Supply Chain Finance

MIT Center for
Transportation & Logistics

Activity-Based Costing

This segment's objective

- Introduce you to Activity-Based Cost (ABC) Accounting
- Review the principles for use of ABC
- Make you aware of the ABC method
- Not intended to make you ABC experts

Activity-Based Cost Accounting (ABC)

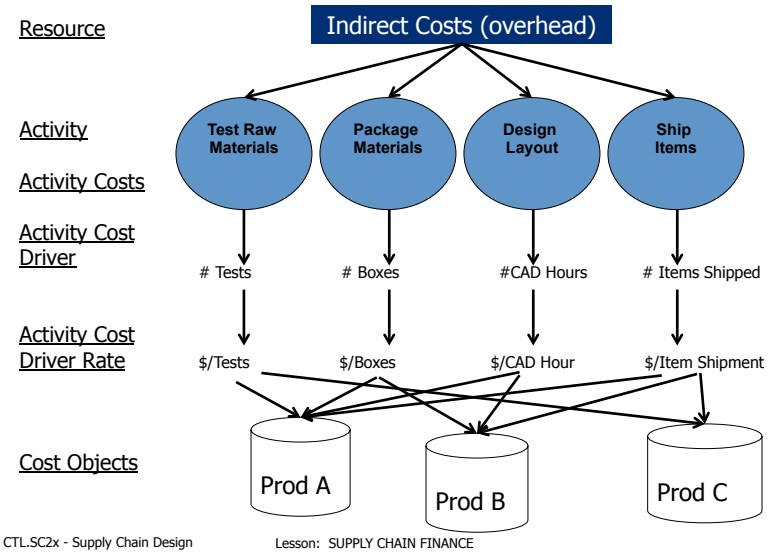
- A method of allocating overhead costs to cost objects based on the amount of resources they consume.
  Costs are allocated using cost drivers
  - Cost drivers consider the activities involved in producing the product/service and the resources used in those activities
- A cost object can be a product, service, customer or other segmentation that management desires to better understand.

Activity-Based Costing

- ABC views product costs as results of activities (or "processes") – costs come from activities
- Each product (service) in the firm is thought in terms of the bundle of activities required to produce (provide) the product (service) - producing a product requires multiple activities
- The costs of a product are the sum of the costs for performing the activities in order to produce (provide) a product (service)
- ABC is especially useful when the variety and complexity of products, service and/or customers are high
- As a result of the improved accuracy, ABC has become the one of the more important methods for product and service decision support and process analysis

Ref.:ESD.251 Class materials prepared by Dr. Jarrod Goentzel, MIT

ABC Expenses Flow from Resources to Activities to Products, Services and Customers



Basic Steps to ABC

1. Identify all relevant (repetitive) activities (a formal approach would involve creating a process model)
2. Identify the resources consumed in performing the activities
3. Determine the costs of the activities
4. Determine cost-drivers of the activities
5. Determine cost-driver rate for the activities
6. Trace costs to (secondary) cost objects

1. Identify all relevant activities

- Usually, the activities are defined functionally, e.g. manufacturing, distribution, order management, etc.
- Activities often take the form of [verb] [direct object], e.g., schedule production, setup machines,…

Identify Relevant Activities

Resource

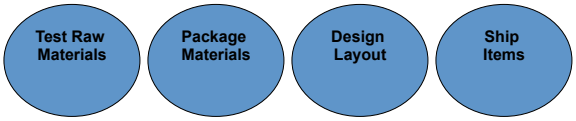
Activity

Activity Costs

Activity Cost Driver

Activity Cost Driver Rate

Cost Objects



2. Identify the resources consumed in performing the activities

- For each identified activity determine the resources used: labor, facilities, equipment, materials,…
- Some resources are used to perform different activities (e.g. shipping and storing are performed by the same workers). In practice, the actual use of resources can be determined through interview and observation.
- Unused capacity is not considered in the cost object allocation, but it should be considered in a separate assessment regarding the cost of carrying additional capacity.

