

# Experiential Learning Enters the Eighties, Volume 7, 1980

## SIMULATING THE PRODUCT LIFE CYCLE ON INTERACTIVE TERMINALS

Newell Edward Chiesl, Indiana State University

### ABSTRACT

This paper reports on a computer simulation designed to assist in the instruction of a product strategy course. Specifically the simulation, using interactive terminals, was developed to illustrate the marketing concept of the product life cycle. The simulation/game presents to the students a marketing environment of five different products, each of which has its own unique product life cycle.

### INTRODUCTION

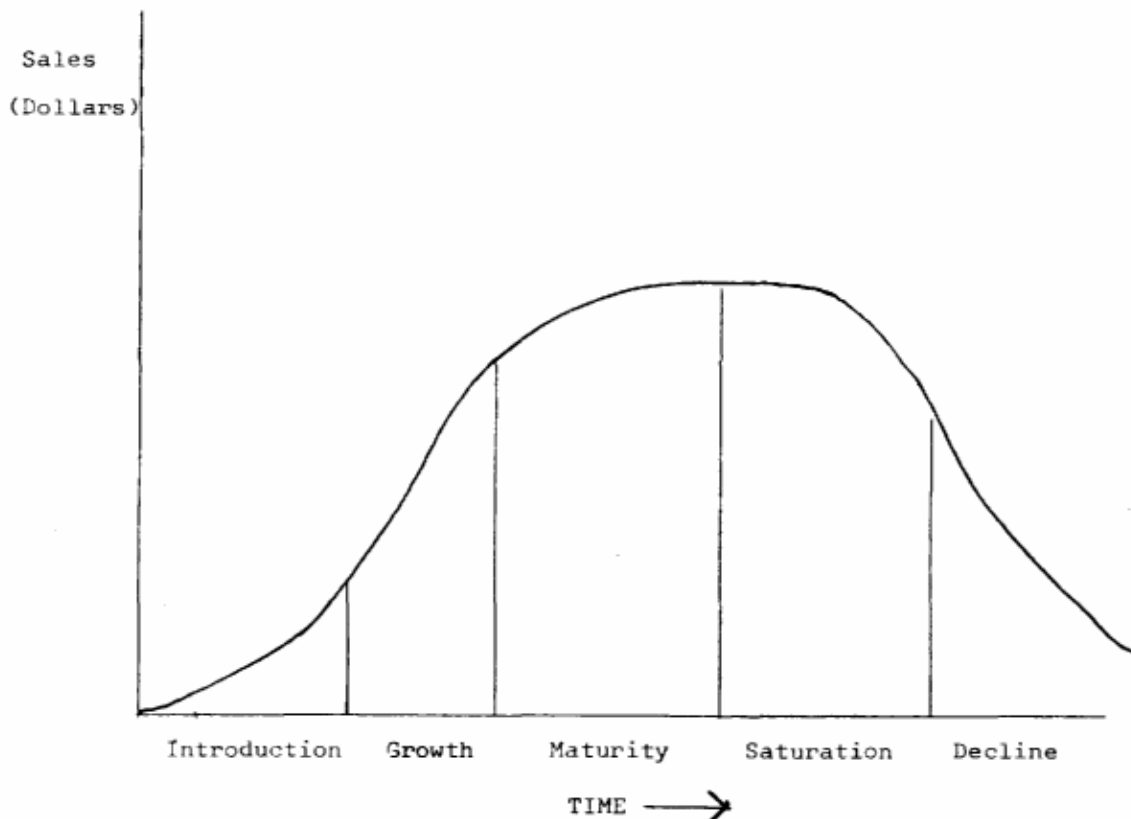
The notion that products have a life cycle is an important marketing concept. Simply stated, products have a life span from birth to death. The different stages in the Product Life Cycle (PLC) are seen in the traditional sales curve illustrated in Figure I, which is adopted from Wasson, (10, pp.247-48). In each stage of the PLC there are different marketing strategies to be implemented. In other words, the marketing

manager adjusts the product's promotional mix, price, product quality and distribution to the needs of the market place.

Not all the marketing classifications of products have such a nice smooth curve of the Product Life Cycle (PLC) portrayed in Figure I, as noted and illustrated in Figure II. In Figure II, a fad's PLC is started and ended rather quickly. A fashion has a longer life in the market place, while changes in a consumer durable good's PLC are slower to develop.

