SOME SUGGESTIONS FOR THE USE OF MICROCOMPUTERS IN MARKETING EDUCATION

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ABSTRACT

This paper seeks to stimulate thought concerning the use of microcomputers in marketing education. It suggests a variety of specific areas where these applications of micros can be made. In a few cases, the software is already available. In other cases, the programs written for mainframe computers will have to be adapted to micros. In still other applications, the creation of the necessary programs will be difficult, and will require the services of computer specialists.

INTRODUCTION

Marketing education currently falls far short of the needs of the business world in one important area — the use of microcomputers. And it appears to face the prospect of falling even farther behind unless steps are taken to remedy this situation. Recent, rapid changes in technology have brought relatively low cost computational power within the reach of all but the smallest marketing organizations. Microcomputers ("micros") are selling well, largely because of the variety of software available (Sneider 1982), and projections by the microcomputer industry indicate even greater penetration into the business marketplace in the near future. Thus, marketing practitioners will come to consider the devices as a necessity much as calculators are considered essential today (Connell 1982; Business Week 1983a). And their desks will become at least part time computer work stations (Business Week 1983).

Marketing education bears the responsibility for preparing graduates for the business world. Educators thus must perform the task of helping graduates to take their places in a business world where managers rely on micros as a basic tool of their profession. Not only should these workers be ready to operate the hardware (equipment) and make use of appropriate software (programs and other instructions for the computer). They should also be oriented toward thinking about problems in terms of solutions that can be gained using micros. At present, scattered islands of progress excepted (Business Week 1982; PC Magazine 1982; Library Journal 1983), educational institutions are failing to fulfill their educational responsibilities on all counts. A lack of planning, funds, and faculty involvement in relevant curriculum development has created a gap between practice and education that may be difficult to eliminate.

Microcomputers will have to be integrated into the curriculum, much as international marketing has recently been made a part of marketing courses (in this case, as mandated by the AACSB). This new subject may be introduced as a part of all or most of the marketing courses. Alternatively, faculty may choose to create a new course on the subject of micros in marketing. Possibly, the importance of this computer revolution may force both these changes in curriculum for some schools.

The objective of this report is to contribute toward the introduction of microcomputer content into marketing education. To this end, this abridged version of the original paper seeks to communicate the magnitude of the current deficiency in marketing education, to stimulate thought about the problem and its possible solutions, and to suggest means by which micros can be integrated into marketing curricula.

AN ORGANIZED TAXONOMY OF USES OF MICROCOMPUTERS IN MARKETING EDUCATION

The remaining material deals with uses of microcomputers in the marketing curriculum. Although space limitations preclude an exhaustive treatment of possible applications, the following suggestions should stimulate the development of additional uses. Six areas of application seem appropriate for the discussion of these applications: (1) market description and assessment; (2) product management; (3) pricing decisions; (4) promotion decisions; (5) distribution management; and (6) marketing strategy and planning.

Market Description and Assessment. Markets may be portrayed at the aggregate and the individual levels. Aggregate level applications include segmentation models and sales level models. Uses of micros for portraying market segments can begin with descriptions of geographical markets in terms of census figures (PC Disc Magazine 1983). Presentations of the demographic characteristics of increasingly smaller consumer markets can be demonstrated by successive disaggregations of data beginning at the state level and working down to sections of a metropolitan area. Students can see how the composition of markets in terms of such features as sex and marital status changes with the level of aggregation. In the same vein, the structure of industrial markets based on Standard Industry Codes can be shown in the format of a graphical tree diagram to illustrate the principle of specific vs. general delineations of markets.

Varying the level of aggregation of clusters of consumers that were obtained through a hierarchical grouping analysis of psychographics can show how "typical" (ie., mean measures of) behavioral characteristics change as the groupings obtained with nine clusters, then eight clusters, etc., are portrayed on the screen. Of course, only two salient dimensions can be used as axes on which to plot members of the clusters at one time. Ellipses that contain the majority (e.g., 70 per cent) of the members of each of these clusters will graphically portray the segments. Color graphics will make this presentation quite impressive.

