University of Kufa
Collage of Administration & Economic
Department of Accounting

Activity – Based Costing System

Presented by
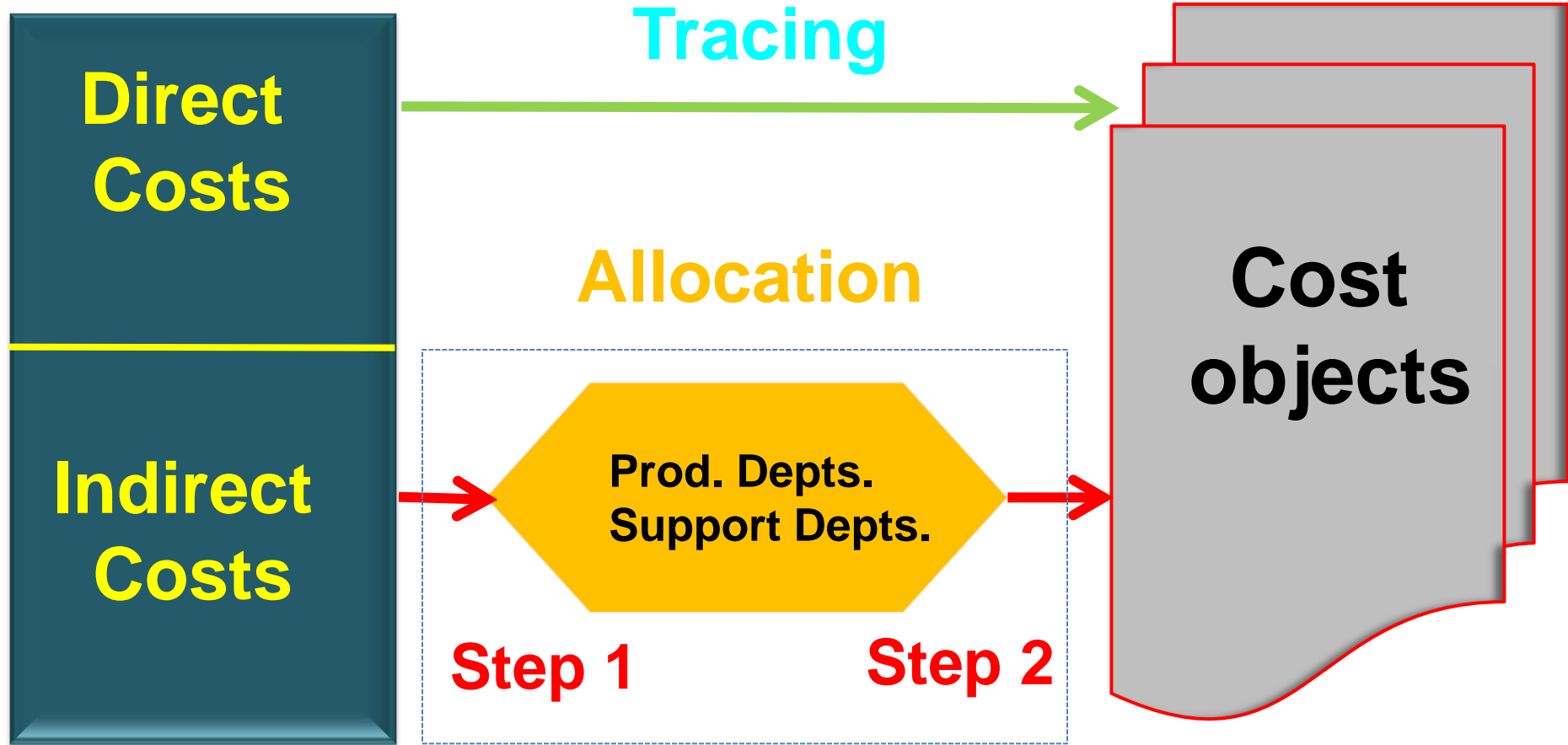## Asst. Prof. Karrar Alkhaldy

Learning objectives

After studying this chapter, you should be able to:

1 – Identify disadvantages of traditional costing systems.

2 – Explain the relationship between activities, resources, and cost drivers.

3 – Explain the logic of activity based costing system.

4 – Describe how activities are identified.

