

# **THE SOCCER BALL MANUFACTURING GAME: AN EXPERIENTIAL EXERCISE IN MANAGERIAL ACCOUNTING**

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## **INTRODUCTION**

Managerial accounting is a standard requirement for all business students. The students' motivation to learn is often more vocationally-based rather than an intrinsic desire to learn the subject matter (Marriott, 2004). After teaching the subject for two years, we observed that the end-of-semester results on exams relative to key learning objectives could be improved. As an example, students did not appear to consistently demonstrate achievement of learning objectives related to cost-volume-profit analysis.

Research indicates that experiential learning in the form of simulations can have a great impact on student assimilation of knowledge and skills. Learning activities that support the transformation of concrete experiences into abstract concepts are integral in creating new understandings (Kolb, 1999). To improve student learning and retention of key managerial concepts, we developed a simple yet competitive and engaging business game that spans the length of the course. The game is based on a scenario of competitive soccer ball manufacturers producing, marketing and selling their product. The students, either individually or in teams, make only three decisions each business period during the game: price, the amount of money the marketing department will spend, also referred to as marketing spend, and the quantity of units to produce. The focus of the game is on learning managerial accounting, not on business strategy. The use of the game motivates students due to interest in the ongoing results (Thein, 2006). Progressively, as the game has evolved over the last few years, additional cases and more learning applications have been developed. The game is now used as a critical component of the managerial accounting course.

## **THE GAME**

### **Learning Objectives**

The game provides an engaged platform throughout the length of the course for the students in support of key learning objectives (Greenlaw & Wyman 1973). Since this game is designed for managerial accounting, the objectives described by Warren, Reeve & Duchac (2016) were incorporated, including, but not limited to, describing terms, illustrating uses, and preparing reports related to:

- Managerial accounting terms, cost terms, computations, and reports
- Cost-volume-profit analysis including breakeven and target operating levels
- Job order costing
- Variable costing
- Pricing – both short term and long term
- Capital investment decisions
- Cash flow analysis
- Budgeting

### **Game Design and Introduction to the Students**

To enhance learning results, the game was designed to meet the objectives for a college-level course on Managerial Accounting. The game was designed to use a simple product, in this case a soccer ball, to illustrate how ongoing decisions are based on previous information and continue to impact future results. The game simulates the real world context, providing authenticity to the exercise (NSEE Annual Meeting, 1988). After the initial overview and orientation to the class, the students are introduced to the structure and purpose of the game and how it will be used throughout the course to help them gain understanding.

The game is played for a duration of several weeks within the term of the class, divided into 6-12 periods as appropriate to the course design. The game starts with each company at the same financial and marketing position. Each company is controlled by either a student or a team of students, based on the size of the class and the desire to include effective teaming as a course objective. For each period, a company must choose three input variables for the next period:

- the soccer ball price to the customer
- the number of soccer balls to be manufactured
- the amount of marketing spend.

At the beginning of each period, students or teams are provided with a current spreadsheet with the calculated number of units sold by the company based on previous units sold (assuming some customer loyalty), relative price, and relative marketing spend. All other company results are a function of the units sold, the three input variables, and the previous period's results. The current game design is "zero-sum": the overall market for soccer balls is fixed and must be shared among the competitors. In order to bring some reality to the game and avoid spreadsheet calculation challenges, there are parameters controlling the choices:

- Each choice has limits (such as the soccer balls manufactured must be in the current production relevant range of between 1 and 200,000)
- The company has limited borrowing capacity
- Inventory must be produced if it is to be sold
- The price change per period is limited (assuming existing customers would not tolerate large and unpredictable price swings).