The use of micros for forecasting sales level needs little elaboration. Data representing time series can be plotted graphically. Exponential smoothing techniques can be used with the series for a single variable. Simultaneous plots of the actual series and forecasted series can be juxtaposed to show how the forecasted series follows and moderates the peaks and valleys of the actual series. Students can change the smoothing constant at will and be immediately shown the accompanying change in the smoothed series. Multiple regression using one of the available statistical or forecasting packages can handle the case of multiple explanatory variables. Again, plots of the dependent variable vs. the independent variables, sequentially taken one at a time, can demonstrate the nature of partial regression coefficients. Predetermined changes

in the data base can be used with plots of the observations to show alternative magnitudes of the standard error of the estimate and coefficient of (multiple) determination to visually portray these statistics to the students.

Estimation of market potential by the chain-ratio method can be used to demonstrate to students how changes in components such as population and expenditures on the product category can change the forecasted level of sales (Ackoff 1970; Armstrong, Denniston, and Gordon 1975). An electronic spreadsheet can be used to show how changes in the estimates of the separate components of sales will bring about changes in the final estimate of the aggregate figure.

At the individual level of market analysis, models of the decision process of consumers (Engel and Blackwell 1982) or industrial buyers (Sheth 1973) can be graphically portrayed using the video display screen. Students can be assigned the term project of turning a set of labelled, appropriately placed boxes representing constructs into a completed flowchart for the decision process. The students might be provided with a model of, say, ten constructs (e.g., including demographics, information search patterns, perceived risk, attitudes, and purchase) at the beginning of a course in consumer behavior. Using a vector graphics package (Norton 1983) students can add the arrowed lines connecting the boxes when they have obtained supporting evidence for such a relationship through a library search of reference materials, journals, books on buyer behavior, and other sources.

The Delphi method of obtaining forecasts (Larreche and Montgomery 1977) might be demonstrated through an interactive program that gives direct access to experts (who might be simulated by students playing appropriate roles). The experts would be stationed at interconnected terminals and queried by a computer program. At each successive stage in the Delphi process the computer would assimilate, aggregate, analyze, and present their responses.

Markov chains (The Hendry Corp. 1970) can be rather simply demonstrated to students by means of matrix multiplication routines incorporated into a program written in, say, the BASIC language. The students could use a few commands to create the market share (state) matrix appropriate to the first period, and then pass to successive periods to examine changes in the state matrix as this market evolves over time.

Product Management. One application in product management that is closely allied to the uses in the previous section is the video presentation of the perceptions held by consumers of competing products or brands (Urban 1975). This application would present attributes of the product as the axes for the display. The concept of product positioning would be graphically demonstrated by means of a program that allows students to change the characteristics of a product to improve its competitive position in the two-dimensional market space that is displayed.

The product life cycle (Rink and Swan) can be shown in this visual format, with different shapes and lengths of cycles used to show how these cycles vary for differing types of products. An extended model would tie the shape of the cycle to alternative marketing strategies such as product differentiation, continual product improvement, and introduction of complementary products. The student would change the elements of product strategy and would be shown the product life cycle that might result.

Diffusion models can also be used to show the effect of changing parameters on sales or profits. The market penetration models of Fourt and Woodlock (1960), Bass (1969), Fisher and Pry (1971), Dodson and Muller (1978), and Horsky and Simon (1983) are but a few of the many models of this type. These models can be used with electronic spreadsheets to provide the answers to "what if?" questions. For example, the latter model shows the effect of varying advertising expenditures on level of sales.