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Identify Resources Consumed in Performing the Activities

Resource

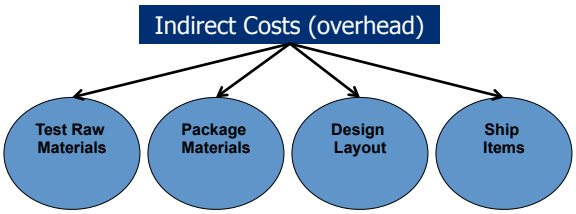
Activity

Activity Costs

Activity Cost Driver

Activity Cost Driver Rate

Cost Objects



3. Determine the costs of the activities

- Generate activity groups or cost pools which collect all resource costs used by the activity
- Traditionally cost pools were functions or departments – this approach creates different groupings based on activities
- Basically determine which costs are associated with a particular activity and accumulate those costs by the activity

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Determine Costs of the Activities

Resource

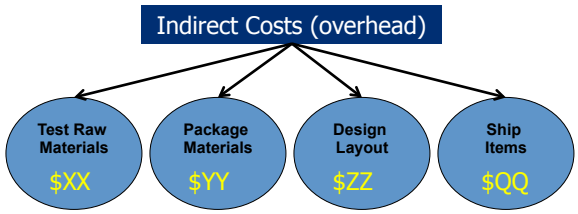
Activity

Activity Costs

Activity Cost Driver

Activity Cost Driver Rate

Cost Objects



4. Determine cost-drivers

- Identify the basis for allocating the costs to the cost object – these are called cost drivers
- A cost-driver is a quantitative measure of the output of an activity
- Examples:
  - Ship product: Number of orders shipped
  - Sort packages: Number of sorting jobs, number of units sorted
  - Test materials: Number of tests, amount of materials consumed in tests
- One cost driver is identified for each activity grouping or cost pool

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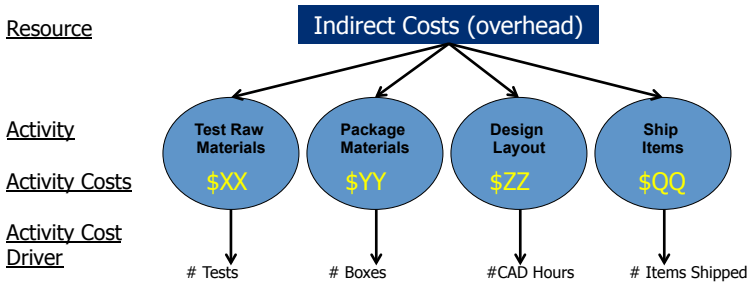
Determine Cost Drivers



5. Determine cost-driver rate

- The cost-driver rate is the cost per unit of cost driver activity, calculated by dividing the cost of the activity by the cost driver
- For example, two activities, process orders and test materials:
  - If the cost driver of "process orders" activity was the number of orders processed, then the cost driver rate would be the "process orders" activity cost divided by the number of orders.
  - Assume the number of orders processed = 2,000 orders, and the cost of the activity "process orders" was $10,000; then the cost driver rate would be $10,000/2,000 or $5/order processed.
  - If the cost driver of the "test materials" activity was the number of hours of operation (500) and the cost of the activity "test materials" was $5,000, then the cost driver rate would be $5,000/500 or $10/ hour of operation.

