

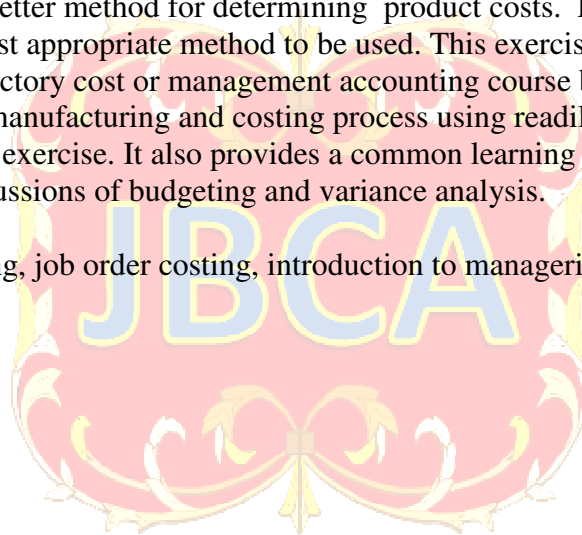
Using a hands-on exercise to teach cost accounting concepts

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The Accounting Education Change Commission has emphasized the need for students to be active participants in the learning process. This paper describes an active-learning exercise that provides a familiar and fun setting to serve as a backdrop for explaining basic cost accounting concepts. The exercise simulates a manufacturing process where two products are produced by teams of students. Student teams then identify costs, classify costs and experience the process of determining product cost. First, students cost products using a method used by the company. Later, students are challenged to develop a better method for determining product costs. Finally, students must advocate for the most appropriate method to be used. This exercise is a useful contribution to an introductory cost or management accounting course because it provides a clear, simple manufacturing and costing process using readily available office materials to complete the exercise. It also provides a common learning experience on which to base future discussions of budgeting and variance analysis.

Keywords: product costing, job order costing, introduction to managerial accounting



INTRODUCTION

Many students perceive cost accounting topics to be difficult to comprehend (Lightbody, 1995, Haskins and Crum, 1985). This is due, in part, to the fact that most students have not worked in a manufacturing environment and have difficulty relating to textbook manufacturing-centered examples and problems. In 1990, the Accounting Education Change Commission (AECC) stated that “Students must be active participants in the learning process, not passive recipients of information...Learning by doing should be emphasized” (AECC, 1990, p. 307). Accounting educators have addressed this issue through the creation of “active-based” learning exercises (Burns and Mills, 1997; Lightbody, 1997).

This paper describes a hands-on learning exercise using a simplistic manufacturing process that can easily be implemented in a traditional classroom. The exercise is designed as an aid to teaching basic product cost concepts by illustrating the concepts of cost classification, the assignment of overhead costs, and the calculation of product cost for inventory purposes using job order costing. Engaging students in the manufacturing process allows students to develop a deeper understanding of the various cost elements as well as an opportunity to self-discover the complexities of cost allocation. In addition, the exercise allows for a common class experience to serve as a backdrop for other management accounting issues including process costing, budgeting and variance analysis.

Previous papers have provided factory simulations to address cost accounting issues. Burns and Mills (1997) used Legos® to illustrate product costing, accounting for materials, labor, and overhead, creating job cost sheets and building work-in-process inventory. Lightbody (1997) introduced a factory simulation exercise by having students produce paper rabbits and calculate work in process and finished goods inventory values. The benefit of the exercise described in this paper is that it is much simpler than the Burns and Mills (1997) exercise, allowing students to cost a product from beginning to end using relatively little classroom time and with little to no special investment in materials on the part of the instructor. In addition, our exercise provides more complexity than the Lightbody (1997) exercise, which allows the instructor and students to explore a wider range of costing concepts and issues.

This active-learning exercise simulates a manufacturing facility where two products are manufactured by teams of students. These student teams are organized to simulate various duties in a manufacturing environment, classify costs, experience the process of overhead allocation, and subsequently determine the cost and target selling price per unit for each model. The students are provided with materials, assembly instructions, and some background cost information to develop cost per unit for each model. This exercise has been successfully used in undergraduate cost/managerial accounting classes. It can be completed in one or two classroom sessions and is an excellent tool in helping students understand the different product costs (direct materials, direct labor, and manufacturing overhead), calculating the cost of a product, and the challenge in assigning overhead to a product.

LEARNING OBJECTIVES

The specific learning objectives for the case are to develop students’ ability to:

- (1) Understand the various functions in a simple manufacturing environment.
- (2) Determine product cost in a job cost environment.

- (3) Analyze the effectiveness of the current costing system.
- (4) Recommend an alternative to the current costing system.
- (5) Effectively communicate the results of the analysis in written form.

CASE SCENARIO

Company Background

The Paper Products Factory (PPF) is a local manufacturer of a single product: paper party hats. They sell primarily to specialty stores in the Mid Atlantic region of the United States. There are several other national and international manufacturers of similar products; therefore it is a very competitive marketplace. The market is very price sensitive; small increases in price can result in large decreases in product demand.

