The Place of a Business Game in the Marketing Curriculum*

by WILLIAM F. MASSY, *Assistant Professor of Industrial Management*, PETER S. KING, *Assistant Professor of Marketing*, and C. DAVIS FOGG, *Graduate Student*

A great deal of interest is currently being devoted to management gaming as a tool for the education of business students and for the development of executives. Some games can be simple, such as Greene and Sisson's Inventory Management Game, which illustrates the square root rule for optimal lot sizes.[1] Other games have attempted to catch the flavor of high pressure sequential decision-making at the general management level. The American Management Association's Top Management Decision Simulation[2] and the IBM Corporation's Management Decision-Making Game[3] are probably the best-known but by no means the only examples. These games require the participating teams to make a series of financial allocations at fifteen minute intervals with information feedback between plays.

More recently, a third type of business game has been developed. Working independently, groups at the Carnegie Institute of Technology[4] and at MIT's School of Industrial Management[5] have

---

[1] Jay R. Greene and Roger L. Sisson, Dynamic Management Decision Games, New York, John Wiley and Sons, 1959.

[2] Franc M. Ricciardi, et al; Top Management Decision Simulation: The A.M.A. Approach; Elizabeth Marting, ed.; American Management Association, New York, 1957.

[3] Discussed in Kalman J. Cohen and Eric Rhenman, "The Role of Management Games in Education and Research," Management Science, Vol. 7, No. 2 (January, 1961), p. 136.

[4] Kalman J. Cohen, et al, "The Carnegie Tech Management Game," Journal of Business, Vol. 33, No. 4 (October, 1960).

[5] P. S. King, W. F. Massy, Arnold E. Amstutz, and Gerald B. Tallman; "The MIT Marketing Game"; Proceedings of the Winter Meeting, December, 1960, American Marketing Association.

*This work was performed in part at the MIT Computation Center, Cambridge, Massachusetts.

developed games that are intended to simulate the broad aspects of a business enterprise and its environment in sufficient detail to allow the players to grapple with a significant and realistic set of business problems. The MIT Marketing Game concentrates upon the problems of product development, distribution, pricing, and sales promotion for a durable good. The CIT game places relatively greater emphasis on the areas of production and finance within the context of the packaged detergent market.

The purpose of this paper is to assess the potential academic usefulness of this third type of business game and then to review the results of the use of the MIT game as the central element in a second year graduate course in marketing management. As the usefulness of the game depends upon the pedagogical objectives it is expected to achieve and the available alternatives for realizing these objectives, it will be necessary to describe briefly (1) the nature of MIT's marketing management course and its relationship to other courses in the marketing curriculum, and (2) other teaching techniques currently employed in teaching marketing management.

ROLE OF THE MARKETING MANAGEMENT COURSE IN THE MARKETING CURRICULUM

MIT's marketing curriculum is divided into three core courses.[6] The introductory course, while adopting the managerial viewpoint, tends to be general, theoretical, and all encompassing. It deals with the environmental elements: the behavior of industrial markets, the structure of trade, and the nature of competition. A textbook, selected readings, and seminar papers provide the basis for effective discussions of contributions from the fields of marketing, economics, sociology, and psychology. Such discussions are relevant for (1) the theory and measurement of consumer demand; (2) the systems approach to the dynamic functioning of distribution channels; and (3) an understanding of the nature of the variables which management manipulates to achieve goals. Case analyses and discussions provide an important supplement to readings, especially in the third area.

The second course, Market Research, emphasizes rigorous problem solving. Study of powerful new analytic techniques is included. But realistic applications of at least some of these techniques are provided through an extensive class project. This combination assures that students achieve a balanced view of the problems of generating information for decision making.

It would be a mistake to assume that students readily learn to apply analytical techniques by working textbook exercises. (They do, of course, learn the mechanics.) The tremendous complexity of marketing decisions requires that the student have some experi-

[6] Specialized courses, such as New Product Planning and Development, are also offered.

ence in balancing the risks and advantages of analytical solutions, on the one hand, and of intuition on the other. Knowing how far one can rely on an operations research solution can be one of the more critical questions facing a manager. The student may fail to grasp the relevance of rigorous analytical techniques if they are taught without reference to real situations. He may become frustrated when he realizes that he does not and probably cannot ever know the mathematical form of the advertising effectiveness curve, for example, and may scrap the analytical tools entirely as a result.

