

Developments In Business Simulation & Experiential Exercises, Volume 20, 1993

SHELF WARS: A GROCERY CHANNEL SIMULATION

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ABSTRACT

Participant teams in this simulation represent either retailers or manufacturers. All manufacturer teams must negotiate contracts with all retailer teams to establish shelf price and promotional plans. After the instructor enters the contract data into a spreadsheet, sales and market share results are calculated as a function of the contract inputs. These results are printed and distributed to the teams before the start of the next round. The simulation emphasizes channel member interactions while attempting to accurately simulate the retail grocery-buying environment.

INTRODUCTION

As consumers, most students are familiar with marketing efforts directed at the end consumer, such as price discounts, coupons, and television advertising. There is a level of marketing activity, however, which is much less obvious to most students. Every product sold to the consumer through a grocery store - from shampoo to frozen food - must first be sold to the grocer by a manufacturer. The terms of this "behind the scenes" sale often has a dramatic impact on the price and promotion of the product, and thus sales volume and market share.

In this simulation, some teams represent manufacturers, and some grocery retailers. The manufacturer's "representatives" (as those who sell for the manufacturers are called) and the retailer's "buyers" (those who buy products for the retailer) will meet and negotiate contracts for the sale of products. These products will eventually be sold in the retail outlet (grocery store). The object of the simulation is for both the manufacturer and the retailer to meet or exceed their respective sales volume, revenue, or profit goals. Conflicts are likely to occur in this negotiation due to the fact that contracts which maximize the manufacturer's benefit do not always maximize the retailer's benefit, and visa-versa.

Shelf Wars was developed through the joint efforts of an academic and a practitioner. We had several goals in mind in designing the game. First, we wanted to go beyond educating students about marketing channels; we wanted to actually show them how exciting and challenging channels can be. Second, we wanted to design a game where human interaction and negotiation skills were paramount. Many other simulations allow students to make decisions without consulting other teams. We felt this was not always realistic. In Shelf Wars, almost all decisions are made as part of a negotiation with other channel member teams. Finally, we wanted to simulate an environment rich enough in "real world" detail that an experienced player could carry on an intelligent technical conversation with a practitioner. We feel Shelf Wars has succeeded in all these areas.

A brief administrative overview is offered below, followed by a more detailed description of the important elements of the game. Finally, a discussion of some of the game's dynamics, as well as some game enhancements, is offered.

Administrative Overview

The Shelf Wars simulation is currently designed to run for six periods. In "real time," running one period per week is recommended. Each period represents two weeks of time in the "simulated world." This format works well for schools on the quarter system, although for schools on the semester system, more periods would be possible and probably desirable. Each period involves the negotiation of contracts, the collection of contracts, the entry of contract data, the printing of results, and the distribution of printouts. Players receive team-specific printouts. In the quarter system

layout, we allocate about twenty minutes of the first class period of the week for the team interaction necessary for contract negotiation. The data are entered and printouts generated soon after class so that printouts can be distributed at the beginning of the next class period. (See the Technical Appendix for a description of the sales calculations.)

The game requires six teams: three manufacturer teams and three retailer teams. The ideal number of students per team is three. This allows one member of each team to negotiate one of the three contracts each team must write each period. For a class size of 30, we allow five players on a team, and encourage some students to negotiate in pairs. For class sizes of 36 or larger, the simulation could be run with two industries.

Team grades are established in part based on how well the team performs vis-à-vis their goals. More heavily weighted in the grade calculations are various reports required during the quarter, including a "plan," due before the first period, and a presentation and final written report, due after the last period.

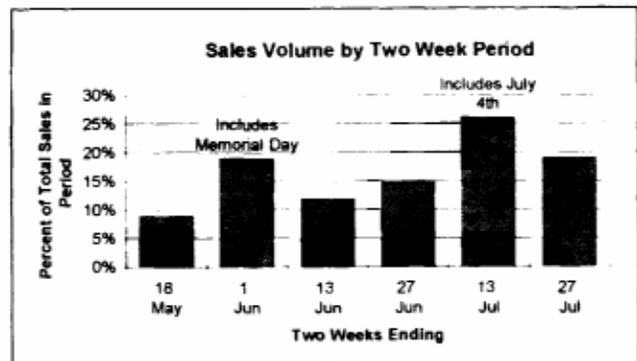
THE SHELF WARS WORLD

The potato chip category was selected as the Shelf Wars environment because of students' familiarity and interest in this product category. In the game, manufacturers represent one of three competing brands of potato chips (Kahuna Crunchers, Idaho's Best, and Salty Spuds), while retailers buy within the category for one of three competing grocery chains (Food Cat, Grocery City, and Save Less). To make the simulation more realistic, the starting positions are not equal, nor are the goals. (See Table 1 for starting positions). Players are randomly assigned to roles.

