INSTRUCTOR'S MANUAL FOR

Applying Marketing Management

Four PC Simulations

John R. Hauser
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Overview of the Marketing Management Simulations

Applying Marketing Management contains four sophisticated PC simulations designed to help students learn key concepts in marketing management, marketing strategy, and product management.

Each simulation is self-contained and challenging. With the help of a short supplementary book, the students can run the simulations themselves. This allows them the chance to try varying strategies and develop an intuitive grasp of the principles behind the simulations. By solving interesting marketing problems, they learn the basic concepts of positioning, competitive strategy, new product development, and life cycle forecasting.

The simulations are menu-driven and can be made self-booting. They run on any IBM-compatible PC with at least 128K of memory. Because all graphics are achieved with standard ASCII characters, the simulations do not require a graphics card. The simulations are in color, but will also run on a monochrome monitor.

This instructor’s manual is designed to help you integrate the PC simulations into your course. Used this way, the simulations raise a myriad of discussion issues as you introduce new concepts and illustrate alternative means by which to address the problems posed by the simulations. By teaching the students effective means of addressing marketing problems and by showing them that the simulations generalize to proven applications, you help your students gain a better understanding and appreciation of marketing concepts.

The Simulations

The four simulations, given memorable names for easy classroom reference, are:

1. **DEFENDER (Positioning Strategy)**. The student plays the role of the manager of the largest brand in the mythical Schnozzle market. He or she is in total control of the firm’s flagship brand, which has a 50 percent share of the market and returns $20MM in annual profit. As the story unfolds, the student learns about the brand’s strategy and its profit opportunities. Then disaster strikes! A strong new competitor, ATTACK, enters the market and reduces profitability of the flagship brand. The student must make marketing decisions to regain profitability.

   The simulation gives strategic information on competitors and consumer
4. **HOME ENTERTAINMENT (Life Cycle Forecasting)**. Students are asked to forecast sales of a home entertainment product. In Part 1, they are given four years of data and asked to forecast the next six years. A new problem is generated each time the simulation is run. By getting feedback on their forecasts, students develop qualitative forecasting skills.

Part 2 then introduces a specific life cycle forecasting model to illustrate the concepts of innovators, diffusion, and market saturation. By learning this one simple model, students can appreciate the conceptual issues and later, more sophisticated models.

The analytical model has three parameters, each of which represents an important life-style phenomenon. Part 3 gives students the opportunity to change any or all of these parameters and plot the results.

Besides teaching the concepts of the product life cycle, innovation, diffusion, and market saturation, this simulation raises issues of judgmental vs. analytical forecasting and sensitivity analysis.

5. **Review and/or print results**. To make grading easier for the professor, the main menu contains a print utility that enables students to review on the screen or record on a printer a detailed summary of their most recent attempts at the simulations. If you require students to hand these summaries in, you insure that they have completed the simulations satisfactorily, and you have a printed, standardized format for grading; it also allows you to provide your students with detailed feedback on their learning progress.

**Student Book**

The student book, *Applying Marketing Management: Four PC Simulations*, which contains the simulation disk, is designed to reinforce your classroom lectures. Besides a few technical instructions on getting started, the student book describes each simulation and all its options in detail. The relevant marketing concepts are introduced and students are challenged to address the conceptual issues underlying each simulation.

The student book includes discussion questions and suggests complementary projects and further readings.

**This Instructor's Manual**

The next four chapters describe the pedagogical uses of the PC simulations and give you hints on how to teach with the simulations. Each chapter includes "answers," technical backup, and a description of the lessons for each simulation. Short bibliographies of materials related to each simulation are provided—they also appear in the student book.

Each chapter also contains one or two complementary exercises and projects that can be assigned prior to, during, or after each PC simulation. These written exercises are particularly effective in helping students generalize beyond the specific situations in the PC simulations.

**Transparency Masters**

The transparency masters that the author uses when teaching with the PC simulations are available in Xerox form from The Scientific Press. They include:

1. **For DEFENDER**: A complete lecture on the theory and application of defensive marketing strategy. Included is an actual application with profit analysis and managerial strategy. The lecture is based on material
The PC simulations can be used in a laboratory of shared personal computers or can be assigned as supplementary material and used in the students' homes. Once the setup instructions in the student book are followed, the disk is self-booting, and since the simulations are menu-driven, no prior computer experience is necessary.

