Addressing the Criticisms of Absorption Cost Systems with Activity Based Costing (ABC)

Outline of our discussion of absorption costing:

- In this lecture we will introduce activity-based costing (ABC) and compare it to traditional absorption costing.
- The last several lectures began the discussion of absorption costing, and it's discontents.
- We also discussed how changes in performance measurement require changes in other parts of organizational architecture (performance measurement and decision rights partitioning).

Problems with absorption costing:

1. Allocating fixed costs on a unit basis makes the seem variable.
    - The death spiral
    - Bad outsourcing choices
2. Incentive to overproduce.

One more problem: Inaccurate Product Costs

- **multiple products**, absorption costing often does not accurately represent the opportunity costs of different products.
- Absorption costing uses few input factors, such as direct labor hours or machine hours, to allocate overhead costs
- Absorption costing does not clearly show how costs are influenced by the diversity and complexity of production processes.
- Absorption cost systems assign too few costs to small batches and complex special orders.

ABC's Major Features

- Better identifies activities that drive costs
- Tracks set-up costs associated with each batch and product line
- Analyzes activities rather than input resources
- Allows cost drivers to vary across the firm.

- Cost analysts attempt to identify cause-and-effect cost drivers for allocating overhead costs.
- Reduces overhead cost pools that are allocated with an arbitrary allocation base

Classifying ABC Cost Drivers

Classify cost drivers into one of four categories:

1. Unit-level
2. Batch-level
3. Product-level
4. Production-sustaining

ABC allows us to isolate costs from production decisions

- This is core to overproduction, death spirals, and incorrect outsourcing choices.

ABC allows us to isolate costs from production decisions

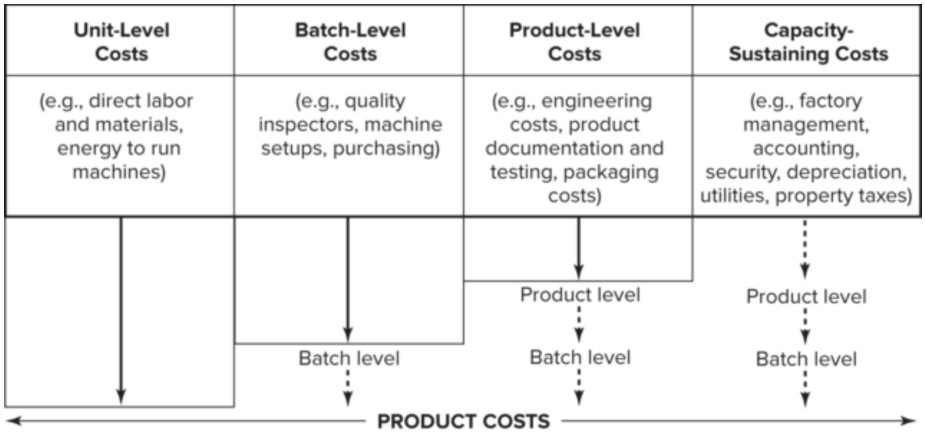

Figure 1: ABC

Unit-level Costs

- **Unit-level costs**: activities that are performed at least once for each unit of product
- Total amount of unit-level costs is a linear function of the quantity produced.

Examples: - Direct labor and direct material - Machine servicing related to number of units produced

Batch-level Costs

- **Batch-level costs**: activities that are performed once for each batch of products
- Batch-level costs are independent of the number of units in the batch.

Examples:

- Indirect labor, such as production supervisors
- Machine set-ups
- Moving batches

Product-level Costs

- **Product-level costs**: activities that support production of a product type or model
- Product-level costs do not vary with the number of batches produced.

Examples:

- Engineering support
- Equipment usable for only one product line

Production-sustaining Costs

- **Production-sustaining costs:** all remaining activities required for overall operation of production facility
- Production-sustaining costs do not depend on number of units, batches, or product lines.

Examples:

- Plant security, insurance, general maintenance
- Plant accounting and administration

Example: ABC vs. Absorption

- **Similarities:** Direct and unit-level costs are allocated the same.
- **Differences:** ABC allocates more indirect costs to products with smaller production volume and more complex set-up. This is *more accurate.* models 801 and 901).

Absorption costing schematic

ABC costing schematic

Two questions:

- Is this simple?
- Is this transparent?

