## PROJECT MANAGEMENT FOR PROJECT MANAGERS

# Lesson 4: Project COST Management



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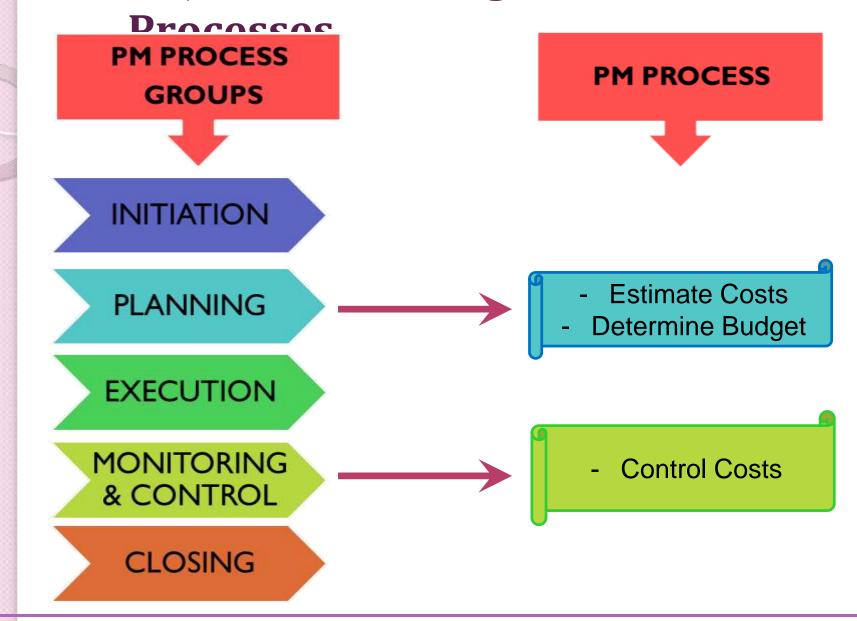
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## 4.1: Definition

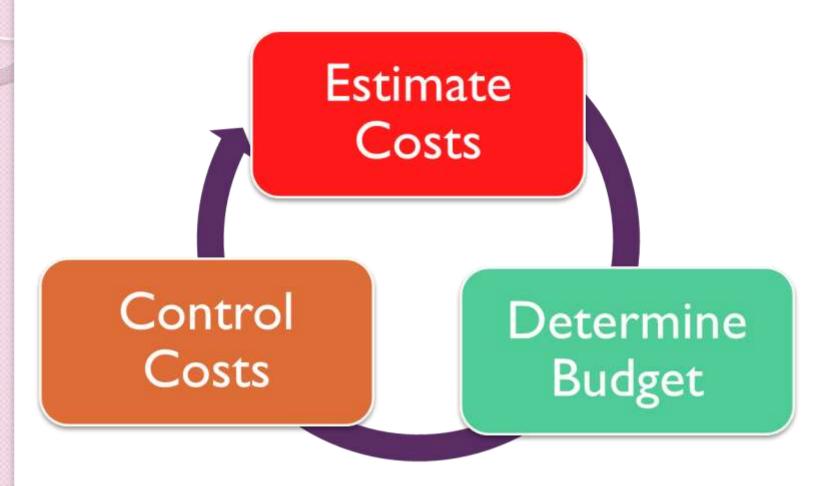
- Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange. It is usually measured in monetary units.
- Project Cost Management
   describes the processes involved in
   planning, estimating, budgeting and
   controlling cost to ensure that the project
   is completed within the approved budget.

### 4.2: Project Cost Management





## .....Project Cost Management Processes (Cont.)





#### 4.3: Project Cost Management -

### **Overview**

## **Project Cost Management**

#### **Estimate Costs**

- Scope Baseline
- √ Project Schedule
- √ HR Plan
- √ Risk Register
- ✓ Enterprise
  Environmental
  Factors
- ✓ Organizational Process Asset
- ✓ Tools and Techniques
- √ Expert Judgment
- ✓ Analogous Estimating
- ✓ Parametric Estimating
- ✓ Bottom-up
- Estimating 
  √ Resource Cost
- Rate

  Vendor Bid
- ✓ vendor Bio Analysis
- √ Cost of Quality

#### √ Output

- ✓ Activity Cost Estimates
- √ Basis of estimates
- √ Project Document

#### **Determine Budget**

#### √ Inputs

- √ Activity Cost Estimates
- √ Basis of Estimates
- √ Scope baseline
- √ Project Schedule
- √ Resource Calendars
- √ Contract
- ✓ Organizational Process Asset

