

## A COMPUTER-ASSISTED PLANNING MODEL TO AID DEPARTMENT STORE BUYERS

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### ABSTRACT

**T**he principal objective of this research was to develop a computer program that would simulate those tasks that are necessary as a retail buyer makes seasonal plans for the department of which he is in charge. These planning programs, when operationalized, were developed to provide a means whereby retail buyers, new management trainees, as well as higher management executives could interact with the planning programs and encounter "real" decision-making situations that would be relevant to their various responsibilities. If the objective is achieved, an overall objective relating to the greater involvement of lower management in planning activity will also be realized. Further objectives of this study were that a rapid method of computation and analysis be provided the retail buyer and that the beginnings of a new usable information system be established. The planning model suggested by this paper is consistent with this trend and seeks to delineate two aspects of buyer planning: sales and assortments. A series of interviews were conducted (N=100) with department store executives and buying personnel of a large department store having retail outlets in the Adana-Mersin metropolitan area. Using information and materials gathered during these interviews, the author developed a planning simulation model that was structured around present planning policy but also provided some new planning activities.

*Key words: Planning model, department store, computer assisted*

## 1.0. Introduction

“The decade of the 1970's is full of promises. All prognostications suggest increasing prosperity, new markets, new and exciting products and better management possibilities through the increasing use of science and computer technology. . . . Personal incomes should rise by 40 per cent during the 1970's and disposable incomes of Americans, already the highest in the world, may reach an aggregate figure of \$850 billion, with personal consumption expenditures amounting to 93 to 95 per cent of this figure (Markin, 1971)”

The forecast made by Markin is a bright one indeed. But he is quick to point out that not all retail institutions will be able to share in the prosperity created by the large expansion of consumption during the coming decade. Why not? Because many retail firms will not be able to establish or maintain the rapid rate of change necessary to adapt properly to the needs of a fast-paced consumer. The survival of many firms during the 1970's will be difficult indeed. Many retail firms will not be caught unaware, however, and they have begun to prepare themselves to anticipate correctly the consumption changes that will affect them.

### 1.1. Importance of Planning in Retailing

Perhaps one of the more notable results of the efforts to prepare for the dynamic years to come has been noted by William Lazer and Eugene J. Kelley. They note that the marketing management concept is growing in acceptance by retail management. This concept has five essential characteristics: planning, consumer orientation, systems approach, change, and innovation. It appears that more and more retail firms are beginning to adapt this approach as they become "concerned with designing a total retail capability to achieve realistic and attainable objectives." (Lazer, et al., 1961, Zhuang, 2013; Samiee, 1990; Michael, G., S., et al., 2014)

The desirability of planning seems obvious, and it is probably a rare instance where a retail firm does not engage in some planning activity. This is particularly true at the executive levels of management within a firm. It is generally quite difficult to achieve a systematic planning effort that pervades all levels of management. At lower levels of responsibility, management by crisis and exception would seem to be normal operating procedure. The problem at hand then is to fill the gap that exists in the planning spectrum so that all levels of management having operational responsibility take part in a systematic planning process. This study, then, will be directed toward closing this planning gap within the retail setting.

### 1.2. Factors Mitigating Against Retail Planning

Traditionally, persons in lower management positions within a retail firm have devoted little time to planning. Their primary concern is the day-to-day operation of the retail outlet, and their busy schedules seldom permit the time to engage in a regular and systematic planning effort. It would seem incredible that those who bear directly responsibility for achieving a retail firm's objectives and goals should not be involved in planning the details that will allow progress toward these goals and objectives (Zhuang, 2013; Samiee, 1990; Michael, G., S., et al., 2014).

There are several reasons why the lower echelons of management, such as department managers or buyers, do not want to become involved in the planning process. First of all, lower management is usually that segment of the management group most directly involved in the active operation of the retail firm. This places substantial time constraints upon them, and they seem to prefer those activities which have the most visible and direct effect upon day-to-day selling activity. Second, although he may often be encouraged or required to make specific plans for his area of responsibility, for the most part a manager or buyer does not have information of the necessary kind or form he needs to make his seasonal or annual plans. In short, the retail

firm provides little incentive for those having operational responsibilities to plan the actions that will be necessary to achieve their goals.