The student disk contains four simulations. At M.I.T. we use all four and refer to previous results as we proceed from one to another. However, all simulations are self-contained. You can choose to use all four, any three, any two, or just one. The specific use and the order in which you use them will depend upon your course syllabus.

The hints and exercises in this Instructor's Manual are examples only, and you may not want to use them exactly as they are given. Modify them, enhance them, use some of them or all of them. The PC simulations teach basic concepts and are not limited to one style of pedagogy. Let your imagination run wild, and good luck!
positioning and to offer consumer benefits. Taste diagrams fulfill a marketing function by telling the manager how consumers vary.

2. Price. Consumers want benefits. They get these by paying a price for the product. This simulation uses per-dollar maps because they are easier to present on a computer screen. You can take this opportunity to discuss value in the form of benefits versus price and to discuss alternative representations such as per-dollar maps (benefits per dollar) or price as another dimension in a perceptual map.

3. Benefits and the marketing concept. A usual first reaction to a perceptual map is to reposition as far out as possible by increasing both Efficacy and Usability. This will increase market share, but may or may not increase profitability. Students learn to balance benefits, production cost, and margins (price minus cost).

4. Advertising. In DEFENDER, advertising is modeled as a means to make people more aware of the product. This is one thing that advertising does, but not the only thing. You can use this simulation as a forum from which to discuss the other roles of advertising.

5. Promotion. In this simulation promotion is bad because of the fixed cost. You can use this opportunity to discuss other roles of promotion—awareness, trial, special display, and so on. Point out that promotion sometimes affects margins by raising or lowering retail margins.

6. Marketing mix. You can use the simulation as a forum to indicate how all elements of the marketing mix must be balanced and coordinated.

7. Competition. DEFENDER assumes that Attack, Powtron, and Overeasy do not respond to Sch-name’s response. Students will do well by getting unrealistically high market share. You can use this simulation as a forum to introduce competitive “chess game” issues. Some instructors may even want to introduce economic equilibrium issues.

8. Value of information. It costs $100,000 for each additional run beyond the sixth simulation. Not only is this realistic, but it forces students to think about the value of information. For example, if the next simulation is likely to increase profitability by at least $100,000, then it is worth the market research cost to run that simulation. Don’t be surprised if students see six simulations as a hard and fast barrier.

Teaching Notes

1. The DEFENDER simulation is designed to be very user friendly. Be careful—the simulation can be too easy. Some students can complete the exercise by trial and error. Avoid this by challenging them and by discussing the “answers” in class.

2. The Schnozzle market is based on a disguised real market. For background, see the Hauser (1986) or Hauser and Gaskin (1984) references in the suggested readings. You can use the simulation to contrast a computer model with the complexities of a real marketing management situation.

3. Students can discover the cost structure by trial and error. They should be encouraged to do so. You will note that at the margin the cost structure is not as dramatic as the global formula.
Teaching Note: You can reproduce Table 8.1 and Figure 10.10 from G. L. Urban and J. R. Hauser, Design and Marketing of New Products (Prentice Hall: Englewood Cliffs, NJ, 1980) for a real-life example.

Exercise 2: Analysis. Perceptual maps represent product images. But what if the prices are not the same for all products on the map? For example, what if Tylenol costs a lot more than Bayer, or M.I.T.'s Sloan School is more expensive than a correspondence school, or a BMW is more expensive than a Chevette? But price does matter. One way to represent price effects on a perceptual map is to add price as a third dimension. Another way to represent price is to make the dimensions per-dollar dimensions such as “effectiveness per dollar.” The new position of the product is its earlier position divided by its price. This exercise illustrates the use of per-dollar maps.

Video Systems, Inc. (VSI) decided to launch a new home entertainment system. It was so successful that two competitors, Home Entertainment, Inc. (HEI), and Copy Cat, Inc. (CCI), entered the market. VSI now wants to understand its competitive position.

VSI asked Positioning Associates, Inc. (PAI) to develop a perceptual map for its market. PAI determined that the market can be described by two perceptual dimensions: Entertainment Potential and Ease of Use. All three products are currently priced at $2000.