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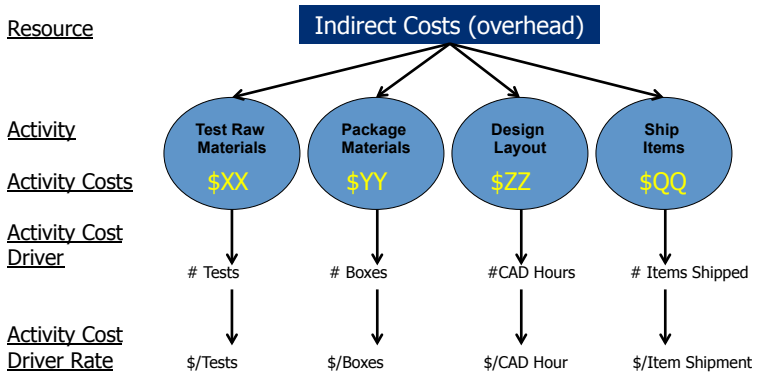
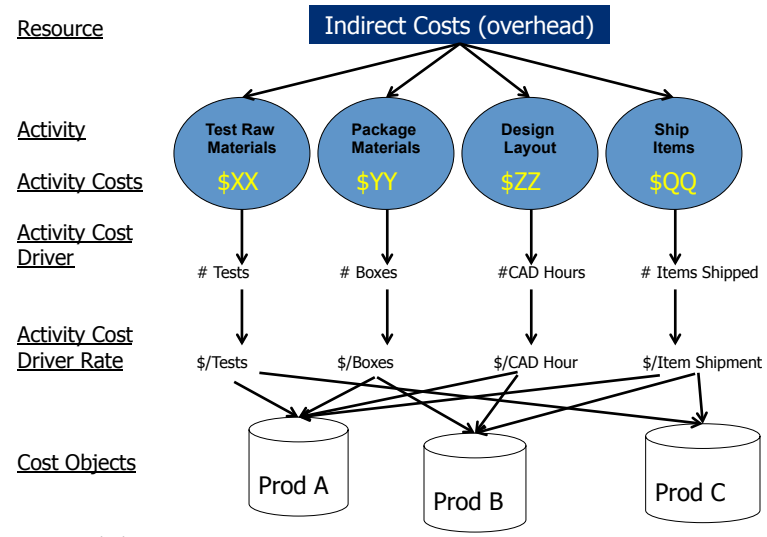
Determine Cost Driver Rate



6. Trace costs to cost objects

- Identify the amount of cost driver used by specific cost objects, and apply the cost driver rate to identify the cost for that specific cost object
  - For example, assume the cost object is a product that requires 3 orders to be processed and 5 hours of operation. What would be the cost allocated to that product?
    - $5/order processed * 3 orders processed = $15
    - PLUS
    - $10/hour of operation * 5 hours of operation = $50
    - For a total of $65 for the product

Trace costs to cost objects aka Products, Services and Customers



Activity-based Costing

- Works in environments with
  - Large expenses in indirect and support resources
  - Multiple product, customer or process environments
- Less important with
  - High labor component of cost
  - Single product, limited diversity (products, customers, processes)
- How much is enough?

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- Usually, the activities are defined functionally, e.g. manufacturing, distribution, order management, etc.
- Activities often take the form of [verb] [direct object], e.g., schedule production, setup machines,…

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Dakota Relevant Activities

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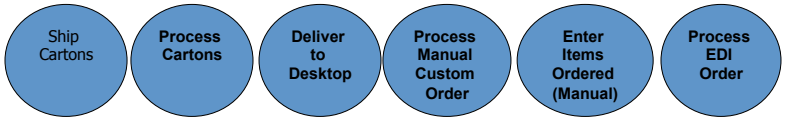

Dakota – Relevant Activities

Ship Cartons	Process Cartons	Deliver to Desktop	Process Manual Custom Order	Enter Items Ordered (Manual)	Process EDI Order