Why should the retail firm be concerned with whether or not those responsible for actual sales operations of the firm are or are not included in the planning process? The reason is quite simple. It is often the lack of planning itself that causes many of the problems in day-to-day retail operations. Errors caused by little or no foresight or planning by the management personnel involved can compound into disastrous situations. A retail firm must take two steps to solve the planning dilemma. First, it must identify those areas where prior planning can eliminate problems in operating the sales outlet. Second, it must provide those lower management personnel having direct operating responsibility for sales with the incentive, time, and information necessary to enable them to make pertinent planning decisions (Zhuang, 2013; Samiee, 1990; Michael, G., S., at al., 2014).

### ***1.3. Importance of the Problem***

The problem suggested in the beginning of this chapter was that retail operations managers did not have the time or the kind and form of information necessary to allow regular and systematic planning of those actions necessary to achieve sales and profit goals. This may suggest a failure in the information systems currently in use. By and large, the data processing sections of most retail firms are geared to providing management with the information normally used to assess day-to-day store or department operations and to make inventory control decisions relating to that store or department.

Managers and buyers have themselves done little to improve the situation. In the past, the planning function was not required of them, and they therefore had no incentive to demand information of the kind and form needed to complete long-term planning for their areas of responsibility. They only required the data processing systems to provide them with the information necessary to make every-day merchandising decisions. Any attempt to involve an operational manager in some kind of planning process must be entrenched in an information system that allows fast and accurate computation and decision making.

In conclusion, all lower management personnel having direct operational responsibilities must be provided with a planning mechanism that has time and information advantages over their current methods of operation and also is an incentive in itself to engage in the planning of action necessary to achieve sales and profit goals.

### ***1.4. Objectives of the Research***

The objective of this research is (1) to develop the general framework for a computer-assisted planning mechanism to aid a department store buyer who is responsible for several separate stores and (2) to suggest an approach to use in testing and evaluating the effectiveness of the proposed planning mechanism. Such computer-assisted planning involves two main steps. The first is the planning of department sales for a season (department stores divide their year into two six month seasons; spring and fall), broken down by product class, store and month. The second is the detailed planning within a product class to consider the vendors from whom merchandise is purchased and the classes of average selling price within each product class (termed the "price points").

The present research develops only the framework for such a planning model and does not attempt to implement the model. However, it is believed that implementing the model would;

1. Provide a means whereby buyers (particularly new trainees) can encounter “real” decision-making situations that have relevance to their own responsibilities.
2. Allow the assesment of buyer decision making by higher management.
3. Provide the buyers themselves with a rapid method of computation and analysis.
4. Encourage real “thought” on the part of the buyer about two decision areas (sales and assortments) that are critical to the performance of his department.
5. Provide a vehicle for the training and retraining of buying personel.
6. Provide the structure necessary to achieve a usable (and expandable) information system.

If these benefits can be achieved by the proposed framework, it is hoped that the model may be developed in conjunction with some department store in the future.

### **1.5. Overview**

The outline of the study follows from the research objectives identified above. 2.0 will provide a background drawn from the literature on two areas related to the planning approach suggested in this study; modeling and simulation. 3.0 relates the rationale for and structure of this approach and presents the flow diagrams for a computer planning program. A method for testing the simulation is offered in 4.0, while 5.0 explores the possible uses of the simulation, presents possible areas where the program can be expanded and indicates where further research must be done.

## **2.0. Literature Search**

This chapter reviews selected topics that relate to the planning simulation model developed in this study. Four distinct areas were felt to bear upon the problem. The first the growing use of the computer as a vehicle often used in simulation and modeling. The use of the computer has played a major role in the changing pattern of Electronic Data Processing (EDP), and Management Infomatlon Sys-tems (MIS), within the corporation. Second, a discussion is presented in general terms about models and simulations, their various uses and applications. A third section of this chapter is devoted to the use of models and simulations in the marketing context, Finally, the use of computer models in simulation in retelling is explored (Noşan R., L., at al., 1980; Phillip, E., at al., 1982; Miller, 1977).

