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## **INSTRUCTIONAL CASE: A MANUFACTURING PROJECT**

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### **ABSTRACT**

Colleges and universities frequently require business majors to take managerial accounting. Since many non-accounting majors find accounting boring this may be one of the reasons why they may have a difficult time learning the fundamental concepts of the course. This paper describes a project I employ when teaching managerial accounting to make cost accounting interesting and relevant. One of the reasons students may have a difficult time learning managerial accounting is that traditional accounting assignments generally provide students with all of the numbers. Thus, there is very little involvement or attachment to the numbers. This project was designed to get students involved with the numbers by simulating a real-world manufacturing process that they can understand and replicate. Since the students are active participants in making the product (Treats), the financial numbers they work with should have more meaning and relevance than in a traditional assignment.

This project requires students to obtain all of the ingredients in order to manufacture a variety of Rice Krispie Treats. After manufacturing the product, students then calculate their labor and materials costs. In time, since they will make the product several times, they can then compute and evaluate variance reports. In addition, this project requires students to learn how to benchmark their product against their fellow students'. Furthermore, students who participate in these assignments also end up preparing cost budgets and how to work in an environment that encourages continuous improvement.

Overall, this project provides students with a hands-on activity that helps them to understand and apply fundamental cost accounting techniques to everyday business activities. This project has been successful because, unlike regular managerial accounting assignments, the accounting numbers in this case have meaning to students since they created the numbers by actually shopping for the materials and manufacturing the product(s) themselves. The paper is divided into three parts. The first part provides an introduction to and an overview of the assignments. The second part represents the actual assignments given to the students. The third part provides the teaching notes to help provide the instructor with the necessary insight into the purpose of each assignment.

## I. INTRODUCTION

Colleges and universities frequently require business majors to take managerial accounting. Since many non-accounting majors find accounting boring this may be one of the reasons why they may have a difficult time learning the fundamental concepts of the course. This paper describes a project I employ when teaching managerial accounting to make cost accounting more interesting and relevant. One of the reasons students may have a difficult time learning managerial accounting is that traditional accounting assignments generally provide students with all of the numbers. Thus, there is very little involvement or attachment to the numbers. This project was designed to get students involved with the numbers by simulating a real-world manufacturing process that they can understand and replicate. Since the students are active participants in making the product (Treats), the financial numbers they work with should have more meaning and relevance than in a traditional assignment.

Since 1941, Rice Krispie Treats have been a favorite snack of Americans and people around the world. This product is easy to prepare and inexpensive to make. Students are formed into teams of two to three people; groups larger than three are ineffective because the Treats only take about 15 minutes to make. The project has five separate parts that students perform every two to three weeks during the semester. Although teams work together to produce the product, students are required to turn in their own individual assignments and analysis. While they can share the same financial data, their written report and interpretation must be their own. This solves the problem of students' loafing and/or receiving a grade for work they did not earn.

The assignments require students to shop for and obtain the necessary ingredients to manufacture Rice Krispie Treats. During the process of shopping and manufacturing, students prepare budgets and analyze variance reports based on their actual effort. After each manufacturing assignment, students are required to submit a variance and/or a budget report. Each of these different reporting assignments is designed to help students understand key terminology along with learning how to analyze and use variance reports in order to reduce costs and improve quality. Overall, this project has been a great success in the classroom. Past students continually ask if I am continuing to use this assignment in the classroom. This educator believes that when students relate to the numbers through active participation, they may have a greater chance of understanding the appropriate accounting terminology and calculations.

## II. STUDENT ASSIGNMENTS

### 1. ASSIGNMENT 1: BASIC RECIPE

Management Speech: Congratulations on becoming a management trainee for the Super Duper Treat Company. We at Super Duper are glad that you have chosen our company to start your promising management career. Your first assignment requires you to make a batch of our popular Treats according to the same basic recipe that has been handed down since 1941. The basic recipe can be found on most boxes of Kellogg's Rice Krispies or at [www.treatsrecipes.com](http://www.treatsrecipes.com).

Required: The first assignment requires you to determine your primary costs (direct labor and direct materials) for making the basic recipe for the first time. Please keep track of the time spent performing each of the production steps. The production steps for this assignment are: acquisition, melting, mixing, spreading, cutting, wrapping, and cleaning. In addition to keeping track of your time to perform each of these stages of production, please keep track of your materials costs (direct and indirect). It is also your responsibility to determine the hourly pay for each of the employees working at each production step.

Review the format used in Exhibit 1 for an acceptable way to present your time and cost figures. After you have completed this assignment, be sure to turn it in to your supervisor (instructor) for review.

