\lambda]\}\]

The sum in equation A5 applies only to those firms which have products in the market. If a firm does not have a product in the market, then $P_i(\alpha) = 0$ for that firm. The segment dependent constants in equations A4 and A5 are given by:

\[ w_x(\alpha) = 1/[1 + \tan(\alpha)] \]
\[ w_y(\alpha) = \tan(\alpha)/[1 + \tan(\alpha)] \]
\[ \beta(\alpha) = B * [1 + \tan(\alpha)]/[1 + \tan^2(\alpha)]^{1/2} \]

For ENTERPRISE, $B = 10$ and $\lambda = 0.50$. 
For those who are interested, equation A5 is a logit approximation to a probit model. In the probit model the uncertainty comes from heterogeneity in customers' perceptions of $x_i$ and $y_i$. This uncertainty is modelled by a multivariate normal distribution.

Finally, the unadjusted share of firm $i$, $s_i$, is given by

\[(A6) \quad s_i = \{\Sigma \alpha P(\alpha)\}/90\]

where $\alpha$ is summed from $0^\circ$ to $90^\circ$.

Sales

If $S$ is the market size, then the sales of firm $i$ is given by equation A7 where A7 applies separately to each market. We index $s_i$ by time period

\[(A7) \quad Sales = S \times R(t) \times s_i(t)\]

Production Costs

If $\theta$ is the angle given by table 1 in chapter 4, then production costs, $c_{ij}$, for firm $i$ in market $j$ are given by:

\[(A8) \quad c_{ij} = [A(\theta)x^2_{ij} + B(\theta)x_{ij}y_{ij} + C(\theta)y^2_{ij}] \times K\]

where $x_{ij}$ and $y_{ij}$ give firm $i$'s position in market $j$ and $K = 0.03$. The values of the parameters of the isocost ellipses in equation A8 are given by table A1.
Table A1: Parameter Values for Isocost Ellipses. (See Table 3 in Chapter 4 for the value of $\theta$ which corresponds to each firm/market combination.)

<table>
<thead>
<tr>
<th>$\theta$</th>
<th>A(\theta)</th>
<th>B(\theta)</th>
<th>C(\theta)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>1.000</td>
<td>0.000</td>
<td>9.000</td>
</tr>
<tr>
<td>20°</td>
<td>1.936</td>
<td>-5.142</td>
<td>8.064</td>
</tr>
<tr>
<td>30°</td>
<td>3.000</td>
<td>-6.928</td>
<td>7.000</td>
</tr>
<tr>
<td>40°</td>
<td>4.305</td>
<td>-7.878</td>
<td>5.695</td>
</tr>
<tr>
<td>50°</td>
<td>5.695</td>
<td>-7.878</td>
<td>4.305</td>
</tr>
<tr>
<td>60°</td>
<td>7.000</td>
<td>-6.928</td>
<td>3.000</td>
</tr>
<tr>
<td>70°</td>
<td>8.064</td>
<td>-5.142</td>
<td>1.936</td>
</tr>
<tr>
<td>90°</td>
<td>9.000</td>
<td>0.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>
Appendix 5

HINTS FOR
ADVERTISING RESPONSE REGRESSIONS

The advertising experiments give as data fifteen values of the pairs \((a(t), R(t))\). If the students have an idea of the constant, 0.50, in equation A1, then they can keep track of \(a(0), a(1), \ldots, a(t-1)\) to compute \(\hat{a}(t)\). Thus we will assume that the students have access to fifteen data points of the form \((\hat{a}_m, R_m)\) where \(m = 1, 2, \ldots, 15\).

The students will not know which market has an exponential response function, equation A2, and which market has a logarithmic response function, equation A3. Thus, for a given market they will need to try both and choose the equation with the best fit. To make it interesting you can throw in a "red herring" such as suggesting they try a linear form as well.

**Exponential Form**

The equation to be estimated is

\[
(A9) \quad R_m = 1 - \exp[-(k_1\hat{a}_m + k_2 + \text{error})]
\]

Transposing and taking logarithms yields.

\[
(A10) \quad -\log (1 - R_m) = k_1\hat{a}_m + k_2 + \text{error}
\]

Thus, if they use the logarithmic transform in equation A10 as the dependent variable and the \(\hat{a}_m\) as the explanatory variable, then the intercept is an estimate of \(k_2\) and the slope is an estimate of \(k_1\).

