NETWORKS, PERT AND CPM EXERCISE SOLUTION

DESCRIPTION

This document summarizes the answers to the exercise so that students can evaluate their work by comparing their answers to the ones in this document.

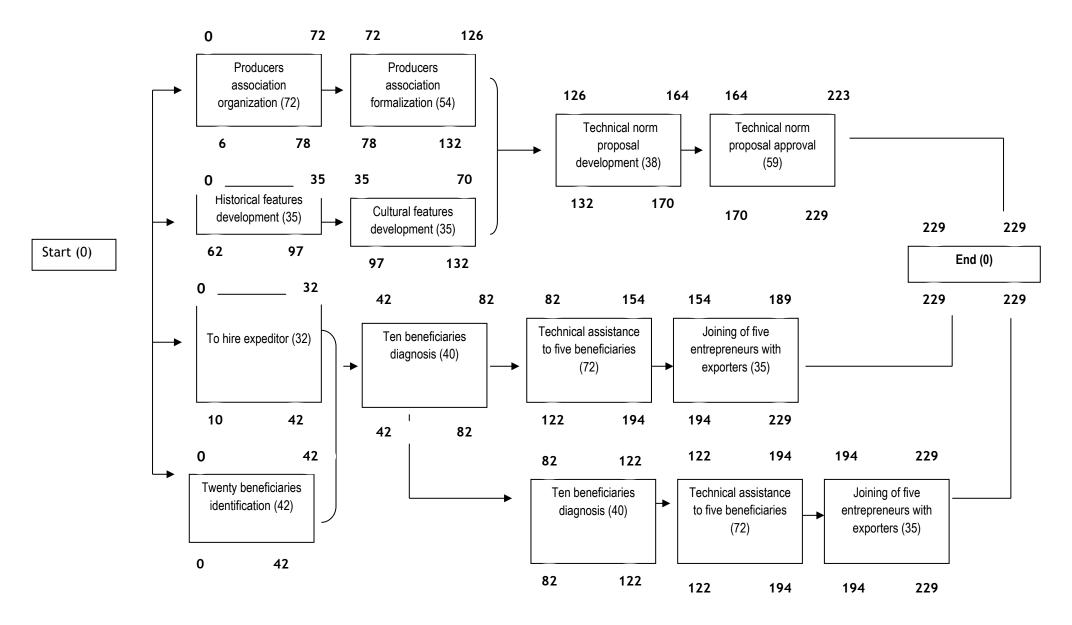
1. Gantt diagram (notice that there are no dependencies shown on a Gantt diagram)

#	Title	Given Planned Expected Start Expected End Q1 / 201 Q2 / 2013		3	Q3 / 2013			Q4 / 2013			Q1 / 2014			Q2 / 2014						
		Duration			03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06
0	☐ PERT, CPM EXERCISE		01/07/13	03/06/14		P	PERT, CPM EXERCISE													-
1	Start		01/07/13	01/07/13				Start <	>											
2	Producers asociation organization	70 days	01/07/13	04/10/13	Pro	ducers aso	ciation orga	nization	70 days											
3	Historical features development	33 days	01/07/13	14/08/13	F	Historical fe	atures deve	lopment	33 days											
4	To hire expeditor	30 days	01/07/13	09/08/13			To hire e	xpeditor	30 days											
5	Twenty beneficiaries identification	40 days	01/07/13	23/08/13	Twe	enty benefic	iaries identi	fication	40 days											
6	Producers asociation formalization	51 days	16/10/13	25/12/13					Producers	asociation	formalizatio	n 51 d	ays							
7	Cultural features development	33 days	16/08/13	01/10/13			Cultu	ıral features	developme	nt 33 d	lays									
8	Technical norm proposal development	38 days	01/01/14	21/02/14							Technic	al norm pro	oposal devel	opm ent	38 days					
9	Technical norm proposal approval	54 days	03/03/14	15/05/14									Tec	hnical norr	m proposal	approval	54 days			
10	Ten beneficiaries diagnosis	40 days	02/09/13	25/10/13				Ten be	neficiaries di	agnosis	40 days									
11	Techinical assistance to five beneficiaries	70 days	01/11/13	06/02/14					Techinical	assistance	to five bene	ficiaries	70 days							
12	Joining of five entrepreneurs with exporters	35 days	17/02/14	04/04/14								Joinin	g of five ent	epreneurs	with expo	rters 35	days			
13	Ten beneficiaries diagnosis	40 days	01/11/13	26/12/13						Ten be	neficiaries d	agnosis	40 days							
14	Techinical assistance to five beneficiaries	70 days	01/01/14	08/04/14							Techinical	assistance	to five bene	ficiaries	70 days					
15	Joining of five entrepreneurs with exporters	35 days	16/04/14	03/06/14										Joining	of five ent	repreneurs	with exporter	35 d	ays	