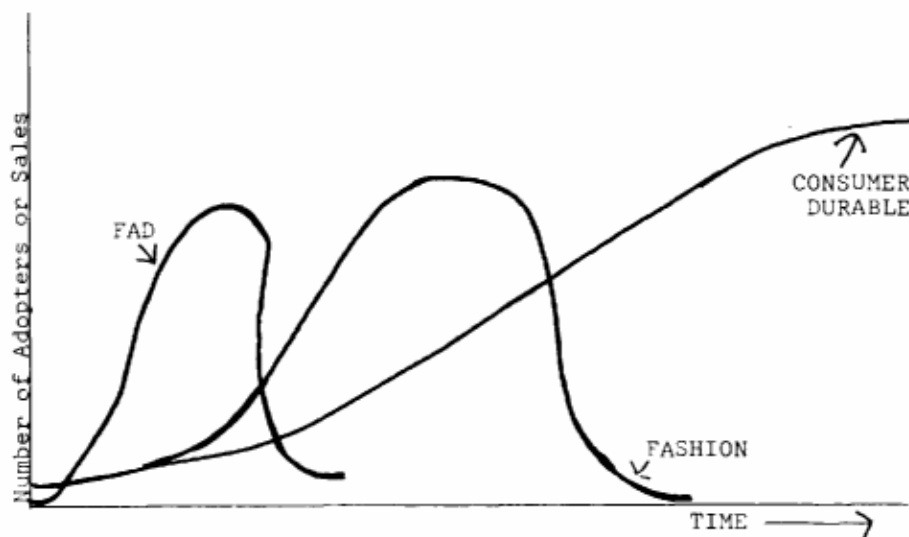
There are a few non-believers of the PLC who point out the few products that are exceptions to the rule. Dhalla and Yuspeh have studied several products contrary to the PLC, (3, p.110). However, there are many more marketing applications of the product life cycle concept that originated with the work by Levitt, 1965, (6, pp.81-94) and Wasson, 1968, (9, pp.36-43). Currently many of today's product strategy textbooks

FIGURE I  
The Product Life Cycle



## Experiential Learning Enters the Eighties, Volume 7, 1980

FIGURE II (1, p.143)  
Rate and Level of Adoption in  
Three Product Life Cycles: FAD, FASHION, DURABLE



either stress, or carry throughout the book, the concept of the Product Life Cycle, Hisrich and Peters (5), Pessemier (7), Rothberg (8), Hise (4), and Cardozo (2). The concept of the product life cycle, then, is considered by many to be of marketing importance.

### THE SIMULATION

A computer simulation was developed by the author entitled, "Tommie Company: An Interactive Marketing Game." The purpose of the game is to illustrate, by means of computer simulation, the marketing implications of five products moving through their life cycles. The game is played by students enrolled in a Product Strategy course. The simulation can be played by two or ten teams on interactive terminals. The computer hardware required to play the game is a main frame (the one the class is using is a half Megabyte, but a 100K would be adequate), interactive terminals, and an on line disc storage system. The on line disc storage system has to have an indirect access system of data retrieval for the storage files. Indirect access simply means that students reading files do not obtain the actual file (data), but a scratch copy of the file. In other words, all ten teams could be reading the same file simultaneously via ten scratch files.

Figures III-VI graphically illustrate the product life cycles for the five simulated products. The hatched area of each curve indicates which stage of the PLC that is being simulated. The total time compressed by simulation is 100 weeks. The widget's PLC presented in Figure III, illustrates that this product will have its entire life from birth to death, simulated during the compressed 100 weeks. In Figure III, the stages of the PLC being simulated are the introduction and growth phases of Thingamabobs. Notice that there are

not any sales during the introduction until week twenty-five. A 100 weeks of Gizmo's maturity stage of the PLC is simulated in the game. This is shown in Figure V. Figure VI illustrates the stages of Whatsamacallit's PLC being simulated. In both the pre-game scenario and the market research information available to the students at the start of the game, the PLC for Whatsamacallit is forecasted to remain stable for the entire 100 weeks. This is also the exact information received concerning Gizmo, but by the 25th week, market research informs the student about a new superior product just entering the market. The results is immediate doom for Whatsamacallit. The product enters the decline stage of the PLC and by week #50 there is zero demand at every price, promotional level, product quality index and amount of distribution coverage.

