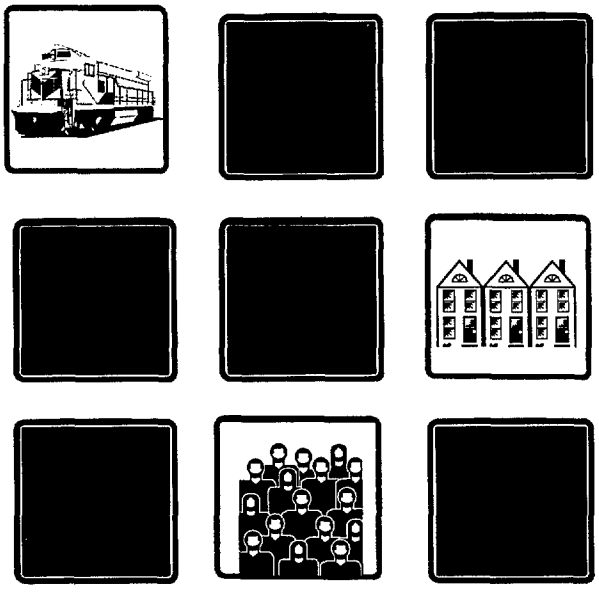
PN-ABX-269



FINAL REPORT

VALUE MANAGEMENT/VALUE ENGINEERING

WORKSHOP

BULAWAYO, ZIMBABWE

June 1995

CFED

Center for Financial Engineering in Development

FINAL REPORT

VALUE MANAGEMENT/VALUE ENGINEERING

WORKSHOP

BULAWAYO, ZIMBABWE

Sponsored by: USAID, National Railways of Zimbabwe and the Ministry of Public Construction and National Housing

June 1995

2

CONTENTS

EXECUTIVE SUMMARY ii

CHAPTER 1: DISCUSSION 1

VM/VE Defined 1
The Workshop 2

CHAPTER 2: COURSE EVALUATION 5

Appendix A — List of Participants 6

Appendix B — Sample Excerpts from Studies 7

Appendix C — Evaluation Sheets 39

3

EXECUTIVE SUMMARY

Thirty- five engineers, managers, and technical experts from the National Railways of Zimbabwe (NRZ) and Zimbabwe's Ministry of Public Construction and National Housing (MPCNH) completed a Society of American Value Engineers Module I Workshop conducted in Bulawayo during the period of June 3 to 8, 1995. Utilizing their newly learned skills, these experts initiated study on seven separate projects identifying significant numbers of opportunities to reduce cost, improve efficiency and increase customer satisfaction. Subject matter of the project studies varied dramatically – ranging from reengineering of the NRZ Workforce to reconstructing water lines in Harare; to developing utility and transportation services for a major (1500 unit) housing development; as well as researching new communication alternatives for the NRZ.

Instructors for the Workshop were financed and contracted by the United States Agency for International Development (USAID)/Zimbabwe, and the excellent training facilities were provided by the NRZ. The objective of the Workshop was to transfer Value Engineering technology to the Zimbabwean experts for their use in future decision making. Judging from the results attained by each of the seven teams, this objective was clearly met.

At the June 8, 1995 closing ceremonies the study teams presented their findings to National Railway of Zimbabwe General Manager Mr. Mabena and the visiting instructors. Each of the teams will now take the results of their analyses to their respective organizations and seek ways to implement the recommendations.

Workshop participants were exceptionally enthused with the training and were unanimous in requesting additional training of this type as well as follow up training to assure the sustainability of the knowledge they gained.

Instruction for the Workshop was provided by Mr. William Kelly and Mr. Kenneth Rikard of CFED. Mr. Kelly and Mr. Rikard are Certified Value Specialists and Professional Engineers with extensive international experience.

Chapter 1

DISCUSSION

VM/VE DEFINED

Value Management/Value Engineering is an analytical management tool which focusses on the elimination of unnecessary costs. VM/VE results are attained through the use of functional analysis, cost modeling and creative exercises implemented through interdisciplinary teams.

Developed in the late 1940's by engineers at General Electric, VM/VE has spread throughout the world and is now being used by major corporations to reengineer and restructure organizations, improve projects and provide customer desired services. VM/VE studies are highly structured exercises which closely follow a six step job plan and use a series of analytical methods to determine new ways of providing the same function at equal quality but lower costs.

Value Engineering is a disciplined action system, attuned to one specific need: accomplishing the functions that the customer needs and wants, whether these functions are accomplished by hardware, service, a group of people, professional skills, administrative procedures, or other at the lowest cost. In its disciplined thinking, value engineering is comprised of specific mind-setting, problem-setting, and problem-solving, systems. These systems will assist anyone who has the task of providing more of what the customer wants for less cost. The providing of more of what the customer wants at the "best value" begins with answers to the following five questions:

1. What precisely is it that we are trying to accomplish?
2. What does it currently cost to accomplish it?
3. What are other ways to accomplish it?
4. What do they cost?
5. What is the lowest cost method that provides what the customer wants/needs?

Created for one specific purpose – the identification of unnecessary costs – value engineering is a system, a complete set of techniques, properly arranged, for the sole purpose of efficiently identifying unnecessary cost before, during, or after the fact. Some of the techniques are familiar, some modified, some new. The effectiveness in utilizing this system depends upon the understanding, training, and skill of the users, as well as the understanding of all business people in the environment in which it operates.

Initial transfer of this technology is most easily conducted through a 40-Hour Workshop.

THE WORKSHOP

Responding to requests from senior managers at the National Railway of Zimbabwe (NRZ) and the Zimbabwean Ministry of Public Construction and National Housing (MPCNH), USAID/Zimbabwe officers contracted with the Center for Financial Engineering and Development, Inc. (CFED) to conduct a Society of American Value Engineers (SAVE) Module I Workshop at NRZ facilities in Bulawayo. Recognizing that improving productivity and subsequent value of their operations is paramount to success, the Ministry and Railway managers identified that VM/VE training could best provide the opportunity for improving the performance of their key personnel.

As a result, on Sunday June 3, 1995 thirty five (35) Zimbabwean engineers and managers gathered in Bulawayo, Zimbabwe to participate in Zimbabwe's first Certified Value Engineering Workshop.

Consisting of 20 hours lecture and 20 hours of team studies the VM/VE methodology was readily transferred to the participants. Utilizing real life projects for study, the teams focussed on gathering information, developing cost models, seeking alternative ways to provide customers with the identified function and prepared implementation plans for future use when they return to their home offices. The objective of the workshop is to teach the methodology – not to finalize analysis or document a complete report. Regardless, of the seven study projects reviewed, two of the studies can be considered as 90-95% complete. In each study considerable progress was made and, on average, cost reductions of 30 per cent were identified.

The Studies

Projects and processes reviewed during the Workshop included:

A. Rightsizing the NRZ Workforce
B. Reconstruction of Water System Mains in Harare.
C. Re-engineering the NRZ Infrastructure Organization
D. Siyi Pambili Ring Road in Bulawayo
E. Servicing Cowdry Park (1500 Housing Units)
F. Spin-Off of Non-Core Business in the NRZ
G. Upgrading of the NRZ Communication System

Using analytical tools learned during the Workshop, participants identified millions of dollars of unnecessary costs which will be reviewed by their managers with the objective of eliminating or reducing them. If approved, the railway and municipalities will be significantly more cost efficient and effective.

The original plan for the Workshop was to review and apply Value Engineering methodology to at least two projects. This number was increased to four in the latter stages of planning and on the first day of the Workshop was further increased to seven due to requests of the participants. A brief discussion of these studies follows.

A. **Rightsizing the National Railways of Zimbabwe Workforce** — During the last several years Senior Management at NRZ has focussed on matching the NRZ workforce to the jobs and activities (functions) required to compete with alternative transportation challenges. To address this issue a team of five NRZ managers identified that the highest order function of the railway is to "Operate Profitably". To accomplish this task the team determined that they must "Satisfy User", "Ensure Convenience", "and "Ensure Dependability". From these determinations the team completed their "Function Analysis System Technique Diagram (FAST) and developed a cost model which displayed how the NRZ currently spends some 923 million Zimbabwean dollars.

   Although it was not possible to complete this study during the 40 hour workshop the team determined that significant operational improvements could be accomplished if more seasonal labor was used in the track maintenance operations. This alternative, along with several others, will be analyzed in the immediate future. (See Appendix).

B. **Reconstruction of Harare Water System** — Five of the Workshops municipal experts used their VM/VE training to focus on looking for new methods/materials to use when replacing water mains in Harare. This group developed their cost model identifying over Z$10.5 million of work for analysis. In the limited time frame they had to work, they proposed 25% of cost reductions would likely be possible if they used new improved pipe. This group took their analysis to the life-cycle cost process which was a different way of looking at costs than they had previously used. (See Appendix).

C. **Streamline NRZ Infrastructure** — In a study closely related to Team A, this group focussed their efforts on how best to accomplish the infrastructure work at NRZ. Selecting "Move Product" as their highest order function, the team determined that "Facilitate Movement" was the basic function which would be required to satisfy their objective. Following completion of their FAST diagram the team next developed a Z$117.5 million cost model which showed that most of their costs (45%) were in "Link Market" related functions and activities. Following considerable analysis the team determined that the formation of a NRZ Infrastructure Division to manage this workload would possibly be the most cost effective. The team identified three other alternatives which are closely related and agreed to study further this entire operation. (See Appendix).

7

D. **Servicing Cowdray Park, Bulawayo** — Engineers from the Bulawayo area and several of their colleagues prepared a mini-VM/VE study to identify a better, less costly way of providing access and utilities to the Cowdray Park area. Identifying "Service Stand" as their highest order function the team concluded that they would focus on costs related to : "Assign Areas", "Optimize Convenience", "Sustain Life", "Maintain Health", "Illuminate Area", and "Access Site". Following minimal study, the team decided that savings of over 30% could be achieved if they revisited the road layout and surfacing proposals. The team will now review this proposal before recommending it as a solution. (See Appendix).

E. **Siye Pambili Road Design** — Reducing User Costs, maintaining environment, and focussing on safety were design criteria which this team considered as they sought new and better ways to approach road construction. Recognizing that 65% of their costs was incurred in "Prepare Roadbed", "Prepare Subbase", and "Construct Base", the team zeroed in on this part of their Z$5.32 million project. Developing alternatives on a life-cycle cost basis the team concluded that considerable cost savings could be achieved if they redesigned their pavement. Using this information the team will now investigate if they can implement the changes proposed. (See Appendix).

F. **NRZ Package Spin-Offs** — Identifying non-core business activities for consideration as spin-off candidates was the subject of Team F's study. Identifying "Increase Profitability" as their objective, this group focussed on ways to "Assess Activity", and "Develop Strategy" as key functions for their analyses. While considerable work will still be required prior to making any final decision, the team agreed that the retirement exercise should continue, assets needed to be disposed of, and opportunities exist for sub-contracting. The team also discussed the need to perhaps review the list of core activities which had previously been conducted by using their newly learned VM/VE skills. (See Appendix).

G. **Upgrade Telecoms System on NRZ** — "Co-Ordinate Business" was the highest order function chosen by this team as they investigated new, less costly ways to provide communications throughout NRZ. Recognizing the need to "Transmit Sound", and "Transmit Data" as basic functions which must be satisfied, the team then complected their FAST diagram. Recognizing that expansion of the copper lines was exceptionally costly (Z$397.6 million) and difficult to secure, the team used life-cycle costs to demonstrate that a radio system was perhaps the best alternative and could be accomplished for almost 27% less cost. The team will next present their findings to the NRZ General Manager and determine what steps should be taken in the immediate future for implementation. (See Appendix).

9

Chapter 2

COURSE EVALUATION

Thirty of the full time participants that attended the course filled out course evaluation sheets. Of these 29 identified that they thought the course was very valuable. Key words used to describe their thoughts included: "my first experience at systematic training"; "the most valuable training I have ever received"; "we need a lot more of this type training", "we need additional training to sustain our efforts"; "a very fine course"; "instructors really knew their material"; "on a scale of one to ten a ten plus".

The most significant comments centered around the need for others to attend this same type course – almost unanimous!