TABLE 1
STARTING POSITIONS

	Grocery City	Save Less	Food Cat
Market Shares:	39%	33%	28%
Typical Ad Prices:			
"A" size	\$7,000	\$6,000	\$5,000
"B" size	\$4,400	\$3,750	\$3,100
"C" size	\$1,800	\$1,500	\$1,300
Display Price:	\$8,200	\$7,000	\$5,800
Typical Shelf Prices: (Mkt Shares)			
Salty Spuds (36%)	\$2.12	\$2.12	\$2.12
Idaho's Best (33%)	\$2.01	\$2.01	\$2.01
Kahuna Crunchers (31%)	\$1.93	\$1.93	\$1.93

FIGURE 1
SEASONAL SALES PATTERN



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Shelf Wars is played through three months in a hypothetical summer. The seasonal pattern for sales used in the simulation is shown in Figure 1. Note the jump in sales related to the period containing the Memorial Day holiday, and that containing the July Fourth holiday. In general, promotions are most effective when they occur during or immediately prior to a major holiday. This quickly becomes apparent to all competitors, and so the competition is most fierce in these periods.

The game revolves around the negotiation of contracts. The details of the contracts are discussed below. A brief discussion of printouts concludes this section.

The Contract

There are basically four items that need to be negotiated in each contract. These are (1) the percent price reduction given to the retailer, (2) the shelf price, (3) the purchase of advertising in the retailer's circular, and (4) the purchase of an end-aisle display. Some data on the effectiveness of each of these, separately or in combination, is shown in Table 2. Participants are reminded that these figures are approximations and that exact estimates of these parameters is not available. A fifth variable, the number of facings the brand has on the shelf, is negotiable only at the start of the fourth period. Each of the contract items are described in more detail below.

Price Reductions. Although the case cost to the retailer is fairly constant, the manufacturer may choose to reduce this price in order to increase sales

TABLE 2
EFFECTS OF VARIOUS PROMOTIONS

Category	Average % Change in Weekly Sales			
	10% price reduction & display	10% price reduction w/ad feature and display	10% price reduction	10% price reduction w/ad feature
Pretzels	122.6%	151.1%	14.5%	44.8%

Source: Information Resources Inc., 1989.

and/or to temporarily boost the retailer's margins. Such case cost reductions are generally referred to in terms of a percent off invoice, or simply 01.

Assuming the manufacturer's production costs are fairly constant, when he/she uses an 01 deal, his/her margin is reduced. Often, the short term increase in sales volume does not compensate for this loss of profit per case. The retailer, however, usually profits by these deals. Typically, the retailer will pass along some, but not all, of the 01 savings to the consumer. This results in both higher net margins for the retailer and higher sales volume. For manufacturers and retailers, price reductions are most beneficial when coupled with other types of promotions.

If a manufacturer chooses to offer an 01, he/she must offer exactly the same 01 to all retailers. Participants are reminded that failure to do so is a federal offense (price discrimination). Representatives are given a budget for 01's. In Shelf Wars, each brand is allowed a total of 5, 5% 01 opportunities, which they may use at any point, and in any combination, during the simulation. Thus, a brand might offer a 10% 01 one period and a 15% in another. This strategy would exhaust the 01 opportunities (2 5%'s in one period and 3 in the other, for a total of 5).

Shelf Price. The shelf price is the price the consumers see when they walk in the store. Thus, it is this price, not the case cost or 01 level, which affects demand. By offering an 01 or other promotions, the manufacturer may persuade the retailer to lower the shelf price. This may take some skillful persuasion, as reductions in shelf price directly affect the retailer's margins.

A non-linear (step) function is used to model the effect of reductions in shelf price. Thus, odd pricing can be used advantageously. A price of \$1.99 is much more effective than a price of \$2.01, but \$2.01 is not much more effective than \$2.03.