5 – Identify the implementing steps of activity based costing.

6 – Compute product cost using activity based costing.

The Concept

Activity-Based Costing

	Tracing	
Direct Costs	→	**Cost objects**
	Allocation	
Indirect Costs	→ **Prod. Depts. Support Depts.** →	
	Step 1　　　　**Step 2**	

Traditional Costing Systems

1 - Direct labor
2 - Direct materials

are easy to trace to products.

3 - MOH cost

cannot be traced easily

must be assigned with estimates

Example: Consider the cost of a restaurant bill for four friends. Each orders separate entrees, desserts, and drinks. The restaurant bill is as follows:

	A	B	C	D	Total	Average
Entree	ID 2,000	ID 6,000	ID 3,500	ID 2,500	ID 14,000	ID 3,500
Dessert	0	ID 2,000	ID 500	ID 500	ID 3,000	ID 750
Drink	ID 500	ID 1,500	ID 1,250	ID 750	ID 4,000	ID 1,000
Total	ID 2,500	ID 9,500	ID 5,250	ID 3,750	ID 21,000	ID 5,250

What is the average cost per lunch ?

Undercosting and Overcosting Example

ID 21,000 ÷ 4 = ID 5,250

2,500   3,750   9,500

__A__ and __D__
are overcosted.

__B__ is
undercosted.

The average can lead to undercosting or overcosting of products:

Product undercosting: a product consumes a high level of resources but is allocated low costs per unit (B).

 Product overcosting: a product consumes a low level of resources but is allocated high costs per unit (A).

Mechanical service   **Electrical service**   **Body repairs**   **Paint service**

1
2
3

1
2
3

Auto repair and maintenance workshop

Provides 4 services:
1- Mechanical services
2 – Electrical services
3 – Repair of vehicle body services
4 – Paint services

3 Vehicles repaired during March, 2018:
- ❖ The first: mechanical and electrical services.
- ❖ The second: paint services.
- ❖ The third: mechanical, electrical, repair of body vehicles, and paint services.

- ➢ **During March, indirect costs for the workshop were ID 300,000.**

- ➢ **The workshop uses the direct labor as allocation base.**

- ➢ **Normal work capacity is 200 DLH for March.**

- ➢ **Direct labor hours used to repairs**
- ➢ **the three vehicles were 20, 10, and 30 DLH respectively.**

How ID 300,000 indirect costs can be allocated to the three vehicles?

Solution:

1 - Compute the allocation rate:
Allocation rate = ID 300,000 ÷ 200 DLH
                        = ID 1,500 per DLH

Indirect costs allocated to each vehicle:
First = ID 1,500 × 20 DLH   = ID 30,000
Second = ID 1,500 × 10 DLH = ID 15,000
Third = ID 1,500 × 30 DLH   = ID 45,000

ABC Definition:

Activity based costing: **is a costing system that assigns resource costs to cost objects such as products, services, or customers based on activities performed for the cost objects.**

1 - Costs of resources are assigned to activities based on the resource consumption drivers.

2 - costs of activities are assigned to cost objects based on activity consumption drivers.

Basic Terms

1 – Activity: is an event, task, or unit of work with a specified purpose.

Example:

- **Designing products - Setting up machines**

- Operating machines - Distributing products - Quality inspection   - Purchase orders

- Materials handling.

2 – Resource: is an economic element needed or consumed in performing activities: Salaries and supplies.

3 - Activity Cost Pool: is group of indirect cost allocated to a distinct type of activity.

4 - Cost Driver: any factor that has a direct cause-effect relationship with the resources consumed.
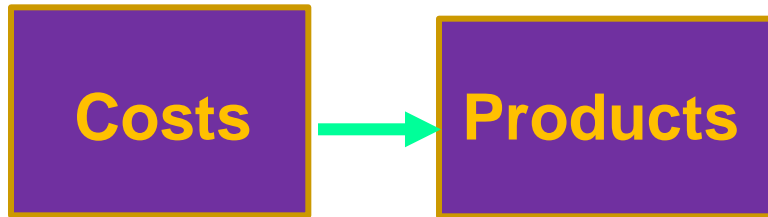
In ABC cost drivers are used to assign activity cost pools to products or services.