An example is provided in Table 1 below, and a complete game extract is available in Exhibit A

Table 1: The Soccer Ball Manufacturing Game - extract showing two competitors					
		Period 3		Miami	Raleigh
Current period decisions:					
		Units manufactured	(1 to 200,000)	50,000	110,000
		Price	(\$1.00 to \$19.00)	\$ 1.00	\$ 11.00
		Marketing to spend	(0 to \$1,000,000)	\$ 80,000	\$ 200,000
Results: key performance indicators for the period based on your decisions:					
		Units sold		83,342	114,656
		Market share		10.4%	14.3%
		Ending inventory in units		68,399	95,305
		Sales in dollars		\$ 916,759	\$ 1,261,219
		Net income in dollars		\$ 127,685	\$ 167,136

Through experiential learning, in addition to specific game cases, the game should promote learning through the business results of decisions made and extrapolating, from the game's application, the value in understanding managerial accounting and analysis (NSEE Annual Meeting, 1988). The student's course grade is partially dependent upon the student's responses to cases related to the game and other required game analysis and reflection. The performance of the student's company, relative to the other companies, has no impact on the students' course grade.

### Game Execution

A game normally starts with a dissection of an inflated soccer ball to get the students' attention and, with the dissected sections, to explain the manufacturing of soccer balls. Thereafter, with student inputs, the game is run over about twelve periods each course; the students get to see the results of their decisions of others with a comparative report of all companies' performance at the end of each period. Purposefully, the students are asked to provide input for the early periods without having any significant managerial accounting tools to help them make good decisions. These early periods tend to trouble some students, who expect there is some "right" answer or input. For early decisions that would lead to significant and long term negative consequences, the students are coached to reconsider their choices.

During the course semester, cases or questions are assigned related to one of the learning objectives noted previously. Three examples are described below.

Short term pricing: You have been approached by a European retailer who is interested in a special order of soccer balls. You can assume that any sales to this European retailer will have no impact on your US sales or your competition. You can also ignore all shipping, customs, and tax implications.

The retailer wants to buy 20,000 soccer balls in period 8. The soccer balls will be like all your other soccer balls except the direct materials will cost \$1 more per ball due to the requirement to silk-screen the retailer's logo on each ball.

1. Calculate your estimate of the total cost of the 20,000 soccer ball job, including a reasonable allocation of factory overhead.
2. What is the minimum price you would accept for the order of 20,000 soccer balls? Why?

Long term pricing: Bigmart has been a minor customer of yours for the last few years. They have been responsible for about 10% of your sales in units. You are certain that they are also buying comparable soccer balls from some of your competition. Bigmart has approached you and two of your competitors (you don't know which two) and has requested a price quote – to be good for two years – and they will commit to buy a total of 2,500,000 to 3,600,000 soccer balls over the next two years – assuming yours is the best price. At this point, there are no product differentiations other than price (that is, you can't promise a better product, more support, or more advertising). And you should assume that the Bigmart order (if you get it) will be incremental to your current expectation of unit sales to other customers.

1. What is your bid per soccer ball?
2. Why did you choose that price?
3. Provide some analysis as to the incremental revenue and costs, including the potential of additional fixed costs.

Capital investment decision: Decide whether or not you should buy a robotic stitching machine for your soccer ball company based on capital investment analyses. An inventor has shown you her robotic machine that can stitch the interior of the soccer balls you're manufacturing. If you were to acquire the machine, you would be able to lower your direct labor cost per soccer ball manufactured from \$1 per ball to \$.50 per ball. The machine will last both physically and technologically four years. You expect that, at the end of four years, the machine will be obsolete and have no value. The inventor has offered to sell you the machine for \$\_\_\_\_\_. As a part of the purchase price, she has committed to maintain the machine for its useful life. The machine's electricity usage and other operating costs are insignificant. Your local bank has offered to lend you the money to purchase the machine. The interest rate for this long term loan is 8%. Of course, you may be able to use any excess cash for part of the purchase as well. For purposes of this analysis, you can 1) assume the labor savings occur at the end of each of the next four years, and 2) disregard any income tax implications. What is your decision? Why? Consider both quantitative and qualitative aspects of your decision.

In addition to those cases above and those in the appendix related to the primary learning objectives, the following game related questions are also considered for group discussion or individual response:

- How would manufacturing cost standards be applied to your company's operations?
- Which company performed best? How did you reach your conclusion?
- How would you compute the market value of your company?
- What one period's set of inputs would you change? Why?