#### √ Tools and Techniques

- √ Expert Judgment
- √ JKR Standard Schedule of Rates
- √ JKR Reference Guide On Cost per Area for Different Types of buildings
- √ JKR Rate Online
- √ Building Elemental Cost Analysis

#### ✓ Outputs

- √ Cost Performance baseline
- ✓ Project Funding Requirement
- ✓ Project Document Updates

#### **Control Costs**

- √ Project Management Plan
- ✓ Project Funding Requirement
- √ Work Performance Information
- ✓ Organizational Process Assets

#### √ Tools and Techniques

- √ Earned Value Management
- ✓ Forecasting
- √ To-complete Performance Index (S-curve: Schedule vs Actual)
- √ Performance Review
- √ Variance Analysis
- ✓ Project Management Software

#### √ Outputs

- ✓ Work Performance Measurements
- √ Budget Forecast
- ✓ Organizational Process Assets Update
- √ Change Request
- ✓ Project Management Plan Updates
- √ Project Document Updates

## 4.4: Estimate Costs

- Involves developing approximation of the cost of the resources to complete each scheduled activity
- Remember, estimation always involved RISK!!!
- Something unforeseen
- Something that may occur in the future
- Cost involve in resolving/mitigating the risk.



## 4.4.1: Basic Tools and Techniques

- Analogous
- Bottom-up
- Parametric
- Resource Cost Rates
- Vendor Bid Analysis
- Expert Judgment



## **Analogous**

- Based on historical cost data/information of similar project.
- Suitable for project using standard design.
- E.g. Cost of school block previously



### Bottom-up

- Based on breakdown of work i.e. work items/component
- E.g. A project maybe broken down into item such as:
- a) Preliminaries
- b) Substructures
- c) Buildings
- d) M&E Works
- e) External works etc.
- Cost of component may be derived from:
  - a) cost per sq. meter of building
  - b) percentage allowances for:
    - i) M&E
    - ii) Preliminaries
    - iii) External Works



### **Parametric**

- Based on characteristic of a project
- **♦** E.g.:
- A hospital project may be estimated based on cost per bed
- A school project may be estimated based on cost per classroom





## **Resource Cost Rate**

- Rates are build up based on resources required to do the job
- E.g. For concreting, the rates are built up from the cost of material (cement, sand etc.), cost of plants and equipment, cost of labour, cost of profit, overhead and expenses.

### **Vendor Bid Analysis**

- Rates are analyzed based on quotation or tenders from vendors.
- The average or the mean of the quotation/tender will be the cost estimate.
- Average will be used if there is no big difference in rates among the vendors.
- Mean will be used if one of the vendors is deemed to have quoted out of the normal range.