Marketing Management, the third basic course, more emphatically than the others, emphasizes the viewpoint of the top marketing decision-maker of the firm. The focus is sharply on realistic problem-solving. Its objective is to familiarize the student with the nature of managerial decision making in the marketing context. To accomplish this objective it is necessary that the student assimilate a considerable amount of information on a wide range of topics. But even more important, he must learn to filter out irrelevant information, to evaluate fragmentary and ambiguous information, and to use this information in the formulation of complex sets of interrelated decisions. The marketing executive must, subject to constraints imposed by the objectives of the firm and by the resource requirements of other units of the firm, accomplish an exceedingly difficult set of tasks. He must develop effective plans based on an analysis of consumer and trade behavior. These plans include price setting, product and product line development, and advertising, sales force, and dealer program development. He must also administer the execution of these plans, modify plans when necessary, and evaluate the consequences of all these actions in order to improve future decisions.

The central objective of the marketing management course at MIT, therefore, is to give students some substantive knowledge of these matters and some understanding of how decision making can be effectively handled in this complex and dynamic environment.

TEACHING TECHNIQUES AVAILABLE

At the present time the great majority of teachers employ the textbook-discussion teaching technique or the case method or a combination of the two in teaching courses in marketing management. Let us assess these basic techniques available for teaching a course of the kind just described.

The textbook-discussion approach has important advantages. It fulfills one important aim of the educational process, the transmission of an accumulated body of knowledge. There are significant hazards, however, in the exclusive use of this technique. In the first place, it is difficult to classify business phenomena precisely, and often next to impossible to communicate the real meaning of these general classifications to the uninitiated. There is danger that the student will associate otherwise valid generalizations with the wrong situations; he may miss the essential and often subtle

differences that set one problem apart from another. Second, if the student comes "to revere the principles as eternal verities, this can easily lead to a closed system of reasoning that impedes or prevents the adventurous exploring of new possibilities and the abandoning of outmoded notions or customs."[7] Third, it puts a heavy premium on the assimilation of factual information. Clearly there is more to effective and imaginative marketing management than a long memory and a fast slide rule. The crucial limitation of the method, however, is that the technique is simply not a sufficient vehicle for imparting the essence of the management experience.

The case method of instruction has been one of the landmarks in the history of business education. Case study attempts to teach practical problem solving by allowing the student to project himself vicariously into a business situation and react, as in the real world, to the multitude of pressures bearing upon his decisions. While we all recognize its power, case analysis has its limitations, too. It is often difficult to motivate members of the class to sift and to apply their fund of knowledge systematically. Failure to sift one's knowledge and failure to set adequate goals can lead to the generation of "quick" solutions based more on intuition than is necessary, given the facts. It is possible to argue that the necessity of presenting and defending a position in a vigorous class discussion insures that the case analyst will be strongly ego-involved. We submit that although vigorous discussions take place, they may be superficial.

Contrary to common opinion, the case method is a rather rigid and static teaching technique. Students cannot clarify the information presented or effectively explore courses of action for which no data are available. They must focus on a specific problem or set of problems because of lack of information. As a result students tend to suboptimize simply because they have never had a clear view of the firm as a whole. Finally, and perhaps most importantly, the sequential character of decision making is neglected in case analysis. The student gets only a single shot at the problem. He is always placed in the position of taking a quick look at a situation with which he has no involvement and of making recommendations without being fully aware of all the pressures that bore upon the managers who guided their firm into the case situation. He never has the opportunity to study and evaluate the consequences of his recommendations or the opportunity to correct his own mistakes.[8]

---

[7] Frank G. Pierson, et al, The Education of American Businessmen, McGraw-Hill Book Co., New York, 1959, page 440.

[8] The Dynamic Business Case, recently developed by the Swedish Research Institute, appears to be free of some of these defects. The new method has much in common with the CIT-MIT type of business game. It is described in: Cohen and Rhenman, op. cit.

The business game as a tool for teaching marketing management. The authors believe that many of the difficulties cited above can be overcome through the use of an appropriate business game, supplemented by case discussions and readings. A game provides for a sequence of decisions, introduces dynamic variables, allows a greater degree of familiarity with the environment through continued information feedback and market research, and if handled properly can generate a substantial degree of ego-involvement. On the negative side, however, lie the rather impressive capital and operating costs, not to mention the large amounts of time students typically put into the preparation of decisions. Also, there is the question of what the feedback itself teaches the students: do they tend to learn falsehoods or to generalize inappropriately from the reaction functions built into the game? Will they come to anticipate that the real world is as structured a place as the game environment? Or, if the game is a highly detailed simulation such as the MIT game, will the students become overwhelmed by complexity and will their decisions degenerate to the level of mere guesses?