The PPF is a family owned company that employs approximately 100 people. The owner and CEO of the company is Brian Clark. At this time no other family members are involved in the business. The company employs administrative staff including the president, vice presidents, and support staff; engineers who design and develop the products; sales representatives; manufacturing labor; distribution center employees; and customer service representatives.

Patrick Clark, the owner's son, recently completed his M.B.A. Wanting to impress his father with his newly acquired skills, he presented his father with a business proposal to add a second product line - paper chains. "Dad, by adding paper chains, we can expand our product line to our existing customer base. For the most part, our current sales and customer service structure can remain as is since we will be selling more products to our existing customers. We would need to add an additional Production Manager to oversee the new product line. We have excess manufacturing capacity, skilled labor, and almost all of the manufacturing equipment necessary to make the chains. We can offer our hourly employees more steady work. The only additional costs will be the additional capital investment involved due to the purchase of some specialized cutting machines, which will cost \$180,000 and can be expected to last about five years. We'll also have to lease a bit more space." Brian Clark thought it over for a few days. "Patrick, your proposal makes sense to me. By adding a product line, we should be able to decrease our unit product costs because our fixed costs will be spread over many more units. This should be good for the new chain product line and the hat product line. I can get additional manufacturing space by moving our administrative offices out of our manufacturing site and into an office complex nearby. This will free up more space in the factory. I looked in to the purchase of the cutting machines and it seems that we will be able to finance the purchase at a low interest rate. There's only one more thing to consider. I will implement your idea only on the condition that you will join the company as the production manager for paper chains." Patrick agreed and is now the Paper Chain Production Manager reporting to the Director of Manufacturing.

There are a variety of manufacturing departments that are involved in producing the products including: Warehouse, Materials Handling, Cutting, Assembly, Finishing, Quality Control, and Factory Supervisor. Supervision is provided throughout the process. Quality Control is provided at the end of the manufacturing process. A description of each department and a diagram of the factory floor is included in Figure 1 (Appendix) - Description of Manufacturing Departments Panel A and Panel B.

The PPF utilizes job order costing by assigning direct material, direct labor, and manufacturing overhead to each individual job. The costs are accumulated using a Job Cost

Sheet. See Figure 2 (Appendix) – Blank Job Cost Sheet. Given the simple, one-product nature of the manufacturing and cost environment in the past, they have always used the following method for determining job costs: (1) Direct material and direct labor are *traced* to each job based on time cards and materials requisition requests. (2) Manufacturing Overhead is *applied* using the total actual manufacturing overhead cost for the month divided by the number of units produced in the month. The selling price of each job is determined using a cost-plus pricing method. The final selling price is 115% of the cost determined on the job cost sheet.

The introduction of the paper chain product line has been a great success. During the six months that the company has offered the paper chains, demand has exceeded all of the initial projections. During September, PPF made and sold 80,000 paper chains, which is 50% higher than their initial projections. Brian Clark is thrilled with his son's performance, but has been less impressed with the Paper Hats Product Manager, Matt Brady. Mr. Clark remarked, "Brady -- what is the problem with the sales for hats lately? Your sales have been down for the past five months. Maybe I should go out and hire another M.B.A. like Patrick. He sure knows how to bring in the sales and some fresh ideas."

Matt Brady has been an excellent and loyal employee for over ten years. He has become frustrated with the decline in the sales of paper hats too. During September, PPF made and sold only 160,000 hats, which is far below their planned sales of 300,000 hats. "I just can't compete in the marketplace anymore. My unit costs keep rising, and corporate forced us to raise prices to our customers in order to cover our product costs and meet targeted selling price. My unit costs were always around \$0.75 per unit and now they are over \$0.80 per unit. My previously loyal customers have switched to other lower cost providers. I need to better understand the manufacturing process and talk to the cost accountants to see if they can help figure out why my costs keep rising."

The Manufacturing Process

At the beginning of each day, the Factory General Manager consults with the sales department and determines which jobs will be completed for the day. The General Manager forwards the Job Cost Sheet and the materials requisition to the Materials Handling Department. Materials Handling obtains the materials needed for each job from the Warehouse stockroom and brings the materials to the appropriate department for the day's manufacturing.

Paper Hats are manufactured as follows:

- (1) Paper is delivered by Materials Handling to the Assembly Department.
- (2) Paper sheets are folded into a cone shape, taped and stapled in the Assembly Department. Finished hats are moved to the Finishing Department.
- (3) Hats are decorated in the Finishing Department using four stickers per hat.
- (4) Hats are placed on a table for inspection by Quality Control. Quality control also checks to ensure that the proper items are included in the order.

The manufacturing process for paper chains is as follows:

- (1) Paper is delivered by Materials Handling to the Cutting Department.
- (2) Links are cut in to 2" by 8.5" strips. Five strips can be made from one sheet of paper. Cut strips are moved to the Assembly Department.
- (3) Each link is connected to the previous link and then taped and stapled in the Assembly Department. Completed chains are moved to the Finishing Department.