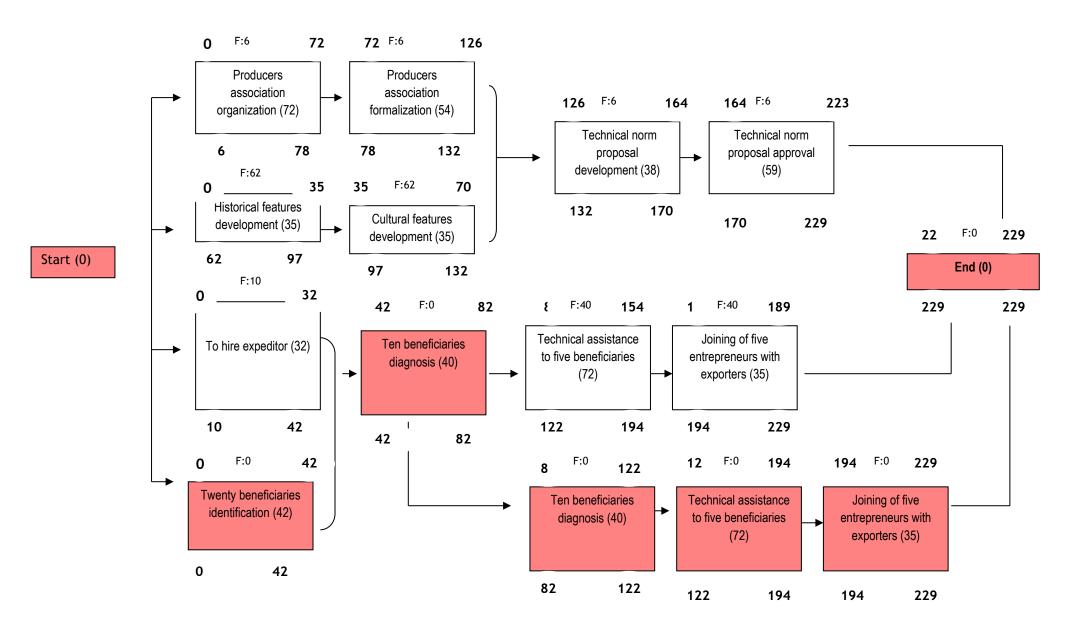
2. In the following table, the three-point estimating technique is used to calculate the expected duration (tE) for each activity as tE = (tO + 4tM + tP) / 6.

			Optimistic 2	Most ∄ ikely ②	Pesimistic2	Expected 2
ID	Description	Predecesor	duration	duration	duration	duration
1	Start	NA	0	0	0	0
2	Producers 2asociation 20 rganization	1	59	70	93	72
3	Historical deatures development	1	22	33	56	35
4	Tothire: expeditor	1	22	30	50	32
5	Twenty beneficiaries dentification 2	1	31	40	61	42
6	Producers to a sociation formalization	2	30	51	90	54
7	Culturalfeatures development	3	22	33	56	35
8	Technical@norm@proposal@development	6,7	25	38	51	38
9	Technical@norm@proposal@approval	8	36	54	102	59
10	Ten Boeneficiaries Idiagnosis	4,5	25	40	55	40
11	Techinical@assistance@to@five@beneficiaries	10	59	70	93	72
12	Joining filive the ntrepreneurs with the xporters	11	25	35	45	35
13	Ten Boeneficiaries Idiagnosis	10	25	40	55	40
14	Techinical ssistance to five beneficiaries	13	59	70	93	72
15	Joining to filive the ntrepreneurs to with the exporters	14	25	35	45	35

3- Network diagram and project duration (229 days)



4 - Critical path (shown in red and calculated based on the pass forward and backward in order to determine float (F)



5 - Critical path duration with a probability of 84%

Once the critical path is identified (see Section 4), the variance is calculated using the formula, $\sigma^2 = ((tP - tO) / 6)^2$ for each activity on the critical path.

Once the variances for each critical path activity are calculated, they are added up to obtain the critical path variance and finally the standard deviation is calculated using the formula, $\sigma = \sqrt{\sigma^2}$.

10,87

deviation

To calculate the 84% probability, we just need to add one standard deviation to the critical path duration (229 days + 10.87 days = 239.87 days).

			Optimistic2	Most ∄ ikely ②	Pesimistic 7	Expected2	
חו	Description	Predecesor	duration	duration	duration	duration	Variance
	Start	NA	0	0	0	0	
	Producers association or ganization	1	59	70	93	72	-
_	Historical deatures development	1	22	33	56	35	
4		1	22	30	50		
	Twenty beneficiaries dentification 2	1	31	40	61	42	25,00
	Producers as ociation formalization	2	30	51	90		
	Cultural deatures development	3	22	33	56		
8	·	6,7	25	38	51	38	
9	Technical@norm@proposal@pproval	8	36	54	102	59	
10	TenBbeneficiariesBliagnosis	4,5	25	40	55	40	
11	Technical@ssistance@to@five@beneficiaries	10	59	70	93	72	-
12	Joining@ffive@entrepreneurs@with@exporters	11	25	35	45	35	
13	Ten beneficiaries diagnosis	10	25	40	55	40	
14	Technical ssistance of of ive beneficiaries	13	59	70	93	72	32,11
15	Joining of Tive the ntrepreneurs with exporters	14	25	35	45	35	11,11
	· · · · · · · · · · · · · · · · · · ·					Critical@path2	
						variance	118,22
						Critical@path2	
						standard2	

6 - Other considerations regarding the exercise

Through the network diagram we can determine the critical and non-critical paths based on the activities sequences. Notice that the number indicated corresponds to the activity ID.

Critical path (CP):
$$1-5-10-13-14-15-End$$

Non-critical paths (NC):
$$1-2-6-8-9$$
 – End

$$1 - 3 - 7 - 8 - 9 -$$
End

$$1 - 4 - 10 - 13 - 14 - 15 - End$$

The critical path variance was already calculated in Section 5. If the variance for another path needs to be calculated, we just need to add up the variances of each one of the activities in the sequence. For example, for the non-critical path 1 - 2 - 6 - 8 - 9 - End, the sum of variances adds up to 271.88. Then we calculate the square root of the total variance and the result is 16.49 days which corresponds to the non-critical path standard deviation.