2. Identify the resources consumed in performing the activities

- For each identified activity determine the resources used: labor, facilities, equipment, materials,…
- Some resources are used to perform different activities (e.g. shipping and storing are performed by the same workers). In practice, the actual use of resources can be determined through interview and observation.
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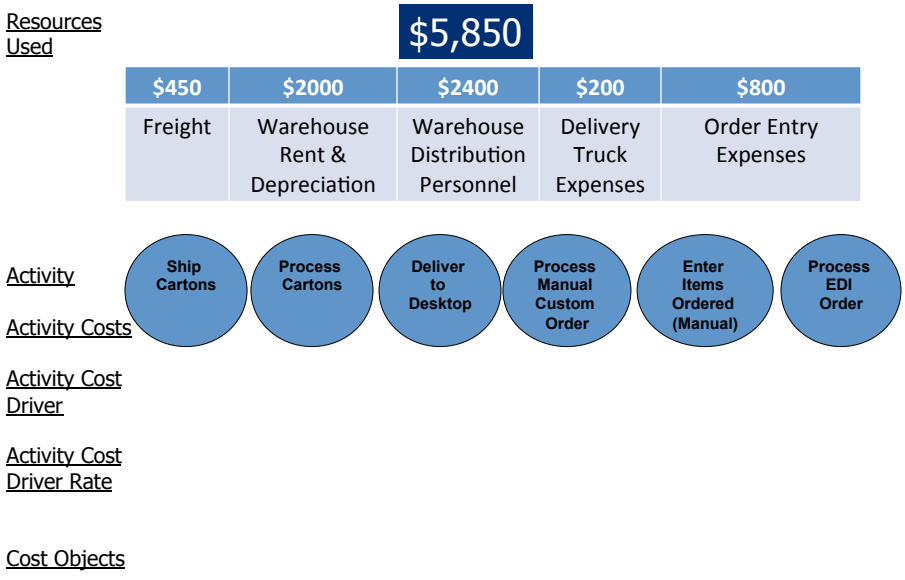
Dakota Resources Consumed Performing Activities



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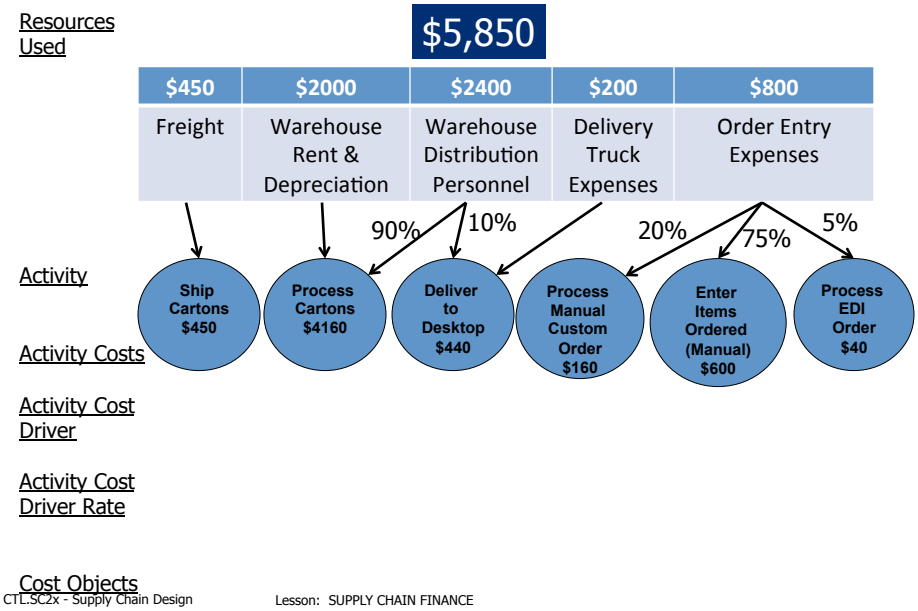

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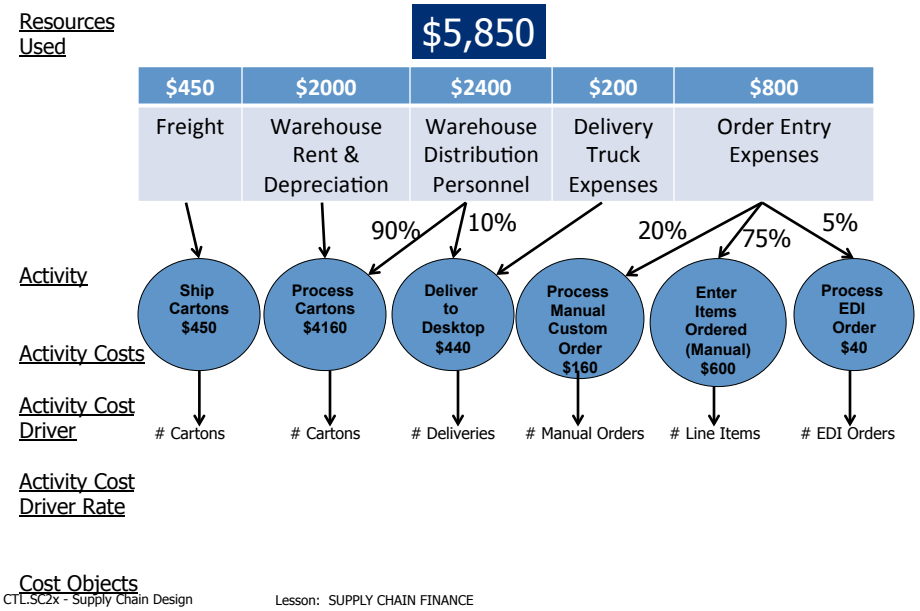