### EXHIBIT 1: TIME AND DIRECT MATERIALS REPORT

#### TIME REPORT FOR ASSIGNMENT ONE:

STEPS:					
DIRECT LABOR		TIME (MIN)		WAGES PER HOUR	TOTAL COSTS
ACQUISITION		30		\$5.15	\$2.58
MELTING		5		\$5.25	\$0.44
MIXING		3		\$5.25	\$0.26
SPREADING		2		\$5.50	\$0.18
CUTTING		5		\$5.50	\$0.46
WRAPPING		5		\$6.00	\$0.50
CLEANING		5		\$5.15	\$0.43
TOTAL LABOR		55			\$4.85

**DIRECT MATERIALS REPORT:**

	AMOUNT IN PACKAGE	COST PER PACKAGE	AMOUNT USED	TOTAL MATERIAL COST
DIRECT MATERIALS				
MARGARINE	24 TBS	0.64	3 TBS	0.08
MARSHMALLOWS	10.50 OZ	0.90	10.50 OZ	0.90
RICE KRISPIES	9 CUPS	3.00	6 CUPS	2.00
	TOTAL DIRECT	MATERIALS		\$2.98
		TOTAL	PRIMARY	\$7.93

**2. ASSIGNMENT 2: BASIC RECIPE AGAIN**

Management Speech: We at Super Duper realize that it takes time to learn how to create a high-quality product. Therefore, in order to improve your efficiency and effectiveness, you will make the Treats a second time according to the basic instructions. We anticipate that you will improve both your production time and the quality of the Treats.

Required: As you make the product for a second time, please keep track of your time for each of the production steps (Same steps as in Assignment One) and compile your report according to Exhibit 1. Using the information from Assignment One and Two, complete the variance report for labor according to the example in Exhibit 2. Ask the instructor if he or she would like this same analysis for the materials costs.

**EXHIBIT 2: DIRECT LABOR VARIANCE REPORT****TIME REPORT FOR LABOR (ASSIGNMENT TWO):**

STEPS:				
DIRECT LABOR	TIME (MIN)		WAGES PER HOUR	TOTAL COSTS
ACQUISITION	22		\$5.15	\$1.89
MELTING	4		\$5.25	\$0.35
MIXING	3		\$5.25	\$0.26
SPREADING	2		\$5.50	\$0.16
CUTTING	4		\$5.50	\$0.37
WRAPPING	4		\$6.00	\$0.40
CLEANING	5		\$5.15	\$0.43
TOTAL LABOR	44			\$3.88
	DECREASE	IN	LABOR COSTS	\$ .97

## EXHIBIT 2 CON'T - ALTERNATIVE WAY TO PRESENT DECREASE IN LABOR COSTS

STEPS:	* CHANGE IN			CHANGE IN
DIRECT LABOR	TIME (MIN)		WAGES PER HOUR	LABOR COSTS
ACQUISITION	-8		\$5.15	-0.69
MELTING	-1		\$5.25	-0.09
MIXING	0		\$5.25	0.00
SPREADING	0		\$5.50	0.00
CUTTING	-1		\$5.50	-0.09
WRAPPING	-1		\$6.00	-0.10
CLEANING	0		\$5.15	0.00
VARIANCE	-11			-0.97

\*THE CHANGE IN TIME WAS COMPUTED BY TAKING THE DIFFERENCE IN TIME FOR DIRECT LABOR FROM ASSIGNMENT ONE AND ASSIGNMENT TWO. A NEGATIVE FIGURE REPRESENTS A FAVORABLE VARIANCE.

Benchmarking and consumer tastes tests are an important tool used by many companies to compare, analyze, and improve their product line. Therefore, please taste test each of the Treats made by the other groups in this class and have them do the same with your product. Each person in the class should rate the other groups' Treats according to the qualities of taste, texture, crispiness, freshness, and appearance. Please use a 5-point Likert Scale (1-very bad, 2-bad, 3-no opinion, 4-good, 5-very good). In addition, write down additional comments in the second grid. Give your taste test results to the appropriate teams. Evaluate the quality of your product to the other groups by using the form in Exhibit 3.

Please note that in the real world, benchmarking and standard costing figures will be generated from the past experience after a lot of production runs and not just from one production run as we are using in this class assignment.