Appendix A

LIST OF PARTICIPANTS

National Railways of Zimbabwe

Mr. Samson Zumbika
Mr. Patrick Bonday
Mr. Kudakwashe Ndoro
Mr. Kainos Magumda
Mr. Thomas Kurebwaseka
Mr. Raphael Wabatagore
Mr. Logatie Mkandhla
Mr. Christopher Nambe
Mr. Chengetai M. Chivonivoni
Mr. Evans Marowa
Mr. Welcome Lugube
Mr. Philip Ngwenya
Mr. George W.T. Tyamzashe
Mr. David Scott
Mr. Vusomuzi Sithole
Mr. Smart Mpofu
Mr. Herbert Dzinotyiwei
Mr. Tapiwa Viki
Mr. John Nyaruwa
Mr. Newton Mlotishwa
Mr. Elliot Mashingaidze
Mr. Stephen Wilfred Chimhamhiwa
Mr. Mazikhethela Banana

Municipal Officials

Mr. Itai Munyame	Mutare
Mr. James Muzofa	Chinhoyi
Mr. Simela Dube	Bulawayo
Mr. Gunda Rugara	Masvingo
Mr. Erasmus Moffat	Gweru
Mr. Samuel Chiduza	Marondera
Mr. Vumisani Sithole	Harare
Mr. Paul Manamike	Kwe-Kwe

Ministry of Public Construction and Housing

Mr. Wingfield Vengesayi
Mr. Brighton Muzangaza
Mr. Luke Ncube

United States Agency for International Development

Mr. Thomas Chiramba

10

Appendix B

SAMPLE EXCERPTS FROM STUDIES

VALUE ENGINEERING PROPOSAL

STUDY NUMBER SEVEN

PROJECT DOWNSIZING WORKFORCE

LOCATION NRZ

TEAM MEMBERS

S. ZUMBIKA (LEADER)

E. MASHINGAIDZE

W. LUGUBE

V.G. SITHOLE

L. NCUBE

CONSULTANTS

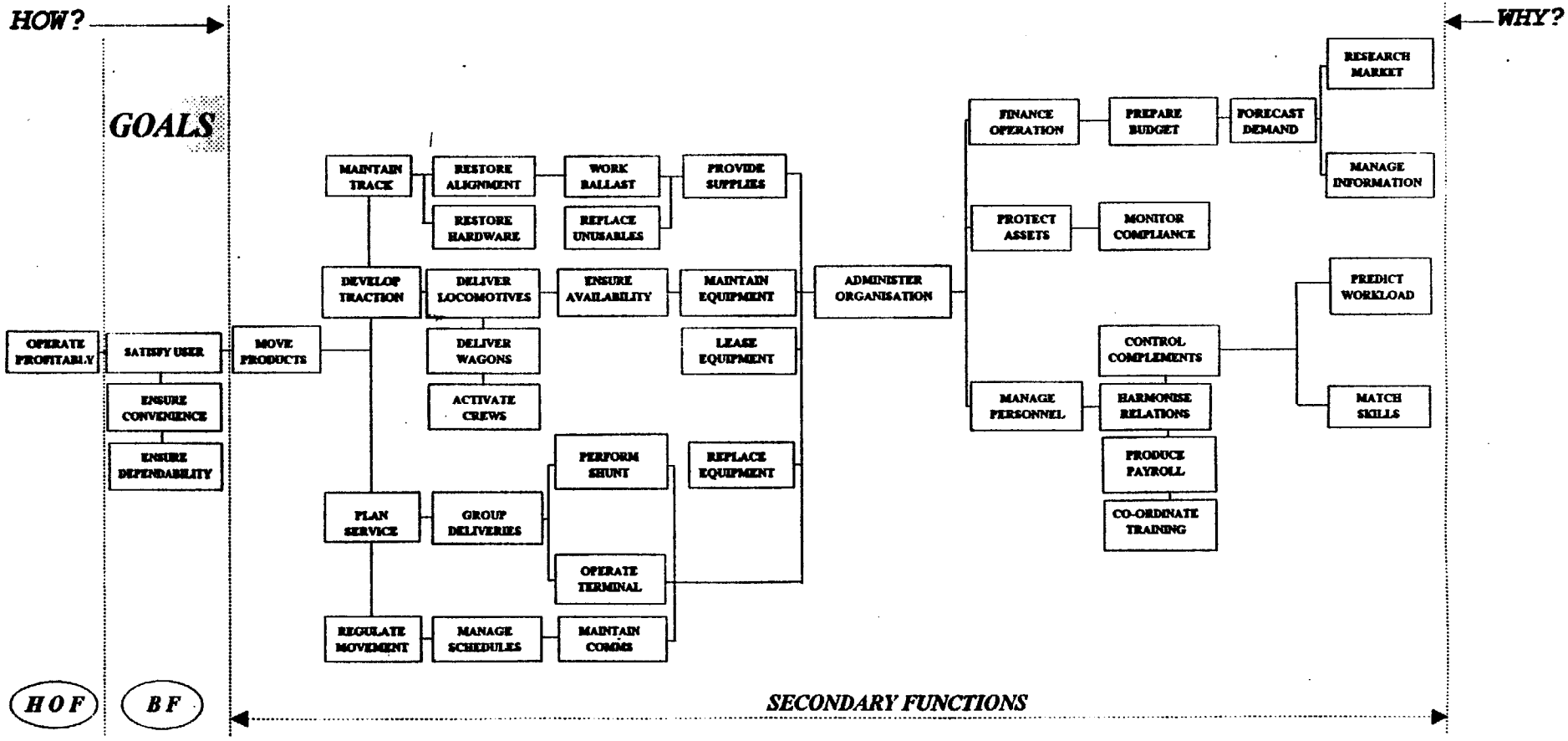
W.L. KELLY

K. RIKARD

VE SIGNATURE:

DATE: 8/6/95.

FAST DIAGRAM : RIGHT SIZING NRZ WORKFORCE



ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
MAINTAIN TRACKAGE	12		112 Million
DEVELOP TRACTION	24		224 Million
PLAN SERVICE	32		295 Million
REGULATE MOVEMENT	3		25 Million
ADMINISTER ORGANISATION	18		169 Million
OTHER	11		98 Million
TOTAL	100%	TOTAL CONSTRUCTION COST	$923

ITEM/FUNCTION COST MODEL

PROJECT:

STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
MAINTAIN TRACKAGE	12		112 Million
DEVELOP TRACTION	24		224 Million
PLAN SERVICE	32		295 Million
REGULATE MOVEMENT	3		25 Million
ADMINISTER ORGANISATION	18		169 Million
OTHER	11		98 Million
TOTAL	100%	TOTAL CONSTRUCTION COST	$923

ANALYSIS MATRIX VEST FORM

SUBJECT: RIGHTSIZING WORKFORCE FUNCTION (S) MAINTAIN TRACK

COMPONENT OF: NRZ

COST / WORTH = $ / $

DISCUSSION:

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	SATISFIES FUNCTION 16	FIRST RANKING	SAFETY 16	LEAST DISRUPTION TO OPERATIONS 8	MAXIMUM SAVINGS 8						TOTAL	FINAL RANKING
1 INCREASE MECHANISATION	5 / 80		5 / 80	4 / 32	2 / 16						208	2
2 CONTRACT OUT	4 / 64		2 / 32	3 / 24	3 / 24						144	5
3 HIVE OFF AND HIRE	4 / 64		3 / 48	2 / 16	3 / 24						152	4
4 SEASONAL LABOUR	5 / 80		5 / 80	5 / 40	4 / 32						232	1
5 EXISTING	5 / 80		5 / 80	4 / 32	1 / 8						200	3
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 2

PROJECT HARARE WATER PROJECT

LOCATION

TEAM MEMBERS

VUMISANI SITHOLE
PAUL MANAMIKE
ITAI MUNYAME
BRIGHTON MUZANGAZA
JAMES MUZOFA

CONSULTANTS

WILLIAM ~~BILL~~ KELLY AND KEN RIKARD

VE SIGNATURE:

DATE:

17

ITEM/FUNCTION COST MODEL

PROJECT: HARARE WATER PROJECT STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
EXCAVATION (FORM VOID)	1,4		300 000
BREAK PAVEMENT	2,8		150 000
REPLACE PIPES	79.4		8.400. 000
FILL VOIDS	0.9		100. 000
REPLACE PAVEMENT	2.4		250. 000
CONTINGENCES	13.1		1.380. 000
TOTAL	100%	TOTAL CONSTRUCTION COST	$10,580,000

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: HARARE WATER PROJECT

STUDY ITEM / NO.: WATER PIPES

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS		8.400.000		7.400.000		6.600.000	
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a.							
b.							
TOTAL INITIAL COST IMPACT (IC)		8.400.000		7.400.000		6.600.000	
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ 12% Interest							
1. Year ____ PW Factor 0.0101							
2. Year ____ PW Factor ____							
3. Year ____ PW Factor ____							
4. Year ____ PW Factor ____							
5. Year ____ PW Factor ____							
Salvage Present Worth	0	0	3.400.000	(31370)	0	0	
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ 12% Interest							
a. Maintenance							
Escal. Rate ____ PWA Factor 8.275	42 000	347550	21000	173775	16500	135 537.5	
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others							
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS	42000						
TOTAL PRESENT WORTH COSTS		8.747.550		7.536,405		6.735537.5	
LIFE CYCLE (PW) SAVINGS							

ANALYSIS MATRIX VEST FORM

SUBJECT: HARARE WATER PROJECT FUNCTION (S) TRANSMISSION OF WATER

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	PERFORMS/SATISFIES FUNCTION	FIRST RANKING	COST	RELIABILITY	MAINTAINABILITY	ENVIROMENTAL IMPACT	OPERATIONAL ECONOMY	CONSTRUCTION TECHNOLOGY	SAFETY	AVAILABILITY OF MATERIALS	TOTAL	FINAL RANKING
RELATIVE WEIGHTS	23		17	23	11	0	11	7	2	4		
1 G.I	5/115		2/34	4/92	2/22	0/0	4/44	3/21	2/4	4/16	233	4
2 A.C	5/115		4/68	2/46	3/33	0/0	3/33	4/28	1/2	5/20	230	5
3 GRP	5/115		3/51	5/115	4/44	0/0	5/55	4/28	3/6	3/12	311'	3
4 HDP	5/115		3/51	5/115	4/44	0/0	5/55	5/35	3/6	3/12	318	2
5 PVC	5/115		5/85	4/92	5/55	0/0	4/44	4/28	3/6	5/12	330	1
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