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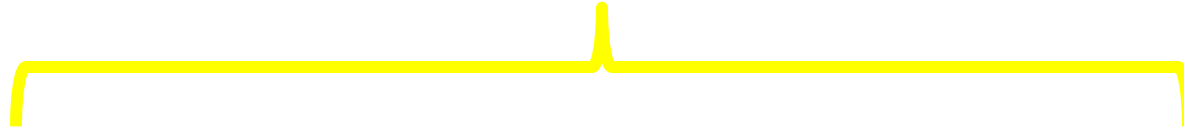
Cost Allocation

Traditional Costing Systems

One allocation base: DLH, MH

| Costs | → | Products |

ABC System

Using many cost drivers as allocation bases: one cost driver for each activity

| Costs | → | Activities | → | Products |

ABC allocates the indirect costs by two stages :


```
┌─────────────┐        ┌─────────────┐        ┌─────────────┐
│    Costs    │ ─────> │ Activities  │ ─────> │  Products   │
└─────────────┘        └─────────────┘        └─────────────┘
       └──── Resource consumption ────┘   └── Activity consumption ──┘
                cost drivers                    cost drivers
```

Resource consumption cost drivers

Activity consumption cost drivers
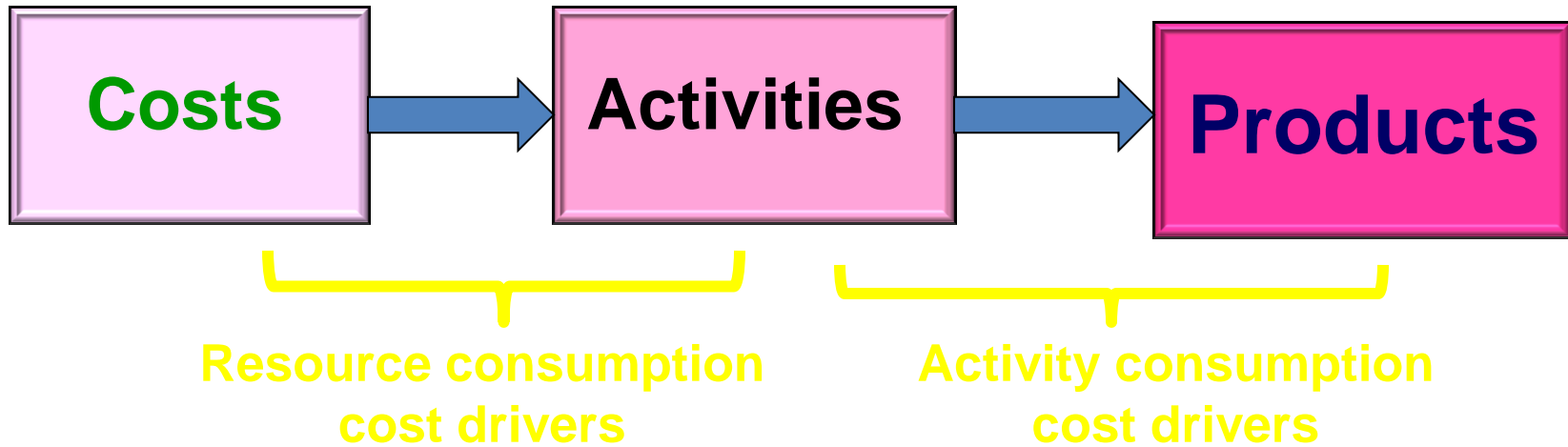
Allocation Stages

Steps of Computing Product Costs using Activity based Costing

Seven-steps:

Step 1: Identify the products that are the chosen cost objects.

Step 2: Identify the direct costs of the products.

Step 3: Select the activities and cost-allocation bases to use for allocating indirect costs to the product.

Step 4: Identify the indirect costs associated with each cost-allocation base.

Step 5: Compute the rate per unit of each cost-allocation base.

Step 6: Compute the indirect costs allocated to the products.