The answers to these queries are not yet clear, though it is obvious that they depend strongly upon the particular game utilized. We believe the difficulties can be overcome. A number of tentative conclusions which have been suggested by our experience with the MIT Marketing Game are presented in the next section and are illustrated by a description and evaluation of one series of plays.

To be an effective teaching tool within the context of an advanced marketing management course, as envisioned above, a game must be detailed enough to allow decisions to be made on a wide range of marketing variables. Our goal is not to "stimulate an attitude of experimentation with respect to the environment," nor to "generate an appreciation of the interrelations among decision areas," nor even "to have a good time," as has sometimes been the case for the general management games of the AMA type.[9] While each of these is an important by-product of any business game play, we emphasize that the sine qua non for the use of a game in the advanced marketing management course is that the exercise contributes more effectively than other teaching techniques to the understanding and use of substantive marketing tools. It is not enough, for example, that the student acquire "some feel" for balancing financial allocations for sales calls and advertising within the limits of the cash budget of the firm. If he is to gain an understanding of the interrelationship between these tools, he must at the very least grapple with the problems of selecting promotional appeals, of training and motivating the sales force, and of stimulating the trade. He must learn to consider his advertising budget in terms of the number of persons reached through media such as Life magazine or network television, rather than merely as a number of homogeneous dollars. Even the type of show or copy content

[9] Ibid., p. 144.

is highly relevant in evaluating the impact of many advertising appeals. The case method currently affords a way of dealing with these problems. If the inherent dynamic advantages of business gaming are to make themselves felt, the game must allow their consideration also.

The MIT Marketing Game is, to the best of our knowledge, the only game presently available which encompasses this necessary range and detail of marketing variables. Many operational problems remain to be solved, but the results gained so far are highly encouraging.

During the construction and testing of the game, we evolved the following "principles" upon which an effective marketing game must be based:

(1) In view of the richness of decision alternatives necessary for the effective teaching of marketing management, the game should follow the model of "Free Kriegspiel" rather than of "Rigid Kriegspiel," the two types of war gaming that grew up in Prussia during the nineteenth century.[10] In the free variety of war game, the experienced judgment of human referees played an important role. In developing a comprehensive marketing game, one must similarly make provision for referees to rate variables such as advertising copy and appeals. Use of referees avoids the need to design an impossibly elaborate model and simultaneously the need to restrict the freedom of action of the players. Referees are thus an essential feature of a comprehensive marketing game.

(2) Reality, freedom of student action, sensitivity to decision, and general plausibility of results are the most important characteristics of the marketing game. A particular real industry must be simulated with sufficient accuracy so that empirical data on product characteristics, known consumer preferences, media advertising rates and coverage, available types of outlets and their characteristics, and economic considerations can be open for student research. Once convinced that arbitrariness and artificiality have been removed, students can be encouraged to place themselves in the role of marketing managers of real firms. Achieving this frame of mind is, of course, one of the central objectives of the comprehensive game. Students come to feel responsible for the fortunes of their firms. They are competing with their peers, not, as in a case analysis, attempting to improve on the decisions of experienced businessmen. They are made to feel that they have realistic freedom to respond to market vicissitudes and that operating results are meaningful and fair. The instructor becomes a con-

[10] Cf. Ibid., p. 132.

sultant to men with pressing and difficult problems. In these circumstances student identification with the role of the marketing manager comes readily and easily.

(3) In formulating detailed, realistic programs the student must have access to information equivalent to that which would be available in the real world. Most games include provision for market research and experimentation within the context of the game structure. When referees are used they, too, provide exceedingly valuable feedback data. They are particularly needed in providing feedback of qualitative information and are the source of all quantitative feedback not generated by the computer. We believe, in addition, that the student should be encouraged to reason by considering marketing principles and analogies from the real world. If the student views the game as realistic, supplementary readings become aids in solving immediate problems and not merely problems he may encounter ten years hence. Thus, the student, because he is playing the game, may become more, rather than less, interested in supplementary readings and cases. The use of real world information need not diminish the significant aspects of the structure of the environment simulation. But how different this is from the blind probing which would result from students being forced to assume the real world offers few lessons for the game player.