Advertising. Manufacturers may purchase advertising in the retailer's circular (such as a newspaper insert or flyer). Three different ad sizes are available, referred to as an "A" Size, "B" Size, or "C" Size Ad. The typical prices for these at various retailers are given in Table 2.

Advertising of this sort has only a small impact on sales volume. The

retailer is usually able to print the ad at a cost much less than the price of the ad. Thus, the retailer makes a profit on the sale of the ads, as well as enjoys some benefits due to increases in sales volume. Shelf price reductions combined with advertising generally have an interactive effect, giving sales volume an additional kick (unless the competition is running a bigger ad and a deeper price discount')

Manufacturer's representatives are each given a promotional budget of around \$50,000. This money can be spent on advertising or displays (see below), in any combination or sequence the manufacturer wishes and/or is able to negotiate with the retailer.

End-Aisle Displays. An end-aisle display (or "display," for short) can have a large impact on sales, especially when combined with an attractive shelf price. Displays are perhaps the most attractive promotional device for manufacturers. Like ads, retailers also profit somewhat on the sale of the display itself, as well as benefit from the increase in sales. The price of the displays are shown in Table 1.

There are two limits on displays. First, there's the budget constraint, as discussed above. Second, only one display is allowed in each store at one time. Thus, Kahuna Crunchers and Idaho's Best can not both buy a display in Food Cat for the first period in July. Food Cat must decide which brand to offer the display to. The decision might come down to who will offer the deepest deal or buy the biggest ad, or which brand is otherwise likely to be the most profitable for Food Cat in that period.

Facings. A "schematic" is the actual written plan where products are located in the grocery section (e.g. on which shelf, next to which brand, etc.). In this simulation, only one change in schematic is allowed, and it must occur between the third and fourth periods. All brands begin with two facings on the shelf in all three-grocery retailers.

The total number of facings allocated to the potato chip category is six in all three grocers, and this must remain constant. Thus, in Shelf Wars, facings allocations among the brands in category is a zero-sum game. If and when a grocer changes his/her schematic, the minimum number of facings for a brand is one and the maximum is three.

Available Printouts

Four types of reports are distributed each time period. These include category-level reports of sales volume and market share broken out by manufacturer (available only to manufacturers), the same data broken out by retailer (available only to retailers), individual performance reports specific to each team, and the Store Audit Report. A sample Store Audit Report is shown in Exhibit 1.

The Store Audit Report reveals all the information a company would know

EXHIBIT 1
STORE AUDIT REPORT

Brand	Promo	Grocery City	Save Less	Food Cat
Salty Spuds	Ad	none	B	none
	Display	no	yes	yes
	Program	no	no	yes
Idaho's Best	Price	\$2.19	\$1.99	\$2.19
	Ad	B	none	none
	Display	no	no	no
Kahuna Crunchers	Program	no	no	no
	Price	\$1.99	\$2.09	\$2.09
	Ad	B	none	none
"Outside" Display	Display	no	no	no
	Program	no	no	yes
	Price	\$1.85	\$2.03	\$2.01

by walking into each of the retailers and doing a "store audit," information such as all the shelf prices, advertising levels, and presents or absents of displays. All reports are generated using macros in Lotus 1-2-3.

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In addition, we write an industry newsletter, the *Chip News*, after the third period. The newsletter helps to give the players "the big picture" of how the industry is progressing. Outstanding performances and missed opportunities are also highlighted.

DISCUSSION

There are two fundamental challenges, which make the game interesting. The first is related to strategy, and the second to goals. Strategically, since displays are the most effective promotional option, it behooves the manufacturers to buy displays during peak sales periods. The number of available displays is always limited, however, and so not all manufacturers will get the displays they want. To please the retailers and thus increase their chances of getting the desirable displays, the manufacturers need to buy promotions in off-peak periods as well. How much to buy, when to buy, and what concessions to ask for are all objectively indeterminate; even in isolation the effects of promotions are somewhat uncertain, and in the presence of competition the effects of promotions are much more uncertain. As a result, personal persuasiveness, trust, and occasional competitor intelligence become key success factors.