### **2.1. The Computer: EDP and MIS**

Generally, the use of computers by business corporations has grown substantially during the past decade. It seems certain that this growth rate will continue in the decade to come. An endless variety of computer applications exists for computers in corpora-tions. Both EDP and MIS can now very prevalent in virtually every major corporation. But, the concepts of electronic processing and information systms are continually changing. As larger and larger computers are built, EDP and MIS are becoming more and more complex, influencing every branch of the organisational chart (Hofer, 1970).

## ***2.2. Modeling and simulation***

In the most general sense, a model is the representation of some real object, event, or process. There are many different kinds of models and many ways to classifying these models. This paper is concerned with only those models that are explicit representations of business processes. Here also, models may be classified as one of three different types: descriptive, predictive, or control. In his book on mathematical models, Buzzell defines the three model types (Buzzell, 1962).

A model, then, can be a very general concept or it can be a very formal mathematical relationship. The continuum of possible models is nearly infinite. For the purpose here, a subset of all the model possibilities can be singled out and focused upon. This is a simulation model. "A simulation model is defined as a representation of some real system or operation (such as the market for a given product) which is sufficiently realistic in its structure and content to be used to determine the effects of a complex set of input conditions on the system or to make predictions about the phenomenon under study for eventual tests outside the simulation (Frank et al., 1967) Simulation is, then, a modeling technique. This technique often utilizes computer programs to "model" the real situation under study. Frank and Green (1967) discuss the three principle kinds of simulations

The simulation model that is suggested in this paper will at different times fall into two of Frank and Green's groupings. To begin with, the proposed planning model conforms with what is termed heuristic programming in that it is a real attempt to capture the current planning situation as it presently exists. Beyond this the planning model seeks to expand and explore the planning decisions actually made by retail buyers. To this end, the proposed model approaches an experimental game which would allow buyer behavior to be observed (recorded) in simulated situations (Chulhan et al., 2013; Pagani, 2013; Philip, et al., 1970; Shycon et al., 1960; Franses, 2005)

The principal advantage of a simulation model is that it is an artificial environment representing a real world situation. It allows the exploration of human perception of that real world situation in a controlled framework so that some understanding of behavior is possible. The following section will examine the extent to which simulation models have been used in the context of marketing management.

## ***2.3. The Application of Model Building and Simulation in Marketing***

The development and use of corporate models, which are specifically designed for use by marketing managers, appears to be on the increase. There are several characteristics of these corporate models that seem to be generally true in most cases. Kotler (1970) describes a corporate marketing planning model having a comprehensive design for the evaluation of alternative marketing plans. The model is also industry-specific, contains its own data base, and is, of course, computerized. Computerization is taking some distinct forms. The trend seems to be toward time-sharing systems having interactive terminals. The reason why the interactive time-sharing system is preferable is that such a system does not require a change in the marketing manager's role. (Chulhan et al., 2013; Pagani, 2013; Philip, et al., 1970; Shycon et al., 1960; Franses, 2005, James et al., 1970, Weitz, 1967).

## ***2.4. Models and Simulations in Retailing***

Among the earliest applications of the computer to marketing and management problems was the adoption of modeling routines to handle different aspects of retailing operations. Credit management, inventory control, and promotional programming were the initial candidates for computer science applications (Lyon, 1970). In addition, retailing organizations are turning to a variety of more sophisticated techniques including modeling (Douglas, 1966), and simulation (Barker, 1970) which are operationalized with

computer programs. In his appraisal of the future use of computers and management science in retailing, Lyon cites "investment appraisal, scheduling delivery routes, sales control, sales accounting, and market research (1970)" as a few of the more common areas that retailing will be developing a computer capability in. In addition to these, Lyon discusses the possible use of simulations which will provide optimum advertising budgets, expand the future of game theory, apply Bayesian decision theory to retailing problems, and promote new forecasting techniques (Lyon, 1970).

Many of the applications above are directly relevant to the positive characteristics of the computer and programming upon which they rely. As Sweeney points out "while retailing firms have historically been quick to recognize and exploit the data processing and reporting capabilities of the computer, they have evidenced substantially less initiative in the development and use of advanced computer-based analytical techniques as an integral component of the decision-making process (1971)."