(4) Even though one is attempting to construct a realistic game in the sense described above, it will be necessary to abstract and simplify, especially within the mathematical model. The abstractions should be performed so that it is worthwhile for the student to apply systematic techniques and valid marketing principles. It may be practical, for example, to construct an advertising effectiveness function in such a way that a team, which intelligently uses linear programming to find a media plan which maximizes exposure among a certain population, will ceteris paribus do better than a competitor who does not. The MIT Marketing Game cannot at present boast such a result.

In summary, the authors view the comprehensive marketing game as a vehicle through which the use of marketing tool variables can be taught. The game itself cannot do the job, as the simulation is not completely accurate and the outputs are often as difficult to interpret as events in the real world itself. In the last analysis, the actual learning and teaching responsibilities lie where they always have - with the student as he studies the literature and interacts with his fellows and with the instructor as he guides the students' efforts and interprets his own experience. The game merely provides a focal point for their efforts.

Description of the MIT Marketing Game. The MIT Marketing Game utilizes student teams who operate competing companies in a mock national floor waxer market. The market itself is simulated by a mathematical model programmed for the IBM 650 and 709 computers. (The important features of the model are presented in the appendix.) The game is structured so that decisions may be made for each 3, 6, or 12 month period. In the most recent use of the game, each play represented 6 months of the company's history. Thus in executing six plays the students ran their companies for a total of three years. Each play of the game took approximately one week of real time.

Prior to the start of the game play, the teams are given data representing several periods of their company's history. Therefore, the students have an opportunity to study the company's financial history, marketing mix, and distribution and sales policies before making their first series of decisions. It generally takes this initial review plus one or two actual plays to familiarize the teams with the market and with the mechanics of game play.

Although the primary emphasis of the game is the determination of the marketing mix for each decision making period, the game forces the student to consider virtually all of the important variables surrounding decision making in a going concern. Each team, within the limitations of its company's financial structure, must define its long range goals. They then make the period-by-period decisions concerning their short run goals and the tactics to be utilized in reaching them. As in the real world, both short and long run goals and tactics are constantly reviewed and modified as the market situation changes.

Among the quantitative decisions required each period, teams must determine how much money is available to them and then disburse what is needed into advertising, sales force expense, maintenance of plant capacity, building of new plant capacity, debt retirement, dealer promotion expenses, market research, product research, process research, inventory maintenance, etc. Prices must be set and distribution channels must be determined. The teams have the option of selling direct or utilizing wholesalers and must determine appropriate margins and advertising allowances for each level of distribution. The teams may sell in a multitude of types and sizes of outlets as well as in any or all of the country's three economic regions (North, South, and West). The companies soon find themselves deeply involved in the question of sales forecasts, expected distribution of sales, budget allocations, and alternative tactics and goals. The teams, in short, must design, within their individual financial restraints, a marketing mix that they feel will be most effective in reaching the company's goals. The budget allocations and cash flow figures that come out of this section of the analysis constitute the teams' quantitative inputs.

In order to ease the administrative burden and keep attention focused on the marketing aspects of the game, certain assumptions and restrictions are given. First, a company may market either a standard model waxer or a deluxe model (heavier motor and construction, more features) in any of the three economic regions of the country. Thus one may sell the standard model in one region and the deluxe model in the other two, but not both in the same region. This limitation, of course, makes the marketing of a product line impossible and does, we feel, take away one of the primary marketing tools found in the real world. It is one of the major faults of the game as presently constituted.

Second, certain fixed and variable costs are given for each company. Administrative burden and unit labor, material, inventory holding, and transportation costs are fixed. The cost of maintaining a company salesman is given, as are the rates for various advertising media, certain point of sale materials, market research surveys of various kinds, etc. All of these figures are based on the probable costs as found in the real world. If a strategy involves costs which are not given in advance, the team prepares a proposal stating and justifying the figures involved. The proposal is then approved or modified by the referees.

In addition to the quantitative factors, the MIT game allows consideration of the qualitative facets of marketing. Each competing team has complete freedom to present detailed programs elucidating the various policies and strategies to be used in the play. For example, the teams present their advertising appeals and strategy by writing the copy and structuring the format of the ads which are placed in the media of their choice - regionally and/or nationally, depending upon actual availability. In a similar manner, plans are designed for dealer promotion, point of sale activity, product design, sales force compensation and motivation, sales call policy, special promotions, etc. Thus, the student refines and implements the marketing methods to be used. He is thereby motivated to delve deeply into the theory and practice of the marketing tools at his command.