**Logarithmic Form**

The equation to be estimated is:
(A11) \[ R_m = \log (k_3 \hat{a}_m + k_4 + \text{error}) \]

Taking logarithms yields

(A12) \[ \exp[R_m] = k_3 \hat{a}_m + k_4 + \text{error} \]

Thus, if they use an exponential transform of \( R_m \) as the dependent variable and the \( \hat{a}_m \) as the explanatory variable, then the intercept is an estimate of \( k_4 \) and the slope is an estimate of \( k_3 \).
INDEX

Advertising Equations 4, 50
Advertising Experiments 3, 4, 25, 32, 45, 54
Advertising Research 47
Advertising Response 3, 4, 25, 27, 28, 50, 54
Angle of Attack 19-21, 27
Backing Up 2, 7
Balance 2, 3
Best Angle 19, 20, 29
Beta Version 41
Caveats 28, 33, 34
Competitive Considerations 19
Cost Summaries 3, 45
Cumulative History 2, 11, 13-15, 21, 22, 38, 48, 49
Data Files 2-4, 9, 11, 12, 21, 47, 48
Decisions 1, 2, 4, 5, 10, 17, 24, 32, 37, 42
Decisions Per Week 37
Defender 38
Diffusion Phenomena 3, 43
Discount Rate 39, 40
Economic Order Quantity 31
Emergency Order 32
Endgame 3, 38, 39
EOQ 31, 32
EPB Files 7, 23
Equilibrium 33, 38, 39
Error Messages 2, 8
Excess Demand 3, 24, 28, 34
Existing Inventory 31, 43
Fast Plot Option 16
Feedback Sessions 3, 36
File Not Found in Module 9
File Transfer 2, 8, 12
Finished Goods 20, 31
Firm Name Syntax 2, 11
Fixed Cost 32, 45
Goodwill 25, 26, 28, 34, 50
Hard Copies 2, 13
Hardware 2, 6
Input Past End 9
Inventory 3, 4, 14, 17, 20, 30-32, 34, 37, 39, 43, 45
Inventory Penalty 32, 43
Isocost Curves 29, 30
Isocost Ellipse 30, 33
JIT 32, 37
Just in Time 32
Loading 2, 6, 7
Market Simulation 2, 6, 12-14, 22, 33, 35, 37
Market Size 52
Market Volume 3, 24, 27, 28
Menu of Options 2, 8, 10, 12, 14, 18
Middle Game 3, 38
Opening 3, 16, 38
Order Raw Materials 31
Perceptual Map 2, 14, 16, 17
Perceptual Map Evolution 2, 14, 16, 17
Positioning Effect 24, 26-28
Positioning/Price Equations 4, 51
Positioning/Price Response 3, 26
Preview of Student Results 2, 13
Price 3-5, 14, 18-20, 22, 26-28, 33, 34, 37-39, 50, 51
Production 1, 3, 4, 14, 20, 28-34, 36, 37, 39, 42, 45, 52
Production Costs 4, 14, 30, 33, 34, 37, 52
Profit 2-4, 14, 15, 19, 20, 22, 34, 39, 40
Quantity Produced 3
Radius 19-21, 27
Raw Materials 3, 4, 31, 42
Redo from Start 9
Regressions 4, 54
Repositioning Costs 3, 34, 43
Reset 23, 48
Revenue 3, 14, 34
Sales Equation 3, 24
Selecting the Six Concepts 27
Setup 2, 3, 9, 10, 22, 23
Suggestions for World Names 4, 49
Summary Tables 2, 3, 17, 18, 21, 27, 35
 Syndicated Data 33, 46
Syntax 2, 4, 10, 11, 22, 47
System Hangs 9
Taste Diagrams 6
Total Profit  3, 4, 14, 20, 34, 39, 40
Transferring Files  2, 6, 8, 12
Value Map  16, 26-29
Video Game Effect  36
"What-if" Analyses  3, 27, 28, 33, 34, 46
World Name Syntax  2, 11
Worlds  1-3, 5, 8, 10, 11, 16, 24, 26, 28, 31, 32, 38, 39, 42