PAI determined that under current market conditions the per-dollar map in Figure 2.2 described the market:

1. CCI and HEI have each just announced that a new technology will enable them to reduce their price by one-third. That is, their new prices will be $1,333.33. Draw the new per-dollar perceptual map.

Answer:

<table>
<thead>
<tr>
<th></th>
<th>EP/$000</th>
<th>EOU/$000</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEI</td>
<td>10.5</td>
<td>1.5</td>
</tr>
<tr>
<td>VSI</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>CCI</td>
<td>1.5</td>
<td>10.5</td>
</tr>
</tbody>
</table>
Related Readings on Positioning and Defensive Strategy


However, myopic incentives are always to promote at 10%, because no matter what competition does, you are better at 10% than at any other level. (Examine the payoff matrix: the row corresponding to 10% is always the maximum myopic profitability.)

The trick of this simulation is that the myopic solution does not take into consideration that your actions in one period affect competitive reactions in subsequent periods. For example, if I promote at 10% in this period, then my competitors may match me in the next period, lowering all our profits to $12 MM rather than $20 MM.

The simulation is made more complex for two reasons: there are three players, and promotion is a continuous variable.

The three-player generalization raises many issues. If one player does not cooperate, do you punish both players? For example, if one player does not cooperate and goes to 10%, the other two are still better off by forming a coalition to cooperate at 6% promotion.

The continuous-variable generalization also raises many issues. For example, if both competitors are at 10%, you can try to lead them down by going to 8%, then 6%, and so on. If they cooperate, you can cheat a little by going from 0% to 2%. Or if someone cheats on you by going to 2%, do you punish him by going to 10%, by matching 2%, or do you ignore a small defection? There are many such complex decisions. Do not be surprised if some markets get into downwardly spiraling promotion wars.

I know of no best answer. The best student groups tend to average $16MM to $17 MM, the worst around $5 MM. Most student groups will be below $12 MM, which is what they would have attained if everyone ignored competition. I have run this with executives, master’s degree students, and undergraduates in the U.S. and Europe. The more savvy students and executives do seem to do better.

Some of you may be aware of the work by Axelrod (1984) on the two-player, two-act prisoner’s dilemma. He argues for “tit-for-tat,” which is to start at 0% and to do in this period what your competitor did last period. Many of the computer strategies are one form of tit-for-tat or another, but the differences in their behavior are quite dramatic.

We have found that in the problem underlying this simulation, the strategies that do best are those that recognize and exploit coalitions if they appear, and that learn passively about their opponents. It still pays to be nice in the sense of not being the first to increase promotion by a large amount.

Lessons

1. Competition is not passive. Students are taught that good choices of marketing actions, whether they are positioning, advertising, promotion, or price, will affect consumer behavior and lead to improved profitability. They can become lulled into making plans as if competition will not react. This simulation is a rude awakening. Competition is not passive. Competition responds actively to your actions and any grand plans must consider that reaction.

2. Cooperation vs. competition. The competitive chess game is complex. A little cooperation can go a long way toward increasing profitability. Whether or not you cooperate depends on legal constraints as well as the culture, history, and rewards of your industry. INTERGALACTIC WIDGETS raises these issues for discussion.

You can also raise discussion issues around means by which to encourage cooperation such as trade shows, trade associations, price leader/follower, rules of thumb, implicit threats, investment in excess capital to make threats credible, cultivating a reputation for retaliation, segmentation to avoid head-on price
Jefferson is a more sophisticated version of Cleopatra. Jefferson recognizes coalitions, but also dampens destructive oscillations. Had Jefferson been entered in the M.I.T. Competitive Strategy Contest, it would have won. (Ah, the beauty of 20-20 hindsight.)

General Montgomery is very aggressive and ignores competition. Use it to encourage aggressive competition and/or give the students a challenge against a difficult opponent.

Gandhi. This strategy begins by computing a number, \( N \), that is equal to maximum promotion level of its competitors in the previous period, or 10\%, whichever is the lower promotion level. It then holds out an olive branch by subtracting 2 percentage points from \( N \). Promotion is set at \( N - 2 \) (or 0\% if \( N - 2 \) is less than 0\%) and held constant for four periods after the last promotion change.

To keep students off guard, five percent of the time Gandhi simply ignores all of the above and sets promotion equal to a random level between 0\% and 20\%. Gandhi tends to elicit cooperation. (Gandhi starts with a promotion level of 0\%.)