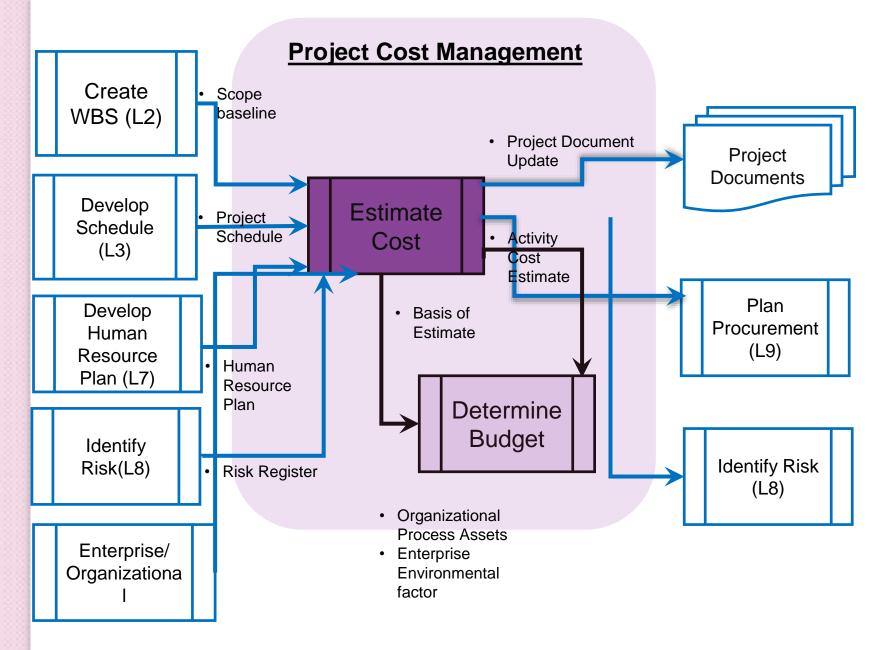


Figure 4.1: Estimate Cost Data Flow Diagram

## 4.4.2: Estimate Cost

**Example In JKR** 



	HEAD	SUB-HEAD	YEAR 2008	i		. PROVIS	SION R CONSTE	RM SUCTION	*******
	BRIEF D	ESCRIPTION O	F BUILD	INGS					
1	В	UILDING	Frame	₩all	Roof	Floor	Ceiling	Vindov	Standard
+	New Block	k of Hostel	RC	BK	M.D	VT, HT, CR	MFB,PGC,PF	CSMT,LV	Normal
1		Lecture Hall	RC	BK	M.D	VT, HT, CR			Normal
7	New Facu	lty For Science And	RC	BK	M.D	VT, HT, CR	MFB,PGC,PF		Normal
1	New Facu	lty For Management	RC	вк	M.D	VT, HT, CR	MFB,PGC,PF	CSMT,LV	Normal
+	New Centi	e For Foundation S	RC	BK	M.D	VT,HT,CR	MFB,PGC,PF	CSMT,LV	Normal
1									
	PRELIMIN	JARIES							33 <b>728300</b> 0
1	PILING/SF Type/size	PECIAL FOUNDATI	ON						5,439,000.0
7	BUILDING	•	Drawin	na No.	Floor	Area M2	Cost / M2		38;258,960:0
1		k of Hostel	214111	ig 140.	1	18,354.00	910.00		16,702,000.0
1		Lecture Hall			<del>                                     </del>	5,606.90	1,650.00		9,251,000.0
7		lty For Science And				5,276.83	830.00		4,380,000.0
1		lty For Management				2,431.91	830.00		2,018,000.0
1		e For Foundation S				4,707.17	830.00		3,907,000.0
+								•	•
1		LSERVICES							<b>14</b> ,500,900.0
_	Electrical '		l						14,500,000.0
_	Mechanic		J						
+	Sanitary A	ppliances (Incld. in b	ldg)						
#									
1									
+									
+									
1									
	HEHDTOTA	AL carried forward							65,923,000.0



## 4.5: Determine Budget

- Allocating the project cost estimate to individual work item and providing a cost baseline
- E.g. RM 2.1 million was allocated for Land
   Acquisition out of the total cost estimate for a project for budgeting purpose. Similarly, appropriate budget were allocated to other components of the project.