These new inroads can be seen as taking two distinct forms. First, new efforts are being made to convert the large amounts of routinely gathered information into the type and form that will be meaningful to retailing decision-makers. This is true where the computer applications involved were more traditional and descriptive, that is where the data processing capability of the computer was routinely utilized (McCanaughy, 1970). Second, as Sweeney has intimated, more sophisticated techniques will be integrated into decision-making processes. Linear programming (Salkin, 1965) and Bayesian decision theory (Phillips, et al., 1968) are two examples of this effort.

One area of retailing that has in the past been relatively untouched by any form of highly developed management or computer science technique is buyer decision making and/or merchandise management. The promise of successful application is apparently becoming strong enough to lure some effort into this area. Dickinson's efforts to capture the dynamic aspects of buyer decision-making are recorded in the form of a normative model he has developed (1967). Sweeney (1971) has also developed a merchandise simulation that begins to approach the realism of an actual situation as have Olson et al., (1970).

The present study is a further attempt to explore the feasibility of introducing the advanced techniques or modeling and simulation into the retail setting. In this instance the concentration is upon the behavior and decisions of a department store buyer (Chulhan et al., 2013; Pagani, 2013; Philip, et al., 1970; Shycon et al., 1960; Franses, 2005).

Several studies drawn from the literature were helpful in the formulation of the planning model that this paper presents. They provided useful information for two reasons. First, they addressed the particular problems of retail buyer decision-making, and second, they applied computerized techniques to the retail setting. A more detailed review of these studies will hopefully aid the reader in understanding the scope and intent of the planning simulation model to be presented later (Chulhan et al., 2013; Pagani, 2013; Philip, et al., 1970; Shycon et al., 1960; Franses, 2005).

The buyer, in the context of a large department, store or chain-type retail operation, is a totally unique individual. He is often the lowest level of profit responsibility in the organization and has the last but most significant amount of merchandise control. The retail buyer practices his "art" somewhere between the executives he is responsible to and the consumer he is responsible for.

Little is known about how a buyer makes decisions. A study by Dickinson (1967) has sought to expose one essential buyer task that of selecting vendors. While it concentrates on major department stores (medium priced), and hard goods departments within those stores, this study suggests some interesting conclusions.

- Buyers seek to minimize the number of vendors with which they interact.
- Buyers rely heavily on historical (especially the immediately preceding year) information to make decisions.
- Buyers often rely on markup as a decision tool.
- Buyers give great preference to those vendors who are currently providing merchandise. New vendors are not easily absorbed into a vendor mix.

A second study proved to be extremely valuable in assigning some level of importance to the merchandising decision variables that confront the buyer. Dalrymple (1966) hypothesized in his study that these variables could be sufficiently quantified: placed in a profit maximizing mathematical model which would then provide the retail decision-maker (buyer) with some relief at last from his dependence upon historical "rules-of-thumb" in governing his operations.

A study by Sweeney (1971) takes a different approach, and uses alternative decision rules to interpret the performance of a merchandise simulation model. A series of computer routines were designed to provide as output; the major decisions facing a retail executive having merchandise responsibilities. The study compared the results of two sets of performance, one by using historical data to generate the decision and another using data which simulated alternative decision rules (maximize sales, profits, levels of service performance). This approach suggests a methodology that will allow an accurate reproduction of a decision-making process. Once the "model" has been validated, alternative decision rules and performance criteria can be applied to evaluate different merchandising management strategies. As a final offering in this section, two texts are noted for their direct exploration of both the sales and assortment planning process (Weberat.,al.,1969;Taylor,1970,Mooreat.,al.,1969).

### **3.0. The Rationale and Structure the Problem**

To attempt to close the planning gap that exists in retailing today is no easy task. This study seeks to achieve a planning format that will find applicability in many kinds of retailing organizations. The present chapter describes this format.

#### **3.1. Definitions Related to the Study**

To clarify the discussion the persons and concepts related to the project will be defined more precisely.

**Planning Model.** The problem was approached using a specific retailing organization for study. This was done to assure the adequate understanding of the problem and to insure a realistic and pragmatic solution to that problem. A large department store with several retail outlets in the X metropolitan area agreed to cooperate with the author in this study.