(4) Chains are decorated in the Finishing Department using eight stickers per completed chain.

(5) Chains are placed on a table for inspection by quality control. Chains are then inspected by Quality Control before being packed for shipment with the completed job.

The following raw materials are used in order to manufacture these products: colored paper, staples, tape, and stickers. The following “manufacturing equipment” is used in this factory simulation: stapler, tape dispenser, and scissors.

Your instructor will demonstrate the manufacture of each product and will walk through each of the job descriptions before you begin. Your role is twofold. Initially, you will be part of the manufacturing organization. Later you will assume the role of a cost accountant responsible for determining the cost of each product and job. Your instructor will serve as the Factory General Manager.

Assignment 1

- (a) Complete the manufacture of Job 101 (or the job assigned by your instructor).
- (b) Identify the major elements of the value chain for the Paper Products Factory.
- (c) Identify the various costs involved in making the products. (Do not concern yourself with dollar amounts at this point.)
- (d) Separate the list of costs identified as product or period costs. Further classify product costs as direct material, direct labor, and manufacturing overhead.

The Product Costing Process

The next step is to determine the cost to produce each job and each unit. PPF uses a job costing system, whereby each job is the *cost object*. Costs are accumulated by job as follows:(1) Direct material and direct labor are *traced* to each job based on the information obtained from the materials requisition requests and factory employee time cards (2) The company accumulates factory overhead into one Manufacturing Overhead cost pool. At the PPF, Manufacturing Overhead is *applied* using an application rate based on the total actual manufacturing overhead for the month divided by the total number of units produced. This rate is then applied to each job by multiplying the rate times the units for each job. The Paper Products Factory targets its selling price at 115% of product cost.

Your instructor will hand out cost information and a partially completed job cost sheet for your use in completing Assignment 2. Actual levels of production and total manufacturing costs for the month of September are included on Exhibit 2 – Costs and Cost Assumptions. A partially completed job cost sheet is included in Exhibit 3 – Partially Completed Job Cost Sheet.

Assignment 2

- (a) Trace the direct material and direct labor amounts used for each job and mark it on the Job Cost sheet. Your job consisted of 15 Hats and 10 Chains. The amounts of materials for the job can be found on the Materials Requisition Report (not included) and the Labor is found on the Labor time records (not included). These amounts have been input onto the Job Cost Sheet for you. See Exhibit 3 – Partially Completed Job Cost Sheet.

- (b) Using one overhead cost pool and units as the cost driver, allocate the overhead to each job.
- (c) Why is the process of *allocating* overhead different from *tracing* direct material and direct labor costs?
- (d) Complete the Job Cost sheets by identifying the total product cost for each job. Next compute the cost for a unit of paper hats and a unit of paper chain.
- (e) What do you think is the cause of the increase in unit costs for paper hats?
- (f) Matt Brady has asked you help him identify some other methods for allocating overhead in the determination of product cost. Identify at least two other possible ways of allocating the overhead to each job. Recalculate the product cost and targeted selling price of each job and each unit using the two methods of allocating overhead identified in (e).
- (g) What are the advantages and disadvantages of the methods identified? Which method would you recommend?
- (h) Write a memo to Brian Clark summarizing your findings and recommendations.

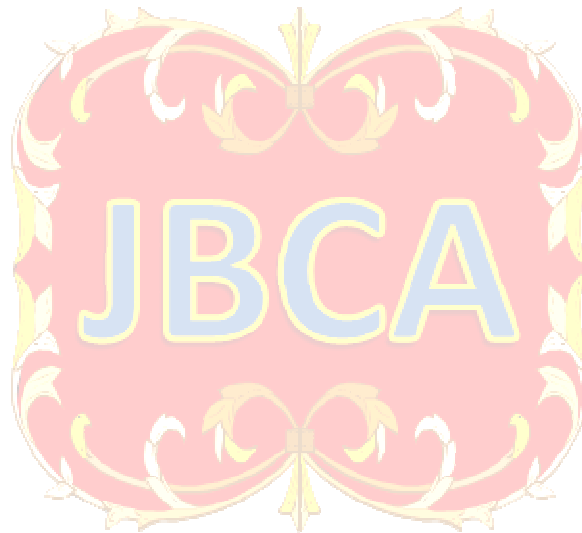


Figure 1
Description of Manufacturing Departments and Building Layout

Panel A - Description of Manufacturing Departments

Receiving / Warehouse	Responsible for storing and distributing raw materials used in the manufacturing process
Materials Handling	Responsible for requesting materials from Warehouse for the day's jobs. Also responsible for moving items in process between departments and keeping factory clean during downtime.
Cutting	Responsible for cutting the paper sheets used in products.
Assembly	Responsible for fastening the product parts.
Finishing	Responsible for decorating the products.
Quality Control	Responsible for ensuring that products are made according to specification and checking the accuracy of the final jobs.
Factory General Manager	Responsible for setting the manufacturing schedule after consulting with the Sales Department, coordinating materials ordering with the Purchasing Department, and supervising the manufacturing process.