20

VALUE ENGINEERING PROPOSAL

STUDY NUMBER _____

PROJECT STREAMLINE NRZ INFRASTRUCTURE

LOCATION _____

TEAM MEMBERS

ES MAROWA

KP MAGUNDA

M BANANA

S CHIMHAMIWA

H DZINOTYIWEI

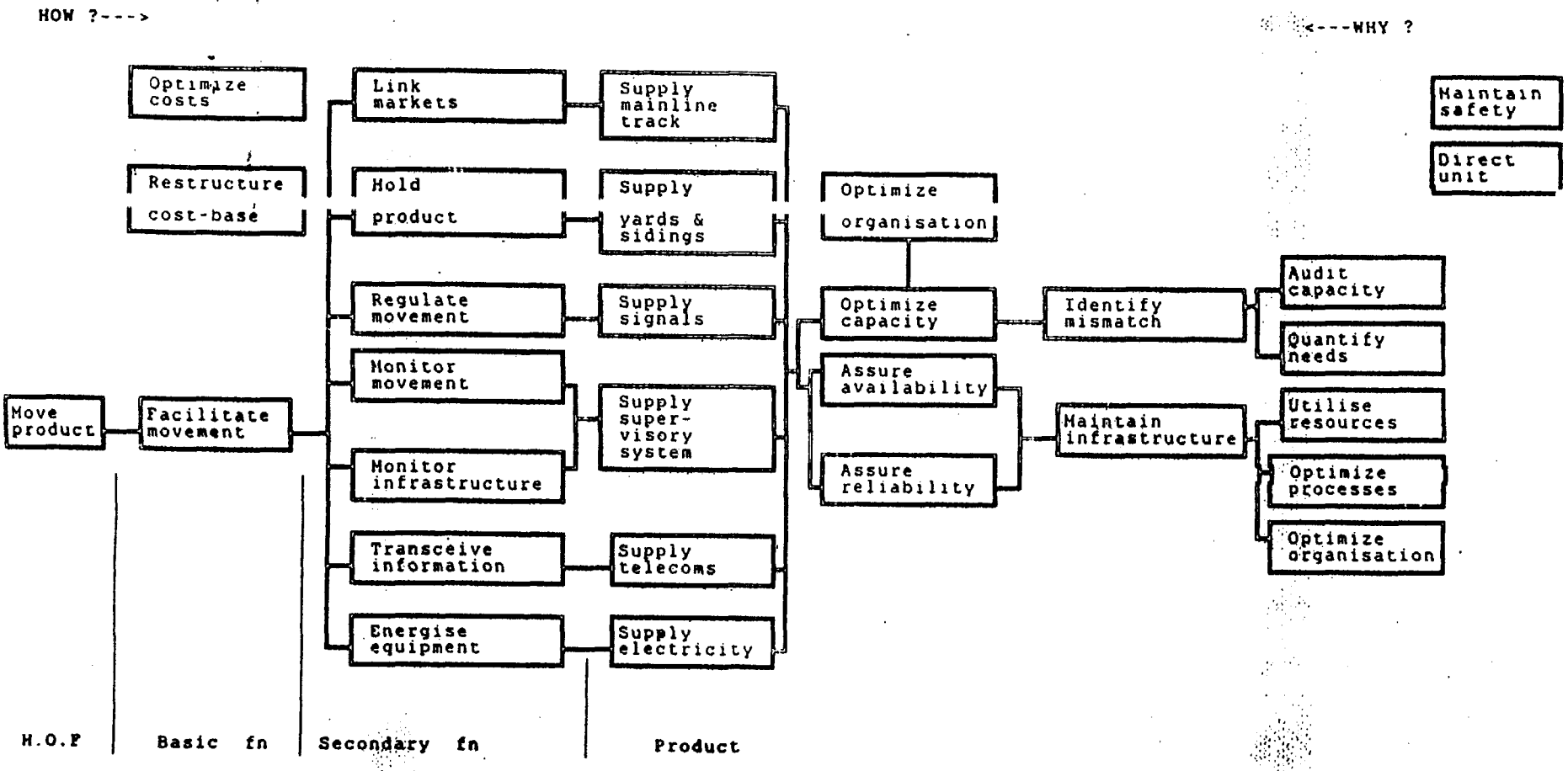
J NYARUWA

CONSULTANTS

VE SIGNATURE: _____

DATE: _____

FAST DIAGRAM NO.4



ITEM/FUNCTION COST MODEL

PROJECT:

STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
LINK MARKET	45		53,3m
HOLD GOODS	21		24,5m
REGULATE MOVEMENT	19		22,5m
TRANSCIEVE INFO	10		11,9 m
SUPERVISORY CONTROL	2		2,6m
ENERGIZE EQUIPT	3		2,7m
TOTAL	100%	TOTAL CONSTRUCTION COST	$ 117,5m

25

ANALYSIS MATRIX VEST FORM

SUBJECT: _____ FUNCTION (S) _____

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	PERFORMS FUNCTION 15	FIRST RANKING	SAFETY 15	RS COMPATIBILITY 10	AVAILABILITY 6	RELIABILITY 5	COST EFFECTIVENESS 5				TOTAL	FINAL RANKING
1 STATUS QUO	5 / 75		4 / 60	5 / 50	4 / 24	4 / 20	3 / 15				244	
2 NRZ INF DIV	5 / 75		5 / 75	5 / 50	4 / 20	4 / 20	4 / 20				264	1
3 GVT DEPT	4 / 60		3 / 45	3 / 30	3 / 18	3 / 15	2 / 10				178	
4 SEPARATE PARASTATAL	5 / 75		4 / 60	4 / 40	3 / 18	4 / 20	3 / 15				228	
5 PUBLIC OWNERSHIP	4 / 60		5 / 75	5 / 50	4 / 24	5 / 25	4 / 20				254	2
6 GVT OWNED PVT CO.	5 / 75		4 / 60	5 / 50	4 / 24	5 / 25	4 / 20				254	2
7 PVT OWNERSHIP	3 / 45											
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

24

VALUE ENGINEERING PROPOSAL

STUDY NUMBER _____

PROJECT Servicing 15000 stands

LOCATION COWDRAY PARK, BULAWAYO

TEAM MEMBERS

WINGFIELD T. VENGESAYI
RUGARA GUNDA
KUDAKWASHE E. NDORO
NEWTON MLOTSHWA
THOMAS CHIRAMBA

CONSULTANTS

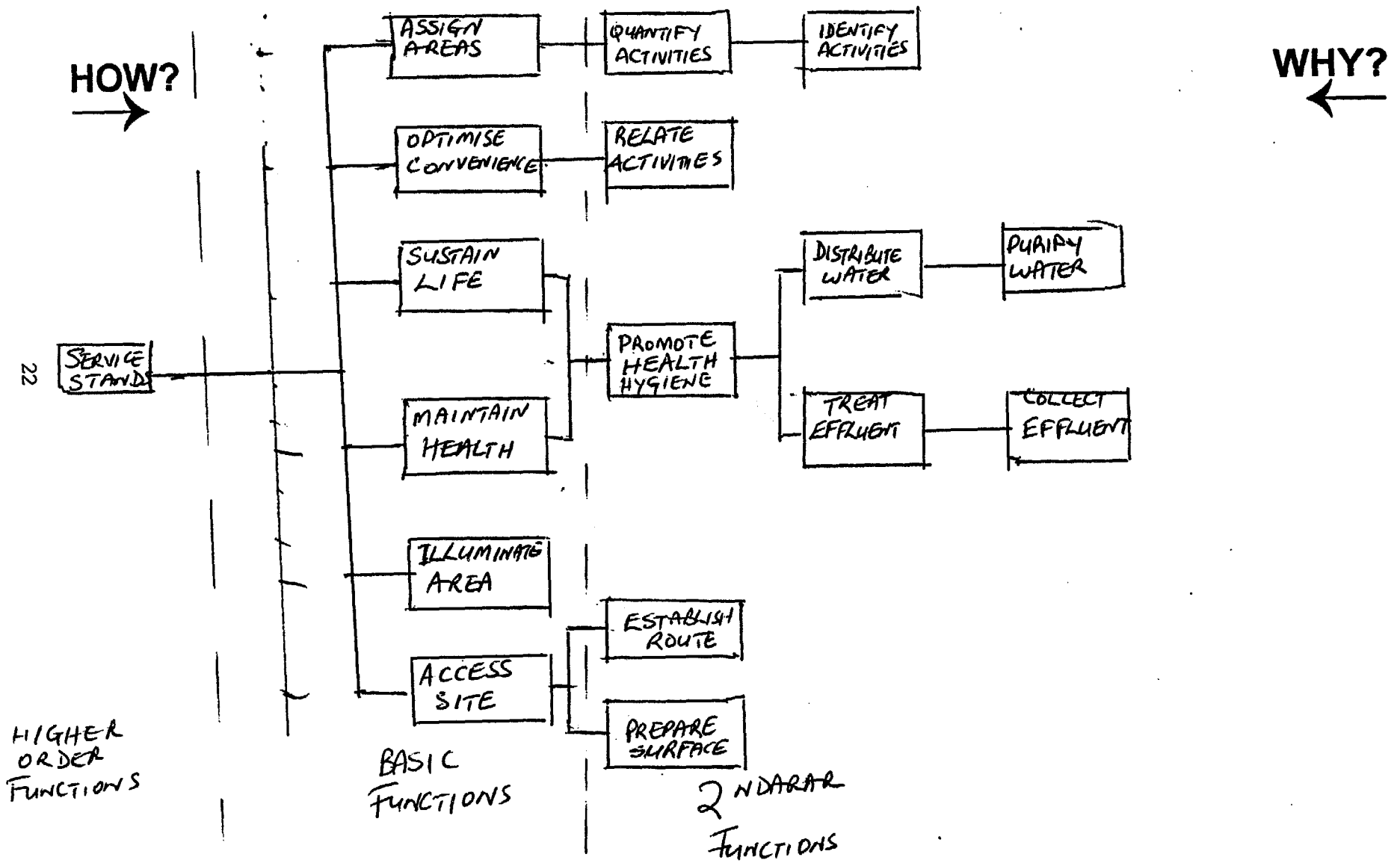
BULAWAYO CITY COUNCIL

VE SIGNATURE: _____

DATE: _____

25

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM



ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
ACCESS SITE	82		11 566
MAINTAIN HEALTH	9		1 269
SUSTAIN LIFE	4		564
ASSIGN AREAS	2		282
RELATE ACTIVITIES	1		141
ILLUMINATE AREA	2		282
TOTAL	100%	TOTAL CONSTRUCTION COST	$ 14 105

27

LIFE - CYCLE COST ANALYSIS

Costs | Stand

Using Present Worth (PW) Costs

PROJECT: _____

STUDY ITEM / NO.: _____

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS	11566		49348		3853.3		
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a.							
b.							
TOTAL INITIAL COST IMPACT (IC)							
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ 20 Interest							
1. Year 15 PW Factor 0.0643 x 2467			2467	160.13			
2. Year ____ PW Factor ____							
3. Year ____ PW Factor ____							
4. Year ____ PW Factor ____							
Salvage 5. Year 20 PW Factor ~				(42)			
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ ____ Interest							
a. Maintenance		9		15	3		
Escal. Rate ____ PWA Factor ____							
b. Operations				32.8			
REPLACEMENT Escal. Rate ____ PWA Factor 0.2053		2374		1013			
c. Others				(8.6)			
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor 4.5							
TOTAL ANNUAL COSTS		2383		1052.2	794		
TOTAL PRESENT WORTH COSTS							
LIFE CYCLE (PW) SAVINGS				6481			

ANALYSIS MATRIX VEST FORM

SUBJECT: _____ FUNCTION (S) _____

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	14	FIRST RANKING	Safety 9	Capital Cost 14	Operating Cost 7	Quality/Comfort 1	Environment 2	Technology/Maturity 3			TOTAL	FINAL RANKING
1 Surfaced Roads	5/70		5/45	1/14	4/28		4/8	3/9			174	III
2 Surfaced bus route and gravel roads	5/70		4/36	2/28	3/21		3/6	3/9			170	IV
3 Surfaced bus route and earth roads	5/70		2/18	3/42	2/14		2/4	3/9			157	V
4 Surfaced bus route only	4/56		1/9	5/70	5/35		1/2	3/9			181	II
5 One base surfaced bus route ~~base earth road~~ reduced with	4/56		2/18	5/70	3/21		2/4	4/12			195	I
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 1/95.

PROJECT SIVE PAMBILI ROAD DESIGN

LOCATION BULAWAYO

TEAM MEMBERS

SIMELA DUBE (LEADER)

SAMUEL CHIDUZA (SECRETARY)

ERASMUS MOFFAT

PHILIP NGWENYA.

CONSULTANTS

NIL.

VE SIGNATURE:

DATE: 8 JUNE 1995.

30

ITEM/FUNCTION COST MODEL

PROJECT:

STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL ($)
ESTABLISH SITE	1.9		0.10
PREPARE ROADBED	20.7		1.10
PREPARE SUBBASE	23.5		1.25
CONSTRUCT BASE	22.5		1.20
PROTECT BASE	17.3		0.92
SAFETY	14.1		0.75
TOTAL	100%	TOTAL CONSTRUCTION COST	$ 5.32

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: SIYE PAMSILI

STUDY ITEM / NO.: 1/95/SP

	ORIGINAL (OPTION 2)		ALTERNATE NO.1 (OPTION 1)		ALTERNATE NO.2 (OPTION 3)		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS	5 320 000	5320000	5543000	5543000	4070000	4070000	
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a. DESIGN 6½	345800	345800	365000	365000	264550	264550	
b. ADMIN 5	266000	266000	304000	304000	203500	203500	
TOTAL INITIAL COST IMPACT (IC)		5938000		6212000		4539000	
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ 12% Interest							
1. Year 7 PW Factor 0,4523					2903500	1313250	
2. Year 5 PW Factor 0.5674	500000	283700					
3. Year 10 PW Factor 0,3219	500000	160950	500000	160950			
4. Year 12 PW Factor 0,2568					500000	128400	
5. Year 15 PW Factor 0.1826							
Salvage Present Worth					200000	(36520)	
TOTAL PRESENT WORTH		444500		160950	3370000	1405130	
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ 12 Interest							
a. Maintenance							
Escal. Rate ____ PWA Factor 6,810	5000	34050	5000	34050	5000	34050	
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others							
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS		34050		34050		34050	
TOTAL PRESENT WORTH COSTS		6416550		6407000		5978180	
LIFE CYCLE (PW) SAVINGS		—		9550		438370	

ANALYSIS MATRIX VEST FORM

SUBJECT: SIYE PAMBILI FUNCTION (S) IMPROVE ACCESS

COMPONENT OF:

COST / WORTH = $6416550 / $5978180 = 1,07 DISCUSSION: WORTHWHILE EXERCISE

FUNCTION FOR STUDY: CONSTRUCT FACILITIES.	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	PERFORMS SATISFIES FUNCTION	FIRST RANKING	SAFETY	COST	USER COSTS	MAINTANABILITY	ENVIRONMENTAL IMPACT	CONSTR TECH.	AVAILABILITY OF CONST. MATERIAL		TOTAL	FINAL RANKING
	15		12	8	7	15	4	3	6			
(0) 1 300mm PAVEMENT CHIP + SPRAY	5/75		5/60	4/32	5/35	3/45	3/12	3/9	4/24		292	3
(1) 2 200mm PAVEMENT 50mm + ASPHALT CONC	5/75		4/48	4/32	5/35	5/75	4/16	3/9	4/24		314	1
(2) 3 150mm PAVEMENT SPRAY + CHIP+	4/60		5/60	5/40	5/35	3/45	5/20	3/9	4/24		293	2
(3) 4 150mm PAVEMENT 100MM + ASPHALT	4/60		4/48	2/16	5/35	5/75	5/20	3/9	4/24		287	4
5												
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 6

PROJECT PACKAGE SPIN-OFFS

LOCATION ZIMBABWE

TEAM MEMBERS

C CHIVONIVONI (TEAM LEADER)

S MPOFU

P S BONDAI

T VIKI Secretary

T T KUREBWASEKA

CONSULTANTS

B KELLY

K RIKARD

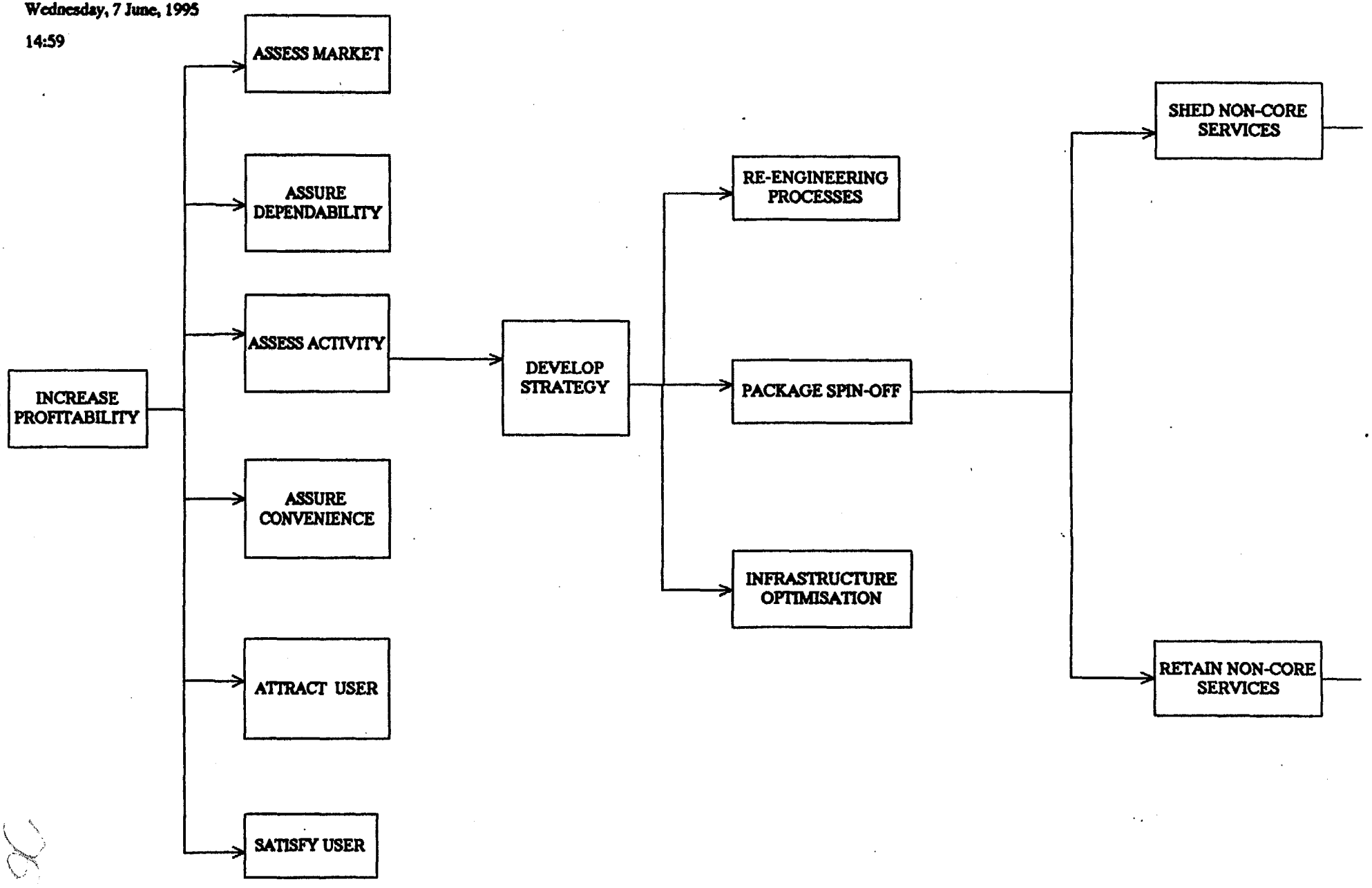
VE SIGNATURE:

DATE:

PACKAGE SPIN-OFFS

Wednesday, 7 June, 1995

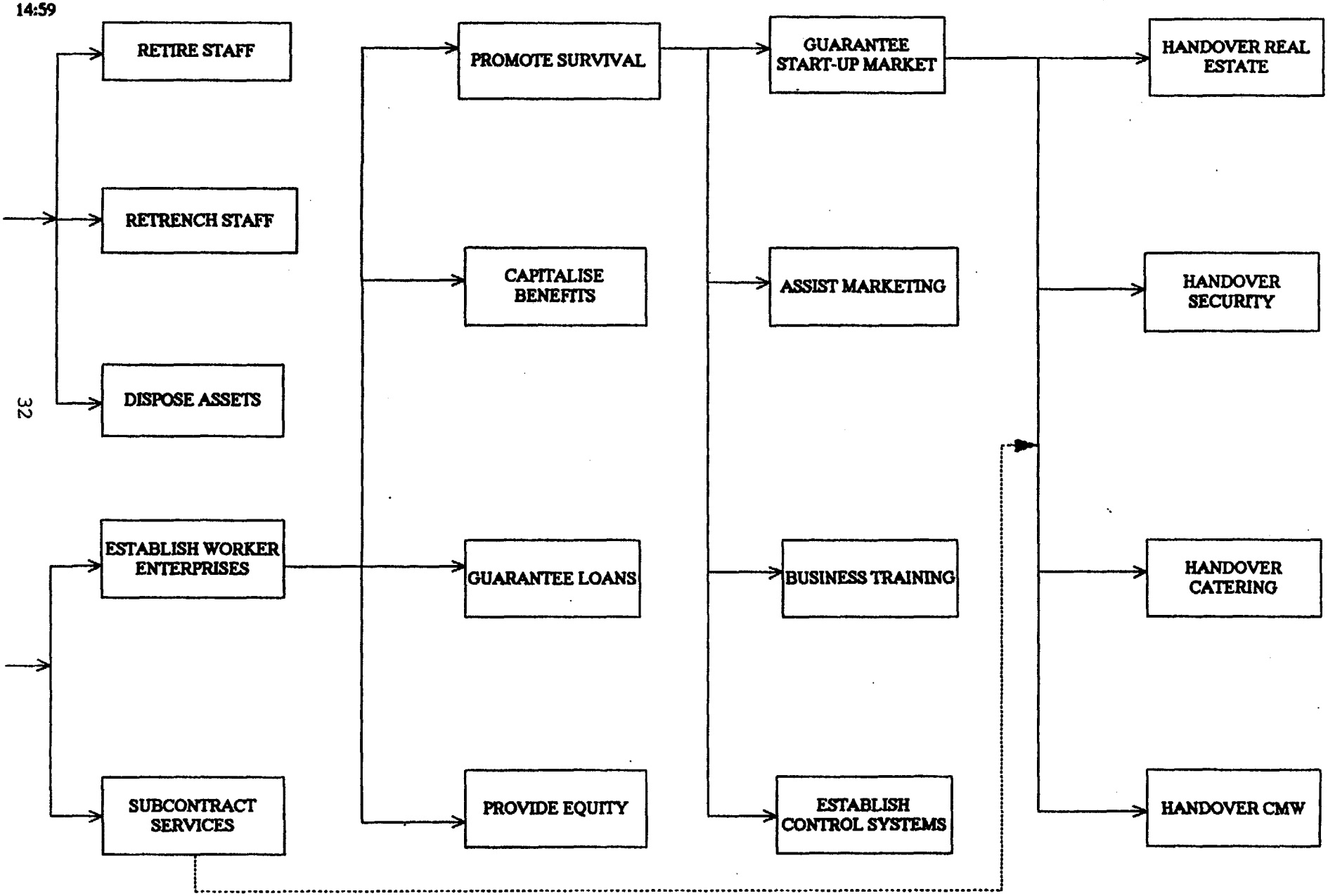
14:59



SECOND

Wednesday, 7 June, 1995

14:59



LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: PACKAGE SPIN-OFF

STUDY ITEM / NO.: 6

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS							
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a.							
b.							
TOTAL INITIAL COST IMPACT (IC)							
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ ____ Interest							
1. Year ____ PW Factor ____							
2. Year ____ PW Factor ____							
3. Year ____ PW Factor ____							
4. Year ____ PW Factor ____							
5. Year ____ PW Factor ____							
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ ____ Interest	$39 M.				$18.3M		
a. Maintenance							
Escal. Rate ____ PWA Factor ____							
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others ANNUAL DIFFERENCE							
Escal. Rate ____ ~~PWA FActor~~ 2.106					$20.7M		
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS 3 YEARS							
TOTAL PRESENT WORTH COSTS							
LIFE CYCLE (PW) SAVINGS						$43.6M	

37

ANALYSIS MATRIX VEST FORM

SUBJECT: PACKAGE SPIN-OFF FUNCTION (S) -

COMPONENT OF: INCREASING PROFITABILITY

COST / WORTH = $ 39 MILLION / $ 18.3 MILLION = 2.13

DISCUSSION: INCREASE PROFITABILITY BY SHEDDING-OFF NON-CORE BUSINESS.

FUNCTION FOR STUDY: SHED-OFF NON-CORE ACTIVITIES			DESIRED CRITERIA									
ALTERNATIVES	RELATIVE WEIGHTS	FIRST RANKING	RETURN ON CAPITAL	INCREASE PRODUCTIVITY	ENSURE SUSTAINABILITY	REDUCE COST	REDUCE DEFICIT	WAGE TO REVENUE RATIO	INCREASE REVENUE	SATISFY CUSTOMER	TOTAL	FINAL RANKING
			25	22	20	15	14	13	7	7		
1 RETIRE STAFF			4/100	4/88	3/60	4/60	3/42	5/65	1/7	1/7	86	1
2 RETRENCH STAFF			4/100	4/88	3/60	4/60	3/42	5/65	1/7	1/7	86	1
3 DISPOSE ASSETS			2/50	2/44	3/60	2/30	3/42	1/13	5/35	1/7	56	3
4 EST. WK. ENT.			1/25	2/44	2/40	3/45	3/42	3/39	1/7	1/7	50	5
5 SUB-CON. SERVICES			1/25	3/66	3/60	3/45	3/42	1/13	1/7	1/7	53	4
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 7