Napoleon. This strategy computes \( N \) in the same way that Gandhi computes \( N \), and when the time is right, sets promotion equal to \( N - 2 \) (or 0\%) as does Gandhi. Napoleon keeps students off guard in a different manner.

Once Napoleon sets promotion, he usually holds it constant for four periods. The exception to this rule is that 20\% of the time he looks up, recomputes \( N \) and punishes defection by setting promotion equal to \( N \) rather than to \( N - 2 \). (If \( N \) is less than 0\% he sets promotion to 0\%.) He then resets the counter for four periods. Napoleon tends to elicit cooperation, but his punishment tends to be more effective than Gandhi’s random punishment. (Napoleon starts with a promotion level of 0\%.)

Kaiser Wilhelm. This strategy starts at a promotion level of 10\% and escalates all conflicts by matching the maximum promotion level set by the competitors in the previous period.

Cleopatra. This strategy starts seductively at a promotion level of 0\%. If a triumvirate forms with everyone at 0\%, she cooperates by staying at 0\%. If only one player defects, she seeks to form a coalition with the remaining player. She recognizes 6\% as the two-player cooperative solution. If the cooperating player was equal to or below 6\% in the previous period, she sets promotion equal to 6\%. If both players defected by being above 6\%, she sets promotion equal to 10\%.

Jefferson. This strategy starts at a promotion level of 0\% and then plays a complex game of checks and balances. Jefferson also recognizes 6\% as the two-player cooperative solution.

If both players were above 6\% in the previous period, he sets promotion equal to the minimum promotion level of the two players or 10\%, whichever is less. If both players were below 6\%, he sets promotion equal to the maximum promotion level of the two players. If only one is below 6\%, he sets promotion equal to 6\%.

General Montgomery. This strategy starts at a promotion level of 0\% but 25\% of the time he makes large thrusts into enemy territory by setting promotion equal to 12\% plus 40\% of his previous promotion. The remainder of the time he retreats by lowering promotion to 80\% of its previous level. Note that General Montgomery’s promotion levels do not depend upon the reactions of other players.
If Unilever and Kao face cost and demand conditions identical to P&G’s, with what price should P&G enter the market? Explain the rationale behind your answer.

Hint: Profit = 3375(p − 1) \( p^{−3.5} p_u^{25} p_k^{25} \) − 480

Algebra Appendix: Suppose that demand, \( d \), is given by:

\[ d = Kp^{−a} \]

where \( K \) is a constant number, \( p \) is the price, and \( a \) is the elasticity. Notice that for any known values of \( p_u \) and \( p_k \), the demand function can be put in this form with \( a = 3.5 \). If variable costs are \( c \) and if they do not depend upon volume, the profit, \( Z \), is given by:

\[ Z = (p − c)d − f \]

where \( f \) is fixed costs.

To choose the price that analytically maximizes \( Z \), we differentiate \( Z \) with respect to \( p \), set the derivative equal to zero, and solve for the profit-maximizing price, \( p^* \). That is:

\[ Z = (p − c)Kp^{−a} − f \]

\[ \frac{dZ}{dp} = Kp^{−a−1} [(1 − a)p + ac] \]

Setting the derivative equal to zero, we see that \( \frac{dZ}{dp} = 0 \) if:

\[ (1 − a)p + ac = 0 \]

or \( p^* = −ac/(1 − a) \)

or \( p^* = \left(\frac{a}{a − 1}\right)c \)

Note that the analytic solution, \( p^* \), does not depend upon fixed costs, \( f \), and the constant, \( K \). It does depend upon variable costs, \( c \), and the elasticity, \( a \).

Discussion Questions

The following questions are not to be handed in. Their purpose is to encourage you to think critically about competitive strategy.

1. If you were to expand the price strategy exercise to encompass other tactical variables such as advertising or product quality, how could you analyze the more complex problem?

2. Can you learn enough to forecast how consumers (and your competitors) will respond to a change in your price?

Related Readings on Competitive Strategy


Very few students will actually solve the algebraic equations, but many will use the perceptual map to argue that Ease of Use should be favored. They will then experiment with costs and be led quickly to a search along an 18° ray from the origin. A little fine tuning will get them over $200 MM.