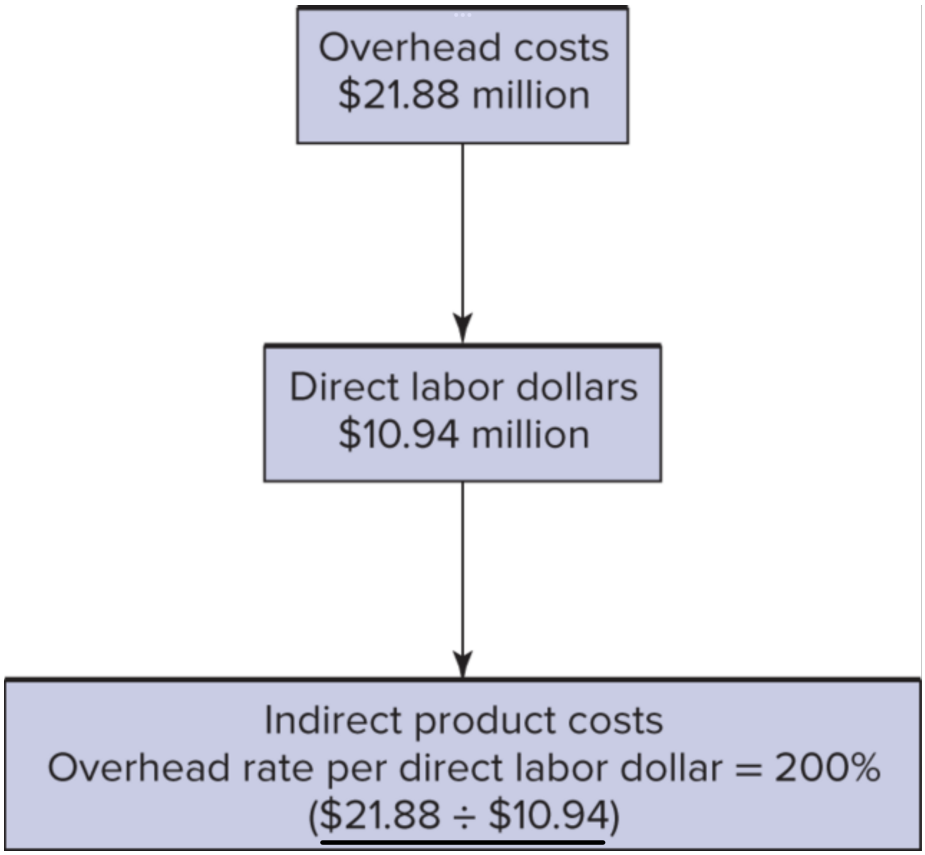

Figure 2: Absorption costing

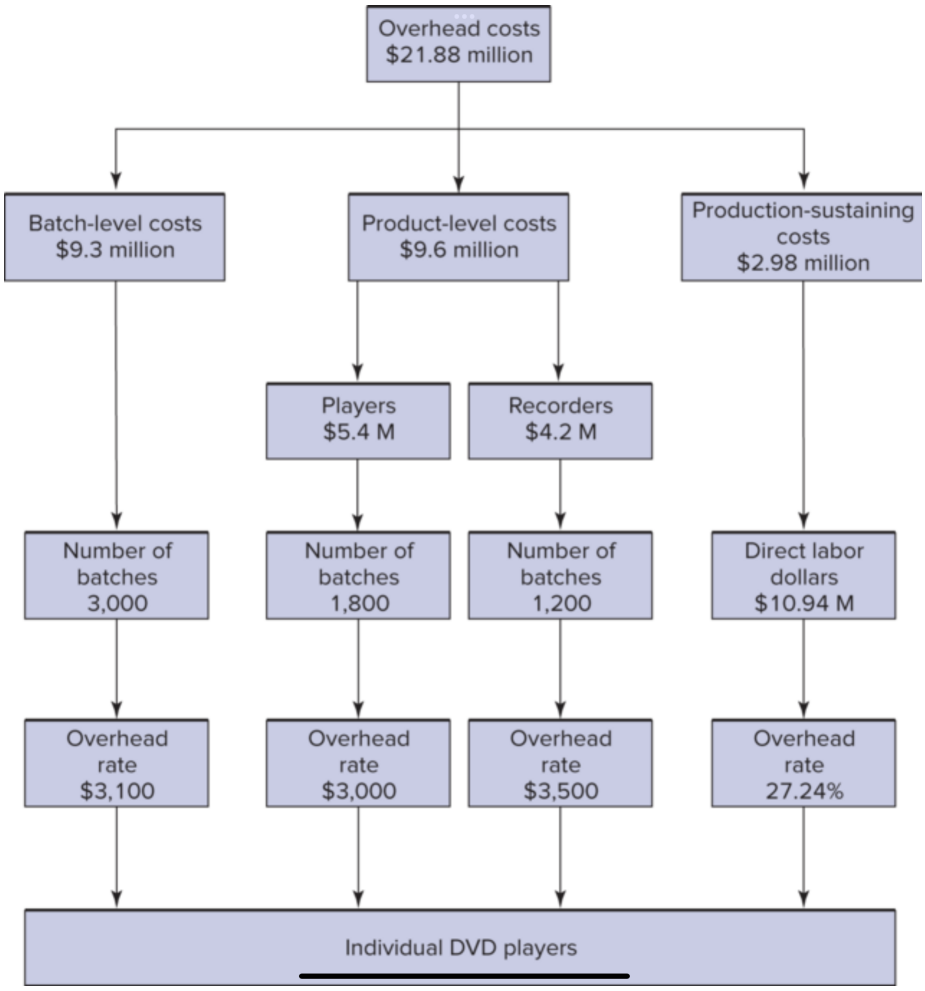
Overhead costs
$21.88 million
Batch-level costs
$9.3 million
Product-level costs
$9.6 million
Production-sustaining costs
$2.98 million
Players
$5.4 M
Recorders
$4.2 M
Number of batches
3,000
Number of batches
1,800
Number of batches
1,200
Direct labor dollars
$10.94 M
Overhead rate
$3,100
Overhead rate
$3,000
Overhead rate
$3,500
Overhead rate
27.24%
Individual DVD players