Step 7: Compute the total cost of the products by adding all direct and indirect costs assigned to the products

Overview of Activity-Based Costing System

Functions

Design

Setup

Shipment

Activities

No. of hours design

No. of workers

No. of shipments

Allocation base

Product 1

Product 2

Product 3

Cost objects

Advantages:

1 - ABC provides more accurate product costs.
2 – ABC improves the indirect costs control.
3 - ABC leads to better decisions such as pricing decisions and keep or drop decisions, and

Example

A company produces two types of watches: hand and mural. The following data is provided:

	Hand watch	Mural watch
Units produced	60,000	15,000
Direct materials	ID 1,125,000	ID 675,000
Direct labor	ID 600,000	ID 195,000
Indirect costs	ID 2,112,000	

Data to allocate the indirect costs are:

Activity	Allocation base	Indirect costs
Design	parts-square meter	ID 450,000
Machines setup	setup-hours	ID 300,000
Machines operations	Machine hours	ID 637,500
Shipment setup	shipments	ID 81,000
Distribution	cubic meter delivered	ID 405,000
Administration	Direct labor-hours	ID 238,500
Total		ID 2,112,000

Budgeted quantity of allocation bases is as follows:

	Hand	Mural	Total
No. of parts-square meter	30 meter	70 meter	100 meter
No. of setup	500 hrs	1,500 hrs	2,000 hrs
No. of Machine hours	9,000 hrs	3,750 hrs	12,750
No. of shipments	100 ships	100 ships	200 ships.
No. of cubic meter delivered	45,000 m3	22,500 m3	67,500 m3.
No. of direct labor-hours	30,000 hrs	9,750 hrs.	39,750 hrs.

Selling price:
 hand watch ID 60 per unit.
mural watch of ID 100 per unit.

Required: Compute cost per unit for each product

Solution

1- Calculate the activity rates:

Design = ID 450,000 ÷ 100 = ID 4,500 per m2

M. setup = ID 300,000 ÷ 2,000 mh. =ID 150 / mh

M. Operation = ID 637,500 ÷ 12,750 mh.= ID 50 / mh

Shipment = ID 81,000 ÷ 200 ships = ID 405 / ship

Distribution = ID 405,000 ÷ 67,500 m3 = ID 6 / m3

Administration= ID 238,500 ÷ 39,750 dlh.= ID 6 /hrs

2- Assign indirect costs to activities:

	Hand watch		Mural watch		Total
	No. all. base	Costs	No. all. base	Costs	
Design (ID 4,500)	30 m2	135,000	70 m2	315,000	ID 450,000
Setup (ID 150)	500 hrs.	75,000	1,500 hrs.	225,000	ID 300,000
Operating (ID 50)	9,000 hrs.	450,000	3,750 hrs.	187,500	ID 637,500
Shipment (ID 405)	100 ship	40,500	100 ship	40,500	ID 81,000
Distribution (ID 6)	45,000 m3	270,000	22,500 m3	135,000	ID 405,000
Administ. (ID 6)	30,000 hr	180,000	9,750 hrs	58,500	ID 238,500
Total cost allocat.	ID 1,150,500		ID 961,500		ID 2,112,000
÷ units produced	60,000 units		15,000 units		
In. cost alloc./ unit	ID 19.17		ID 64.10		

3 - Calculate product costs

	Hand watch 60,000		Mural watch 15,000	
	Total	Per unit	Total	Per unit
Direct material	1,125,000	18.75	675,000	45.00
Direct labor	600,000	10.00	195,000	13.00
Indirect costs		19.17		64.10
Cost per unit		ID 47.92		ID 122.10

Traditional costing systems

Allocation rate = ID 2,112,000 ÷ 75,000 units

= ID 28.16 per units

Cost allocated to:

Hand watch = ID 28.16 × 60,000 units= ID 1,689,600

Mural watch = ID 28.16 × 15,000 units= ID <u>422,400</u>

Total ID 2,112,000

Calculate product costs

	Hand watch 60,000		Mural watch 15,000	
	Total	**Per unit**	**Total**	**Per unit**
Direct material	1,125,00	18.75	675,000	45.00
Direct labor	600,000	10.00	195,000	13.00
Indirect costs	1,689,600	28.16	422,400	28.16
Cost per unit		ID 56.91		ID 86.16

Comparison between Traditional and ABC

Indirect costs allocated per unit	H. watch	M. watch
Traditional costs system	ID 28.16	ID 28.16
ABC	ID 19.17	ID 64,10

Cost per unit	H. watch	M. watch
Selling price	ID 60	ID 100
Traditional costs system	ID 56.91	ID 86.16
ABC	ID 47.92	ID 122.10