The final product in the simulation/game is Unos. Referring to Figure VII, the Uno's product life cycle starts a very rapid decline at the beginning of the game. The pre-game scenario for UNOS was for the product to have a stable 1000 potential units demand, per week, per team, *ceteris paribus*. At the start of the game, however, the players receive market research information that this amount is to decline very quickly. Referring again to Figure VII, 434 potential units are demanded at 10 weeks, 188 at 20 weeks and only a dismal 80 units at 30 weeks. The demand is only potential because of all the interrelated factors determining demand such as competition, price, promotion, product quality indices and certain exogenous factors stochastically being generated in the environment by the simulation.

The computations for the UNO's decline in potential demand is calculated by the equation:

$$(ID)*((R)**(T)) = PD. \quad (1)$$

FIGURE III  
WIDGETS PLC

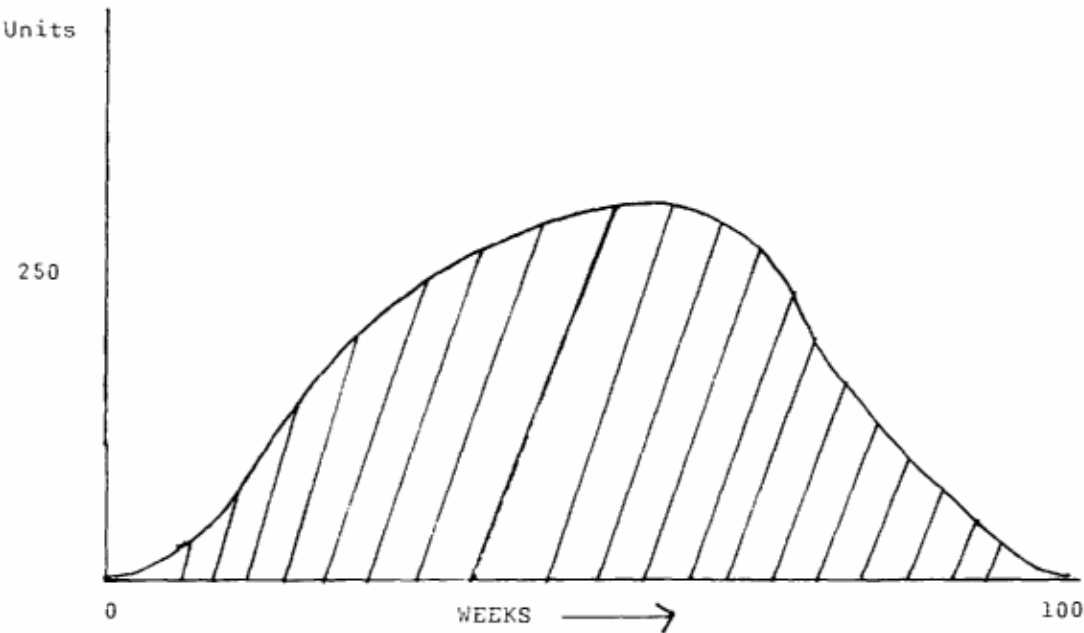


FIGURE IV  
Thingamabob's PLC

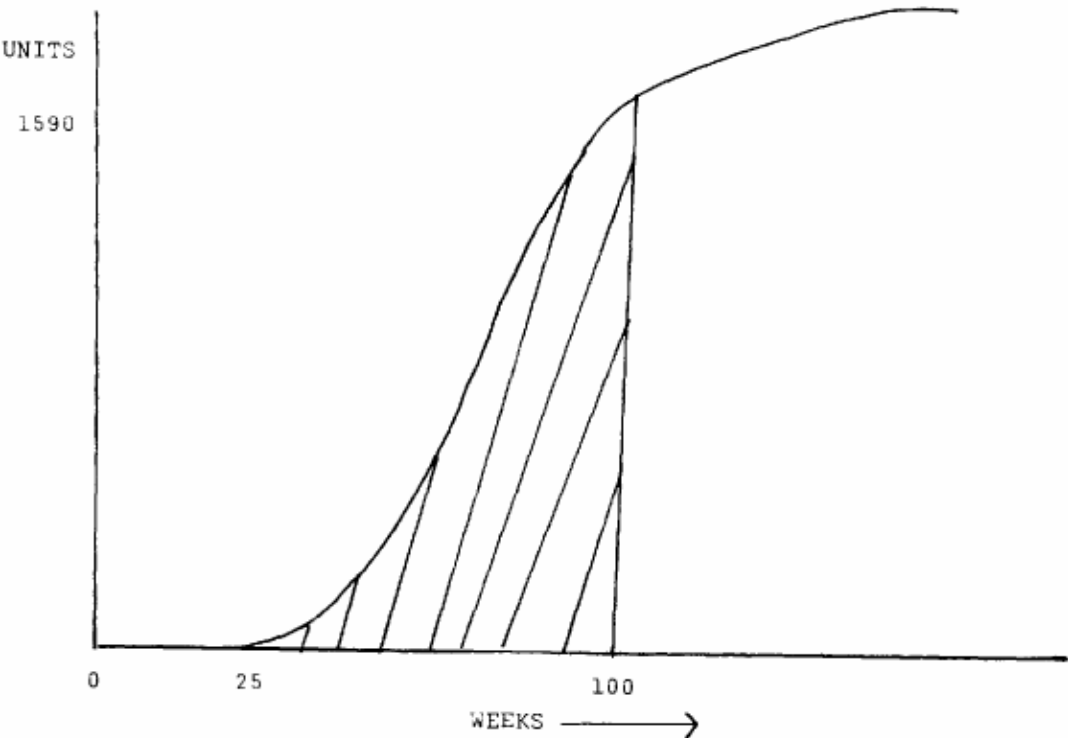


FIGURE V  
Gizmo's PLC

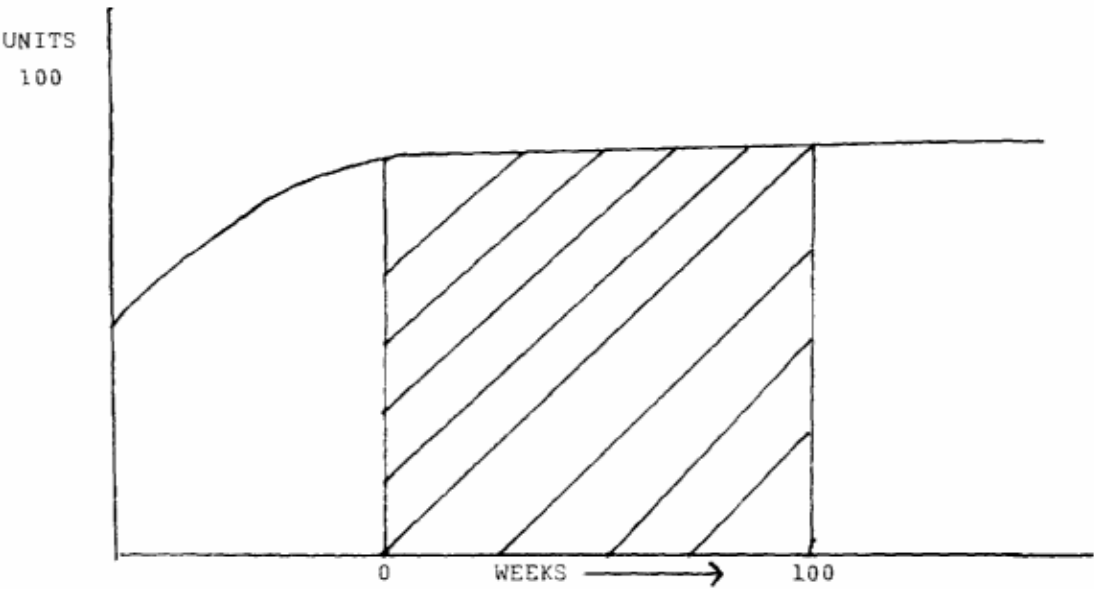
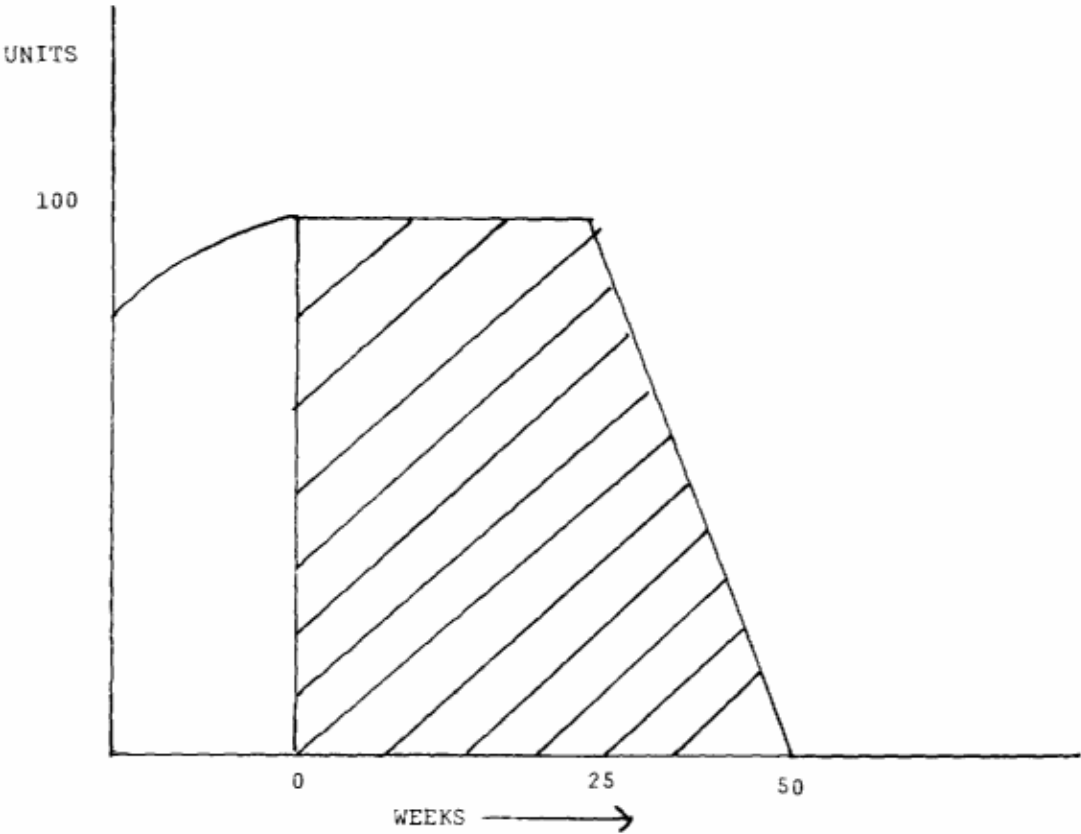
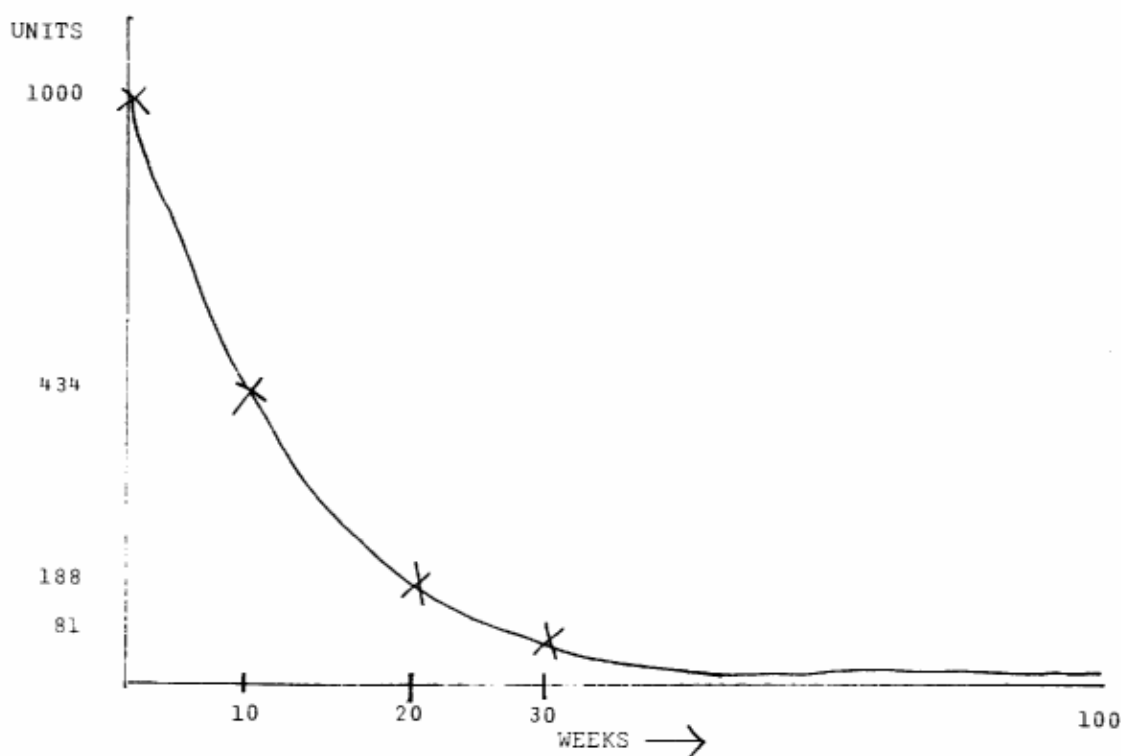