### EXHIBIT 3: BENCHMARKING NUMERICAL REPORT

FOOD QUALITIES	YOUR GROUP	GROUP 1	GROUP 2	GROUP 3	GROUP 4
TASTE	1	2	5	3	3
TEXTURE	2	2	5	1	3
CRISPINESS	1	4	4	5	5
FRESHNESS	4	4	3	4	5
APPEARANCE	5	3	5	4	2

**RATING SYSTEM:**

1. Very Unsatisfactory
2. Unsatisfactory
3. No Opinion
4. Satisfactory
5. Very Satisfactory

**BENCHMARKING COMMENTS REPORT:**

FOOD QUALITIES		YOUR GROUP	GROUP 1	GROUP 2	GROUP 3	GROUP 4
TASTE		TASTELESS	RUBBERY	WONDERFUL	GOOD	BLAND
TEXTURE		GREASY	HARD	FANTASTIC	GOOEY	TOUGH
CRISPINESS		NOT	SNAPPY	GOOD	CRUNCHY	EXCELLENT
FRESHNESS		FRESH	VERY	SO SO	ALIVE	PLEASANT
APPEARANCE		EXCELLENT	ADEQUATE	BRIGHT	RADIANT	UGLY

**3. ASSIGNMENT 3: USING CHEAP INGREDIENTS**

Management Speech: Andrew Carnegie spent a lifetime searching for lower and lower production costs when he owned U. S. Steel. We at Super Duper Treat strive to obtain the best possible quality for the lowest amount of money. However, we will never sacrifice quality in order to save money. The main goal of this assignment is to search for the lowest cost merchandise available and determine whether or not quality was sacrificed in the process of saving money. Overall, the purpose of this assignment is to show that just because you can reduce your costs and create a favorable cost variance does not mean that it is a good thing if taste is compromised.

Required: Prepare the same basic recipe as in Assignment One and Two. This time, search for the least expensive ingredients available. Perform the same variance report as you did in assignment 2 (Exhibit 2). In addition, have the other groups taste test your product and complete a benchmarking report for you (Exhibit 3). Taste test the product yourself and use the format in Exhibit 3 to compare your product to the other teams'. Analyze the results to determine whether or not the quality of the product has been compromised. In addition, compile your evaluation of your product in

assignment two and three to see whether or not you had a significant loss of quality (See Exhibit 4).

#### **EXHIBIT 4: FEEDBACK ANALYSIS REPORT**

THIS REPORT IS USED TO COMPARE TWO OR MORE FEEDBACK REPORTS TO REVIEW PROGRESS OR LACK OF PROGRESS OVER TIME.

FOOD QUALITIES	ASSIGNMENT 2	ASSIGNMENT 3	DIFFERENCE
TASTE	1	3	2
TEXTURE	2	5	3
CRISPINESS	1	3	2
FRESHNESS	4	5	1
APPEARANCE	5	5	0

#### **RATING SYSTEM:**

1. VERY UNSATISFACTORY
2. UNSATISFACTORY
3. NO OPINION
4. SATISFACTORY
5. VERY SATISFACTORY

#### **REMARKS:**

OVERALL, THIS PRODUCT IMPROVED IMMENSELY

#### **4. ASSIGNMENT 4: INNOVATION**

Management Speech: The Company is always looking for new products and we encourage experimentation and will consider all reasonable new ideas in searching for new products. The purpose of this assignment is to create a new product and to learn how to prepare a budget for this new product.



Required: Create a new product. Prior to actually making your first prototype, please prepare a tentative budget for direct materials and direct costs similar to Exhibit

1. After making the product, prepare a budget-variance report similar to Exhibit
2. The comparison will be between your budget and the actual costs to produce that product.

## **5. ASSIGNMENT 5: CONTEST**

Management Speech: The Company is having a contest to determine what our next, new product will be. The only requirement is that 50 percent of the materials must come from cereal. You may want to look at the worldwide web page of the Kellogg's Company to see their wide variety of different recipes. ([www.treatsrecipes.com](http://www.treatsrecipes.com)). Judges will be brought in to taste test and determine the winner.

Required: Make a new product using at least 50 percent of the final product coming from our cereal. The main thing that will be evaluated is the taste. Thus, before introducing the new product, you may want to taste test the product and then compare the results with those of the judges (Exhibit 3).

### **III. TEACHING NOTES**

Overall, the learning objectives are as follows:

- Learn how to calculate variances
- Understand the manufacturing production process
- Learn how to use benchmarking to improve a product
- Learn how create and evaluate variance reports
- Learn how to use accounting numbers to ensure quality control
- Learn how to innovate and prepare a budget for new products

Overall, this project simulates the real-world production and cost accounting issues within the classroom. Student feedback has been positive, as students really enjoy working with and getting to know the other students in the class, especially since their teammates do not affect their project grade. While students work together and are permitted to share the same data, their report must be their own. This eliminates the problem of freeloading on someone else's work.