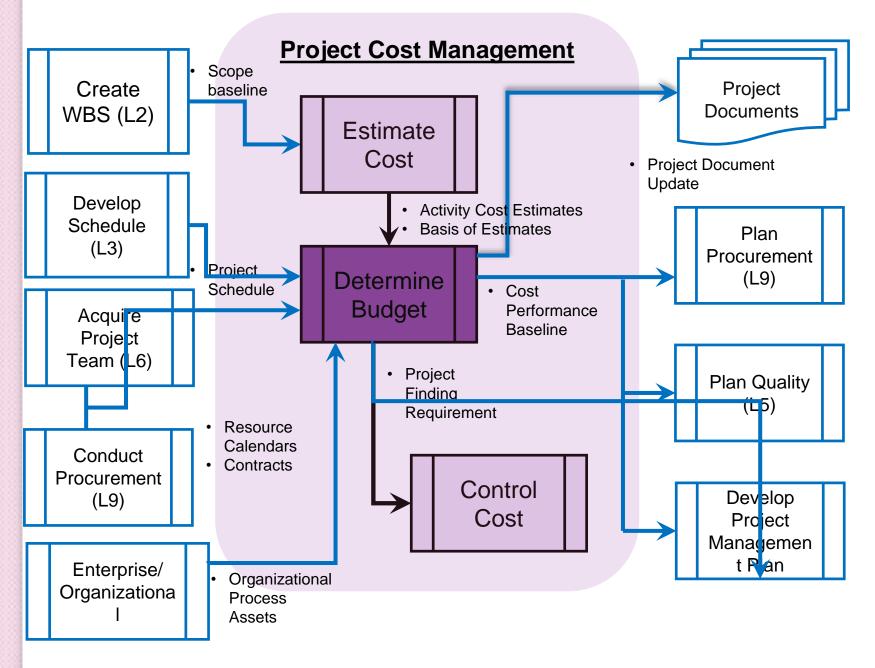


Figure 4.3: Determine Budget Data Flow Diagram

## 4.5.1: Determine Budget

**Example In JKR** 



#### JABATAN KERJA RAYA

AS TENDERED DETAILED ABSTRACT FOR \*\*\*\*\*\*\*\*\*\* Total Amount of Main Tender: Contractor for Main Works Class А Head Sub/Head Year Total Provision ############ Closing Date of Tender Tender Valid Until PFI 7 2008 \*\*\*\*\*\*\*\*\*\*\* Prov. for Construction 22/05/2008 22/11/2008 Competitive Tender List Contract Period: Tender 99 WEEKS Tender Sum (RM) Tender No. Tender Sum (RM) No. 2/12 89.918.397.84 57,129,890.25 5/12 Type of Contract: Design & Build 6/12 73.814.771.00 12/12 90.479.569.39 Form of Contract: PWD Form DB/T - Rev. 2007 11/12 78,578,896.51 96,276,132.88 Basis of Tender: Open Tender 9/12 4/12 78,831,649.00 96,800,000.00 No. of Tender Received: 7/12 12 3/12 86,184,616,76 10/12 98,643,602.00 8/12 89,195,096.80 (Disgualified) 1/12 BRIEF DESCRIPTION OF BUILDINGS BUILDING ₩all WindowStandard Roof Floor Frame Ceiling Blok Akademik RC/PCM Bk/PCM/PF AL/Co.T Con./PCM/CT/HT AL/AB CSMT Normal Blok Asrama Satu (1) Blok Asrama 4 Bilik (1000 Pelajar) RC/PCM Bk/PCM/PF AL/Co.T Con./PCM/CT/H CSMIT Normal T/AB Ь. Dewan Makan RC Bk/PF AL/Co.T Con./CT/HT T/AB CSMT Normal PRELIMINARIES & DESIGN & BUILD 13,403,500,00 Being 18.36 % of Remainder of Main Tender **ELEMENT** PILING/SPECIAL FOUNDATION 3.173.149.60 Unit Quantity Unit Cost m2 30,182.00 105.13 R.C. Piles - 150mm x 150mm, 200mm x 200mm, Micropile - 250mm & Spun Piles - 350mm Floor 3 BUILDING 39,491,407.85 Drawing No. Cost/m2 Vol.m3\* Cost/m3\* Area m2 18,213,423.30 SA/PRE/2008/WDB1 and series Blok Akademik 13,723.00 1,342.00 Blok Asrama SA/PRE/2008/WDB1 and series Satu (1) Blok Asrama 4 Bilik (1000 Pelajar) **}** 16,459.00 1.073.15 SA/PRE/2008/WD-DW and series Dewan Makan Bangunan Sokongan 215,000.00 SA/PRE/2008/WD-RP and series SA/PRE/2008/WD-RT and series Build In & Loose Furniture. Acoustic Treatment To Lecture Hall Loose Furniture, Office System & Signage SA/PRE/2008/WDB1 and series (Prov. Sum) 2,000,000.00 Built In Furniture/Acoustic Treatment 1,400,000.00 Maintenance for building is under item 6.a



## 4.6: Control Costs

#### Includes:

- Monitoring cost performance
- Ensuring that only appropriate project changes are included in a revised cost baseline.
- Informing project stakeholders of authorized changes to the project that affect costs