### **STUDENT FEEDBACK**

At the end of the game, and consistent with Institutional Review Board standards, the students provided feedback about the game through reflection, testing, and focus groups. Student feedback was gathered from three different classes. Feedback from those students that have used the game (gathered through surveys and focus groups) produced the following information:

- Of 45 game participants, 32 strongly agree and 11 agree the game should be used in future managerial accounting classes (see student reaction data in Table 2)
- The students considered the game cases and related assignments were somewhat more helpful in their learning than the exercises from the textbook
- Student engagement in the course was clearly enhanced from the use of this competitive game. This enhanced engagement has been noted in other such applications (Marriott, 2004).
- The use of the game enhanced the integration of various other business concepts (Zeigler, 2015)
- Representative anecdotal feedback from students gathered at focus groups include:
  - "Learning from seeing the "live" numbers were very helpful; you could see how decisions played out."
  - "Without the game, I probably wouldn't have learned anything. It helped because it gave me a real life aspect to accounting."
  - "The game was helpful because there was no right or wrong answer -- you had to think and analyze."

Table 2: Student Reaction Data

1. Responding to the Game questions helped me learn accounting concepts.

Disagree	No opinion	Agree	Strongly agree	Average
1	1	23	20	4.38

2. Doing the assigned exercises from the text helped me learn accounting concepts.

Disagree	No opinion	Agree	Strongly agree	Average
3	1	27	14	4.15

3. I recommend the Game be used in future management accounting classes.

Disagree	No opinion	Agree	Strongly agree	Average
0	2	11	32	4.67

## CONCLUSIONS

The long term goal is to objectively determine if enhanced learning actually results from the game. Though students indicate that they feel their learning experience was enhanced, a control group of students, without the use of the game, has yet to be run. In executing the game, we encountered some unexpected benefits. First, the students learned how brutal business competition can be, providing an authentic early experience of the real world (NSEE). Second, when teams were used instead of individuals, the value of good teamwork and communications showed up in the results and therefore, to the class. Finally, having the entire class engaged in the game, and in the current status of the game, provided an ongoing and interesting platform to clearly illustrate any managerial accounting concepts encountered during the class lectures and one-on-one student conversations. This provided monitoring and continuous improvement of the learning experience throughout the course (NSEE Annual Meeting, 1988). In essence, all of the students and the instructor were “on the same page” as we dealt with various new material.

To create more student interest, the game’s simplicity and flexibility will be leveraged for more opportunities beyond those that have been discussed, such as 1) making unexpected changes to the game’s parameters, during the game’s execution, or 2) building more teaming exercises. We will continue the use of the game, primarily, because of the evidence of greater student engagement, with an understanding that greater engagement supports greater learning (Taylor, 2016), especially over time (Specht, 1991).

## REFERENCES

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Exhibit A – Game Extract						
The Soccer Ball Manufacturing Game - extract with 3 competitors						
ACCT 2020	Period 3	Company:	Miami	Raleigh	Orlando	
<b>Current period decisions:</b>						
	Units manufactured	(1 to 200,000)	50,000	110,000	15,000	
	Price	(\$1.00 to \$19.00)	\$ 11.00	\$ 11.00	\$ 10.00	
	Marketing to spend	(0 to \$1,000,000)	\$ 80,000	\$ 200,000	\$ 50,000	
Limitations: 1) Debt must stay below \$600,000, 2) you can't sell inventory you don't have,						
and 3) your price change each period must be less than \$2						
<b>Results: key performance indicators for the period based on your decisions:</b>						
	Units sold		83,342	114,656	80,007	
	Market share		10.4%	14.3%	10.0%	
	Ending inventory in units		68,399	95,305	68,387	
	Sales in dollars		\$ 916,759	\$ ,261,219	\$ 800,071	
	Net income in dollars		\$ 127,685	\$ 167,136	\$ 51,676	
<b>Balance sheet:</b>						
	Assets: Cash		\$ 387,260	\$ 287,111	\$ 343,755	
	Inventory		431,816	565,129	442,664	
	Total assets		\$ 819,076	\$ 852,240	\$ 786,420	
	Liabilities- Debt		0	0	0	