Panel B - Building Layout

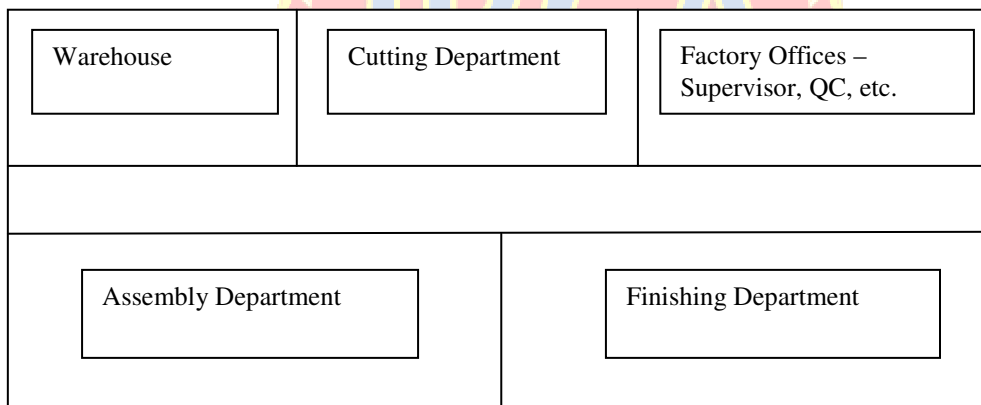


Figure 2
Blank Job Cost Sheet

JOB #	_____
Amounts Ordered:	
HATS	_____
CHAINS	_____
Date started	_____
Date completed	_____

HATS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper			
Stickers			
Total Direct Material			
	# hrs	Cost/hr.	Total \$
Cutting Labor			
Assembly Labor			
Finishing Labor			
Total Direct Labor			
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead *			
Total Mfg. overhead			
Total Product Cost			
Cost per unit			
Selling Price per unit			

CHAINS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper			
Stickers			
Total Direct Material			
	# hrs	Cost/hr.	Total \$
Cutting Labor			
Assembly Labor			
Finishing Labor			
Direct Labor			
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead*			
Total Mfg. overhead			
Total Product Cost			
Cost per unit			
Selling Price per unit			

<u>Overhead Calculation</u>

TEACHING NOTE

Implementation Guidance

This exercise has been successfully used in undergraduate introductory cost accounting classes. It can be completed over one or two class sessions, where ten minutes are used to set up and explain the manufacturing process and fifteen minutes are used to complete the manufacture of a job order. The remainder of the class period is used to identify costs, classify costs, and calculate product costs.

In order to fully utilize class time and minimize distractions, the instructor should have a sample of each product available at the start of the class. Next, the instructor will demonstrate how to make each product. Students will complete the manufacturing job, identify costs, classify costs, and work through calculating direct materials and direct labor costs based on dollar amounts given by the instructor, which can be found in Exhibit 2. Next, the overhead allocation is completed. In the authors' experience, it is usually best to complete all of Assignment 1 and Assignment 2 (a) through (e) in class. Questions (f) through (h) can be completed for homework to be discussed in the next class period. This allows for a more thorough consideration of the complexities involved in determining overhead allocation bases.

Assignment #1 suggested solutions

1(a). Set up the classroom by designating certain areas of the classroom as the Stockroom, Cutting Dept, Assembly Dept, and Finishing Dept. This can be done by setting out the materials on desks across the front of the room. Before demonstrating how to manufacture the products, the instructor should show the class a completed unit of Hat and Chain products. This helps students to focus on the manufacturing process since they already know what the product will look like. Next, the instructor should demonstrate the manufacture of each item. It is important to explain each step and identify the materials and equipment used along the way. This will help ensure that students will recognize the materials and equipment as costs involved in production.

The process for chains is as follows:

- (1) Materials Handling picks up a job sheet from the General Manager then goes to the Warehouse to get materials. Next, he or she will distribute materials to the Cutting Department (for Chains) and the Assembly Department (for hats).
- (2) Cut paper into 2"by 8 1/2" strips. You will be able to get 5 strips and you will have some waste. (Note: It is best if you draw lines for cutting on to the paper and then copy onto colored paper. This will prevent a bottleneck in the cutting process.) Materials Handling moves product to the Assembly Dept.
- (3) Bend the strip, staple and tape the end. Loop the next strip through the previously completed strip, staple and tape. Continue until you have five loops on your chain. Move to the Finishing Department.
- (4) Decorate the chain with eight stickers.
- (5) Move items to an area designated for completed units.

The process for Hats is as follows:

- (6) Start with paper delivered by Materials Handling.