Students enjoy tasting the other products (benchmarking) and evaluating how good their product is compared with the other teams'. One problem though is that students do get somewhat tired of tasting the same Treats over and over again. That is why the new products are introduced in Assignments 4 and 5. Students also get excited discussing the bad products (some can taste like styrofoam) as well as the good ones. The project assignments can be expanded and changed to include a wide variety of products. The Kellogg's Company has a web page dedicated to all of the recipes that people can make. The web address is [www.treatsrecipes.com](http://www.treatsrecipes.com).

This hands-on project reinforces the key themes taught in a traditional managerial accounting class. The variety of assignments based on an easily learned baking process helps the students better understand Kaizen or continuous improvement more than any lecture I could give. I believe that this project is especially useful for business students, who may not be accounting majors, but who are required to take accounting classes.

## **1. BEFORE ASSIGNMENT 1**

Prior to actually starting this project, have the class read the recipe and the production steps listed on the cereal box. While the basic recipe indicates three production steps (melting, mixing, and spreading), discuss with the class the other possibilities. In my classes, the production steps have been expanded to include the following stages: acquisition, melting, mixing, spreading, cutting, packaging, and cleaning up. Explain to the class that they will be keeping track of the amount of time it takes to complete each of the agreed upon manufacturing steps.

After agreeing upon the standard production steps with the class, discuss with them the meaning of direct materials and direct labor (overhead is discussed in a later assignment). After looking at the basic ingredients list (margarine, marshmallows, Rice Krispies, and vegetable cooking spray) the class will generally understand that the first three ingredients appear to be direct materials. They are not always sure about the cooking spray. After some discussion, they should come to understand that cooking spray is an indirect material, and will be included as overhead, which will be discussed later in the semester.

## **2. ASSIGNMENT 1**

For the first assignment, I generally do not prescribe the "correct" reporting format to be used by students. I want them to realize that each company will record their managerial accounting information differently. The first assignment should look somewhat similar to Exhibit 1. Only after they have handed in their first assignment do I show them Exhibit 1. That way they can learn from their mistakes. I have found

that students remember the “better” way to do things when they have first been left to their own devices.

Remind students that each production division generally pays different wages within a firm based on the duties performed and that all employees’ wages should meet or exceed the minimum wage for each production division. Students should learn several things from the first phase. First, they should learn that accounting information takes time and money to gather and record. The more detailed the information needed, the more time, and hence cost involved in gathering and communicating the results. Second, students should learn that managerial records are not as structured as financial accounting records are, and they must be flexible in designing their own managerial accounting schedules.

### **3. ASSIGNMENT 2**

This assignment makes it easy to introduce the subject of variance. Students should manufacture the Treats much faster this time. Thus, when they complete the forms in Exhibit 2, they should end up with a favorable time variance. The second assignment requires students to compare the actual direct labor times and direct labor costs between Assignment 1 and 2 (Exhibit 2). When asked for the reasons for the improved times, most students indicate that a lack of communication between team members contributed to their relatively slow work in Assignment 1.

In order to teach the topic of “benchmarking” students are asked to sample each of the other teams’ products. Students evaluate the other teams’ products for such factors as taste, appearance, freshness, crispiness, and/or cheesiness. Remind the students that it is common business practice for a company to purchase a competitor’s product in order to evaluate the competitor’s product against their own product(s).

Since management accounting is less structured than financial accounting, give the students a second chance to resubmit their assignments. For example, during the semester, students turn in the required assignments to me. Corrections are made and the work is handed back without a grade. I inform them that they can turn in all five corrected assignments at the end of the semester for a grade. I do this in order to teach the students that in the “real” world, they don’t get a grade for an assignment, but they may get the work back to correct.

### **4. ASSIGNMENT 3**

The purpose of this assignment is to illustrate to the students the problems that can be associated with a “favorable” variance. While many firms emphasize obtaining a favorable variance, this assignment helps students understand that favorable variances

can be manipulated by using lower quality materials, but they may end up tasting worse than the original. Thus, if corporate management applies too much pressure on employees to lower costs, employees might comply by reducing the quality of materials, which could easily decrease sales.

This is a good time to discuss standard costs with the class and the negative impact that a lack of quality can have on sales. The class should be informed that unless standards are reasonable or developed to ensure quality, a firm could have employees meeting the company's standards by violating the customers' desire for quality and consistency. One department's lack of meaningful standards can cause customers to go elsewhere, thus lowering the marketing department's figures. Thus, one division's favorable variance could be the sales departments negative variance.

