

Developments in Business Simulation & Experiential Exercises, Volume 16, 1989

SENSITIVITY ANALYSIS WITH THE COMPETE IFPS/PERSONAL STUDENT ANALYSIS PACKAGE: A MARKETING DECISION SUPPORT SYSTEM

Aspy P. Palia, University of Hawaii at Manoa

ABSTRACT

Sensitivity analysis with the COMPETE IFPS/Personal worksheet is used by student teams participating in the marketing simulation COMPETE (Faria, Nulsen, and Roussos 1984) to explore and evaluate alternative scenarios before finalizing their marketing decisions. Using this type of sensitivity analysis, marketing teams can preview the results of their marketing decisions under a given set of assumptions. Based on this preview they may find it necessary, for instance, to adjust their desire to increase advertising expenditures, hire additional sales people, plow money into R&D, and spend heavily on marketing research. Students can, thereby, improve their decision-making skills by using this simple yet powerful marketing decision support system.

INTRODUCTION

The primary purpose of this paper is to present a new teaching tool which helps to prepare students for marketing decision-making responsibilities in their future careers. The objective here is to provide student teams the opportunity (1) to plan, implement, and control a marketing program for their products, and (2) to learn and apply key marketing concepts and marketing decision-making tools.

A key objective of business school education is to prepare students for decision-making responsibilities in their future careers. Principles and facts about various facets of business can be taught in the classroom. However, the ability to make decisions in a complex, dynamic and uncertain environment is best learned through experiential learning. A growing number of marketing simulations provide students with the opportunity to practice and improve their decision-making skills.

A decision support system is a computer-based information system that supports the process of structuring problems, evaluating alternatives, and selecting actions for more effective management (Forgionne 1988). The COMPETE IFPS/Personal marketing decision support system permits student teams to preview the results of their decisions under a given set of assumptions. The additional insight gained from this preview helps the student teams make better decisions.

THE MARKETING SIMULATION COMPETE

COMPETE (Faria, Nulsen, and Roussos 1984) is a widely used marketing simulation designed to provide students with marketing strategy development and decision-making experience. Competing student teams are placed in a complex, dynamic and uncertain environment. The participants experience the excitement and uncertainty of competitive events and are motivated to be active seekers of knowledge. They learn the need for and usefulness of principles learned.

Competing student teams plan, implement, and control a marketing program for three high-tech products in three regions within the United States. The features and benefits of each product and the characteristics of consumers in each region are described in the student manual. Based on a marketing opportunity analysis, a mission statement is generated. Specific and measurable company goals are set, and marketing strategies are formulated to achieve these goals. Constant monitoring and analysis of their own and competitive performance helps the teams better understand their markets and improve their decisions.

Each decision period (quarter), the competing teams make a total of seventy three marketing decisions with regard to marketing their three brands in the three regional markets. These decisions include nine pricing decisions, nine shipment decisions, three sales force size decisions, nine sales force time allocation decisions, one sales force commission decision, twenty seven advertising media decisions, nine advertising content decisions, three quality-improvement R&D decisions, and three cost-reduction R&D decisions. Successful planning, implementation and control of their respective marketing programs requires that each company constantly monitor trends in their own and competitive decision variables and resulting performance. Monitoring performance is facilitated by the use of Lotus 1-2-3 spreadsheet and IFPS/Personal modeling software packages.

COMPETE IFPS/PERSONAL MARKETING DECISION SUPPORT SYSTEM

The COMPETE IFPS/Personal marketing decision support system exposes student teams to the operation of a marketing information system. As in any information system, a variety of inputs are processed with available technology to generate a range of outputs needed by users. Easily accessible models interact with data entered by the user from COMPETE simulation printouts to support decision making in an interactive manner. The data entered are transformed into relevant user information with the decision models. These models are designed to summarize the data, develop business relationships, and project future outcomes.