**Lower Management.** Lower management personnel were alluded to in describing the problem. "Lower management" is the group of people managing either departments or classifications in a retail firm, which is the lowest management segment given direct decision-making responsibilities for the operation of the retail outlet. As one article state it, "in most retail stores, and especially in the larger stores, departments and classifications represent the customary basis for allocating managerial responsibility or what may be called decision centers (Leroy, at., all., 1970)"

**Department.** A department in the context of a "department store" or other retail outlet is a grouping of products having related usage characteristics with such products usually located in a distinct physical space of the store layout.

Class. A class is a subgrouping of products having greater homogeneity than the products throughout the entire department.

Buyer. Persons who "manage" departments or classifications can have many different titles, but their responsibilities are generally the same whether they are called departmental managers, retail buyers or class managers; they all have direct responsibility for the sales and profits of their department or class.

Spring and Fall Seasons. The sales year in most retail stores is divided into two selling seasons. The Spring season is from January through June and the fall season from July through December, each being six months long.

### ***3.2. Sales Planning Routine***

Sales goals for a department as a whole are established for a buyer by a divisional executive who has responsibility for the performance of several different departments which taken together constitute a single type of commodity. Ready to wear and house wares are two such divisions.

A buyer is currently responsible for making certain sales estimates for various breakdowns of the sales goals established for his department. Among the sales figures he must estimate for a season are total sales by store, month, and class. These estimates are the extent of sales planning as it is now performed by retail buyers in the organization under study.

The purpose of this first portion of the planning simulation model is to capture the procedure now being used to make these six-month seasonal sales plans. In addition to this, it will also provide the much needed speed and flexibility allowed by a computer application.

### ***3.3. Flow Diagram of Sales Planning Program.***

A sales planning flow diagram is presented in this section. It will be discussed in eight parts. The first of the eight subroutines receives the most detailed description. The estimation process for the subsequent subroutines is similar so that if the reader understands the first subroutine, the remainder of the planning program should be comprehensible by following the diagram itself. The number for each step in lettering preceding the description below corresponds to the numbers on the boxes in the flow charts.

1. The buyer receives a description of the task at hand. He is told he will be making estimates of sales breakdowns, and for the more aggregate cases, estimates of profits. He will also be provided with background information about his department.
2. The buyer receives some historical sales information of his department's performance by store during the same season last year. He is also given the sales goals he will be responsible for during the current season and the percentage difference between the two sets of figures.
3. The buyer must make a decision at this point. Does he expect that the total amount of change reflected in (2) above will be achieved in each of the stores having his department?
4. If the buyer decides that he does expect the changes to be equal, the computer makes the necessary calculations and presents him with the resulting estimates.
5. If the buyer decides that he does not expect the changes to be equal he is given the opportunity to make the estimates himself.
6. The computer checks his estimates to determine if the sales goals already established will be met if these estimates are actually achieved.
7. If the estimates fall short of the goals, the buyer is told he must re-estimate these particular breakdowns.
8. If sales goals are met or exceeded, the buyer is informed that his estimates are adequate. Utilizing the estimates the buyer has made, the computer makes the necessary calculations and presents the results.

9. The buyer now has the opportunity to consider the results of his planning effort thus far and must decide if he wishes to revise his previous estimates. If he is not satisfied with the sales estimates that have been generated he respond; YES and is returned to (5) where he can revise his estimates of change to reflect his dissatisfaction.
10. The buyer is reminded that he has completed a particular portion of the sales planning process. In this instance he has estimated sales (and profits) for each store in the retail organization.

### ***3.4. Advantages of the Sales Planning Routine.***

The sales planning portion of the planning simulation model has many advantages over current methodology. Much of this advantage is due to the fact that it is a computer operation. The number of different estimates that can be produced is endless. The process itself is fast and accurate, and the procedure the buyer is required to follow is repetitive making it easy to understand.

### ***3.5. Assortment Planning Routine***

Each buyer within his department has a number of classifications or classes that he is responsible for. Basically these are groupings of different kinds of items. Using the men's clothing department as an example, some of the classes within it might be shirts, belts, trousers, and ties. Within each class the items can be distinguished by differing manufacturer and price.