Part 2 of ROBOLOGIC introduces the relationship between position and raw materials. This relationship is equivalent to an aggregate conjoint analysis in that it tells the manager what he or she can get as a function of physical features. If $E =$ Ease of Use, $P =$ Power, $S =$ Software, $M =$ Electro-Mechanical hardware, and $I =$ Information Processing hardware, then this conjoint analysis is:

$$E = .05S + .075I$$
$$P = .05M + .025I$$

and cost is given by

$$\text{Cost} = (S^2 + M^2 + P^2)/5$$

From the cost equation, students will recognize that all three ingredients are equally costly. They will then look to the conjoint analysis data for insight.

From the conjoint analysis they should recognize two important qualitative insights: (1) I-P hardware appears in both equations and hence will have a big impact. (2) If the ingredients are all equal ($S = M = I$), then you get more Ease of Use (E) than Power (P). Thus, consistent with the experiments in part 1, Ease of Use is probably less costly.

Together, these insights plus the results of part 1 should lead students to favor I-P hardware (I) overall and to favor software (S) over E-M hardware (M) because software affects Ease of Use only and E-M hardware affects Power only. If students try $I = 40, S = 20, M = 10$ they will start well and some insightful fine-tuning will lead them to $I = 36.5, S = 20,$ and $M = 13.5$ as a very good way to achieve a target position of $E = 3.75$ and $M = 1.01$.

For a given $E$ and $P$, the optimal solution is $I = (60E + 20P)/7, S = (50E - 30P)/7,$ and $M = (130P - 30E)/7$ as derived in the analytical solution, later in this chapter. Only the math whizzes will get this, but it is useful information for you to have in reserve. For example, you can have this on a programmable calculator.

Lessons

1. **Positioning a new product.** The perceptual map tells the manager the strengths of competition and identifies gaps for new products.

2. **Price.** Price is to be coordinated with position for maximum profitability. Greater price improves margins but provides less of an image of value. As in DEFENDER (positioning strategy), you can take this opportunity to discuss value as benefits per dollar versus price as a separate decision criterion. The simulation does not explicitly model the effect of price as a cue to quality, but you can introduce this issue into a discussion.

3. **Benefits vs. cost.** Students are tempted to position as far out as possible to give the consumer the most benefits and to capture the greatest market share. The simulation forces them to consider the costs of doing so. Profit is a function of sales and margins.

4. **Conjoint analysis.** Students are often taught conjoint analysis in marketing research. This simulation gives them an opportunity to see how to use the results in a managerial setting. Note, however, that knowledge of conjoint analysis is not a prerequisite for this simulation.
analytical solution. This appendix summarizes that solution just in case.

Let $E = \text{Ease of use}$, $P = \text{Power}$, $S = \text{Software}$, $I = \text{Information Processing}$

hardware, $M = \text{Electro-Mechanical}$ hardware, and $C = \text{Cost}$. Part 2 of the exercise gives the following equations.

\begin{align*}
E &= .05S + .075I & (1) \\
P &= .05M + .025I & (2) \\
C &= (S^2 + M^2 + I^2)/5 & (3)
\end{align*}

We first find the cost-effective solutions, that is, the relationship among $S$, $M$, and $I$ that gives the most $E$ and $P$ for a given cost.

The solution technique is Lagrange multipliers. Let $L$ be the Lagrangian and let $u_1$ and $u_2$ be the Lagrange multipliers for the $E$ and $P$ constraints respectively. The Lagrangian then becomes:

\begin{align*}
L &= (S^2 + M^2 + I^2)/5 + u_1(E - .05S - .075I) \\
L &= + u_2(P - .05M - .025I)
\end{align*}

(4)

taking derivatives with respect to $S$, $M$, and $I$ gives:

\begin{align*}
8L/8S &= 2S/5 - .05u_1 = 0 \text{ implies } u_1 = 8S & (5) \\
8L/8M &= 2M/5 - .05u_2 = 0 \text{ implies } u_2 = 8M & (6) \\
8L/8I &= 2I/5 - .075u_1 - .025u_2 = 0 \text{ implies } I = .1875u_1 + .0625u_2 & (7)
\end{align*}

Substituting equations (5) and (6) in equation (7) yields:

\begin{align*}
I &= 1.5S + .5M & (8)
\end{align*}

as the relationship among $S$, $M$, and $I$ necessary for a cost effective position.