- (7) Bend the sheet of paper into a cone shape (lines on the inside), staple and tape the end. Move to the Finishing Department.
- (8) Decorate the hat with four stickers.
- (9) Move items to an area designated for completed units. Check to ensure that all items in the Job are finished and sign off on the completed Job Sheet. Quality control will check all items and all jobs for completeness.

Assigning students to roles will vary depending on the number of students in the class. For a class size of 25, I assign students as follows: Stockroom employee (1), Materials Handling employees (2), Quality Control (1), and Cutting Department (3), with the remaining eighteen students broken into three groups of six. The students in each group are assigned as Assembly department (4) and Finishing department (2). The instructor is the General Manager. For a class this size, I assign three jobs – Job 101, 102, 103, where each job requires the completion of 15 units of hats and 10 units of chains. This is done in order to make the class review simpler.

1(b). The value chain elements include: Engineering and Design, Manufacturing, Sales, and Customer Service.

1(c). The instructor asks students to identify the costs associated with making each of the products and lists the types of costs that students identify on the board. It is useful at this point to mention that the Hats do not use labor or machinery in the cutting department. This helps students to recognize that the products do not use resources equally. (Students are not given cost assumptions until later, so dollar amounts are not discussed at this point.)

Students generally identify most of the direct material and direct labor costs (paper, stickers, staples, tape, and manufacturing labor) and the cost of the machinery. The instructor should point out that the cost of tracing immaterial items such as tape and staples may not be worth the cost. In the solution, the authors chose to include these items in the manufacturing overhead. Students require some prompting to recognize that the machinery cost is the annual depreciation on the equipment, not the original cost of the equipment. Students generally fail to consider many of the other factory overhead costs such as depreciation on the facility, materials handling, taxes, utilities, and quality control as well as the non-manufacturing value chain costs such as design, selling, and administrative costs. The instructor should identify the non-manufacturing costs and emphasize that they are not product costs for GAAP purposes, but are still necessary and significant costs associated with the products. See Exhibit 1 for a list of costs and cost classifications.

1(d). See Exhibit 1 (Appendix).

e.

Assignment 2 – The Product Costing Process Suggested Solutions

2(a). Hand out Exhibit 2 (Appendix) - Actual Costs for September and Exhibit 3 (Appendix) - Job Cost Sheet. Note that the Job Cost Sheet will have the units of materials and labor already completed. It is suggested that you have at least two extra copies of Exhibit 3 for each student on hand so that students can complete the additional requirements in Part(g).

2(b). PPF's method of allocating overhead is to take total overhead costs and divide by total units to arrive at an overhead application rate. Total units are used in this example for two reasons. First, before introduction of paper chains, the company made only paper hats. In the single product case it is logical to use units since it can be assumed that each like unit consumes overhead at the same rate. Second, in the absence of guidance, students will almost always try to use units produced to allocate overhead. The example of moving from a one product to a two product helps students to understand the concept of finding an appropriate cost driver later in the case. In addition, it helps to demonstrate that you cannot use units as an allocation base for overhead until you have allocated the overhead to a product or product line first.

See Exhibit 4 (Appendix) Panel A – Overhead cost allocations.

2(c). The process of allocating is necessary because the factory overhead costs incurred are shared among many products. Some attempt must be made to allocate this cost to products based on the product's consumption of the overhead cost.

2(d) See Exhibit 5 (Appendix) – Job Cost Sheet using Units as Cost Driver.

2(e). The cause of the increase in the unit cost is due to a reduction in total units produced and an increase in fixed overhead. The number of units of hats has declined significantly and this has not been overcome by the increase in units of chains. This results in the fixed costs being spread over fewer units. In addition, overhead costs have grown due to the addition of the cutting machines, the additional production manager's salary, and the use of more factory space. Using units as a cost driver will result in allocating two-thirds of the overhead costs to Hats. Upon considering the way the space is used and the resources are consumed, this will result in a disproportionate share of the overhead is being allocated to the Hats. Chains are a more complex product and likely cause more than one-third of the overhead.

On the board, keep the list of costs by type, total costs, and have a completed unit of Hat and Chain available for the students to see. Students will generally argue that it's not "fair" to use this averaging method to determine the cost for the two products. Students comment that this method is not fair to Matt Brady in the case since his product is picking up many of the overhead costs of the paper chains.

In the discussion the instructor should take care to make the following points: (1) it is obvious that each product uses different amounts of materials, but they also use different amounts of manufacturing overhead; (2) this averaging method of costing products doesn't reflect the way the products cause overhead costs; (3) getting the cost right has a significant impact on pricing and product mix decisions; (4) getting the cost right will impact the financials through the Inventory and Cost of Goods Sold values.

2(f) Two suggestions are to allocate overhead based on total labor hours or to split the overhead into cost pools and allocate to the jobs using an appropriate cost driver for each cost pool. See Exhibit 4 Panel B for calculations using labor hours. See Exhibit 6 (Appendix) for the product cost using labor hours as the cost driver.