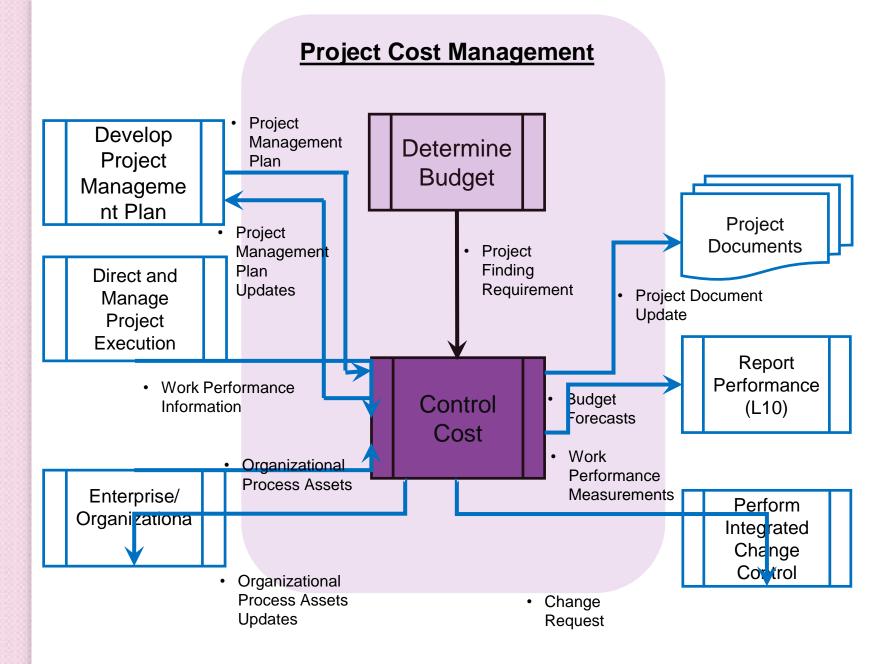


Figure 4.4: Control Cost Data Flow Diagram

## 4.6.1: Control Costs

**Example In JKR** 



#### EXAMPLE: COST PROJECTION Vs ACTUAL COST

#### Butiran Kewangan Unjuran Untuk Tahun 2010

Jumlah Unjuran : RM 60,194,809.10

No.	Bulan	Unjuran Asal Bulanan (RM)	Unjuran Asal Kumulatif (RM)	% Unjuran Asal Kumulatif / Kos Kontrak Asal	Unjuran Semasa Bulanan (RM)	Unjuran Semasa Kumulatif (RM)	% Unjuran Semasa Kumulatif / Kos Kontrak Semasa	Nilai Kerja Kumulatif (RM)	% Nilai Kerja Kumulatif / Kos Kontrak Semasa
1	Januari	802,628.56	13,647,672.82	15.33	802,628.56	13,647,672.82	15.21	12,874,218.46	14.35
2	Febuari	2,909,833.34	16,557,506.16	18.60	2,909,833.34	16,557,506.16	18.46	13,676,847.02	15.25
3	Mac	4,442,493.84	21,000,000.00	23.60	4,442,493.84	21,000,000.00	23.41	16,586,680.37	18.49
4	April	4,040,000.00	25,040,000.00	28.13	4,040,000.00	25,040,000.00	27.91	21,484,816.42	23.95
5	Mei	5,450,000.00	30,490,000.00	34.26	5,450,000.00	30,490,000.00	33.99	22,422,416.80	25.00
6	Jun	7,120,000.00	37,610,000.00	42.26	7,120,000.00	37,610,000.00	41.93	23,371,735.19	26.05
7	Julai	14,570,000.00	52,180,000.00	58.63	14,570,000.00	52,180,000.00	58.17	28,318,364.89	31.57
8	Ogos	10,870,000.00	63,050,000.00	70.84	10,870,000.00	63,050,000.00	70.28	30,414,016.74	33.90
9	September	10,492,155.56	73,542,155.56	82.63	10,492,155.56	73,542,155.56	81.98	34,352,484.59	38.29
10	Oktober	10,333,243.16	83,875,398.72	94.24	- 29,760,429.55	43,781,726.01	48.81	43,781,726.01	48.81
11	November	5,124,601.28	89,000,000.00	100.00	7,161,544.54	50,943,270.55	56.79	47,610,339.50	53.07
12	Disember	0.00	89,000,000.00	100.00	9,251,538.55	60,194,809.10	67.10	50,943,270.55	56.79



JKR-KPK (Pind. 1/2008)

#### KERAJAAN MALAYSIA JABATAN KERJA RAYA

PERMOHONAN UNTUK MENDAPAT KELULUSAN PERUBAHAN KERJA NO.: 2

#### A. BUTIR-BUTIR KONTRAK

- Tajuk Kontrak:
- 2. Harga Kontrak Asal: RM 73,814,771.00
- 3. Tarikh Milik Tapak Asal: 2hb Januari 2009
- 4. Tarikh Siap Asal/Dilanjutkan: 21hb Mei 2010
- Kemajuan Kerja Semasa: 23%

#### B. MAKLUMAT - PERUBAHAN KERJA

- 1. Huraian Perubahan Kerja: Pengalihan paip dan perubahan STP daripada 900 PE kepada 1600 PE
- Nilai Anggaran Perubahan Kerja: RM 699,985.56 (Butir-Butir Pengiraan Disertakan)
- 3. Punca-Punca Perubahan Kerja:

Pengalihan paip dan perubahan STP daripada 900 PE kepada 1600 PE

#### C. NILAI DAN PERATUS KPK TAMBAHAN

(i) Jumlah Bersih KPK Semasa\* : RM 2,015,815.65 Peratus: 2,73 % (ii) Nilai Perubahan Kerja ini : RM 699,985,56 Peratus: 0,94 %