### ***3.6. Problems in Assortment Planning.***

At various times either by choice or necessity every buyer must make an assortment decision. This decision involves either the addition, removal or replacement of a class item. There may be many different reasons for such action on the part of a buyer. Sales, markups, promotional expenses, and in-store service considerations are a few of the variables that must be considered before a single assortment decision is made.

Buyers at the present time do little of what could be called assortment planning. They back into their assortment decisions and do not attempt on a regular basis to examine the kinds of items they carry for sale. It would seem that buyers tend not to worry as much about what they are selling as long as they have enough of something to sell.

### ***3.7. Flow Diagram of the Assortment Planning Routine.***

We have accomplished sales planning in the preceding sections of this chapter; now we will seek to accomplish assortment planning. To achieve assortment planning in this simulation model, the buyer will be required to consider each of the different kinds of items within a particular classification. These items are designated by the vendor from which they are available and also the price point at which they are sold. This vendor-price point analysis can be performed class by class until the entire department has been considered. The output of each of the analyses will be an assortment plan formulated by the buyer through his decisions about the various vendor-price point combinations that exist within a class.

In comparison with sales planning, assortment planning appears a great deal less complicated. This may well be true in the sense that there are fewer decisions that actually have to be made on a single pass through the program. In actuality, however, a particular department may have as many as a dozen classes contained within it, and each class may be composed of a multitude of vendors and price-points. In short, it is likely that more time will be spent in planning assortments than in planning sales. This is rightly so, since assortment planning is more micro-analytic in dealing with individual kinds of items.

### **3.8. Computer Hardware and Software Requirements**

Up to this point both the planning of sales and assortments have been presented by using flow diagrams. The plan for actually implementing the planning simulation model, in terms of the computer program and hardware to be utilized, will now be discussed.

Sales planning and assortment planning have both been presented in this chapter in a flow diagram format. Plans are being made, however, to convert these flow charts into computer programs utilizing the Fortran language. At the present time, the simulation planning program will contain three different segments: (1) a sales planning program, (2) an assortment planning program, and (3) a data file, which will contain the necessary information for a subject to inter-act with the programs during the simulation.

Two types of terminal facilities seem feasible for the kind of input-output that will be required of program users. One is a CRT unit and the other is the more standard teletype terminal. It is not critical which of these two terminals are chosen as the programs and related software will be compatible with either after minor modifications. What will be necessary, however, is that the terminal must have hard-copy capability.

### **4.0. A Proposed Approach for Testing The Simulation**

The sales and assortment planning programs that were outlined in 3.0 are not conceptually complex. However, their length in terms of the number of decisions that must be made and the actual amount of time required to proceed through the programs are substantial. Also, these programs are quite general in the sense that they are developed to be used in planning the sales and assortments of many different kinds of departments. These departmental differences become particularly important in the assortment planning program because every possible variable will be changed. Classes, vendors, and price-points will all have a differing character depending upon which particular department is selected for analysis.

This raises the question about whether or not the planning programs, in their general format, will apply to specific departments. Unless the model applies to a specific departmental situation, the sales and assortment programs are useless as planning tools. Therefore, as a test, the planning model will be applied to a single department within the retail organization under study. In summary, then, a simulation format is needed for the following reasons:

1. The simulation will serve to introduce a specific department with all its particular variables into the general program framework and thus determine how relevant the general framework really is.
2. The simulation will allow the programs to be actually operationalized and to be, in the software vernacular "debugged."
3. The simulation will allow when operationalized the actual interaction between a subject and the computer. This will provide the first look at the potential problems that can be expected from his man-machine interaction.
4. The simulation stage itself will be a useful tool to many people within the retail organization when used as a general training device which allows actual decision-making in the area of sales and assortment planning.