PROJECT UPGRADE TELECOMS SYSTEM ON N.R.Z

LOCATION NRZ

TEAM MEMBERS

D. SCOTT

R. WABATAGORE

L. MKANDHLA

C. NCUBE

GEORGE TYAMZASHE

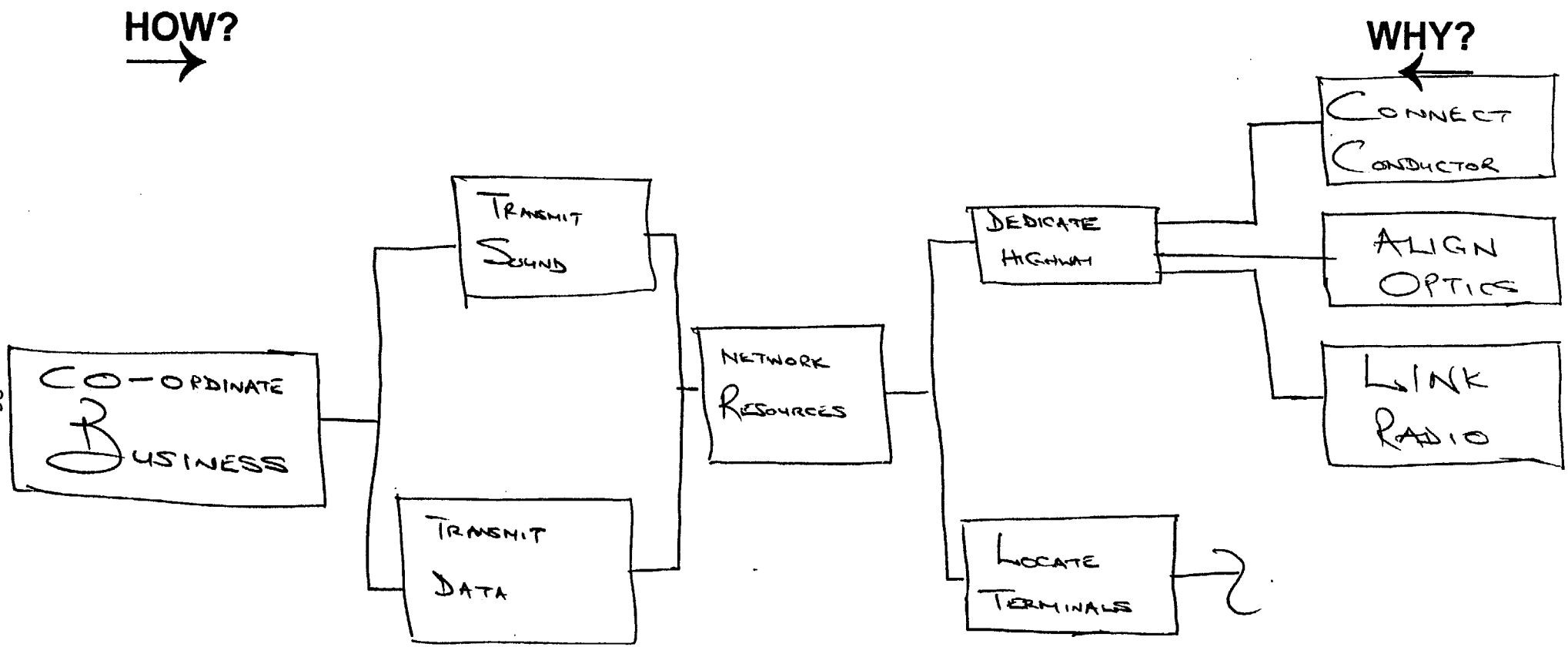
CONSULTANTS

NIL

VE SIGNATURE:

DATE: 08.06.95

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM



Using 10% factor

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

Ex(AWS) LOPER FIBRE Suspended. RADIO.

PROJECT: TELECOMS SYSTEM

STUDY ITEM / NO.:

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS							
Base Cost	INITIAL	400M	INITIAL	445.	INITIAL	290M	
Interface Costs	EXPANSION				COST.		
a.	MAINT		MAINT	1,434	MAINT.		
b.	15YRS 10M	2.39	15YRS - 6M		25YRS - 4M	.368M	
c.	Vandalism		Vandalism		Vandalism		
Other Initial Costs	15YRS 25M	5.975	15YRS - 20M	4.78M	INTERFERENCE		
a.	Interference		INTERFERENCE		1M.	0,092M	
b.	15YRS 10M	2.39	1M ~~0.239~~	0,239			
TOTAL INITIAL COST IMPACT (IC)					TRAINING		
SALVAGE & REPLACEMENT COSTS	Recovery		TRAINING		.1M	0,092	
Single Expenditures @ ____ Interest	(100M)	-13,1M	1M	0,239			
1. Year ____ PW Factor ____			Recovery		Recovery		
2. Year ____ PW Factor ____			(20M)	-2,62	25YRS (90M)	-3716M	
3. Year ____ PW Factor ____					PW 0,101		
4. Year ____ PW Factor ____							
5. Year ____ PW Factor ____							
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ ____ Interest							
a. Maintenance							
Escal. Rate ____ PWA Factor ____							
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others							
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS							
TOTAL PRESENT WORTH COSTS		397,6.		448.9M		290.6M	
LIFE CYCLE (PW) SAVINGS							

ANALYSIS MATRIX VEST FORM

SUBJECT: _____ FUNCTION (S) _____

COMPONENT OF: _____

COST / WORTH = $ _____ / $ _____

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	SATISFIES FUNCTION (MEET SPECS)	FIRST RANKING	VANDAL PROOF	IMMUNITY FROM ELEC. INTERFERENCE	MAINTAINABILITY	CAPACITY	FLEXIBILITY	COMPATIBILITY	OPERATING ECONOMY	RELIABILITY	TOTAL	FINAL RANKING
	21		21	1	12	8	6	7	1			
1 UPGRADE COPPER	2 / 42		1 / 21	1 / 1	3 / 36	1 / 8	3 / 18	2 / 14	5 / 5		145	4
2 FIBRE SUSPENDED	4 / 84		2 / 42	5 / 5	3 / 36	5 / 40	1 / 6	4 / 28	3 / 3		244	3
3 FIBRE BURIED	4 / 84		3 / 63	5 / 5	3 / 36	5 / 40	1 / 6	4 / 28	3 / 3		265	2
4 RADIO	5 / 105		4 / 84	4 / 4	4 / 48	5 / 40	5 / 30	4 / 28	2 / 2		341	1
5												
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

Appendix C

EVALUATION SHEETS

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The systematic manner in which a problem is diagnised and options at solving it arrived at.

2. Future Value Management/Value Engineering Workshops would be better if:-

Project work commences from the onset and Lectures placed in between.

3. I would like to see Value Management/Value Engineering training be made available to:-

Middle Management level of NRZ, Junior Engineers & Officers. A 'critical mass' must be reached before it can become effective, accepted and implementable on NRZ.

4. General comment:-

A very good well presented course.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

There is an obvious need for overhauling practices at NRZ and this course provides a systematic, logical & clinical way of going about this. The course comes in the background of a recent call for a haphazard reduction in staff. We must think again.

2. Future Value Management/Value Engineering Workshops would be better if:-

a) they cover a significantly greater proportion of NRZ managers and line managers. Some may not ~~undrsta~~ use the course method but at least they will understand what is going on.
b) they include union leaders. For no reason other than exposing them to what management is doing

3. I would like to see Value Management/Value Engineering training be made available to:-

A core of ~~large~~ NRZ personnel to sustain the effort initiated.

4. General comment:-

A very fine course presented by able specialists who whose humour to good effect.

46

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

excellent instructors & new material

2. Future Value Management/Value Engineering Workshops would be better if:-

we had more time

3. I would like to see Value Management/Value Engineering training be made available to:-

all engineers and more railway officials

4. General comment:-

on a one to ten scale a ten + (plus)

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The thrust at Managers to analyse Situations, cost them and determine Course of Action.

2. Future Value Management/Value Engineering Workshops would be better if:-

Amble time is made available to simulate specific Scenarios.

3. I would like to see Value Management/Value Engineering training be made available to:-

All officers and Supervisors

4. General comment:-

Course material provided would assist in revisiting exercises

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

IT CAN READILY BE APPLIED IN MY FIELD OF WORK. IT WAS RELEVENT. THE WORKSHOP ACTIVITIES ADDRESSED REAL PROBLEMS/PROJECTS. THE CONCEPT BEING TALKED ABOUT IS/HAS MULTIDISCIPLINARY - NOT SPECIFIC TO ONE FIELD.

2. Future Value Management/Value Engineering Workshops would be better if:-

THE TEAMS/PARTICIPANTS ARE MORE MIXED. THERE WERE FAR TOO MANY RAILWAY PARTICIPANTS COMPARED WITH PARTICIPANTS FROM OTHER COMPANIES.

3. I would like to see Value Management/Value Engineering training be made available to:-

ALL RAILWAY OFFICERS INCLUDING SENIOR MANAGEMENT

4. General comment:-

THE COURSE WAS PRESENTED WITH A LOT OF FLAIR. THE PRESENTATION WAS VERY GOOD. THERE WAS A LOT OF INTERESTING, DIVERSE BUT RELEVANT INFORMATION THROWN IN.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

THE CHALLENGES IT GIVES IN ANALYSING SITUATION IN ORDER TO IDENTIFY OPPORTUNITIES

2. Future Value Management/Value Engineering Workshops would be better if:-

IF TIME COULD BE EXTENDED.

3. I would like to see Value Management/Value Engineering training be made available to:-

ALL RAILWAYS OFFICERS AND SUPERVISORS

4. General comment:-

The COURSE WAS AN EYE OPENER FOR ANALYSING THE WORK SITUATION FOR CONTINUOUS IMPROVEMENT.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   VE is a new concept.
   Problems are simplified to basic functions.

2. Future Value Management/Value Engineering Workshops would be better if:-

   More time to allow more interaction between lecturer and participants

3. I would like to see Value Management/Value Engineering training be made available to:-

   To lower levels of management ie junior engineers and officers.

4. General comment:-

   This is a course I would recommend to all large organizations

50

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

IT is a practical course and does result in an organisation cutting costs without sacrificing quality

2. Future Value Management/Value Engineering Workshops would be better if:-

More local authorities were involved

3. I would like to see Value Management/Value Engineering training be made available to:-

Engineers
NGO's

4. General comment:-

The facilities were good and the food too!
The instructors generated excitement in their presentation.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

THE APROACH TO PROBLEM SOLVING WHICH IS OPEN TO DIVERSE VIEWS AND FUNCTIONAL ANALYSIS OF A PROBLEM

2. Future Value Management/Value Engineering Workshops would be better if:-

PARTICIPANTS ARE GIVEN ENOUGH NOTICE TO PREPARE PROJECTS FOR VALUE ANALYSIS IN ORDER TO BRING ADEQUATE DATA.

3. I would like to see Value Management/Value Engineering training be made available to:-

HEADS OF MINISTRIES IN GOVERNMENT AND AS MANY SENIOR CIVIL SERVANTS AS POSSIBLE

4. General comment:-

I BELIEVE VM/VE IS A VERY USEFUL TOOL FOR PROJECT APPRAISAL AND WILL HAVE A SIGNIFICANT IMPACT IN ZIMBABWE

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It provided an alternative method of evaluating projects/ideas.

2. Future Value Management/Value Engineering Workshops would be better if:-

A concise example was chosen and fully worked out with the concept being emphasised.

3. I would like to see Value Management/Value Engineering training be made available to:-

Planning Branch - who are responsible for co-ordinating and approving Capital Projects

4. General comment:-

A simple and effective tool for decision analysis.

53

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

IT PROVIDED AN ENLIGHTENING AND LOGICAL METHODOLOGY OF ASSESSING CURRENT PROBLEMS WITH THE VIEW OF IMPROVING ON THEM WITHOUT SACRIFICING THE ORIGINAL BASIC FUNCTION AND QUALITY.

2. Future Value Management/Value Engineering Workshops would be better if:-

THESE WERE CONCENTRATING ON MORE PRACTICAL EXAMPLES.

3. I would like to see Value Management/Value Engineering training be made available to:-

ALL OFFICERS ON N.RZ.

4. General comment:-

THIS WAS A WONDERFUL LEARNING EXPERIENCE WHICH WILL ADD VALUE TO MY FUNCTION.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The format the course was presented by the two presenters.

2. Future Value Management/Value Engineering Workshops would be better if:-

the course took a bit longer to allow for emphasis in certain areas like the cost part of it.

3. I would like to see Value Management/Value Engineering training be made available to:-

Heads of some of these organisations here present inorder to make it possible for appreciation of its values and easier implementation.

4. General comment:-

I wish the mentors could try and make a follow up in future or organise more advance materials for the present group.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The concept of value engineering as this was new to me and the areas where it can be applied

2. Future Value Management/Value Engineering Workshops would be better if:-

(1) A specific organisation is dealt with on its own i.e. excluding participants from other organisation are excluded

(2) Period is extended e.g. to two week

3. I would like to see Value Management/Value Engineering training be made available to:-

All officers (grade 1 to 3) in the National Railways Zimbabwe

4. General comment:-

Value engineering is a concept which is universally applicable the presentation was excellent

56

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It taught me new ways of project/problem analysis. VE/VM is a usable tool for current organisational efforts.

2. Future Value Management/Value Engineering Workshops would be better if:-

1.) Time is lengthened by at least another week.
2.) Live organisational problems/projects are analysed with information available.

3. I would like to see Value Management/Value Engineering training be made available to:-

All managers as it inculcates the need to focus on functions with a view of cost reduction with no compromise to reliability, safety, performance etc. It teaches managers the art of teamwork, creativity, innovation and the need for clarity in problem analysis.