If we substitute equation (8) in equations (1) and (2) we obtain relationships among $E$, $P$, $S$, and $M$. For example,

\begin{align*}
E &= .05S + .075(1.5S + .5M) = .1625S + .0375M & (9) \\
P &= .05M + .025(1.5S + .5M) = .0375S + .0625M & (10)
\end{align*}

Solving equations (9) and (10) for $S$ and $M$ and using the relationship in equation (8) gives us the optimal investments in $S$, $M$, and $I$ as a function of position. These are:

\begin{align*}
S &= (50E - 30P)/7 & (11) \\
M &= (130P - 30E)/7 & (12) \\
I &= (60E + 20P)/7 & (13)
\end{align*}

Finally, we obtain the least cost, $C$, necessary to realize a given $E$ and $P$ by substituting equations (11), (12), and (13) in the cost equation, equation (3). This yields the cost equation that is used in part 1 of the exercise. After some algebra this equation simplifies to:

\begin{align*}
C &= (5E^2 - 6EP + 13P^2)/49 & (14)
\end{align*}

Finally, from analytical geometry*, we recognize equation (14) as an ellipse with its major axis at $18^\circ$ from the horizontal axis. Since the tangent at $18^\circ$ is .325, this serves as a good starting point for the ratio of Power ($P$) to Ease of Use ($E$).

A quick search in this region yields very good potential profit.

Note that the optimal solution is the intersection of the isocost and isodemand curves, thus the optimal solution need not be and is not on the major axis of the isocost contour. The solution of $E = 3.75$, $P = 1.01$, price = $750 will yield

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1. Mr. Galva’s first questions depends on net discounted profit, which in turn depends upon the size of the potential market and the share of that market CLI can expect to capture. This question also depends on how much investment in advertising, promotion, and other marketing activities are necessary to support the product launched. Mr. Galva has allocated $20M for the product launch. If that is insufficient, he will want strong justification for a greater expenditure, since such an expenditure would put a strain on CLI’s resources. If it is too much, he wants to be convinced that a lesser amount is appropriate.

Mr. Galva wants to know more than industry norms. He wants you to reason carefully and lay out the reasoning behind your decision. Your answer also depends on your margin (price minus cost). Remember that CLI sells through a wholesaler, not directly to the consumer. You may need to make some assumptions or do library research.

2. In forecasting share, the following equation is a useful first-cut approximation:

\[
\text{Share} = \text{Percent of consumers aware of new product} \\
\quad \quad \times \text{Percent of retail outlets carrying new product} \\
\quad \quad \times \text{Percent of consumers who would try the product if they were aware of it and it was available} \\
\quad \quad \times \text{Repeat rate, that is, the percent of triers who will buy the new product when they buy a product in the category}
\]

The trial rate will depend on the product’s image. The repeat rate will depend on the product’s image and its ability to live up to that image. You may also wish to include promotion and sampling.

3. If you make any assumptions, be sure to justify those assumptions with a common-sense argument or perhaps a reference to a published source. You may want to consider a sensitivity analysis to determine how strongly any assumption affects the ultimate decision. (In an actual situation you would need to obtain relevant data on costs, competitive market share, category volume, and so on.)

4. The second question depends upon a perceptual map, among other things. What perceptual dimensions define the market? How are our competitors perceived relative to those dimensions? Are there any gaps where we can position our product? Are there any special segments we can exploit? Will our physical product and our advertising campaign be able to obtain the desired perceptual image? Can we defend our position if our competitors respond to our new entry by repositioning their product?

5. You may not agree with the product positioning, the target market segmentation, or any of the other details. After all, it is hard to achieve consensus in such a large group. Alternatively, after analyzing the market, you may wish to modify the product positioning or the target market segmentation. If so, make the necessary modifications and provide appropriate justification. New product development is an interactive process, and Mr. Galva is prepared to reward creative, constructive modifications.

**Related Readings on New Product Development**

Teaching Life Cycle Forecasting with HOME ENTERTAINMENT

The pedagogical goals of the HOME ENTERTAINMENT simulation are to illustrate the product life cycle concept and to teach the concepts of innovators, diffusion of information, and market saturation. The vehicle chosen to illustrate and teach these concepts is the widely studied and used Bass life cycle model. This model is conceptually clear and precise, which allows students to study and visualize these phenomena so that they can later recognize them in more complex situations.