FIGURE VI  
Whatsainacallit' s PLC



# Experiential Learning Enters the Eighties, Volume 7, 1980

FIGURE VII  
UNO'S PLC



where: ID = Initial demand = 1000

R = Rate of change = .92

T = Time period

at Time 20 when R = .92, ID = 1000, PD or Potential Demand will equal 188.69333 units. With integer format, the answer becomes 188.

The influence of the product quality index is calculated by the equation:

Quality index =  $(f) \cdot (TPQI / AVpqI)$   
(2) where: IPQI = influence of the Product Quality index

F 0 1

TPQI = Team's product quality index

AVpqI = Average Product Quality Index for all teams.

The function (f) is really the percent the game administrator wants to emphasize the product quality index's influence on actual demand. For example, when (f) is initialized at .6 in the simulation, then the product quality index has a 60% affect on the actual demand for the product. Referring again to equation (2), when TPQI = 120 and AVPQI = 80, then:

$$Ipqi = (.6) \cdot (120/80)$$

$$Ipqi = .9$$

Putting it all together in the equation:

$$AD = (PD \cdot Ipqi) \pm (PD \cdot (1-f))$$

(3) where, AD actual demand

PD = potential demand

(1-f) = compliment to the (f) percentage. Substituting

when PD = 188:

$$AD = (188 \cdot .9) + (188 \cdot (1 - .60))$$

$$AD = (188 \cdot .9) + (188 \cdot (.40))$$

$$AD = 169.2 + 75.2$$

$$AD = 244.4 \text{ units.}$$

Similar calculations are also performed for the influences that price and promotion have on potential demand.

All of the calculations rely on the interactive nature of computer terminals and the system of indirectly accessing the data files. Without such computer capabilities there would be no student interaction with competition (other student players). This combined interaction results in a verisimilitudinal competitive environment in which the students (potential future marketing managers) are collectively and simultaneously experimenting with marketing variables in a closed controlled simulated marketing environment.

## IMPLICATIONS

The simulation of the Product Life Cycle concept on interactive terminals offers business students the opportunity to experiment with marketing variables during the different stages of a product's life cycle. These experiments offer instant feedback that can be either positive or negative to students. The computer simulation of the Product Life Cycle concept, therefore, has offered to students a valuable experiential learning exercise.

## Experiential Learning Enters the Eighties, Volume 7, 1980

### REFERENCES

1. ANDERSON, W. Thomas Jr., BENTLEY, C. and SHARPE, L. K. IV, MULTIDIMENSIONAL MARKETING, (Austin: Austin PRESS, 1976)
2. CARDOZA, Richard N. PRODUCT POLICY, (Reading, Massachusetts: Addison-Wesley, 1979)
3. DHALLA, Noriman K. and YUSPEH, Sonia, "Forget the Product Life Cycle Concept," HARVARD BUSINESS REVIEW, January-February, 1976.
4. HISE, Richard T., PRODUCT/SERVICE STRATEGY, (New York: Petrocelli/Charter, 1977)
5. HISRICH, Robert D. and PETERS, Michael P. MARKETING A NEW PRODUCT (Menlo Park: Benjamin! Cummings, 1978)
6. LEVITT, Theodore, 'Exploit The Product Life Cycle,' HARVARD BUSINESS REVIEW, November-December 1965.
7. PESSENIER, EDGAR A., PRODUCT MANAGEMENT, (Santa Barbara: John Wiley & Sons, 1977)
8. ROTHBERG, Robert R., CORPORATE STRATEGY AND PRODUCT INNOVATION, (New York: The Free Press, 1976)
9. WASSON, Chester R. "How Predictable Are Fashion And Other Product Life Cycles?," JOURNAL OF MARKETING, July 1968.
10. WASSON, Chester R., PRODUCT MANAGEMENT: PRODUCT LIFE CYCLES AND COMPETITIVE MARKETING STRATEGY, (St. Charles, IL: Challenge Books, 1974)