Jumlah Keseluruhan KPK Tambahan [(i) + (ii)] : RM 2,715,801.21 Peratus: 3.67 %

Nota: Kesemua peratusan di atas adalah nilai peratusan daripada harga kontrak asal

#### D. PERAKUAN PENGARAH PROJEK / PEGAWAI PENGUASA / WAKIL P.P.

Adalah dengan ini saya memperakukan bahawa kerja yang dihuraikan di atas:

- adalah benar-benar perlu dilaksanakan. Projek ini adalah projek di bawah PFI dengan siling peruntukan sebanyak RM 80 juta.
- kerja ini dilaksanakan di dalam kawasan UPNM dan tapak asal perlu diubah ke lokasi alternatif bagi mengambilkira masalah persempadanan UPNM dengan Kem Sungai Besi.
- (iii) kerja-kerja ini tidak boleh dilaksanakan secara tender atau sebut harga berasingan.
- (iv) pada asasnya skop dalam kerja perubahan ini memang telah termasuk di dalam brif asal projek.
- (v) semua kehendak lain di bawah A.P.202 dipatuhi

Pengarah Projek/Pegawai Penguasa/Wakil P.P.

Tarikh:





#### **Example: Adjustment of Contract Sum for Approved Change Requests**

LAWITIKANE

JKR-PHK (Pind. 1/2008)

#### KERAJAAN MALAYSIA JABATAN KERJA RAYA PERAKUAN PELARASAN HARGA KONTRAK PHK NO.

Nama	Kontraktor:									
Alamat	t Kontraktor:									
Tajuk	Kontrak:									
No. Kontrak:										
1.	Pelarasan I	Harga berikut telah dibua	at menurut Syarat-syara	at Kontrak.						
	Jenis/Tajuk	/Huraian Pelarasan:								
2.	menjadi T	ambahan/Potongan* se	ebanyak Ringgit Mala	g dikepilkan bersama ini dan akan iysia						
(RM) kepada harga dan bayaran atas Kontrak kepada tuan. Der jumlah bersih terkumpul pelarasan-pelarasan harga PHK No. 1 hingga dan termasuk ialah RM										
3.	Sila akui pe	nerimaan Perakuan ini.								
		an Pegawai Penguasa /		Tarikh:						
Saya / K	ami yang ber	tandatangan di bawah ir	ni mengakui penerimaar	n Perakuan di atas.						
			-							
	 Fandatangan	Kontraktor		arikh:arikh:arikh:arikh:arikh:						
	randatangan	TOTAL GRADI		ama dan cop cyaniar .						
s.k.		Kanan Cawangan JKR, Kuala Lumpur								
-		Cawangan JKR, Kuala Lumpur								
-	Pengarah J	KR Negeri								
-	Juru Ukur E	Bahan								



## 4.7: Cost Closure In JKR

Preparation of final account to determine the final cost of the project, taking into consideration the followings:

### **E**.g.:

- a)Previous payment made
- b) Variation Orders
- c)LAD
- d)Outstanding debts owing
- e)Adjustment of advance payment





## 4.7.1: Cost Closure

**Example In JKR** 



#### **Example: Final Account**

	JA	ERAJAAN MALAYSIA BATAN KERJA RAYA		JKR 66A (Pin. 2/1959)
PEDI	PERAKUAN AK NTUKAN PENBANGUNAN:	AUN DAN BAYARAN I		UTIRAN:
	K KERJA	mrate ob.		
	DAN ALAMAT RAKTOR:			
NO 1	ONTRAK:			
	SA ASAL KONTRAK :			RM
	AH BERSIH TAMBAHAN/POTONGA	M#-		RM
3100	A MUKTAMAD KONTRAK :	100		N
HARC	MORTAMAD KONTRAK:			RM
A. E	UTIR-BUTIR JUMLAH POTONGANI	CURANGAN:		
	1. Bayaran Interim Terdahulu No	hingga No		RM
	<ol> <li>Bayaran Wang Pendahuluan.</li> <li>Fotongan lain jika ada.</li> <li>Gantirugi Tertentu Dan Ditetapi</li> </ol>			RM
	b) Kerja Membaiki Kecacatan		a Han	RM
	<ul> <li>Surcharge 10% untuk kerja seb</li> <li>BAYARAN MUKTAMAD DI BAWAH I</li> </ul>			RM RM
B. S	aya dengan ini memperakukan bay	yaran muktamad di ba	ıwah ini berju	umlah Ringgit Malaysia
- 50	) menunjukkan ba	aki muktamad di bawa	ah kontrak ad	lalah patut dan kena di
b	ıyar oleh kerajaan seperti berikut:			
1	Kontraktor utama	3	esa.	
	(i) Nilai kerja dan amaun-amaun (ii) Pelepasan Deposit Wang Jan	ninan Pelaksanaan 📙		RM
2			MPIRAN 'A'	RM
3	@ RM selama Hari	nu ban bitetapian		RM
	JUNLAH BAYARAN	MUKTAMAD		FOM
y	kuan Statutori atau Perakuan yang ang dikehendaki dibawah Fasal 48 (	ditandatangani oleh at (d) Syarat syarat kontra	au bagi pihak ak telah diken	k Ketua Pengarah Buruh nukakan oleh kontrktor.
7	arikh:	(Pega	wai Penguasa	1)
•	Tambahan / Potongan yang telah dilulu	ıskan seperti Penyata Pı	elarasan Harga	Kontrak