Thanks For Your Lessening

Requirement 1 — Summary journal entries for August

Entry (a): Purchase of direct materials

	Debit	Credit
Materials and In-Process Inventory Control	540,000	
Accounts Payable Control		540,000

Entry (b): Conversion costs incurred

	Debit	Credit
Conversion Costs Control	425,000	
Various accounts (e.g., Wages Payable, Accumulated Depreciation)		425,000

Entry (c): Completion of good finished units
(19,000 units × $42 = $798,000; DM = 19,000 × $24 = $456,000; Conversion = 19,000 × $18 = $342,000)

	Debit	Credit
Finished Goods Control	798,000	
Materials and In-Process Inventory Control		456,000
Conversion Costs Allocated		342,000

Entry (d): Sale of finished goods
(18,000 units × $42 = $756,000)

	Debit	Credit
Cost of Goods Sold	756,000	
Finished Goods Control		756,000

Requirement 2 — T-accounts

Materials and In-Process Inventory Control

Debit	Credit
(a) 540,000	(c) 456,000
Bal. 84,000	

Finished Goods Control

Debit	Credit
(c) 798,000	(d) 756,000
Bal. 42,000	

Conversion Costs Control

Debit	Credit
(b) 425,000	

Conversion Costs Allocated

Debit	Credit
	(c) 342,000

Cost of Goods Sold

Debit	Credit
(d) 756,000	

The solution :

1. Purchase of direct materials

Direct Materials Control $540,000
      Accounts Payable Control $540,000

Conversion costs Control $425,000
      other accounts $425,000

2. Completion of good finished units of product
   Finished product Control $798000
       Direct Materials Control $ 456000
       Conversion costs allocated $ 342000
       (24* 19000 = $4560000 , 18* 19000= $342000)
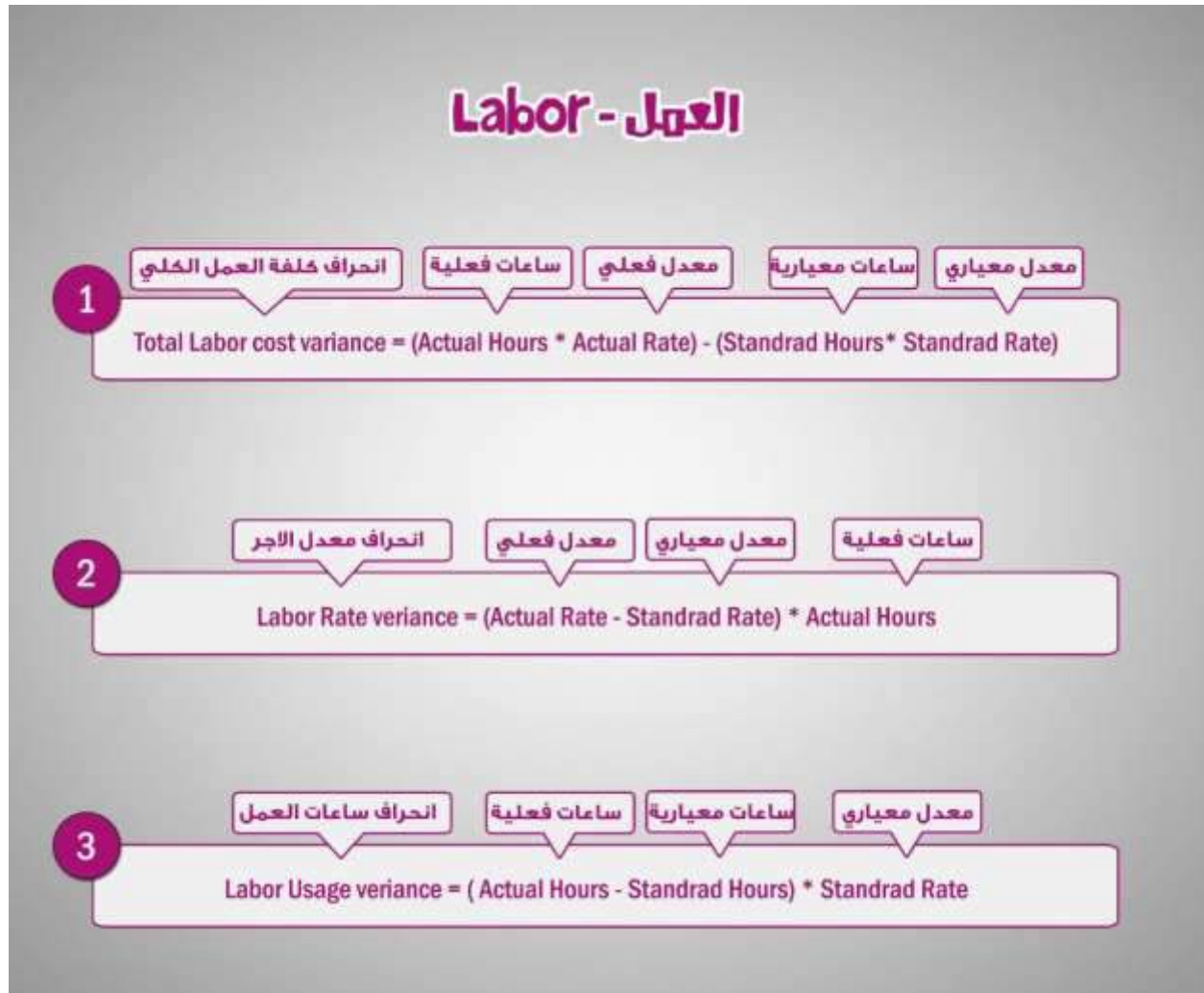   (24+18* 19000 = $798000)