The decision maker is the focal point of the COMPETE IFPS/Personal marketing decision support system. Students use this marketing decision support system to store, retrieve, and manipulate information. They can structure problems, simulate proposed decisions under specified conditions, and evaluate alternatives.

This personal computer-based marketing decision support system uses the IFPS/Personal Version 2.0 applications package (non-procedural modeling language) to create and manage a database, perform worksheet analysis, calculate summary statistics, and solve standard mathematical models. Based on this analysis, the COMPETE IFPS/Personal marketing decision support system generates a variety of status reports and forecasts, and facilitates rational and informed decision-making.

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The IFPS/Personal Modeling Software Package

IFPS/Personal is one of the premier software packages for electronic analysis work. According to Execucom Systems Corporation, IFPS/Personal is used by over 380 colleges and universities in the United States. The IFPS/Personal modeling language has a wide array of features. It uses a descriptive, non-procedural English language base.

With the use of IFPS/Personal, the spreadsheet is automatically generated by the statement of assumptions, and is viewed on a split screen with the underlying logic. Color graphics generate views of key indicators analyzed. The "What If" capability permits temporary changes to any cell. The "Coal Seek" capability generates views of alternative business strategies for achieving predefined targets. The use of the COMPETE IFPS/Personal student analysis package exposes students to the IFPS/Personal modeling and planning system for business professionals.

The COMPETE IFPS/Personal Student Analysis Package

The COMPETE IFPS/Personal student analysis package assists the student in recording, summarizing, and analyzing the data that results from playing the game. This analysis package comprises two data disks, one support disk, and the student manual. The two data disks contain fourteen worksheets used by the student teams in monitoring and analyzing their own and competitive performance.

The COMPETE IFPS/Personal worksheets introduce the student to an electronic modeling and planning system. They are intended to be used as an aid in analysis and decision-making by students using the marketing simulation game COMPETE. The worksheets are designed to analyze the output data that results from the period-to-period play of the COMPETE simulation.

Competing student teams use the COMPETE IFPS/Personal worksheets to analyze (1) the contribution to company profit of each of their three brands, (2) the contribution to margin of each of the three regions, (3) the sales and gross margin for each product in each region, and the overall sales and gross margin for each product, (4) the sources and uses of cash, (5) breakeven analysis for each product in each region, and (6) financial statement ratio analysis.

Hardware and Software Requirements

The COMPETE IFPS/Personal student analysis package requires the following system components and characteristics:

1. An IBM PC or MS-DOS compatible microcomputer with two 5 1/4 inch double-density disk drives.
2. PC DOS or Microsoft 2.0+ operating system.
3. At least 640 K of CPU RAM memory.
4. The IFPS/Personal Regular Version 2.0 "Program Disk" by Execucom.
5. The specially configured IFPS/Personal (COMPETE) "Support Disk".
6. The COMPETE "Data Disk 1" and/or "Data Disk 2".
7. Output data from one or more sessions of the COMPETE game, and
8. A dot matrix printer with graphics capability for printing tables and graph output. A daisy wheel printer may be used to print table output but not graphs.

"What If" Analysis

"What If" is a useful and powerful command available in the IFPS/Personal software package. It enables the marketing team to specify changes in some of the variables and to preview the effects of these changes in

business decisions on the model's solution. "What If" analysis thereby provides the marketing teams with greater knowledge on which to base their decisions. The improved understanding of the underlying relationships among the marketing variables leads to more informed decision-making.

For example, the marketing team may wish to preview the effect of changes in advertising, sales force size, and sales revenue on net profits. Further, the variable costs, such as sales commission, vary with the level of sales generated. With the use of the COMPETE IFPS/Personal worksheet, the marketing team specifies the anticipated level of sales revenue and the corresponding levels of advertising and sales force size. Based on this specification, IFPS/Personal calculates the new level of profit/loss.