Pricing Decisions. Pricing models may be simply classified as those representing either buyers' or competitors' responses to pricing strategies and tactics. The first category includes the relationships between price and quantity demanded. Simple equations that express this relationship may be graphed on the display screen. Students can change the parameters of the relationship and observe the changes in market response. Then, more complex relationships may be introduced to demonstrate such extensions as break-even analysis (Bui 1982) and the limit concept of Sowter, Gabor, and Granger (1971). Similar to its use in the area of product management, the life cycle for products and brands can be portrayed for alternative pricing strategies such as penetration or skimming (Simon 1979).

The concept of competitive pricing response can be shown through models presented in the format of games for students to play. Much in the spirit of popular video games, the students can try to outwit one another when placed in the position of trying to select the most profitable strategy as defined by a response function that is unknown to them. A simple competitive bidding model can be used to demonstrate the nature of the one-time pricing decision. Similarly, more complex models can be used to allow students to respond to a series of moves by their competitor over time, with cumulative sales or profits the criterion for success.

Promotion Decisions. The relationships between market response and promotional efforts can also be modelled using micros. For example, Wittink (1977) and Rao (1978) have presented S-shaped curves that represent the response to advertising expenditures. The underlying functions, either simulated or based on empirical data, can be entered into the computer to allow students to systematically substitute different parameter values. The results can be portrayed by means of video displays. The response to advertising efforts can also be related to such explanatory variables as time since presentation (Bass and Clarke 1972), frequency of purchase (Little 1979), and frequency of exposure (Ogilvy and Mather 1965).

In a normative vein, media selection decisions can be modelled using a linear programming format (Miller and Starr 1960; Engel and Warshaw 1964). One interesting class of models involves iterative processes. For example, the high assay model of Moran (1963) would provide interactive involvement for students, as they would be required to make a series of selections over simulated time.

Market response to personal selling strategies can be similarly used in student exercises. To deomonstrate how to find the best way to allocate the salesman's scarce time resource, a model by Lodish (1971) could be used. Students could estimate the result on sales of changing the frequency of sales calls. A model created by Montgomery, Silk, and Zaragoza (1971) could be used to show students how changing the effort devoted to selling various products in the product line will affect sales.

Optimization procedures suitable for use with micros have also been developed in the area of personal selling. Assignment of salesmen to sales territories (Lodish

1975) the allocation of their time (Zoltners, Sinha, and Chong (1979), and the design of sales territories (Richardson 1979) can be handled via mathematical programming models. One large scale model that could be programmed to allow students to interact with the computer is the model of Beswick and Cravens (1977).

Distribution Management. Distribution applications of micros generally fall into the area of physical distribution. Location and site selection models, such as the gravitational (Huff 1964) and least cost models (Smykay, Bowersox, and Mossman 1961) can be used with video presentation of a map to demonstrate how to find the optimal location. More advanced location models that feature heuristics (Ballou 1973) can be programmed for micros using one of the popular languages. These models lend themselves well to class projects in physical distribution and other marketing courses in that both data collection and computations based on these data can be used in a realistic fashion.

Inventory applications include the computation of optimal order quantities and reorder points (Davis 1983). Micros can also be used to keep records of inventory stock levels, and data base management packages can easily be adapted to this purpose. Linear programs have many applications in the area of distribution. For example, Ballou's (1967) stock placement model is framed in the format of a linear program. At the level of the distribution system, allocation decisions that link plants to warehouses to retail centers can be solved with linear programming tools. In the area of transportation decisions, carrier selection and shortest-path routing models have already been programmed for micros (Erikson and Hall 1983).

Marketing Strategy and Planning. While strategic decision making permeates the applications introduced to this point, several additional uses of micros should be briefly mentioned. Here, financial models and electronic spreadsheets can be used to help select a decision alternative on the basis of profit projections. In this vein, Wind (1981) cites a number of product portfolio models that may be used for strategic decision making. And students can use micros to perform the computations needed to apply the Boston Consulting Group's business portfolio matrix to appropriate case studies. Or, micros can be used to apply the Churchman-Ackoff value measure (Churchman, Ackoff, and Arnoff, 1957) to make strategic decisions in situations where at least some of the decision factors have a qualitative nature.

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