The picture is further complicated by differences in goals. The retailers are given profit and volume goals, while the manufacturers are given revenue and sales volume goals. Thus, the retailer may be indifferent to the category revenue, and the manufacturer may be indifferent to the retailer's profitability. Successful negotiators must be able to see the negotiation from the other side of the table in order to reach a mutually acceptable contract.

Enhancements

Several enhancements have been explored with this simulation. Some of the most effective involved allowing the players to develop their own promotional materials and programs. Manufacturers were encouraged to design their own end-aisle displays (not life size). These teams submitted reports describing their displays, and how the displays tied into their promotional strategies in general. Several anonymous faculty volunteers then evaluated the display reports, and estimated which would be more effective. These results were made known to all teams, and the weight parameters on the display attributes were modified in the Shelf Wars program (see Technical Appendix, Equation 2). Knowledge of the differences in display effectiveness had a big impact on display price and timing negotiations, and increased student emotional involvement in the simulation as well.

A similar enhancement was implemented with grocer promotional programs. Students were provided with examples of typical grocer programs, and asked to develop their own variations. Again, anonymous faculty volunteer evaluators were used to estimate performance parameters. The effects on price negotiations and student involvement were similar to those with the customized displays.

Another valuable enhancement involved having practitioners available for comment during some of the most intense negotiation periods. The students were often frustrated with the uncertainty in the game, and the practitioners were able to confirm that the real world is no more certain. Through additional student/practitioner discussions of strategy and promotional planning students developed a richer understanding of the industry.

Additional enhancements have yet to be tried. Students often reach high levels of emotional involvement in the game, sometimes too high. Students occasionally become frustrated with tough negotiations, and threaten (and implement!) mutually destructive tactics in retaliation. To help the students understand the importance of long-term cooperation, a brief experiential exercise involving a variation of the prisoners dilemma game might be helpful before the start of the Shelf Wars game. (See, for example, Holden, Harmer and Nagle's [1987, p.44-5J "Win as Much as You Can.")

Conclusion. The Shelf Wars simulation has been successful in getting students excited about channel interactions and developing in them a rich understanding of a specific industry. The enhancements discussed above have increased involvement, and may be applicable to other simulations as well. The participants gain new interest in this area of marketing, and more insight into their own strengths and weaknesses as negotiators.

TECHNICAL APPENDIX: SALES CALCULATIONS

To calculate sales based on contract inputs, a modified additive constant-utility choice model is used (Lilien, Kotler and Moorthy 1992, p.98). The formula for $S_{i,j}$, the sales of brand i in store j , is

$$S_{i,j} = \frac{U_{i,j}}{\sum_i \sum_j U_{i,j}} \cdot \frac{S_0}{U_0} \cdot P \cdot 6 \quad (1)$$

Where $U_{i,j}$ = the utility of brand i in store j (see below)
 S_0 = the base sales volume (a constant)
 U_0 = the base utility (a constant)
 P = the percent of sales in the period (one of 6 periods)

The utility for any one brand, U_{ij} , is determined by

$$U_{i,j} = (1 + \beta_{Pr} Pr + \beta_D D + \beta_{DPr} DPr + \beta_{A} A + \beta_{A} Pr) \cdot U_{i,j,t-1} + \beta_{U_{i,j,t-1}} U_{i,j,t-1} + \beta_{U_{i,j,t-2}} U_{i,j,t-2} + \beta_{S_j} \left(\frac{F}{2}\right)^\lambda \quad (2)$$

Where β_x = the weight on attribute x
 Pr = the price discount
 D = Display (0, 1)
 A = Ad in circular (3, 2, 1, for ad sizes A, B, C, respectively)
 DPr = the interaction between display and price
 APr = the interaction between ad and price
 $U_{i,j,t-1}$ = the utility of this brand in this store in the prior period
 $U_{i,j,t-1}$ = the utility of this brand overall last period
 $U_{i,j,t-2}$ = the utility of this brand overall two periods ago
 k = "kicker" for having the lowest shelf price in the store
 S_j = the size of store j
 F = the number of facings of the brand
 λ = the facings effectiveness coefficient

The β_x parameters differ for each brand, leading to different optimal strategies for each brand. To establish parameters, goals, and promotional budgets equitably (and to be reasonably consistent with the effects shown in Table 2), the simulation was "simulated" using trial values. Macro commands expedited the simulation of the six periods required for each repetition of the game.

REFERENCES

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