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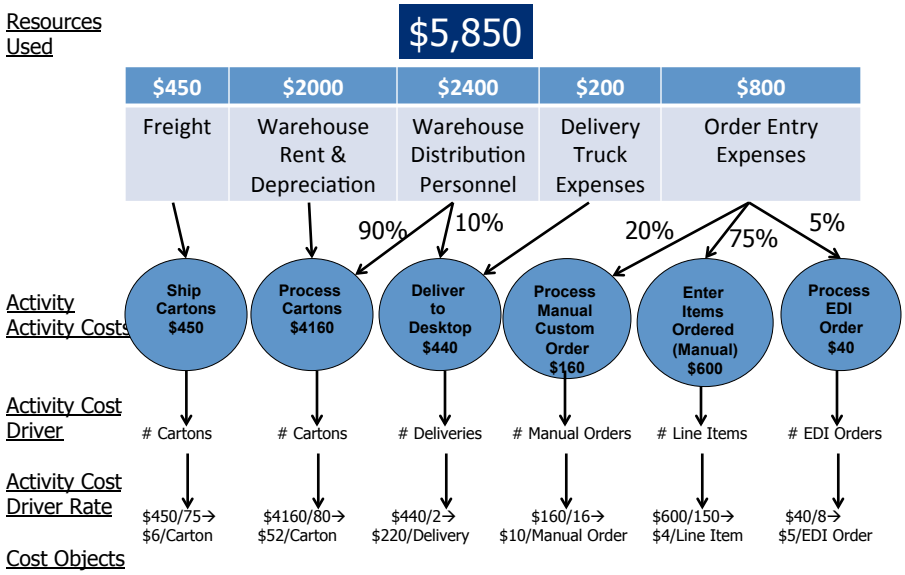
Dakota Cost Drivers



Dakota Profitability Analysis

Comparative Customer Profitability

		Cust. A		Cust. B
Sales		$103,000		$104,000
Cost of items purchased		$85,000		$85,000
Gross margin		$18,000		$19,000
Operating Expenses				
Ship Cartons (Comm'l), # of cartons shipped	200	$1,200	150	$900
Process Cartons, # of cartons ordered	200	$10,400	200	$10,400
Deliver to Desktop, # of deliveries			25	$5,500
Process Manual Orders, # of manual orders	6	$60	100	$1,000
Enter Items Ordered (manual), # of line items	60	$240	180	$720
Process EDI orders, # EDI orders	6	$30		
Net customer profitability		$6,070		$480

C

Dakota Profitability Analysis

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Enter Items Ordered (manual), # of line items	60	$240	180	$720
Process EDI orders, # EDI orders	6	$30		
Net customer profitability		$6,070		$480
Average Accounts Receivable	$9,000	$900	$30,000	$3,000
Total Customer Profitability (loss)		$5,170		-$2,520

Key Points

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- Activity-Based Costing provides a different and potentially more accurate cost for producing products and providing services
- ABC can be helpful for decision makers assessing the profitability of various products, services or segmentations of those by customer or geography

CTL.SC2x -Supply Chain Design

Questions, Comments, Suggestions? Use the Discussion…..

MIT Center for Transportation & Logistics

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Sources, Image & Reference Information

- **References**
- ESD.251 Class materials prepared by Dr. Jarrod Goentzel, MIT