These detailed plans, which we may call qualitative inputs, along with the quantitative inputs discussed above become the team's program for the period in question. The qualitative inputs are submitted to a control team of referees made up of several professors, who evaluate the detailed strategies of the competing teams and assign "effectiveness" ratings to their various budgetary allocations. For example, Company A may budget $100,000 for media advertising directed to consumers. The control team, reacting as consumers, may consider the appeals, layout, copy, and media placement relatively ineffective. Therefore, the control team may decide that Company A's $100,000 will, actually, be worth only $70,000. Thus for every dollar spent, Company A's brand receives only $0.70 worth of consumer advertising. In addition, it may be decided that Company A's appeals will stimulate

a great deal of primary demand (demand for floor waxers in general) as opposed to selective demand (demand for Company A's brand). The control team may therefore decide that 50 percent ($35,000) of Company A's advertising dollars will go toward stimulating industry demand while the remaining $35,000 will be effective in bringing consumers into stores to see Brand A. In this manner, the control team assigns effectiveness ratings to each applicable quantitative input figure.

The assembled data for the competing teams is fed into the computer and the play completed. It should be noted that the economic conditions surrounding the market at the time of the play can be controlled by the game administrator. This added bit of flexibility means that the students may find themselves coping with a recession at any time.

At the end of each play, each company receives its income statement, balance sheet, company and industry sales data broken down by region, and a breakdown of company sales by store type, size, and region. Each company is supplied with such information about its competitors as would normally be available in the real world, i.e., the type of outlets in which they are selling, the content of their advertising and point of sale material, their retail prices, their product design, and a rough estimate of their advertising and point of sale budgets. At the end of every year of play, each team receives its competitor's annual income statement and balance sheet. Additional information about competitors, consumers, and the market in general can be explored, for a price, by conducting market research.

Market research information is provided by a game administrator. The students must structure the research methods and the questions to be directed at the consumer or the trade. The better the structure of the research, the more reliable the answers, so the students are motivated to gain an understanding of the techniques and methodology of market surveys and to be on guard against the bias inherent in such procedures. In this manner, the teams may gain a more complete perception of competitive tactics, the effectiveness of various promotional techniques, and the nature of the consumer and the market place.

Some of the feedback information is realistically incomplete. The student knows little more about the financial affairs of his competitor than would the informed stockholder. Knowledge of the consumer and of the trade is improved with research and experience. The student is forced to make decisions with incomplete information. He cannot avoid the necessity for making a decision (as can be done in the case method) by saying, "If I had more information about this I...." He has the choice of either getting the information - time, money, and methodology permitting - or doing without it.

Further light can be thrown upon the nature of the educational process inherent in game play by assessing some aspects of the history of an actual play. In this instance, the game was being used in a second year graduate course in marketing management conducted during the Fall of 1960. The pages that follow contain a description of an important strategic decision and comments about the use and value of certain portions of the exercise.

A Team Strategy. At the outset of the game, Company A found itself holding a 35% share of the floor waxer market, its sole competitor having captured the remainder. The Company's financial position was poor. It was saddled with a high amount of debt, low borrowing power, and little cash. On the other hand, the Company's competitors found themselves in excellent financial shape. Nevertheless Company A decided that its primary goal was "to seize a commanding share of the market." It was believed that the waxer market was largely undeveloped and that media advertising would contribute more heavily to primary, rather than selective, demand. By keeping its own media advertising expenditures low and by emphasizing point of sale promotion, Company A hoped to divert consumers from the competitor's product.

The general strategy proved successful. Sales increased rapidly in the successive three periods and Company A achieved a commanding share of the market. A lag in the liquidation of accounts receivable, however, produced insufficient additional cash flow to meet the increased production costs involved with the expanded sales. An additional difficulty arose when Company B cut prices severely in one of the three regions.

A reevaluation of long-run goals was required of Company A. Possession of the major share of the market had increased rather than decreased the financial pressures on the firm. In addition, sufficient development had occurred in the market to require Company A to assume its share of media advertising if it intended to maintain its sales. Furthermore, it was clear that the competitor was in an excellent position to indulge in severe price competition. The company could not maintain sales at the current rate without endangering profits in the near future.