4. General comment:-

It would be beneficial to avail participants (interested) the opportunity of advancing this technique further

57

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It introduced a completely new concept which is an extremely ~~used~~ useful tool for management. It is also very versatile in terms of application.

2. Future Value Management/Value Engineering Workshops would be better if:-

Projects to be tackled are advised in advance to enable gathering of information and data

3. I would like to see Value Management/Value Engineering training be made available to:-

NRZ staff in the grade below Branch Head (which attended this course).

4. General comment:-

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Being able to identify opportunities for cost reduction where none were clearly apparent.

2. Future Value Management/Value Engineering Workshops would be better if:-

Allowed more time with course tutors to allow more hands on experience. Life Cycle costing would have been appreciated to a greater extend.

3. I would like to see Value Management/Value Engineering training be made available to:-

All managers in production related fields in the organisation

4. General comment:-

Value engineering a must for future to enhance competitiveness.

59

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

the practical approach where groups worked on various projects.

2. Future Value Management/Value Engineering Workshops would be better if:-

held away from workplaces.

3. I would like to see Value Management/Value Engineering training be made available to:-

Senior Executives as well to enable them to appreciate.

4. General comment:-

With the available time given the workshop was quite a success.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   The fast diagram and analysis.

2. Future Value Management/Value Engineering Workshops would be better if:-

   More time is allocated to each area of discussion.

3. I would like to see Value Management/Value Engineering training be made available to:-

   Both top and middle management of organizations

4. General comment:-

   The time allocated was rather short therefore having participants without tools for hands-on evaluation.

61

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

the manner in which all participants were involved in the activities — enhanced team work.

2. Future Value Management/Value Engineering Workshops would be better if:-

examples on life cost cycles were practised on these occasions so as to improve learning and application.

3. I would like to see Value Management/Value Engineering training be made available to:-

N.R.Z Section Heads 1&2. Grade 2 & Grade 1 Officers and those involved in Project Work. In particular the Project Team on the Manning levels study and Workstudy & Manning officers.

4. General comment:-

Course facilitators Messrs Rikkard and Kelly were dynamic, professional in their presentation and extremely helpful in imparting their skills and knowledge to participants.

62

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Clarity in the presentation and direction as everything was paid to the point

2. Future Value Management/Value Engineering Workshops would be better if:-

Time for seminars/workshops is increased to 2 weeks so that an in-depth study is made on case studies.

3. I would like to see Value Management/Value Engineering training be made available to:-

Officers below my grade grade 1 Officers to give them an appreciation of this new thinking

4. General comment:-

Value Management/Engineering is indeed a good technique of instilling into Managers ability to think in other terms be adaptive to the ever changing business world environments.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Clarity in the presentation and direction as everything was said to the point

2. Future Value Management/Value Engineering Workshops would be better if:-

Time for seminars/workshops is increased to 2 weeks so that an in-depth study is made on case studies.

3. I would like to see Value Management/Value Engineering training be made available to:-

Officers below my grade grade 1 Officers to give them an appreciation of this new thinking

4. General comment:-

Value Management/Engineering is indeed a good technique of instilling into the managers ability to think in other terms be adaptive to the ever changing business world environments.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Mr Pickard and Mr Kelly outstanding presentations and the work problems

2. Future Value Management/Value Engineering Workshops would be better if:-

we had more railway examples

3. I would like to see Value Management/Value Engineering training be made available to:-

all of my supervisors and our professional institutions

4. General comment:-

By far the best training ever given to us! - we need more

65

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

its focus on reduction of unnecessary costs & improvements in performance without compromising quality.

2. Future Value Management/Value Engineering Workshops would be better if:-

Practical examples were introduced when new concepts/stages are covered. Practical examples/assignments were taken to completion, time permitting.

3. I would like to see Value Management/Value Engineering training be made available to:-

all officers, in the 1st instance & Supervisors.

4. General comment:-

Good course, good participants and excellent facilities & administration

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It enabled me to look at issues slightly differently.

2. Future Value Management/Value Engineering Workshops would be better if:-

more practical cases could be gone through in the presentation.

3. I would like to see Value Management/Value Engineering training be made available to:-

More officers on the NRZ.

4. General comment:-

In a mixed group, there was need to place less emphasis on NRZ

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   its ability ~~to~~ to present information in a compact form

2. Future Value Management/Value Engineering Workshops would be better if:-

   each participant would bring problems for discussion, and not a chosen few

3. I would like to see Value Management/Value Engineering training be made available to:-

   technicians and accountants in local authorities

4. General comment:-

   this course has opened my mental eyes. I wish I could find more material to read and be able to practice this provocative way of thinking. The presenters were excellent.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   Its Comparison of Criteria used and the alternatives at the same time

2. Future Value Management/Value Engineering Workshops would be better if:-

   MORE CASE STUDIES ARE AVAILED

3. I would like to see Value Management/Value Engineering training be made available to:-

   ALL DOWN TO THE FOREMAN

4. General comment:-

   This HAS BEEN REAL VALUE

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

PRESENTERS, IT HAS RELEVANCY TO OPERATIONS OF THE MUNICIPALITIES

2. Future Value Management/Value Engineering Workshops would be better if:-

~~WHE~~ MORE TIME COULD PLANNED FOR CASES STUDIES. I.E SOME REPORTS PREPARED BEFORE COMMENCEMENT. TO MINIMIZE WRONG ASSUMPTION.

3. I would like to see Value Management/Value Engineering training be made available to:-

THE MANAGEMENT OF LOCAL AUTHORITIES
TOWN CLERKS, TOWN TREASURERS.. TOWN ENGINEERS
DIRECTOR OF HOUSING & COMMUNITY SERVICES
CHAIRMANS OF COUNCIL COMMITTES.

4. General comment:-

It would good to have ~~to~~ more literature about VE/VM in the country to ~~cop~~ reinforce the subject. Even monthly journals if there any.

70

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

the approach to problem solving ~~and~~ which self checking

2. Future Value Management/Value Engineering Workshops would be better if:-

we could start from scratch an exercise applicable to the organisation right to the end instead of examples that might not bear relevance to the organisation

3. I would like to see Value Management/Value Engineering training be made available to:-

all officers and supervisors on NRZ

4. General comment:-

The course could be run in a shorter period if all story telling could be minimised.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It encouraged teamwork, free and sincere exchanged of ideas and also provided a framework to enhance knowledge. Also provided a systematic and analytical way of managing systems.

2. Future Value Management/Value Engineering Workshops would be better if:-

More time is given in explaining essential details on such things as Team working - and analytical skills.

3. I would like to see Value Management/Value Engineering training be made available to:-

The generality of NRZ officers as they are the ones who will generally be called upon to perform the majority of the activities.

4. General comment:-

Starting on a Sunday was not very helpful - however the course should be made available to more people if the correct culture is to be develop.

72

U.S. Headquarters
1899 "L" Street, N.W., Suite 1100
Washington, D.C. 20036
Telephone (202) 728-2983 Facsimile (202) 728-1865 Telex 3737669 CFED

73

A

VALUE ENGINEERING

PROPOSAL

VM/VE WORKSHOP

4-8 JUNE 1995

74

VALUE ENGINEERING PROPOSAL

STUDY NUMBER SEVEN

PROJECT DOWNSIZING WORKFORCE

LOCATION NRZ

TEAM MEMBERS

S. ZUMBIKA (LEADER)

E. MASHINGAIDZE

W. LUGUBE

V.G. SITHOLE

L. NCUBE

CONSULTANTS

W.L. KELLY

K. RIKARD

VE SIGNATURE:

DATE: 8/6/95.

INFORMATION

ITEM UNDER STUDY	RIGHTSIZING	NRZ
BASIC FUNCTION(S)	SATISFY USER	ENSURE CONVENIENCE
FUNCTION(S) BEING ANALYZED	TRACK MAINTENANCE	DEVELOP TRACTION

SPECIAL CRITERIA

USER'S:

CODES:

RESTRICTIONS:

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

TELEPHONE CONVERSATION REPORT

PROJECT: _____ STUDY ITEM/NO: _____

DATE: _____ PHONE TO: _____

FROM: _____ TO: _____

BY: _____

ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
MAINTAIN TRACKAGE	12		112 Million
DEVELOP TRACTION	24		224 Million
PLAN SERVICE	32		295 Million
REGULATE MOVEMENT	3		25 Million
ADMINISTER ORGANISATION	18		169 Million
OTHER	11		98 Million
TOTAL	100%	TOTAL CONSTRUCTION COST	$923

ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
MAINTAIN TRACKAGE	12		112 Million
DEVELOP TRACTION	24		224 Million
PLAN SERVICE	32		295 Million
REGULATE MOVEMENT	3		25 Million
ADMINISTER ORGANISATION	18		169 Million
OTHER	11		98 Million
TOTAL	100%	TOTAL CONSTRUCTION COST	$923

FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

PROJECT RIGHTSIZING WORKFORCE STUDY ITEM: NRZ ORGANISATION

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	
	RESTORE	ALIGNMENT			INCREASE MECHANIZA-		
	RESTORE	HARDWARE			TION CONTRACT OUT		
	WORK	BALLAST			HIVE OFF AND HIRE		
MAINTAIN TRACK	PROVIDE	SUPPLIES		$112M	SEASONAL LABOUR		
	DELIVER	ROLSTOCK					
	ENSURE	AVAILABILITY					
	MAINTAIN	EQUIPMENT					
DEVELOP TRACTION	ACTIVATE	CREWS		$224M			
	GROUP	DELIVERIES					
	PERFORM	SHUNT					
	OPERATE	TERMINALS					
PLAN SERVICE				$295M			
	MANAGE	SCHEDULES					
	MAINTAIN	COMMUNICATION					
REGULATE MOVEMENT				$ 25M			
	FINANCE	OPERATION					
	PROTECT	ASSETS					
	MANAGE	PERSONNEL					
ADMINISTER ORGANISATION	MONITOR	COMPLIANCE		$267M			

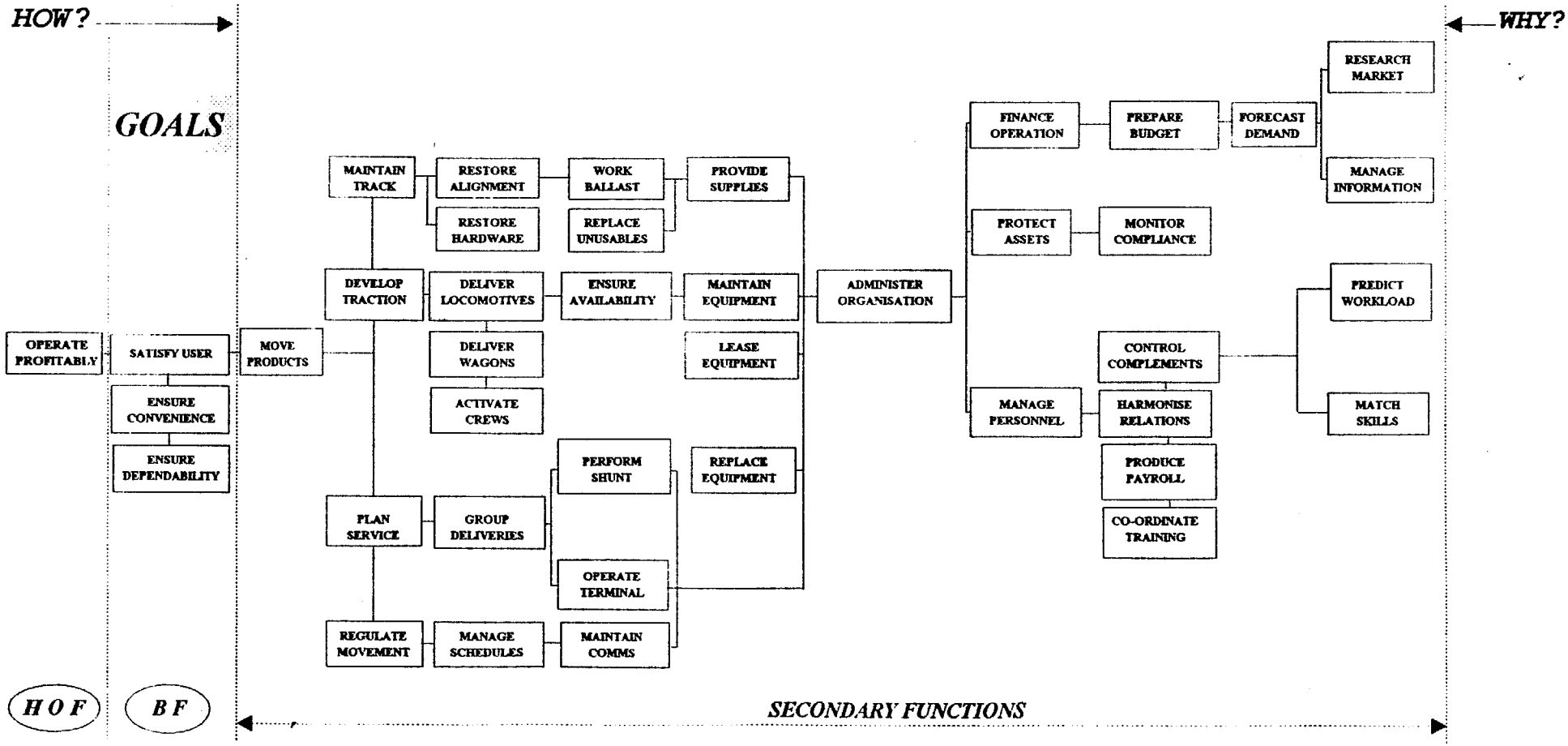
NOTES. Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate
Initial Alternative: Mini-Brainstorm; Alternative Cost (W), Lowest known cost to satisfactorily achieve the function
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE, POOR VALUE ITEMS SHOULD BE STUDIED!