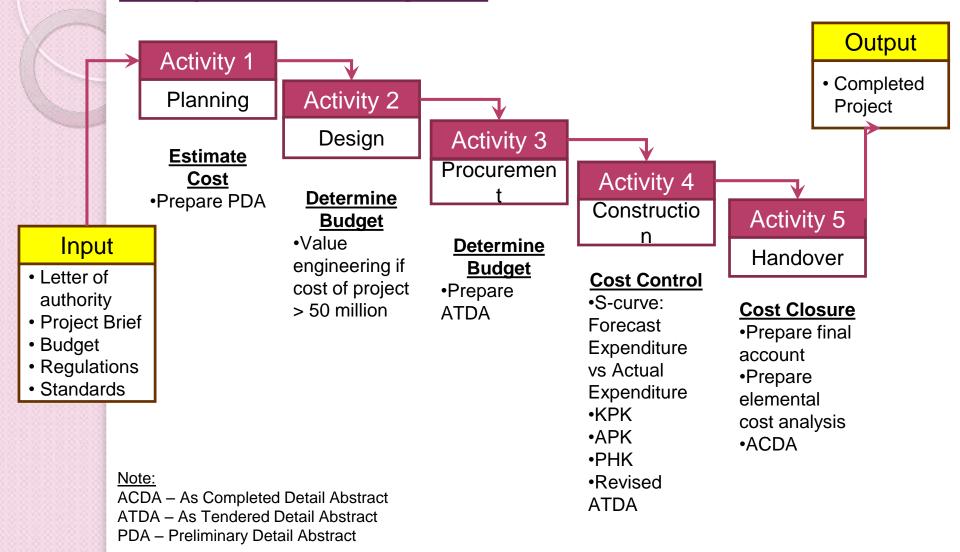


#### Example : ACDA

_	JABATAN KERJA RAYA										
Δ	S COMPLETED DETAILED AE						lain Tender	- BM		_	
ľ	3 COMPLETED DETAILED AL	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ACT TO	•						Class	
l											
					Date of Possession of Site				pletion		
					Original Contract Period						
			Extension of Time (if any)								
Head Sub/Head Year Total Prov. RM Prov. for Cons RM					Amour	nt of L&A Da	amages (if a	any)			
H	BRIEF DESCRIPTION OF BU		NGS		<u> </u>						
⊢	BUILDING	-	Frame	\ \	√all	Roof	Floor	Ceiling	Window	Standard	
а								_			
Ь		-									
0 -											
d e		-+									
f											
Γ	PRIME COST AND PROVISIONAL SUMS										
	ITEM				ALLOWED RM A					ACTUAL RM	
а Ь											
0											
В											
e f											
9											
h				-:-:-:-	1-1-1-1-		-1-1-1-1-1-1		1-1-1-1-1-1-	1-1-1-1-1-1-	
	BREAKDOWN OF COST	COS	ST RM								
	PRELIMINARIES			Being		% of Ren		Main Tend			
2	PILING/SPECIAL FOUNDATION Type and Size				Unit Quar		Quant	ntity Unit		: Cost	
а Ь											
-											
Г							Floor	0			
3				Di	awing N	lo.	Area m2	Cost/m2	Vol.m3*	Cost/m3*	
а Ь											
О											
4		_									
e f											
ġ											
	SUBTOTAL carried forward		_								



## 4.8: Project Cost Management in JKR Project Life Cycle





## 4.9: Exercise



## **EXERCISE 1**

 a) Using the project cost management table, identify the resources required to execute the Soil Investigation Works