Under these pressures Company A decided that a majority share of the market was not a desirable short run criterion. Instead, regaining industry sales leadership was established as the long run goal, with profitability the dominant short run criterion of performance. Therefore, Company A concluded that, if necessary, it would sacrifice part of its market share in order to protect profits and to improve the firm's financial condition. In addition, Company A felt compelled to insulate itself from severe price competition with Company B.

Product differentiation appeared to offer a solution to the problem; a deluxe model polisher featuring a variable speed motor was designed. It was priced $20 above the standard model being retailed by the competitor in two regions, and $10 above the deluxe model marketed in a third.

Because it was believed that dealer push was essential to the sale of such a high-priced product, margins and sales calls to dealers were increased, additional push money (spiffs) was given to retail salesmen, and a selective distribution policy was solidified to concentrate sales in compatible outlets of high potential. Realizing that competitors would, in the next period, retaliate either by cutting price further (which was considered unlikely) or by emulating A's product features, Company A initiated an extensive consumer advertising campaign to create a favorable brand image for its product. The image desired for Company A's waxer was that of high quality, versatility, and ease of use. In addition, a long term warranty was introduced to back up the expected favorable price-quality association. The variable speed feature was dramatized by a descriptive and catchy name, Selectramatic, and high impact advertising was designed to convince the consumer of the need for the variable speed feature.

Company A's share of the market, in units, dropped from nearly 50% to around 35%, but its profits more than doubled. (Company A maintained industry profit leadership throughout the remainder of the game.) When an imported Japanese deluxe model, priced $20 below Company A's brand, was introduced on the fifth play, Company A lost only $2\frac{1}{2}$% of the market while the Japanese firm took nearly 33% away from the other American competitor.

CONCLUSION

The example shows the realism involved in the game and the detail and thought that is elicited from the student. The profit and loss statement is real and relevant, and this fact is never forgotten. However, the financial facts of the market place do not necessarily breed conservatism. On the whole, tactics were carefully thought out, and team goals and strategies were usually kept in mind.

An important question arises as to the extent of student recognition of the need for sequentially consistent decisions. We would say that the problem was recognized in varying degrees by the four teams participating in this Fall's game. For example, Company A, when making the decision to market the deluxe model, formulated plans, including alternatives for several eventualities, for several periods in advance. In other instances the Company realized the value of stability from the retailer's point of view and resisted any temptations to juggle prices and margins from period to period.

On the other hand, some teams would reverse policies from period to period as expediency and the current state of competition seemed to dictate. This juggling could, if taken to its logical ex-

treme, result in each period being looked upon as a separate case. This is an undesirable viewpoint, and measures aimed at avoiding it need to be implemented in future class discussions.

In planning his marketing strategy, the student finds himself speculating on the various structural elasticities and lags inherent in the market. It was often very difficult to isolate the cause or causes of any particular success or failure, much less separate out the effect of particular efforts by the firm or its competitors on sales volume and distribution. The students, however, proved to be quite astute in making these analyses even with extremely incomplete information. By combining available feedback data and market research information with a good theoretical background in marketing, teams felt that they were able to determine with rough accuracy the various elasticities and elements important to their particular program.

The analytical techniques used were not particularly profound and, indeed, there was a strong belief that the time available and the nature of the feedback information did not make themselves amenable to sophisticated techniques. The students did make considerable use of rough graphical and tabular methods of summarizing and interpreting data. At least one team kept a running graphical record of company and industry sales by region and then attempted to explain changes by noting any changes in the content of their marketing mix. More work on this point is clearly necessary.

Certain written assignments based upon the game were utilized. The students were required to describe and analyze their marketing strategies and tactics so that the instructor could judge the quality of their work. At the end of the course each team member wrote a semi-annual report for his company outlining the important facts and events for a particular period. The reports were duplicated and collected to form a detailed summary of the company's performance. Finally, all the students were given copies of their own and their competitors' reports and were asked to write an analytical history of the industry. The assignment was not only valuable in crystallizing the experience gained by the student, but it provided valuable information for the game administrators as well.

Time commitments were heavy for all involved in the game. The enthusiasm of the students meant that the professors teaching the course sections had to be readily available for consultation, and the administration of the game itself occupied the full time of a graduate research assistant. For the student, it meant six to ten hours per week in preparation and team discussion in addition to the normal reading, case assignments, and three regular hours of class time. But regardless of the burdens involved, the twenty-four graduate students who participated in the game during the Fall of 1960 almost unanimously agreed that it was one of the more interesting and valuable experiences of their business education.