3. Sale of finished goods

   Cost of Goods Sold $756000
       Finished product Control $756000
   (24+18*18000= 756000)

Direct Materials Control

Beginning balance	0	Finished product Control	$4560000
Accounts Payable Control	$540,000		
		Ending balance	84000
	$540,000		$540,000

Conversion costs Control

Other accounts	$425,000	Conversion costs allocated	$425,000
	$425,000		$425,000

Conversion costs allocated

Conversion costs control	$425,000	Finished product Control	$342000
		Cost of goods sold	$83000
	$425000		$425000

Finished product Control

Beginning balance	0		
Direct Materials Control	$4560000	Cost of goods sold	$756000
Conversion costs allocated	$$342000		
		Ending balance	$ 42000
	798000		798000

Cost of goods sold

Finished product Control	$756000		
Underallocated conversion costs	$83000		
	839000		839000

The direct labor variances

Labor - العمل

1 انحراف كلفة العمل الكلي | ساعات فعلية | معدل فعلي | ساعات معيارية | معدل معياري
Total Labor cost variance = (Actual Hours * Actual Rate) - (Standrad Hours* Standrad Rate)

2 انحراف معدل الاجر | معدل فعلي | معدل معياري | ساعات فعلية
Labor Rate veriance = (Actual Rate - Standrad Rate) * Actual Hours

3 انحراف ساعات العمل | ساعات معيارية | ساعات فعلية | معدل معياري
Labor Usage veriance = (Actual Hours - Standrad Hours) * Standrad Rate

من احراضات العمل احسب

Example 5 :- Compute the Labor variances from the

Page 9 :- أداء المعطاة المعلومات

information given below :-

للوحدة الواحدة الوقت المعياري

Standard time per unit   3 hours

للساعةالواحدة الأجر معدل المعياري

Standard rate of wages per hour   6 R.S

حجم الإنتاج الفعلي

Actual production   700 units

المستغرق الوقت الفعلي

Actual time taken   2,000 hours

الأجور الفعلية

Actual wages   14,000 R.S

الحل

Solution :-

① total Labor cost variance $= (AH * AR) - (SH * SR)$

$= (2,000 * 7) - (2,100 * 6)$

$= 14,000 - 12,600$

$= 1,400$ u

② Labor Rate variance $= (AR - SR) * AH$

$= (7 - 6) * 2,000$

$= 1 * 2,000$

$= 2,000$ u

(14).