The "What If" interrogation of the model temporarily changes the logic and data of a model in order to determine the effect these changes produce on the solution. It permits the user to solve the model under new conditions without permanently altering the data or structure of the base model.

Marketing teams may use "What If" analysis with the COMPETE IFPS/Personal worksheet to explore and evaluate alternative scenarios before finalizing their marketing decisions. The use of this type of sensitivity analysis will enable marketing teams to preview the results of their marketing decisions under a given set of assumptions. Based on this preview they may find it necessary, for instance, to adjust their desire to increase advertising expenditures, hire additional salespeople, plow money into R&D, and spend heavily on market research.

"Coal Seek" Analysis

"Goal Seek" is another useful and powerful command available in the IFPS/Personal software package. It enables the marketing team to specify a "goal" value for some variable, and to identify the variable to be changed. When the "Goal Seek" command is issued, IFPS/Personal calculates a new value for this adjustment variable that satisfies the goal and is consistent with the constructed model.

For example, the marketing team may wish to determine the level of product sales within a region that is necessary to generate a target level of product profit, given certain fixed and variable costs. Further, the variable costs, such as sales commission, vary with the level of sales generated. With the use of the COMPETE IFPS/Personal worksheet, the marketing team specifies the target level of product profit, and the variable "Sales Revenue" to be changed. Based on this specification, IFPS/Personal calculates the level of "Sales Revenue" necessary to generate the target level of product profit.

Marketing teams may use "What If" and "Goal Seek" analyses with the COMPETE IFPS/Personal worksheet to interrogate a given model, and to preview the results of specified changes. The ability to put a given model through some changes and to preview the results of those changes is one of the most powerful and important features of the COMPETE IFPS/Personal decision support system.

COMPETE IFPS/Personal Worksheets

Currently available worksheets summarized in Table 1 assist student marketing teams in performing

(1) product profit contribution analysis, (2) regional profit contribution analysis, (3) cash flow analysis, (4) breakeven analysis, and (5) balance sheet/ratio analysis. The principal advantages of the COMPETE/IFPS

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Personal student analysis package include simplicity and ease of use, consolidation and integration of the COMPETE output, "What If" and "Goal Seek" analyses capabilities, and exposure to and training in the use of IFPS/Personal.

These marketing concepts and decision-making tools are used by the student teams to plan, implement and control their marketing programs. The phases of the marketing management process, in which each marketing concept or decision-making tool is employed, are identified in Table 2.

TABLE 1
SUMMARY OF AVAILABLE WORKSHEETS

Description	Analysis #
LST PROFIT - this worksheet analyzes the profitability of the Large Screen Television.	1
HCS PROFIT - this worksheet analyzes the profitability of the Home Computer System.	2
WCS PROFIT - this worksheet analyzes the profitability of the Weight Control System.	3
INCOME AREA #1 - this worksheet is designed to analyze income data from region #1.	4
INCOME AREA #2 - this worksheet is designed to analyze income data from region #2.	5
INCOME AREA #3 - this worksheet is designed to analyze income data from region #3.	6
PROFIT CONSOLIDATION - this worksheet consolidates data from the LST, HCS, and WCS PROFIT worksheets.	7
INCOME CONSOLIDATION - this worksheet consolidates data from the three INCOME AREA worksheets.	8
INCOME SUMMARY - this worksheet takes data from the three previous worksheets and provides a comparative, ratio, and graphic analysis summary of all three products and regions.	9
CASE-I FLOW STATEMENT - this worksheet performs an analysis of sources and uses of cash.	10
BREAKEVEN ANALYSIS LET - this worksheet analyzes the breakeven point and profitability of the LST.	11
BREAKEVEN ANALYSIS FIGS - this worksheet analyzes the breakeven point and profitability of the HCS.	12
BREAKEVEN ANALYSIS WCE - this worksheet analyzes the breakeven point and profitability of the WCS.	13
BALANCE SHEET RATIOS - this worksheet performs financial and ratio analysis of the Balance Sheet.	14