Although this simulation can be used to teach the analytical model, you will find that students become more motivated if you stress the underlying concepts and their generality rather than the specific analytical model. For example, at M.I.T. we ask students to obtain data from the library on a real product and examine it with respect to the phenomena described in the model. This chapter includes such an exercise.

Because this exercise generates a new set of parameters (and therefore sales history) each time it is run, it is useful to have students run it more than once so that they can practice their qualitative forecasting skills and observe the phenomena of innovation, diffusion, and market saturation in a variety of sales histories.

"Answers"

Part 1 chooses values for the three parameters of the analytical model,* generates a sales history for fifteen periods based on these parameters, and gives the student the sales history in the first four periods. The student is asked to estimate by judgment only the sales in the next six periods. The student is then given actual sales and a plot that compares his or her estimates to actual sales.

Judgmental forecasting is very difficult, especially on the first try. This alone is an important lesson. In particular, most students will not anticipate the drop-off in sales due to saturation and will subsequently remember to consider

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*The parameters are \( p = .01 + .02r_1, \eta = .4 + .8r_2, m = 100 + 200r_3 \) where \( r_1, r_2, \) and \( r_3 \) are random numbers between 0 and 1.0. The seed of the random numbers is based on the clock time of the computer.
2. Market saturation. Students see the downturn in sales due to market saturation. This is dramatic and memorable if they fail to forecast it.

3. Diffusion. The curve starts slowly and gains momentum as more people purchase the home entertainment product. The Bass model models diffusion explicitly and part 3 of the exercise shows the impact of changing the diffusion parameter.

4. Innovation. The innovation parameter starts the models. (Try setting it to zero.) The Bass model models innovation explicitly and part 3 illustrates its impact. This is a perfect vehicle to provide motivation for the study of the diffusion of innovation.

5. Judgmental forecasting. Students quickly find that judgmental forecasts are not as easy as they seem, but they also find that their abilities improve with practice. Students also learn to recognize the value of an analytical model.


Teaching Notes

1. Expert option. To proceed from the copyright screen you are instructed to “Hit enter when ready.” If, instead, you type E (or e) and then hit [Enter], you put the simulation in expert mode.

   Expert mode is best for demonstration purposes. It sets the parameters to the standard problem of \( p = .022, q = .498, \) and \( m = 102.2 \), so you know the “answers” ahead of time. It also skips the initial explanation and the detailed description of part 2. In other words, you go immediately to the queries for judgmental forecasts, and after this section is completed, skip directly to the sensitivity analysis.

   The next section provides a written assignment that corresponds to this preset problem. At M.I.T. we have students complete this written exercise prior to running the PC simulation. We then use the expert option with a projection system for classroom discussion.

2. Hard copy. The best record of the students’ work for this simulation is hard copy of the plots of judgment vs. actual sales and plots of the sensitivity runs. These are obtained with the print screen option: Press the shift key and [PrtSc] simultaneously. Because there is no need for the students’ work to be recorded on disk, HOME ENTERTAINMENT does not appear as an option in the main menu’s “Review and/or print utility.”

3. Bass model. If you want more explanation of the Bass life cycle model, see the references at the end of this chapter.

Exercises and Projects

The HOME ENTERTAINMENT simulation provides ample practice in qualitative life cycle forecasting. One of its features is that students get a different problem every time they run the simulation. However, in some cases you will want a common qualitative forecasting problem to help you coordinate a classroom discussion. The hidden expert (E) option in the simulation gives you one such common problem.
Discussion Questions

The following questions are not to be handed in. Their purpose is to encourage you to think critically about product life cycles.

1. How can you quantify life cycle analysis for durable products?
2. What life cycle phenomena, if any, are different for consumer durables, industrial products, and consumer packaged goods (for example, products sold in grocery stores)? Can models of durable purchasing be modified for packaged goods? If not, why not?
3. Since any life cycle model is incomplete, does it have any managerial use?
4. Try to think of some recent examples—for example, CB radios, where life cycle analysis could have made a difference in effective management.
5. Common wisdom says, “Enter growth markets.” Are there hidden dangers in growth markets?

Related Readings on Life Cycle Forecasting


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Related Readings on Life Cycle Forecasting


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