③ Labor usage/efficiency variance $= (AH - SH) * SR$

$$= (2,000 - 2,100) * 6$$

$$= -100 * 6$$

$$= -600 \quad f$$

ملاحظات حول المثال 5 ٠

① نحتاج أن نستخرج معدل الأجر الفعلي للساعة كالآتي ٠

إجمالي الأجور الفعلية

$$AR = \frac{14,000}{2,000} = 7 \text{ R.S per hours}$$

الوقت الفعلي المستغرق

② نحتاج أن نستخرج ساعات العمل المعيارية لحجم الإنتاج الفعلي كالآتي ٠

$$SH = 700 * 3 = 2,100 \text{ hours}$$

حجم الإنتاج الفعلي ← ← الوقت المعياري للوحدة الواحدة

Date: / تمرين

Exercise 2:- Materials and manufacturing labor Variances

لشركة انظر تم جمعها للبيانات التالية

consider the following data collected for great homes, Inc.;

تضمن الكلفة		أجورتصنيع مباشرة Direct manufact. Labor	مواد مباشرة Direct materials
Cost incurred:-			
Actual inputs * Actual prices مدخلات فعلية سعر فعلي		$ 90,000	$ 200,000
Actual inputs * standard prices مدخلات فعلية سعر معياري		$ 86,000	$ 214,000
Standard inputs allowed for actual outputs * Standard prices لـ مسموحات المدخلات المعيارية حجم إنتاج فعلي سعر معياري		$ 80,000	$ 225,000

الانحرافات الكلية و الكفاية السعر احسب المطلوب

Required:- compute the price, efficiency, and total variances

أجور التصنيع المباشرة و المواد المباشرة لـ

for direct materials and direct manufacturing labor.

الحل

Solution:-

① Total materials cost variances = AC - SC

$$= 200,000 - 225,000$$

$$= -25,000 \ F$$

(20)

4

② Material price Variance = (AP − SP) ∗ AQ
= (AP ∗ AQ) − (SP ∗ AQ)
= 200,000 − 214,000
= − 14,000 f

③ Material usag/efficiency Variance = (AQ − SQ) ∗ SP
= (AQ ∗ SP) − (SQ ∗ SP)
= 214,000 − 225,000
= − 11,000 f

④ Total Labor cost Variance = AC − SC
= 90,000 − 80,000
= 10,000 u

⑤ Labor Rate Variance = (AR − SR) ∗ AH
= (AR ∗ AH) − (SR ∗ AH)
= 90,000 − 86,000
= 4,000 u

⑥ Labor usage\efficiency Variance = (AH − SH) ∗ SR
= (AH ∗ SR) − (SH ∗ SR)
= 86,000 − 80,000
= 6,000 u

Standard Costing
Computing and Analysis of direct labor Variances

Presented by
Assist.Prof. Karrar Alkhaldy
2020- 2021

Labour Variances

- <u>Total direct Labour Cost Variance</u>= *(*Actual hours *AH** Actual rate per hour *AR) - (*Standard hours for the actual output *SH** Standard rate per hour *SR)*

- *or* Actual direct labor cost *AC-* Standard direct labor cost *SC,*

- <u>Direct Labour Rate Variance</u> *=(* Actual rate per hour *AR-* Standard rate per hour *SR)** Actual hours *AH*

- <u>Direct Labour Usage/Efficiency Variance</u> *=(*Actual hours *AH-* Standard hours for the actual output *SH)** Standard rate per hour *SR*