Explain to your students that since "variances" cannot predict quality, a firm should not base the evaluation of a division's "success" solely on one evaluation measurement. Students need to be aware that the manufacturing division affects the sales divisions. While students may obtain a favorable report for their division by obtaining the cheapest ingredients and materials, they may also be ensuring an "unfavorable" variance for the sales division, thus hurting the company's chances of survival.

For this assignment, students should complete a benchmarking report to each team after tasting the other teams' products. This feedback will help students to understand that cost savings are not acceptable if they result in a significant unfavorable taste difference. Some of the results for Assignment 3 have been amazing. Frequently, students purchase items on sale without sacrificing quality. One group accidentally discovered the formula for Styrofoam.

## **5. BETWEEN ASSIGNMENTS 3 & 4**

Prior to Phase 4, discuss with the class how to handle overhead costs. Discuss this topic in conjunction with similar chapter material. By this time, the students should have a good grasp of direct materials and direct labor. Remind the class how difficult it is to determine exactly how many vegetables sprays each person will use during the production process. Other overhead topics should include such items as insurance, electricity, rent, depreciation, etc. The form in Exhibit 5 could be used as one way to compute the total cost of the product.

Plan to spend some time instructing the class on how to allocate fixed assets costs. Students need to be aware that the allocation process is not an exact science, and the actual contribution of each fixed asset to the cost of a company's product is difficult to determine. At this point, the class should be given some estimated costs

for each of the overhead accounts. The class should then calculate an agreed upon overhead rate to use. Thus, Assignment 4 and 5 should include overhead allocation costs in their reports. Furthermore, activity-based costing could be introduced as one of the alternative ways to allocate overhead costs. Exhibit 5 is one way that this assignment could be completed.

### EXHIBIT 5: TOTAL PRODUCTION COSTS INCLUDING OVERHEAD

#### TIME REPORT FOR ASSIGNMENT ONE:

#### TOTAL LABOR COSTS:

STEPS:					
DIRECT LABOR		TIME (MIN)		WAGES PER HOUR	TOTAL COSTS
ACQUISITION		30		\$5.15	\$2.58
MELTING		5		\$5.25	\$0.44
MIXING		3		\$5.25	\$0.26
SPREADING		2		\$5.50	\$0.18
CUTTING		5		\$5.50	\$0.46
WRAPPING		5		\$6.00	\$0.50
CLEANING		5		\$5.15	\$0.43
TOTAL LABOR		55			\$4.85

#### DIRECT MATERIALS COSTS:

		AMOUNT	COST PER	AMOUNT		TOTAL MATERIAL
		IN PACKAGE	PACKAGE	USED		COST
DIRECT MATERIALS						
MARGARINE		24 TBS	0.64	3 TBS		0.08
MARSHMALLOWS		10.50 OZ	0.90	10.50 OZ		0.90
RICE KRISPIES		9 CUPS	3.00	6 CUPS		2.00
		TOTAL DIRECT	MATERIALS			\$2.98

## OVERHEAD AND TOTAL PRODUCTION COSTS

TOTAL OVERHEAD	COMPUTED	AT 40% OF	LABOR	\$2.33
TOTAL PRODUCTION	COSTS			\$10.16

### 6. ASSIGNMENT 4

For the fourth assignment of the project, students create a new twist on the Treats. This phase encourages students to try to create a “new” product. After determining the “new” product, students are required to prepare estimated budgets for their prototypes prior to actually making the product. This helps them deal with the difficulties and uncertainties of establishing a budget for a new product line and also gives the students another look at a variance report since they are required to compare their budget to the actual costs to create the new product.

The most difficult part of this assignment is trying to anticipate whether or not the established standard labor times or costs of material for the previous assignments can be used to determine the new standard costs of labor and material for the new product. Thus, students learn the difficulties of estimating costs in advance and the need to have budgets that are fair, flexible, and reasonable. This also holds true for standards. Standards that are not fair, flexible, and reasonable are not standards and will, therefore, be ignored by the employees manufacturing the product. After completing the new product, students then compare their budgeted costs to the actual costs and make some reassessments.

### 7. ASSIGNMENT 5

For the final phase, each group prepares a new product to be entered into a contest. The only proviso is that at least 50 percent of the product must be cereal. In most cases students will continue to use the Rice Krispies. At the conclusion of this phase, judges are brought in to taste test and announce the winner. Finding judges is easy when you inform people that there will be free food. Winners do not receive a higher grade, just recognition and applause from their fellow classmates. For some reason, the judges have tended to like products that have chocolate in them.

Overall the total costs to any one student are minimal. Typically, these costs should not exceed \$10 to 15 dollars during the semester -- a small price to pay for the lessons learned.