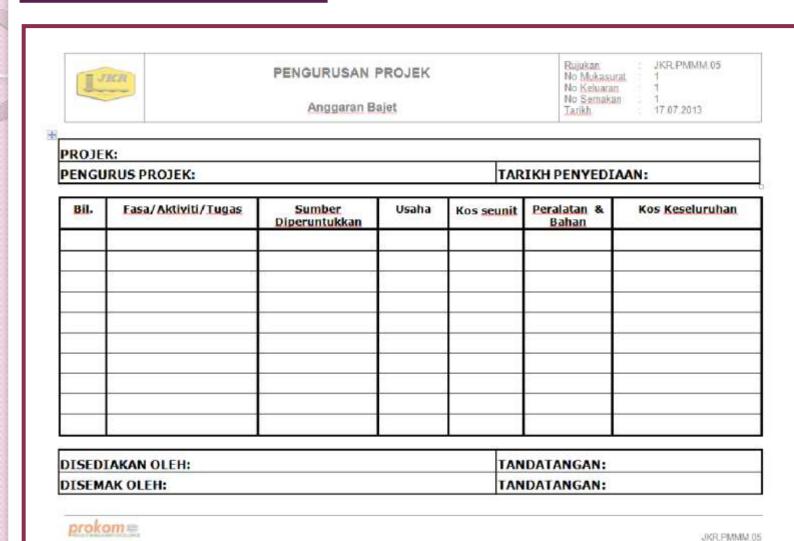
(15 minutes)

 b) Using the same template, prepare the project cost budget based on the information provided.

(15 minutes)



## Project Cost Management Table: Estimate Costs





## **Resource Planning**

#### **Example: (Project: Competency Development)**

1.0 specialist salary 2.0 Staff a) J54 b) J52 c) J48 d) J41	1 x RM 1 x RM 1 x RM 2 x RM 2 x RM	70,000.00 x 9,000.00 x 7,000.00 x 5,000.00 x 3,000.00 x	20 /Month 20 /Month 20 /Month	= R = R	280,000.00 M 180,000.00 M 140,000.00 M 200,000.00 M 120,000.00
3.0 Workshop					
Nos of people attend	10 x RM	250.00			M 2,500.00
Fesilitator	4 x RM	200.00 x	8 /Jam		M 800.00
Venue	2 x RM	500.00			M 1,000.00
Refreshment	14 x RM	50.00		= R	M 700.00
4.0 Meeting	10 x RM	350.00		= R	M 3,500.00
5.0 Documentation Submission	5 x RM	2,500.00		= R	M 12,500.00
6.0 Training					
a) Top Management	1 x RM	15,000.00		= R	M 15,000.00
b) Project Team	4 x RM	1,000.00		= R	M 4,000.00
c) Project Manager	1 x RM	10,000.00		= R	M 10,000.00
d) JKR's Profesional	2 x RM	3,000.00		= R	M 6,000.00
e) JKR's Supporting Staff	2 x RM	6,000.00		= R	M 12,000.00
			TOTAL	= <u>R</u>	M 988,000.00



## EXERCISE 2

 Using project cost management table, analyze the case study given for Control Costs.

(15 minutes)



## Project Cost Management Table: Project Budget



Bajet/Kewangan

#### PENGURUSAN PROJEK

Bajet Projek

Rujukan : JKR PMMM.23

No Mukasurat No Keluaran No Semakan

Tarikh : 17.07.2013

Kos Dijangkakan

PROJEK:	
PENGURUS PROJEK:	TARIKH PENYEDIAAN:

Kos Hingga Tarikh Terkini

	1000100E	/ Kewangan		KO3 I	myya tatiki	ti asansina	Kos Dijangkakan			
Bil.	Bajet Diluluskan	Perubahan Diluluskan	Bajet Keseluruhan	Bayaran	Tambahan Kos Yang Diperlukan	T/Jawab Keseluruhan	Bajet Untuk Siap kerja	Unjuran Bajet Untuk Siap Kerja	Perbezaan Bajet	

DISEDIAKAN OLEH:	TANDATANGAN:
DISEMAK OLEH:	TANDATANGAN:



JKR.PMMM.23



## **4.10 Summary**

- Project Cost Management is primarily concerned with the cost of the resources needed to complete project activities.
- JKR has established processes, tools and techniques for project cost management.
- Control Costs is important to be implemented to ensure project is completed within budget.

## THANK YOU