	Shareholders' equity		\$ 550,000	\$ 550,000	\$ 550,000
	Earnings to date		<u>269,076</u>	<u>302,240</u>	<u>236,420</u>
	Total liabilities and equity		<u>\$ 819,076</u>	<u>\$ 852,240</u>	<u>\$ 786,420</u>
		<b>Company:</b>	<b>Miami</b>	<b>Raleigh</b>	<b>Orlando</b>
<b>Income statement (per GAAP)</b>					
	Sales		\$ 916,759	\$ 261,219	\$ 800,071
	Cost of goods sold at average cost		526,149	679,877	517,880
	Gross margin		390,610	581,342	282,192
	Sales commissions		83,342	114,656	80,007
	Marketing expense		80,000	200,000	50,000
	Administrative expense		100,000	100,000	100,000
	Interest revenue ( - = expense)		<u>417</u>	<u>450</u>	<u>(508)</u>
	Net income		<u>\$ 127,685</u>	<u>\$ 167,136</u>	<u>\$ 51,676</u>
<b>Variable costing income statement</b>					
	Sales		\$ 916,759	\$ 1,261,219	\$ 800,071
	Variable cost of goods sold:				
	Direct materials @\$4/unit		333,367	458,625	320,028
	Direct labor @\$1/unit		<u>83,342</u>	<u>114,656</u>	<u>80,007</u>
	Manufacturing margin		500,050	687,938	400,036
	Variable sales commissions @\$1/unit		<u>83,342</u>	<u>114,656</u>	<u>80,007</u>
	Contribution margin		416,709	573,281	320,028
	Contribution margin %		45%	45%	40%
	Fixed costs:				
	Fixed (and indirect) factory overhead		100,000	100,000	100,000
	Fixed administrative costs		100,000	100,000	100,000
	Fixed (for this period) marketing costs		<u>80,000</u>	<u>200,000</u>	<u>50,000</u>
	Total fixed costs for period		<u>280,000</u>	<u>400,000</u>	<u>250,000</u>
	Income from operations		136,709	173,281	70,028
	Interest revenue (-expense)		<u>417</u>	<u>450</u>	<u>(508)</u>
	Income - using variable costing		<u>\$ 137,126</u>	<u>\$ 173,732</u>	<u>\$ 69,520</u>
		<b>Company:</b>	<b>Miami</b>	<b>Raleigh</b>	<b>Orlando</b>
<b>Statement of cash flows</b>					
	Collections from customers		\$ 916,759	\$ 1,261,219	\$ 800,071
	Paid for direct materials		\$ (200,000)	\$ (440,000)	\$ (60,000)

	Paid for direct labor		\$ (50,000)	\$ (110,000)	\$ (15,000)
	Paid for factory overhead		\$ (100,000)	\$ (100,000)	\$ (100,000)
	Paid for sales commissions		\$ (83,342)	\$ (114,656)	\$ (80,007)
	Paid for marketing costs		\$ (80,000)	\$ (200,000)	\$ (50,000)
	Paid for administrative costs		\$ (100,000)	\$ (100,000)	\$ (100,000)
	Received as interest revenue (- paid expense)		\$ 417	\$ 450	\$ (508)
	Cash produced (- used)		\$ 303,834	\$ 197,013	\$ 394,556
<b>Calculation of average inventory cost:</b>					
<b>Costs:</b>	of beginning inventory		\$ 607,965	\$ 595,006	\$ 785,544
	direct materials in new manufacturing		200,000	440,000	60,000
	direct labor in new manufacturing		50,000	110,000	15,000
	fixed factory overhead in new manufacturing		100,000	100,000	100,000
	Total costs		\$ 957,965	\$ 1,245,006	\$ 960,544
<b>Units:</b>	of beginning inventory		101,741	99,961	133,394
	of new manufacturing		50,000	110,000	15,000
	Total units		151,741	209,961	148,394
	<b>Average cost per unit</b>		\$ 6.31	\$ 5.93	\$ 6.47
<b>PREVIOUS period information:</b>					
	Units sold		103,259	110,039	91,606
	Units in inventory		101,741	99,961	133,394
	Balance sheet:				
	Assets: Cash		\$ 83,426	\$ 90,098	\$ -
	Inventory		607,965	595,006	785,544
	Liabilities- Debt		-	-	50,801
	Shareholders' equity-previous year		550,000	550,000	550,000
	Earnings to date		141,391	135,104	184,743