### **4.1. Methodology for Running Subjects**

As a next step beyond this study a number of subjects will be run through the simulation to validate its structure and content. As it is envisioned now, a terminal will be placed somewhere in the retail store and some twenty to thirty retail buyers will form the subject pool. The procedure for running the subjects will be

identical for each subject. Basically, the following information will be obtained:

1. What decisions were actually made? This will be obtained from the printout.
2. Why was each particular decision made? What factors were involved in influencing a particular decision? Answers to these questions can be determined during debriefing when the researcher will query the subject about some decision points that appear on the printout.
3. What difficulties were encountered during the simulation? Were these difficulties because of the way the computer program was designed? Were these difficulties due to a failure of the subject at those times when he was required to interact with the terminal? Was the difficulty due to the inability of the subject himself, either because of his failure to become involved with the task at hand, or more generally his failure in the skills involved in decision-making and planning? These questions will be answered during the debriefing and/or by information that was volunteered by the subject while he was engaged in the planning programs.
4. What possible modifications or improvements could be made in the simulation, and what would the subject suggest be added as the planning programs become operationalized in the retail planning system?
5. Finally, the subject would be asked to comment on the relevance of the simulation to his particular department, indicating those areas that would be particularly difficult for the planning program as it was structured in the simulation, to handle. The subject might also indicate those related materials such as calendars or promotional schedules that might be regularly included in planning efforts of this kind. Specifically, he might serve to indicate where these materials might best be included and where they are most appropriate.

#### ***4.2. Results of Subject Runs***

The most obvious result of having run a number of subjects through the simulation stage is the ability to modify and improve the programs themselves based at this point upon actual interaction between retail buyers and the sales and assortment planning programs. This alone, is a worthwhile objective for the simulation stage. But, other results can also be obtained at the same time that the programs are used in a simulation context.

One of the results that is hoped for during the period the programs are being used as a simulation is the insight as to how a retail buyer makes decisions. This insight will be valuable from two points of view. The retail buyer himself can utilize his experience on the simulation to reflect and see why he made the particular decisions that he did. On the other hand, other company executives above the level of the retail buyer can also begin to understand decision-making of their retail buyers. This insight into decision-making can find expression in several different ways. First of all, the actual decisions themselves become readily apparent, and given the structure that surrounded the particular decisions in the simulation, it becomes possible to analyse those decisions using relevant criteria. Secondly, the simulation makes it apparent what kinds of information buyers are using to make their decisions. This may well allow some pattern of information preference to be discovered either in terms of the new kinds of information that buyers would like to have available, or in terms of different methods of compiling and reporting data that is at the present time available. In summary then, the results of the simulation programs and their attending debriefing interviews can provide retail management with the beginnings of a better understanding of retail buyer decision-making.

## 5.0. Conclusion and Discussion

In brief review, the principal objective of this research was to develop a computer program that would simulate those tasks that are necessary as a retail buyer makes seasonal plans for the department of which he is in charge. These planning programs, when operationalized, were developed to provide a means whereby retail buyers, new management trainees, as well as higher management executives could interact with the planning programs and encounter "real" decision-making situations that would be relevant to their various responsibilities. If these two objectives are achieved, an overall objective relating to the greater involvement of lower management in planning activity will also be realised. Further objectives of this study were that a rapid method of computation and analysis be provided the retail buyer and that the beginnings of a new usable information system be established.

A review of the literature indicated that the concepts of modeling and simulation are widely used in marketing and that their application to retail problems is growing. In particular, computerized techniques are being used in direct relation to buyer decision-making and to merchandise planning and control. The planning model suggested by this paper is consistent with this trend and seeks to delineate two aspects of buyer planning: sales and assortments.

A series of interviews were conducted with department store executives and buying personnel of a large department store having retail outlets in the Adana-Mersin metropolitan area. Using information and materials gathered during these interviews, the author developed a planning simulation model that was structured around present planning policy but also provided some new planning activities. The planning program were divided, one portion being a sales planning program and the other was an assortment planning program. This division was a natural one given the two major areas of buyer concern; sales and inventory. The programs themselves are structured planning procedures allowing buyer interaction with the computer program. This interaction occurs as buyers are required to make decisions or estimates and rely such information to the central computer via an input-output terminal. The program allows for constant adjustment and re-estimation of the decisions to be made, and the planning process can continue until the buyer is satisfied with the results. The final output of each of the planning programs is, redundantly, a plan. This plan is in the form of differing amounts of sales and inventory dollars that a buyer can utilize to adjust related activity, monitor current performance, and control the levels of stocks and related expenses. In a fully operational mode, the programs would be of a general nature having specific input possible from various department data files. Every retail buyer could, therefore, deal in depth with the planning process for his particular department. As a prelude to a fully operational information system that would, therefore, be necessary, the author has suggested that a single department be chosen as a simulated situation. This simulated format will allow the testing and validation of the general tenants inherent in the general program.