Total Direct Labour Cost Variance

Direct Labour Usage/Efficiency variance

Direct Labour variance
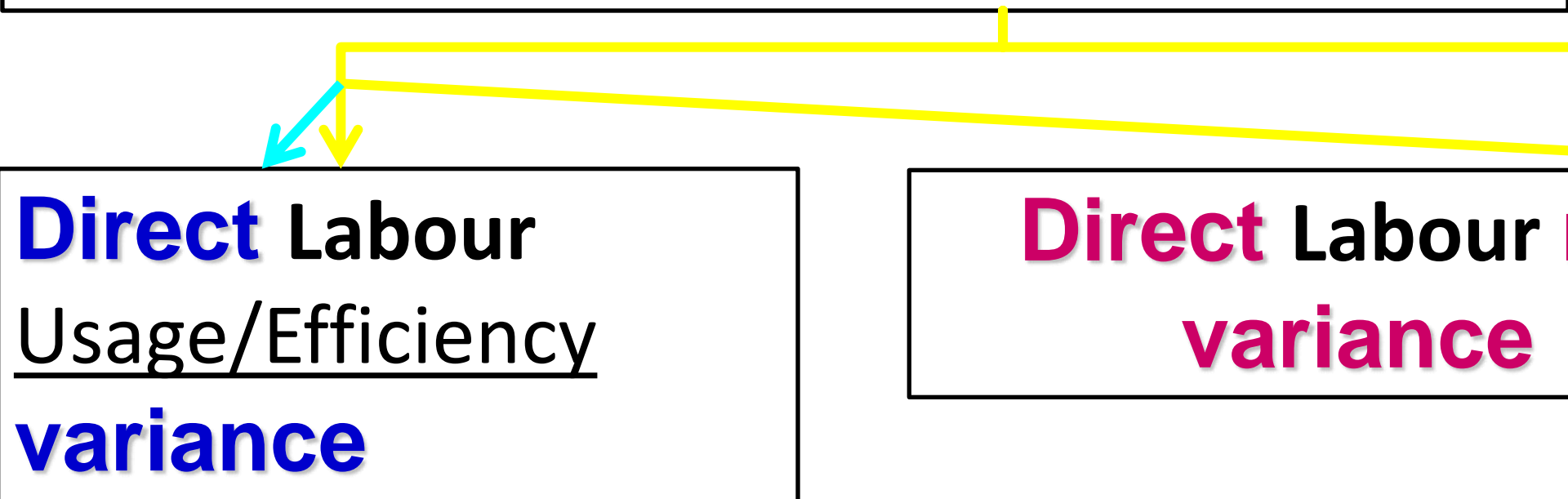
Practice Problem

A firm gives you the following data:

Standard time per unit 2.5 hours

Actual hours worked 2,000 hours

Standard rate of pay Rs. 2 per hour

25 % of the actual hours has been lost as idle time.

Actual output 1,000 units

Actual wages Rs. 4,500

Calculate all labour variances.

Solution

- <u>Total direct Labour Cost Variance</u>= *(*Actual hours *AH** Actual rate per hour *AR)* - *(*Standard hours for the actual output *SH** Standard rate per hour *SR)*

- *= $ 4500 – ((2.5 h *1000 units)****Rs. 2 per hour**

- = $ 4500- (2500 h*Rs. 2 per hour)

- = $4500 - $5000= $500 F. variance

- <u>Direct Labour Rate Variance</u> *=(* Actual rate per hour *AR-* Standard rate per hour *SR)** Actual hours *AH*

- *= (Rs. 2.25* **per hour-** h*Rs. 2 per hour)2000 h

- = $ 500 UNF. Variance

- <u>Direct Labour Usage/Efficiency Variance</u> *=(*Actual hours *AH-* Standard hours for the actual output *SH)** Standard rate per hour *SR*

- *=(2000 h- 2500 h)* **Rs. 2 per hour**

- **= $1000 F. variance**

Practice Problems

Compute the Labour variances from the information given below:

Standard time	3 hours per unit
Standard rate of wages	Rs. 6 per hour
Actual production	700 units
Actual time taken	2000 hours
Actual Wages	Rs. 14000
Idle time	50 hours

The solution

- <u>Total direct Labour Cost Variance=</u> *(*Actual hours *AH** Actual rate per hour *AR) - (*Standard hours for the actual output *SH** Standard rate per hour *SR)*
- *= \$ 14000 – ((3 h *700 units)****Rs. 6 per hour**
- = \$ 14000- (2100 h*Rs. 6 per hour)
- = \$14000 - \$12600= \$1400 UNF. variance
- <u>Direct Labour Usage/Efficiency Variance</u> *=(* Actual rate per hour *AR-* Standard rate per hour *SR)** Actual hours *AH*
- *= (Rs. 7* **per hour-** h*Rs. 6 per hour)2000 h
- = \$ 2000 UNF. Variance
- <u>Direct Labour Rate Variance</u> *=(*Actual hours *AH-* Standard hours for the actual output *SH)** Standard rate per hour *SR*
- *=(2000 h- 2100 h)* **Rs. 6 per hour**
- **= \$600 F. variance**

Labor Efficiency Variance- Causes

Poorly trained workers

Poor quality materials

Unfavorable Efficiency Variance

Poor supervision of workers

Poorly maintained equipment