Marketing Decision-making Tools Used

The data generated by the marketing simulation game COMPETE are rich enough to enable the student teams to use several marketing concepts and key decision-making tools. These include (1) market segmentation analysis, (2) breakeven analysis, (3) contribution to margin analysis by product and by region, (4) proforma analysis, (5) sales forecasting using trend analysis and multiple regression analysis, (6) performance and cost analyses with respect to objectives and competition and over time, (7) product portfolio analysis using the growth share matrix and the growth gain matrix, and (8) sensitivity analysis using the IFPS/Personal "What If" and "Goal Seek" commands.

TABLE 2
TOOLS FOR MARKETING PLANNING,
IMPLEMENTATION & CONTROL

Tool	Planning	Implementation	Control
Situation Analysis	XX	X	
Marketing Opportunity Analysis	XX	X	
Positioning (Marketing Warfare)	XX	X	
Sales Analysis		X	XX
Cost Analysis		X	XX
Performance Analysis		X	XX
Breakeven Analysis	XX	X	
Market Segmentation Analysis	XX	X	
Values and Lifestyle Analysis	XX	X	
Proforma Analysis	XX		XX
"What If" Analysis	XX	X	
"Goal Seek" Analysis	XX	X	
Regression Analysis	XX	X	
Product Portfolio Analysis	XX		XX

Index to Symbols:

XX Used heavily
X Used moderately

Pros and Cons of IFPS/Personal

IFPS/Personal is a powerful and flexible modeling software package that uses a descriptive, nonprocedural English language base. It can be used to solve large complex models with simultaneous equations and multiple unknowns.

The power and flexibility of IFPS/Personal are gained at the cost of additional memory requirements and disk space. In addition, the program takes longer to boot up and the response time is longer relative to LOTUS 1-2-3. Output data from the period-to-period play of the COMPETE simulation must be entered with care into the input data files. The model and its underlying assumptions must be left unaltered when updating the input data files.

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A major advantage of the COMPETE IFPS/Personal Student Analysis Package is the ability to obtain hard copy of graphics directly. There is no time lost in saving pix (picture) files, and later using a routine such as PRINTGRAPH to print graphics. Five graph style options (3d bar, percent bar, clustered bar, stacked bar, and pie charts) are available. After previewing the graph plot on the screen, hard copy is available immediately, if desired.

“What If” and “Goal Seek” analyses with the COMPETE IFPS/Personal worksheets enable the student teams to explore and evaluate alternative scenarios before finalizing their marketing decisions. Split screen capability with model, case, and solution windows enable the user to view respectively the underlying logic, the temporary changes made in individual cells, and the resultant solution.

CONCLUSION

The COMPETE IFPS/Personal marketing decision support system provides a depository of analytical techniques readily accessible to the decision maker. It directly involves the decision maker in the analysis and evaluation processes, and thereby facilitates organizational communication, acceptance and implementation of the resulting decisions. Further, it encourages rational decision making through the analysis of dynamic and complex relationships and the evaluation of alternative courses of action.

The COMPETE IFPS/Personal Student Analysis Package is a simple yet powerful marketing decision support system. However, the fourteen worksheets in the COMPETE IFPS/Personal Student Analysis Package are designed to assist the marketing manager in the decision-making process and are not a substitute for it. In the final analysis, a successful marketing program is the result of a well-conceived marketing strategy, a balanced marketing mix directed toward a carefully chosen target group of consumers, and the effective implementation of pricing, promotion, distribution, and production policies.

REFERENCES

- Faria, A.J., R.O. Nulsen, Jr., and D.S. Roussos. (1984), COMPETE: A Dynamic Marketing Simulation, Plano, TX: Business Publications, Inc.
- Forgionne, G.A. (1988), “Building Effective Decision Support Systems”, Business, 38 (No. 1), 19-30.