Students will come up with a variety of cost pools and drivers in order to provide a better overhead allocation. Exhibit 4 Panel C illustrates one possible way to determine cost pools. The pools in this illustration are based on each manufacturing function – cutting, assembly, and finishing as well as a "general" cost pool for all of the other costs. Students trace costs of machinery and an allocation of Building overhead to each department. The Building allocation is based on an estimation of square footage. Based on Figure 2, assembly and finishing each use

one-fourth of the space and warehouse, cutting, and factory offices each use one-sixth of the floor space. The general cost pool includes all other shared costs that can't be directly traced to a department. See Exhibit 7 (Appendix) for a completed Job Cost Sheet using the cost pools.

2(g). Direct labor is an appropriate cost driver for much of the overhead. The advantage of using direct labor as the cost driver is its simplicity. Labor records are readily available to use in the allocation. Using cost pools is probably a more accurate way of allocating overhead since we allocate using cost drivers that are more closely related to the cost and the uses of the cost. The students should consider the cost/benefit of each method. In this example, either method appears appropriate.

2(h). Students will respond to this question in a variety of ways. The main focus is to ensure that they clearly articulate their point of view and support their answer in a way that a non accountant will understand.

Other Benefits of the Exercise

The authors have found that although there is some class time given up in order to run the exercise, the benefits of the exercise extend far beyond the product costing topics covered. The exercise can serve as a common example to: (1) discuss the difference between tracking costs in a job order versus process costing environment, particularly in the calculation of Work in Process and Finished Goods Inventory; (2) as an introduction to the budgeting section by having students use the cost information to develop production, purchasing, and cost of goods sold budgets using the cost data from the exercise; and (3) as an introduction into variance analysis by using a familiar context to explain the nature of variances.

CONCLUSION

The active-learning exercise described in this article is a practical method for students to grasp the basics of a manufacturing process as well as the effort required to cost a product. The exercise is easy to implement in a managerial or cost accounting course and it complies with the demands from the IMA Practice Analysis (1999) which states that management accountants need communication (both oral and written) skills, an ability to work in teams, better analytical skills, and a solid understanding in accounting.

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Appendix

Exhibit 1
Costs and Cost Classifications

Product Costs

Paper	direct material
Stickers	direct material
Direct labor -- Cutting/Assembly/Finishing	direct labor
Staples	indirect -- manufacturing overhead
Tape	indirect -- manufacturing overhead
Quality control labor	indirect -- manufacturing overhead
Supervisory labor	indirect -- manufacturing overhead
Other indirect labor (stockroom, materials handling)	indirect -- manufacturing overhead
Depreciation on tape machines	indirect -- manufacturing overhead
Depreciation on stapling machines	indirect -- manufacturing overhead
Depreciation on cutting machine	indirect -- manufacturing overhead
Depreciation on the factory portion of the building	indirect -- manufacturing overhead
Taxes on the factory portion of the building	indirect -- manufacturing overhead

* Could be classified as direct material; however, treat as indirect since it is not cost effective to trace immaterial items to jobs and products.

Other Value Chain Costs

Design
Customer service
Sales
Administrative Salaries
Depreciation and taxes on the office portion of the building

Exhibit 2
Costs and Assumptions
Costs for the Month of September

Production and sales of Hats	160,000 units
Production and sales of Chains	80,000 units
Total Production and Sales for September	240,000

Direct Material

# Sheets of paper used to make HATS	1 per unit	\$ 0.05 per sheet	\$ 8,000.00
# Sheets of paper used to make CHAINS	1 per unit	\$ 0.05 per sheet	\$ 4,000.00
# stickers to make HATS	4 per unit	\$ 0.01 each	\$ 6,400.00
# stickers to make CHAINS	8 per unit	\$ 0.01 each	\$ 6,400.00
TOTAL DIRECT MATERIAL (SEPTEMBER)			<u>\$ 24,800.00</u>

Direct Labor HOURS

	Hats	Chains	Total
Cutting labor hours	-	1,500	1,500
Assembly labor hours	2,500	3,000	5,500
Finishing labor hours	2,500	1,500	4,000
TOTAL DIRECT LABOR HOURS (SEPTEMBER)	<u>5,000</u>	<u>6,000</u>	<u>11,000</u>

Direct Labor COSTS

	Cost per hour	Hats	Chains	Total
Cutting labor	\$ 15.00	-	22,500	\$ 22,500.00
Assembly labor	\$ 15.00	37,500	45,000	\$ 82,500.00
Finishing labor	\$ 15.00	37,500	22,500	\$ 60,000.00
TOTAL DIRECT LABOR COSTS				<u>\$ 165,000.00</u>

Manufacturing Overhead (TOTALS)