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM

HOW? →

← WHY?

FAST DIAGRAM : RIGHT SIZING NRZ WORKFORCE



dm/a/sizing

SPECULATION PHASE

Applied Creativity To Generate Alternatives

PROJECT:_____ STUDY ITEM / NO.:_____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

CRITERIA WEIGHTING PROCESS

PROJECT: _____ STUDY ITEM / NO.: _____

	CRITERIA	RAW SCORE (WEIGHT)
A.	LEAST CONFRONTATION WITH UNIONS	1
B.	LEAST DISRUPTION TO OPERATIONS	8
C.	MAXIMUM SAVINGS	8
D.	FLEXIBILITY FOR CHANGE	1
E.	SAFETY	16
F.		
G.		
H.		

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H
A	B4	C3	A1 D1	E4			
B		B1 C1	B3	E4			
C			C4	E4			
D				E4			
E							
F							
G							

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered in Advantages/Disadvantages Analysis)

ANALYSIS MATRIX VEST FORM

SUBJECT: RIGHTSIZING WORKFORCE FUNCTION (S) MAINTAIN TRACK

COMPONENT OF: NRZ

COST / WORTH = $ / $

DISCUSSION:

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	SATISFIES FUNCTION 16	FIRST RANKING	SAFETY 16	LEAST DISRUPTION TO OPERATIONS 8	MAXIMUM SAVINGS 8						TOTAL	FINAL RANKING
1 INCREASE MECHANISATION	5 / 80		5 / 80	4 / 32	2 / 16						208	2
2 CONTRACT OUT	4 / 64		2 / 32	3 / 24	3 / 24						144	5
3 HIVE OFF AND HIRE	4 / 64		3 / 48	2 / 16	3 / 24						152	4
4 SEASONAL LABOUR	5 / 80		5 / 80	5 / 40	4 / 32						232	1
5 EXISTING	5 / 80		5 / 80	4 / 32	1 / 8						200	3
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

ALTERNATIVE EVALUATION

PROJECT: RIGHTSIZING WORKFORCE STUDY ITEM:

FUNCTION BEING ANALYZED: TRACK MAINTENANCE

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
1.	INCREASE MECHANIZATION	Less Labour, better quality increased productivity.	High cost, specialised equipment maintenance, total occupation.	2
2.	CONTRACT OUT	Less overheads, improved productivity.	May compromise safety, more disruptions to operations.	5
3.	HIVE OFF AND HIRE	No overheads, reduced cost.	May compromise safety, more disruptions to operations, less flexible.	4
4.	SEASONAL LABOUR	Reduced costs, reduced overheads Maintains level of safety.	Acceptability to Unions.	1

COST ESTIMATE FORM

PROJECT:_____ ITEM / NO.: _____

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST

87

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: _____

STUDY ITEM / NO.: _____

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS							
Base Cost							
Interface Costs							
a _____							
b _____							
c. _____							
Other Initial Costs							
a _____							
b _____							
TOTAL INITIAL COST IMPACT (IC)							
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ _____ Interest							
1. Year _____ PW Factor _____							
2. Year _____ PW Factor _____							
3. Year _____ PW Factor _____							
4. Year _____ PW Factor _____							
5. Year _____ PW Factor _____							
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ _____ Interest							
a. Maintenance							
Escal. Rate _____ PWA Factor _____							
b. Operations							
Escal. Rate _____ PWA Factor _____							
c. Others							
Escal. Rate _____ PWA FActor _____							
d. Others							
Escal. Rate _____ PWA FActor _____							
TOTAL ANNUAL COSTS							
TOTAL PRESENT WORTH COSTS							
LIFE CYCLE (PW) SAVINGS							

VALUE ENGINEERING PROPOSAL

PROJECT: _____

LOCATION: _____

STUDY ITEM / NO.: _____

ITEM'S FUNCTION(S): _____

ORIGINAL CONCEPT	VE CONCEPT

COSTS	INITIAL	LIFE CYCLE	TOTAL
ORIGINAL CONCEPT			
VE CONCEPT			
SAVINGS			
IMPLEMENTATION COSTS (INCLUDING REDESIGN)		SUBTOTAL (ROUNDED)	
		IMPLEMENTATION COSTS	
		NET SAVINGS	

ADDITIONAL ITEMS FOR STUDY

Listing of Items With Potential For Improvement

PROJECT: _____ DISCIPLINE: _____

PROPOSAL DESCRIPTION	POTENTIAL SAVING

VALUE ENGINEERING SERVICES TRANSWORLD

IMPLEMENTATION SHEET - SUMMARY ACTIONS - ATTACH DETAILS

FUNCTION	WHAT	WHO	WHEN
APPROVE	Track Maintenance Re-engineering	Chief Executive	As Soon As Possible
SCHEDULE	"	Project Team	1 Week After Approval
REDESIGN	"	"	3 Months After Approval
ESTIMATE	"	"	1 Week After Redesign
BUDGET	"	"	1 Week After Redesign
COORDINATE	"	Sponsor	Soon After Approval to Fini:
TEST	Use of Seasonal Labour	Functional Head	Soon After Design

The environment you are entering carries many roadblocks, such as:

Personal risk	Is the change safe or is there risk? How much?
Change	Will turf be reshuffled? Will there be big losers? Is relearning required? Will it be traumatic or small?
Time	Will the proposal fit into present schedules for completion or delivery? Will it shorten present schedules?
Benefits	Who are the big gainers? Who are the losers? Do both individuals and the organizations benefit?

That list barely scratched the list of roadblocks that will flow across the path of implementation. Any manager knows that if one can delay a decision for just two or three weeks, the enthusiasm of a fresh idea will be dampened by the weight of habit and special interests and it will be back to business as usual. And so to sleep.

ADVANTAGES:

DISADVANTAGES:

The functions shown are suggested active verbs. Use those functions applicable to your project.

VALUE ENGINEERING PROPOSAL PLAN

PROJECT: _____ STUDY ITEM / NO.: _____

92

CRITERIA/IDEA MATRIX

PROJECT: DOWNSIZING WORKFORCE STUDY ITEM.: TRACK MAINTENANCE

LOCATION: NRZ (BLR) ITEM'S FUNCTION(S): MAINTAIN TRACK

DISCIPLINE: _____ TEAM MEMBER(S) _____ TEL. NO.: ( ) _____

SPECULATION-ALTERNATIVES

1. (ORIGINAL CONCEPT) CURRENT METHOD
2. INCREASE MECHANISATION
3. CONTRACT OUT
4. HIVE OFF AND HIRE
5. SEASONAL LABOUR
6. _____
7. _____
8. _____

Note: Alternative Numbers are repeated at top of Matrix

MATRIX WEIGHTING OF ALTERNATIVES

CRITERIA	WEIGHT	1	2	3	4	5	6	7	8
* Satisfies Function(s)	16	5 / 80	5 / 80	4 / 64	4 / 64	5 / 80			
SAFETY	16	5 / 80	5 / 80	2 / 32	3 / 48	5 / 80			
DISRUP. TO OPS	8	4 / 32	4 / 32	3 / 24	2 / 16	5 / 40			
MAX SAVING	8	1 / 8	2 / 16	3 / 24	3 / 24	4 / 32			
Desirability Rank/ Total Weighted Value									

** Satisfies function is a must criteria. Its weight must be equal to or greater than any other. Total weights x 4 (very good) = Minimum score for an alternative to be a satisfactory solution.*

RANK VALUE: 5 = Excellent 4 = Very Good 3 = Good 2 = Fair 1 = Poor

RANK	ALT. NO.	ADVANTAGES	DISADVANTAGES	FINAL RANK
2	2			2
4	4			4
1	5			1

RECOMMENDED ALTERNATIVE: SEASONAL LABOUR

VM/VE

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 2

PROJECT HARARE WATER PROJECT

LOCATION

TEAM MEMBERS

VUMISANI SITHOLE
PAUL MANAMIKE
ITAI MUNYAME
BRIGHTON MUZANGAZA
JAMES MUZOFA

CONSULTANTS

WILLIAM ~~BILL~~ KELLY AND KEN RIKARD

VE SIGNATURE:

DATE:

INFORMATION

ITEM UNDER STUDY _____

BASIC FUNCTION(S) _____ _____

FUNCTION(S) BEING ANALYZED _____ _____

SPECIAL CRITERIA

USER'S:

CODES:

RESTRICTIONS:

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

TELEPHONE CONVERSATION REPORT

PROJECT: _____ STUDY ITEM/NO: _____

DATE: _____ PHONE TO: _____

FROM: _____ TO: _____

BY: _____

96

ALTERNATIVE EVALUATION

PROJECT: _____ STUDY ITEM: _____

FUNCTION BEING ANALYZED: _____

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING

COST ESTIMATE FORM

PROJECT:_____ ITEM / NO.: _____

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST

98

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: _____

STUDY ITEM / NO.: _____

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS							
Base Cost							
Interface Costs							
a._____							
b._____							
c._____							
Other Initial Costs							
a._____							
b._____							
TOTAL INITIAL COST IMPACT (IC)							
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ ____Interest							
1. Year _____ PW Factor _____							
2. Year _____ PW Factor _____							
3. Year _____ PW Factor _____							
4. Year _____ PW Factor _____							
5. Year _____ PW Factor _____							
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ _____ Interest							
a. Maintenance							
Escal. Rate _____ PWA Factor _____							
b. Operations							
Escal. Rate _____ PWA Factor _____							
c. Others							
Escal. Rate _____ PWA FActor _____							
d. Others							
Escal. Rate _____ PWA FActor _____							
TOTAL ANNUAL COSTS							
TOTAL PRESENT WORTH COSTS							
LIFE CYCLE (PW) SAVINGS							

ITEM/FUNCTION COST MODEL

PROJECT: HARARE WATER PROJECT STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
EXCAVATION (FORM VOID)	1,4		300 000
BREAK PAVEMENT	2,8		150 000
REPLACE PIPES	79.4		8.400. 000
FILL VOIDS	0.9		100. 000
REPLACE PAVEMENT	2.4		250. 000
CONTINGENCES	13.1		1.380. 000
TOTAL	100%	TOTAL CONSTRUCTION COST	$10580.000

FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

PROJECT: STUDY ITEM:

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	

NOTES: Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate.
Initial Alternative: Mini-Brainstorm; Alternative Cost (W); Lowest known cost to satisfactorily achieve the function.
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE; POOR VALUE ITEMS SHOULD BE STUDIED!

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM

HOW? →

← WHY?