Figure 3: ABC

When we answer these questions, we also have to make sure that we are accurately comparing the two methods. We want to achieve our goals with methods that are simple and transparent, but the methods we choose between must *actually achieve our goals*.

Example: ABC vs. Absorption

Consider the following example where models 801 and 901 are more complex/lower volume products.

Model number	105	205	305	801	901
Batches per year (100 units/batch)	800	1,000	600	400	200
Absorption cost per unit	$162	$169	$173	$206	$217
ABC cost per unit	$157	$162	$164	$234	$242
Difference	-3%	-4%	-5%	+14%	+12%

Kiddo Inc Example

Kiddo Incorporated manufactures running shoes. Recently, it added a new line of pump sneakers. Over the past two years, sales of both the Runner and the Pump have been flat at 5,000,000 and 2,400,000 pairs, respectively. However, in anticipation of increased sales, production was increased from 5,140,000 to 5,200,000 for the Runner and from 3,000,000 to 3,564,000 for the Pump from year 1 to year 2.

Kiddo Inc Example

Production costs for the two sneakers are very different. Materials cost $14.00 per Runner and $17.75 per Pump. Labor costs are $4.60 and $5.00 and variable overhead costs are $6.60 and $7.30 for the Runner and the Pump, respectively. Fixed overhead costs are $50 million and are allocated based on direct labor cost. Kiddo uses LIFO.

Kiddo Inc Example: Year 1 Absorption Income statement

	Runner	Pump	Total
Revenue	$160,000,000	$110,400,000	$270,400,000
Expenses:			
Material	70,000,000	42,600,000	112,600,000
Labor	23,000,000	12,000,000	35,000,000
Variable overhead	33,000,000	17,520,000	50,520,000
Fixed overhead	29,650,000	15,480,000	45,130,000
Net income	$ 4,350,000	$ 22,800,000	$ 27,150,000

Kiddo Inc Example: Year 1 Fixed Overhead rate

First, find the fixed overhead rate per unit of the allocation base (direct labor dollars):

	Runner	Pump	Total
Direct labor per pair	$ 4.60	$5.00	
× Units produced	5,140,000	3,000,000	
Direct labor cost	$23,644,000	$15,000,000	**$38,644,000**

- Fixed overhead:

$$\frac{50,000,000}{\$38,644,000} = \$1.29$$

Kiddo Inc Example: Year 1 FOH allocation

	Runner	Pump	Total
Direct labor per pair	$4.60	$5.00	
× FOH rate	$1.29	$1.29	
FOH per pair	$5.93	$6.45	
× Number of pairs sold	5,000,000	2,400,000	
FOH Allocated	$29,650,000	$15,480,000	$45,130,000

Kiddo Inc Example

Further analysis of Kiddo's production process has allowed it to allocate costs using activity-based costing. Engineering costs, rework expenses, and equipment maintenance and depreciation were estimated for each production line. Product-line costs for the Runner and Pump sneakers are $5 million and $12 million, respectively. Setup costs for each batch are $2,500. The batch size for the Runner is 1,000 pairs of sneakers. The batch size for the Pump in year 1 is 500 pairs and 600 pairs for year 2. Remaining fixed overhead costs total $5,150,000 and were allocated based on direct labor cost.