Quality control hours	320 hours	\$ 40.00 per hour	\$ 12,800.00
Indirect labor -- Supervisor	360	\$ 60.00 per hour	\$ 21,600.00
Other indirect labor (stockroom, materials handling)	960 hours	\$ 15.00 per hour	\$ 14,400.00
Depreciation on tape machines	\$1,000 per month		\$ 1,000.00
Depreciation on stapling machines	\$2,000 per month		\$ 2,000.00
Depreciation on cutting machine	\$3,000 per month		\$ 3,000.00
Rent and taxes on the factory	\$10,000 per month		\$ 10,000.00
Utilities	\$1,500 per month		\$ 1,500.00
Staples			\$ 100.00
Tape			\$ 150.00
TOTAL MANUFACTURING OVERHEAD (SEPTEMBER)			<u>\$ 66,550.00</u>

TOTAL PRODUCT COSTS FOR SEPTEMBER

\$ 91,350.00

Exhibit 3
Partially completed Job Cost Sheet

JOB #	_____
Amounts Ordered:	
HATS	15
CHAINS	10
Date started	_____
Date completed	_____

HATS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper	15		
Stickers	60		
Total Direct Material			
	# hrs	Cost/hr.	Total \$
Cutting Labor	0		
Assembly Labor	0.25		
Finishing Labor	0.25		
Total Direct Labor	0.5		
	Cost driver	Cost/unit of cost driver	Total \$
<i>Mfg Overhead</i> *			
Total Mfg. overhead			
Total Product Cost			
Cost per unit			
Selling Price per unit			

CHAINS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper	10		
Stickers	80		
Total Direct Material			
	# hrs	Cost/hr.	Total \$
Cutting Labor	0.15		
Assembly Labor	0.3		
Finishing Labor	0.15		
Total Direct Labor	0.6		
	Cost driver	Cost/unit of cost driver	Total \$
<i>Mfg Overhead</i> *			
Total Mfg. overhead			
Total Product Cost			
Cost per unit			
Selling Price per unit			

*Overhead Calculations

Exhibit 4
Overhead Cost Driver Rate Computations

Panel A							
Using Original Plan		Overhead Cost	Cost driver	#	Cost per unit of cost driver		
	<u>Total \$ Overhead for Month</u>						
	Total # of units	\$ 66,550	units	240,000	\$	0.28	per unit

Panel B							
Alternative #1 -- Using Labor hours as cost driver		Overhead Cost	Cost driver	#	Cost per unit of cost driver		
		\$ 66,550	Total Labor hrs	11,000	\$	6.05	per labor hour

Panel C							
Alternative #2 -- Using Cost pools		Overhead cost \$	Cost driver	#	Cost per unit of cost driver		
<i>Cutting Dept Cost Pool:</i>							
	Depreciation on cutting machine	\$ 3,000					
	Depreciation and taxes on bldg (16.67%)	\$ 1,667					
	Cutting OH	<u>\$ 4,667</u>	Cutting dept labor hours	1,500	\$	<u>3.11</u>	cutting labor hour
<i>Assembly Dept. Cost Pool</i>							
	Depreciation on Stapling equipment	\$ 2,000					
	Depreciation on Tape equipment	\$ 1,000					
	Building Depreciation (25%)	\$ 2,500					
	Staples	\$ 100					
	Tape	\$ 150					
	Assembly OH	<u>\$ 5,750</u>	Assembly dept labor hours	5,500	\$	<u>1.05</u>	per assembly labor hour
<i>Finishing Dept. Cost Pool</i>							
	Depreciation and Taxes on Bldg (25%)	\$ 2,500		4,000	\$	<u>0.63</u>	per finishing labor hour
	Finishing OH	<u>\$ 2,500</u>					
<i>General Cost Pool</i>							
	Deprecation on Bldg. (33.33%)	\$ 3,333					
	Utilities	\$ 1,500					
	Indirect labor	\$ 14,400					
	Quality Control	\$ 12,800					
	Supervision	\$ 21,600					
	"General" OH	<u>\$ 53,633</u>	Total labor hours	11,000	\$	<u>4.88</u>	labor hour
	Total Overhead	\$ 66,550					

Using a hands-on exercise

Exhibit 5
Job Cost Sheet
Using units as cost driver

JOB #	101
Amounts Ordered:	
HATS	15
CHAINS	10
Date started	_____
Date completed	_____

HATS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper	15	\$ 0.05	\$ 0.75
Stickers	60	\$ 0.01	\$ 0.60
Total Direct Material			\$ 1.35
	# hrs	Cost/hr.	Total \$
Cutting Labor	0	\$ 15.00	\$ -
Assembly Labor	0.25	\$ 15.00	\$ 3.75
Finishing Labor	0.25	\$ 15.00	\$ 3.75
Total Direct Labor	0.5	\$ 15.00	\$ 7.50
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead *	15	0.28	4.159375
Total Cost for the Job -- HATS			\$ 13.01
Cost per unit			\$ 0.87
Selling Price per unit			\$ 1.00