Our game will never supplant an intensive basic course in marketing. The theoretical premises supplied by case-discussion-text methods are the foundation upon which the student builds as he experiences the game simulation. Here at MIT the game playing itself was interspersed with lectures, cases, and textual material that dealt with the situations encountered in the game. At least one class hour each week was reserved for cases drawn from other industries and new situations. It should be noted that the teams expended a great deal of time and effort in voluntarily searching the literature for data and ideas.

The work reported in this paper is naturally just a beginning. We are learning more about the capabilities and limitations of our game in each class for which it is used. Administrative techniques have had to be devised and constantly revised in order to handle the flow of information to and from the student teams. A systematic effort to define and evaluate what the student gains through taking the game-oriented course is under way, and a revision of the existing game's mathematical model to incorporate some of the functions previously handled by the human referees is scheduled for the near future.

Of great promise, also, is the recent interest in gaming on the part of faculty members from the areas of business economics, production, accounting, and finance within the School of Industrial Management. If agreement can be reached about the teaching goals to which gaming can contribute in these areas, MIT can look forward to the development of a Comprehensive Management Game in the near future.

APPENDIX

DESCRIPTION OF THE MODEL USED IN THE MIT MARKETING GAME

The mathematical model is split into two sections. The market simulation section computes industry and company sales for each of the competing companies in each region. The second section takes the sales data computed by the simulation model and, in combination with the assigned fixed and variable costs and budgeted expenditures, computes a profit and loss statement and balance sheet for each company. The programming of the second section is in accordance with standard accounting procedures and therefore needs no discussion.

Working in response to economic factors, initial market conditions, and total marketing activity during the period, the market simulation model first generates total industry sales by region. It then computes each company's sales in each region by considering such competitive factors as the price, quantity, and quality of advertising, sales force activity, product quality, etc., for each competitor.

The generation of industry sales is governed by reference to a pattern of normal industry sales expressed as a percent of families that will purchase a waxer at any point in the sales history of the market. This pattern indicates that acceptance of a new appliance, while slow at first, rapidly increases once a certain level of market saturation is reached. The curve, of course, tapers off as full saturation is approached. The normal sales pattern provides for seasonal and cyclical variations, and the three regions are at different levels of saturation at the beginning of the game.

Actual industry sales are determined from the normal sales as influenced by elasticity functions accounting for all competitors' product prices and qualities, sales promotion activities, adequacy of distribution, and retail margins. These functions have the expected "S" shape: that is, there are levels above and below a normal range where one would expect marginal dollars to be less effective.

Each company's sales are in turn a function of the competitiveness of its prices, distribution policies, and advertising. Because the operation of this part of the model is quite complex, there is considerable interaction between competitors as well as among the individual elements of a single company's marketing mix. One example is the distribution function, (i.e., the competitive effectiveness of distribution policies), which depends on the interaction of the number of sales calls on a store, the amount and quality of point of sale materials and trade advertising, and the level of retail margins and advertising allowances. A "dealer enthusiasm" function takes into account the past selling success, in previous periods, of the brand in a particular outlet as well as the loss of retailer interest to be expected if the company has selected a set of incompatible types of outlets (e.g., auto accessory stores competing with large department stores). In addition, the effectiveness of sales calls is related to the level of media advertising expenditures.

Each of the aforementioned functions have threshold and saturation values. For example, it will take a certain level of selling activity to induce a dealer just to stock the product, much less to push it. On the other hand, marginal dollars spent beyond a certain sales activity level add little to the selling effort expended by the dealer.

In addition to these elasticities, the simulation model has certain built-in lags that determine the time at which previously introduced elements of the marketing mix become effective. For example, with a given level of promotional activity, when a new outlet is added it may take several months for the volume of sales to reach the expected level. On the other hand, the effective gains of a magazine advertising campaign may continue for some time after the campaign is dropped. The model has an implicit decay constant to reflect this effect. In a like manner, lags and decay constants are built into the model to reflect the timing and ef-

fectiveness of changes in the level of newspaper advertising expenditure, sales call frequencies, number of outlets, and so on.

As the previous discussion shows, the authors of the game took great pains to assure a realistic simulation of the market. While the elasticity functions may not coincide exactly with those found in the real world, they are realistic enough to confront the student with a market that is as sensitive and responsive as that of the real world.