Kiddo Inc Example: Year 1 ABC Income statement

	Runner	Pump	Total
Revenue	$160,000,000	$110,400,000	$270,400,000
Expenses:			
Material	$70,000,000	$42,600,000	$112,600,000
Labor	$23,000,000	$12,000,000	$35,000,000
Variable overhead	$33,000,000	$17,520,000	$50,520,000
Gross margin	$ 34,000,000	$ 38,280,000	$ 72,280,000

	Runner	Pump	Total
Batch costs	$12,500,000	$12,000,000	$24,500,000
Product-line costs	$4,863,813	$9,600,000	$14,463,813
Fixed overhead	$3,065,159	$1,599,213	$4,664,372
Net profit	$ 13,571,028	$ 15,080,787	$ 28,651,815

Kiddo batch costs

	Runner	Pump
Cost per batch	$ 2,500	$ 2,500
× Units sold	5,000,000	2,400,000
÷ Units per batch	1,000	500
Allocated batch costs	$12,500,000	$12,000,000

Kiddo product-line costs

	Runner	Pump
Total product-line costs	$5,000,000	$12,000,000
÷ Units produced	5,140,000	5,000,000
× Units sold	3,000,000	2,400,000
Allocated line costs	$ 4,863,813	$ 9,600,000

Kiddo Fixed Overhead Costs

	Runner	Pump	Total
Remaining fixed overhead			$ 5,150,000
Units produced	5,140,000	3,000,000	
× Direct labor per pair	$4.60	$5.00	
Total labor cost	$23,644,000	$15,000,000	$38,644,000
Fixed overhead per direct labor $			$ 0.1333
Direct labor of units sold	$23,000,000	$12,000,000	
Fixed overhead allocated (× $0.1333)	$ 3,065,159	$ 1,599,213	

ABC and Decision Making

- ABC improves pricing decisions because product costs are presumably more accurate estimates of opportunity cost.
- Low-volume high-complexity products should get higher prices or be dropped. The benefit here is that this decision will be based on the actual avoidable costs.

- ABC focuses attention on reducing use of activities that are most associated with costs.

ABC and Decision Control

- ABC requires more monitoring.
- Time to identify and measure activities.
- Meetings to resolve disputes over activity drivers
- ABC shifts decision rights over activity drivers to lower-level managers with specialized knowledge of the relation between costs and activities.
- Departmental managers could opportunistically pick cost drivers that maximize their performance rewards.

ABC Measures Costs, Not Benefits

- ABC does not measure the benefits of producing/selling multiple products.
- Firms offer multiple products because of economies of scale and scope.
- ABC allocates common costs – not the common or joint benefits of multiple products.

History of ABC

- Pre-cursors of ABC were efforts to improve cost allocations in 19th century businesses.
- Activity-based costing terminology was invented and popularized in the late 1980s to early 1990s.
- In the later 1990s and up to the present, the success of ABC systems has been mixed and alternative strategies have been successfully applied to achieve some of the same benefits of ABC with less cost.

ABC Cost Accumulation and Allocation

The bookkeeping for ABC is similar to the two-stage allocation procedure in

Figure 9-4.

1. Unit-level costs are directly assigned to products.
2. Indirect costs are accumulated in the appropriate activity cost pools.
3. Indirect costs are allocated from the activity cost pools using the batch, product, and production-sustaining cost drivers.

Acceptance of ABC is evolving with internal information systems

Although many controllers are interested in ABC, most are skeptical that the benefits of ABC outweigh its implementation costs.

ABC for strategic analysis rather than replace absorption costing:

Absorption required for external reporting

ABC for strategic analysis and special studies

ABC is most likely to be adopted by:

Manufacturers in price-sensitive competitive markets

Large plants with many different products and processes

Cost Allocation and Automation

In highly automated plants where direct labor costs are a small share of total costs, using machine hours as an activity base gives more accurate cost than direct labor.

Automation improves efficiency and eliminates bottlenecks so that less indirect labor is needed for moving, inspecting, and expediting products.

Cost Allocation as a Tax System

(Motivation versus Accuracy)

Cost allocations are an internal tax system that motivate mangers to use less of resources with high cost allocations. (Chapter 7).

Cycle time: Zytec uses total time to manufacture the product as its allocation base to motivate managers to reduce cycle time.

Direct labor: Hitachi allocates overhead on direct labor hours so that managers improve automation as a way to eliminate costly direct labor.

How does ABC relate to the cost functions we were writing in the beginning of the course?

cost systems can be related back to the discussion of cost curves in [Chapter 2. L Chapter 2 presented a linear cost curve of the form TC = VC × 0 + FC where TC = Total cost VC = Variable cost per unit 0 = Number of units produced FC = Fixed cost That is, total cost, TC, can be disaggregated into variable costs, VC × Q, and fixed cost, FC. Fixed costs, by definition, do not vary with Q, units produced. Activity-based costing assumes a more complex cost function-namely, TC = VCx 0 + BC X B + PC XL + OC where TC = Total cost VC = Variable cost ver unit 0 = Number of units produced BC = Cost per batch B = Number of batches PC = Cost per product line L = Number of product lines OC = All other costs that do not vary with some activity measure In addition. FC = BC X B+ PCXL + OC That is, some fixed costs, FC, that do not vary with units produced do vary with the number of batches and product lines.