CHAINS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper	10	\$ 0.05	\$ 0.50
Stickers	80	\$ 0.01	\$ 0.80
Total Direct Material			\$ 1.30
	# hrs	Cost/hr.	Total \$
Cutting Labor	0.15	\$ 15.00	\$ 2.25
Assembly Labor	0.3	\$ 15.00	\$ 4.50
Finishing Labor	0.15	\$ 15.00	\$ 2.25
Total Direct Labor	0.6	\$ 15.00	\$ 9.00
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead*	10	0.28	\$ 2.77
Total Cost for the Job --Chains			\$ 13.07
Cost per unit			\$ 1.31
Selling Price per unit			\$ 1.50

*Overhead Calculation :			
Total Monthly Overhead Cost / Cost Driver	=	Overhead Cost per unit of cost driver	
\$ 66,550	=	\$ 0.28	
240,000			

Exhibit 6
Job Cost Sheet
using direct labor as cost driver

JOB #	101
Amounts Ordered:	
HATS	15
CHAINS	10
Date started	_____
Date completed	_____

HATS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper	15	\$ 0.05	\$ 0.75
Stickers	60	\$ 0.01	\$ 0.60
Total Direct Material			\$ 1.35
Direct Labor			
	# hrs	Cost/hr.	Total \$
Cutting Labor	0	\$ 15.00	\$ -
Assembly Labor	0.25	\$ 15.00	\$ 3.75
Finishing Labor	0.25	\$ 15.00	\$ 3.75
Total Direct Labor	0.5	\$ 15.00	\$ 7.50
	Cost driver	of cost driver	Total \$
Mfg Overhead *	0.5	6.05	3.03
Total Cost for the Job -- HATS			\$ 11.88
Cost per unit			\$ 0.79
Selling Price per unit			\$ 0.91

CHAINS			
<i>Direct Material</i>	#	Cost per each	Total \$
Paper	10	\$ 0.05	\$ 0.50
Stickers	80	\$ 0.01	\$ 0.80
Total Direct Material			\$ 1.30
Direct Labor			
	# hrs	Cost/hr.	Total \$
Cutting Labor	0.15	\$ 15.00	\$ 2.25
Assembly Labor	0.3	\$ 15.00	\$ 4.50
Finishing Labor	0.15	\$ 15.00	\$ 2.25
Total Direct Labor	0.6	\$ 15.00	\$ 9.00
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead*	0.6	6.05	\$ 3.63
Total Cost for the Job --Chains			\$ 13.93
Cost per unit			\$ 1.39
Selling Price per unit			\$ 1.60

*Overhead Calculation :			
Total Monthly Overhead Cost / Cost Driver	=	Overhead Cost per unit of cost driver	
\$ 66,550	=	\$ 6.05	
11,000			

**Exhibit 7
Job Cost Sheet**

Using cost pools and various cost drivers

JOB #	101
Amounts Ordered:	
HATS	15
CHAINS	10
Date started	
Date completed	

HATS			
Direct Material	#	Cost per each	Total \$
Paper	15	\$ 0.05	\$ 0.75
Stickers	60	\$ 0.01	\$ 0.60
Total Direct Material			\$ 1.35
	# hrs	Cost/hr.	Total \$
Cutting Labor	0	\$ 15.00	\$ -
Assembly Labor	0.25	\$ 15.00	\$ 3.75
Finishing Labor	0.25	\$ 15.00	\$ 3.75
Total Direct Labor	0.5	\$ 15.00	\$ 7.50
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead *			
Cutting	0	3.11	0.00
Assembly	0.25	1.05	0.26
Finishing	0.25	0.63	0.16
General OH	0.5	4.88	2.44
Total Mfg. overhead			2.86
Total Product Cost			11.71
Cost per unit			\$ 0.78
Selling Price per unit			\$ 0.90

CHAINS			
Direct Material	#	Cost per each	Total \$
Paper	10	\$ 0.05	\$ 0.50
Stickers	80	\$ 0.01	\$ 0.80
Total Direct Material			\$ 1.30
	# hrs	Cost/hr.	Total \$
Cutting Labor	0.15	\$ 15.00	\$ 2.25
Assembly Labor	0.3	\$ 15.00	\$ 4.50
Finishing Labor	0.15	\$ 15.00	\$ 2.25
Direct Labor	0.6	\$ 15.00	\$ 9.00
	Cost driver	Cost/unit of cost driver	Total \$
Mfg Overhead*			
Cutting	0.15	3.11	0.47
Assembly	0.3	1.05	0.31
Finishing	0.15	0.63	0.09
General OH	0.6	4.88	2.93
Total Mfg. overhead			3.80
Total Product Cost			14.10
Cost per unit			\$ 1.41
Selling Price per unit			\$ 1.62

Overhead Calculation			
	Overhead Costs	Cost Driver	Cost Driver Rate
Cutting	\$ 4,667	1500	\$ 3.11 per cutting labor hour
Assembly	\$ 5,750	5500	\$ 1.05 per assembly labor hour
Finishing	\$ 2,500	4000	\$ 0.63 per finishing labor hour
General OH	\$ 53,633	11000	\$ 4.88 per total labor hour
	\$ 66,550		