It was proposed that after the programs are converted into the Fortran language and adapted for use on an input-output terminal, a number of retail store personnel be ran through the simulation to test its actual operational advantages. It was also suggested that the terminals be located in the retail facility where store personnel would have easy access to it, and that retail buyers themselves comprise the subject pool of the initial simulated runs. This period of simulated activity would allow additional program debugging and improvement, and would serve as a first step in proceeding to a fully operationalized system by acquainting retail executives and personnel with the programs and determining if they have suggested modifications or improvements.

### ***5.1. Suggested Uses of the Simulation Planning Model***

The simulation was first and foremost meant to be a planning tool to be used by a retail buyer. This use is most obvious. But, other uses of the model are possible either for different purposes or by personnel other than retail buyers. The planning programs could be easily used as a training device. These planning programs would allow the retail buyers themselves to gain greater experience in making decisions related to their department. The simulation allows a large amount of actual decision-making time to be "logged in" by the buyer.

Any large retail outlet also has substantial numbers of new lower management entering the organization quite regularly. Many of these people will begin as management trainees with the expectation of some day moving up into the ranks of the buyers. The planning simulation model would again provide these trainees with the opportunity for situationally realistic decision-making. The planning programs could also serve as an important information source for new personnel about organizational structure. They would also help the trainee to gain a rapid familiarity with planning procedure as well as actual operating responsibilities that are involved in the different departments. Company executives, particularly those divisional executives having responsibility directly above the retail buyers may indeed find substantial benefits in using the planning model. The model could serve as the basis for a great deal of direct communication between the buyer and his divisional managers. Also, by becoming themselves involved in the same planning process as the retail buyer, divisional managers would have the opportunity to understand fully what is involved in the planning process at the level of the buyer. All this, in the hope that greater empathy will evolve regarding the particular problems and responsibilities that exist at both these levels of management.

It was previously mentioned that the model, and the related information to make it operable, could be used by management trainees as a device that would permit the rapid familiarisation of departmental structure. Not only new personnel, but all those personnel who have tended to specialize either in a particular job or even in a particular location could use the planning model to their benefit. In general, the model with its attendant supply of information could be used as a resource device. Information, could be provided on demand about the various departments, classes within the departments, vendors and suppliers, retail price structures, and data about the different stores in the retail organization. The model itself suggests that a flexible file of historical and current status information and data be developed.

### ***5.2. Program Expansion Possibilities***

The preceding section has suggested several different uses that the program as it is presently envisioned will make possible. There do exist, however, some real opportunities for expanding the programs themselves. One method of accomplishing this would be to make the present planning process itself more elaborate. This could be done by providing additional variables within the planning framework. Two such variables might be the seasonal calendars and the promotional schedule for each department. This would serve to make the planning process more complete and realistic than it is at the present time. A second method of program expansion would involve the addition of supplementary programs which relate to other buyer activities. These activities could be such things as expense planning and control, sales personnel scheduling, and customer service evaluations. Behind each of the planning programs, a file of information must exist to support it. One form of program expansion would be creating new or improving present information files to serve as the program inputs. Program elaboration, program addition, and information file improvement all provide substantial expansion opportunity for the planning simulation model. This paper represents a first step in bringing a complete retail planning program to an operational plateau. There is no doubt that much more work needs to be done to achieve an operational planning system. Modification and improvement must be constant to achieve such a state in present-day large scale retailing. If retail institutions are to maintain

the rate of change necessitated by rapidly changing consumption patterns, they must begin now to prepare for it. The single most important factor which will allow retail firms present in the 2010's to survive in the 2020's will be the increasing use of computer technology. Planning programs, such as those developed in this paper, will be needed. As retailing firms grow larger and larger, and operational responsibility decentralized, the planning function must also be decentralized. Every effort must be made to involve lower management personnel in the planning effort. Success or failure in accomplishing this may well prove to be crucial for large retail business.

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