SPECULATION PHASE

Applied Creativity To Generate Alternatives

PROJECT:_____ STUDY ITEM / NO.:_____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

CRITERIA WEIGHTING PROCESS

PROJECT: HARARE WATER PROJECT STUDY ITEM / NO.: 2

CRITERIA	RAW SCORE (WEIGHT)
A. COST	17 (2)
B. RELIABILITY	23 (1)
C. MAINTAINABILITY	11 (3)
D. ENVIROMENTAL IMPACT	0 (7)
E. OPERATIONAL ECONOMY	11 (3)
F. CONSTRUCTION TECHNOLOGY	7 (4)
G. SAFETY	2 (6)
H. AVAILABILITY OF MATERIAL	4 (5)

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H
A	B_3	A_1 C_1	A_4	A_2	A_3	A_4	A_3
B		B_2	B_4	B_3	B_2	B_4	B_4
C			C_3	E_2	C_2	C_3	C_2
D				E_2	F_2	G_2	H_2
E					E_3	E_2	E_2
F						F_3	F_2
G							H_2

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered
in Advantages/Disadvantages Analysis)

104

ANALYSIS MATRIX VEST FORM

SUBJECT: HARARE WATER PROJECT FUNCTION (S) TRANSMISSION OF WATER

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	PERFORMS/SATISFIES FUNCTION	FIRST RANKING	COST	RELIABILITY	MAINTAINABILITY	ENVIRONMENTAL IMPACT	OPERATIONAL ECONOMY	CONSTRUCTION TECHNOLOGY	SAFETY	AVAILABILITY OF MATERIALS	TOTAL	FINAL RANKING
	23		17	23	11	0	11	7	2	4		
1 G.I	5/115		2/34	4/92	2/22	0/0	4/44	3/21	2/4	4/16	233	4
2 A.C	5/115		4/68	2/46	3/33	0/0	3/33	4/28	1/2	5/20	230	5
3 GRP	5/115		3/51	5/115	4/44	0/0	5/55	4/28	3/6	3/12	311	3
4 HDP	5/115		3/51	5/115	4/44	0/0	5/55	5/35	3/6	3/12	318	2
5 PVC	5/115		5/85	4/92	5/55	0/0	4/44	4/28	3/6	5/12	330	1
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

ALTERNATIVE EVALUATION

PROJECT: HARARE WATER PROJECT STUDY ITEM: PIPE TYPES.

FUNCTION BEING ANALYZED: TRANSPORT WATER

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
1	PVC	1. LOW COST 2. EASY TO HANDLE 3. LIGHT WEIGHT 4. LOW FRICTIONAL LOSSES 5. GOOD CORROSSION RESISTANCE	1. POOR RESISTANCE TO STATIC AND TRANSIENT LOADS 2. DAMAGED BY ULTRA-VIOLET LIGHT 3. POOR RESISTANCE TO HEAT.	3.
2.	HDP	1. MEDIUM COST 2. EASY TO HANDLE 3. LIGHT WEIGHT 4. LOW FRICTIONAL LOSSES 5. GOOD CORROSSION RESISTANCE 6. GOOD RESISTANCE TO STATIC AND TRANSLENT LOADS.	1. NOT READILY AVAILABLE	2
3.	G.R.P	1. LIGHTWEIGHT 2. LOW FRICTIONAL LOSSES 3. CAN WITHSTAND STATIC AND TRANSIENT LOADS	1. NOT READILY AVALABLE	1

COST ESTIMATE FORM

PROJECT: HARARE WATER PROJECT ITEM / NO.: PIPES

ITEM / DESCRIPTION		QTY.	UNIT COST	TOTAL COST
G.I	~~BREAK TANK~~			
	PIPES	10.000	$500/m	$5.000.000
	LABOUR	10.000	$340/m	$3.400.000
GPR	PIPE	10.000	$530/m	$5.300.000
	LABOUR	10.000	$210/m	$2.100.000
HDP	PIPES	10.000	$450/m	$4.500.000
	LABOUR	10.000	$210/m	$2.100.000

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: HARARE WATER PROJECT

STUDY ITEM / NO.: WATER PIPES

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS		8.400,000		7.400,000		6.600.000	
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a.							
b.							
TOTAL INITIAL COST IMPACT (IC)		8.400,000		7.400.000		6.600,000	
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ 12% Interest							
1. Year ____ PW Factor 0.0101							
2. Year ____ PW Factor ____							
3. Year ____ PW Factor ____							
4. Year ____ PW Factor ____							
5. Year ____ PW Factor ____							
Salvage Present Worth	0	0	3.400.000	(31370)	0	0	
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ 12% Interest							
a. Maintenance							
Escal. Rate ____ PWA Factor 8.275	42 000	347550	21000	173775	16500	135 537.5	
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others							
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS	42000						
TOTAL PRESENT WORTH COSTS		8.747.550		7.536,405		6.736537.5	
LIFE CYCLE (PW) SAVINGS							

VALUE ENGINEERING PROPOSAL

STUDY NUMBER _____

PROJECT STREAMLINE NRZ INFRASTRUCTURE

LOCATION _____

TEAM MEMBERS

ES MAROWA

KP MAGUNDA

M BANANA

S CHIMHAMIWA

H DZINOTYIWEI

J NYARUWA

CONSULTANTS

VE SIGNATURE: _____

DATE: _____

INFORMATION

ITEM UNDER STUDY _____

BASIC FUNCTION(S) FACILITATE _____ MOVEMENT _____

FUNCTION(S) BEING ANALYZED _____ _____

SPECIAL CRITERIA

USER'S:

CODES:

RESTRICTIONS:

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

PROJECT STUDY ITEM

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	
TRACK	CREATES	HIGHWAY					
	LINKS	MARKETS					
	HOLDS	GOODS					
	SUPPORTS	LOADS					
SIGNALLING	REGULATES	MOVEMENT					
	ENSURES	SAFETY					
	OPTIMIZE	CAPACITY					
TELECOMS	TRANSCIEVE	INFORMATION					
SUPERVISORY CONTROL	MONITORS	MOVEMENT					
	TRANSIMITS	INFORMATION					
	MONITORS	INFRASTRUCTURE					
POWER SUPPLIES	ENERGIZE	EQUIPMENT					
BUILDINGS	HOUSES	EQUIPMENT					
	HOUSES	STAFF					
ACCESS ROADS	ACCESS	INFRASTRUCTURE					

NOTES Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate.
Initial Alternative: Mini-Brainstorm; Alternative Cost (W); Lowest known cost to satisfactorily achieve the function.
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE; POOR VALUE ITEMS SHOULD BE STUDIED!

BEST AVAILABLE COPY

SPECULATION PHASE

Applied Creativity To Generate Alternatives

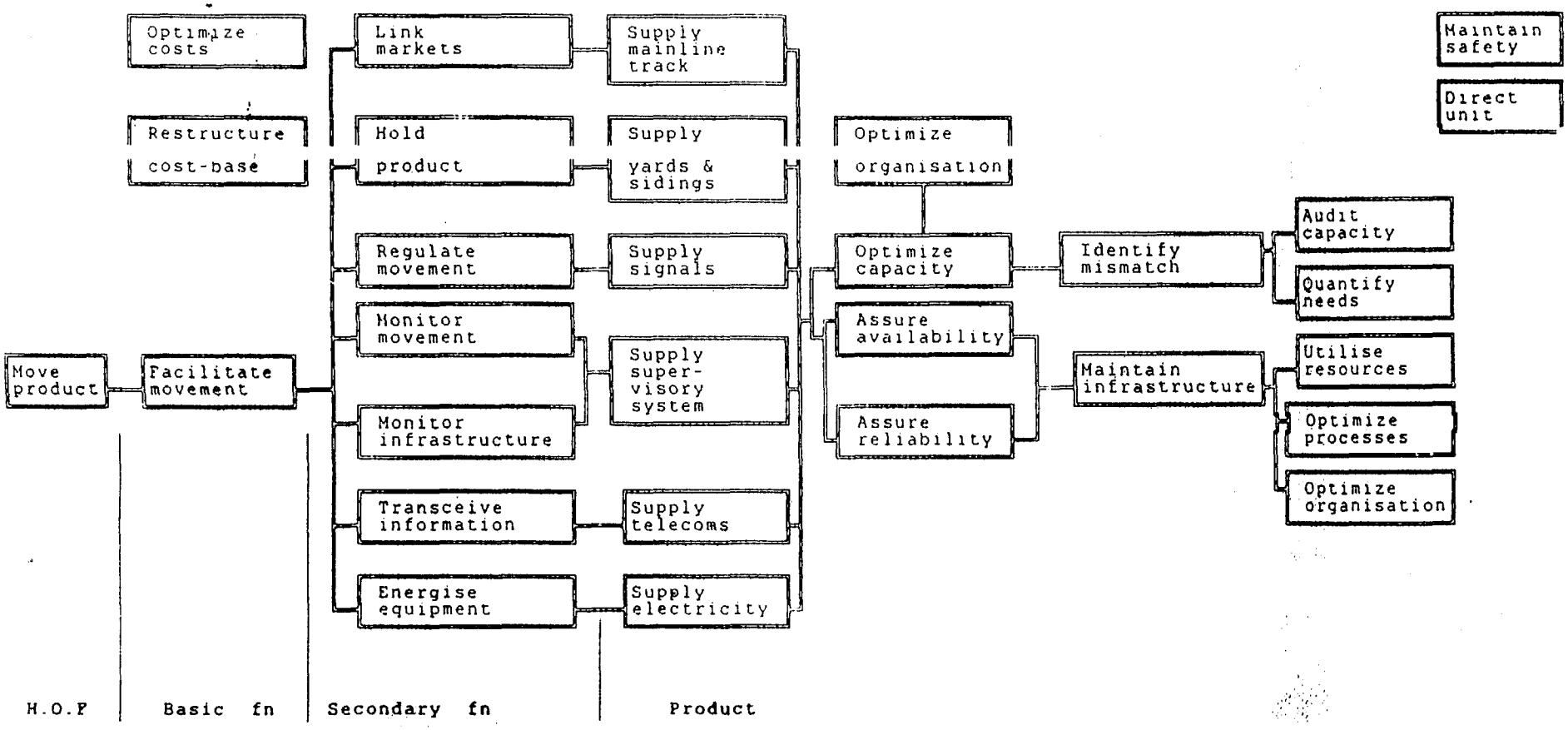
PROJECT: _____ STUDY ITEM / NO.: _____

1. STATUS QUO
2. CREATE INFR DIV
3. INFR. AS GVT DEPT
4. INFR AS PARASTATAL
5. PVT OWNERSHIP
6. PUBLIC COMPANY
7. GVT OWNED PVT CO.
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

FAST DIAGRAM NO.4

HOW ?--->

<---WHY ?



PROJECT:

1. STATUS QUO
2. CREATE INFR
3. INFR. AS G
4. INFR AS PAR
5. PVT OWNERS
6. PUBLIC CON
7. GVT OWNED
8.
9.
10.
11.
12.
13.
14.

ITEM/FUNCTION COST MODEL

PROJECT:

STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
LINK MARKET	45		53,3m
HOLD GOODS	21		24,5m
REGULATE MOVEMENT	19		22,5m
TRANSCIEVE INFO	10		11,9 m
SUPERVISORY CONTROL	2		2,6m
ENERGIZE EQUIPT	3		2,7m

CRITERIA WEIGHTING PROCESS

PROJECT: _____ STUDY ITEM / NO.: _____

	CRITERIA	RAW SCORE (WEIGHT)
A.	RELIABILITY	5
B.	SAFETY	15
C.	COST EFFECTIVENESS	5
D.	AVAILABILITY	6
E.	ROLLING STOCK COMPATIBILITY	10
F.	GOOD LIASON/INTERFACE	0
G.		
H.		

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H
A	B_3	A1 C1	A1 D1	E_3	E_3		
B		B_3	B_3	B_2	B_4		
C			C1 D1	E_3	C_3		
D				D1 E1	D3		
E					E_3		
F							
G							

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered in Advantages/Disadvantages Analysis)

ANALYSIS MATRIX VEST FORM

SUBJECT: _____ FUNCTION (S) _____

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	PERFORMS FUNCTION 15	FIRST RANKING	SAFETY 15	RS COMPATIBILITY 10	AVAILABILITY 6	RELIABILITY 5	COST EFFECTIVENESS 5				TOTAL	FINAL RANKING
1 STATUS QUO	5 / 75		4 / 60	5 / 50	4 / 24	4 / 20	3 / 15				244	
2 NRZ INF DIV	5 / 75		5 / 75	5 / 50	4 / 20	4 / 20	4 / 20				264	1
3 GVT DEPT	4 / 60		3 / 45	3 / 30	3 / 18	3 / 15	2 / 10				178	
4 SEPARATE PARASTATAL	5 / 75		4 / 60	4 / 40	3 / 18	4 / 20	3 / 15				228	
5 PUBLIC OWNERSHIP	4 / 60		5 / 75	5 / 50	4 / 24	5 / 25	4 / 20				254	2
6 GVT OWNED PVT CO.	5 / 75		4 / 60	5 / 50	4 / 24	5 / 25	4 / 20				254	2
7 PVT OWNERSHIP	3 / 45											
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

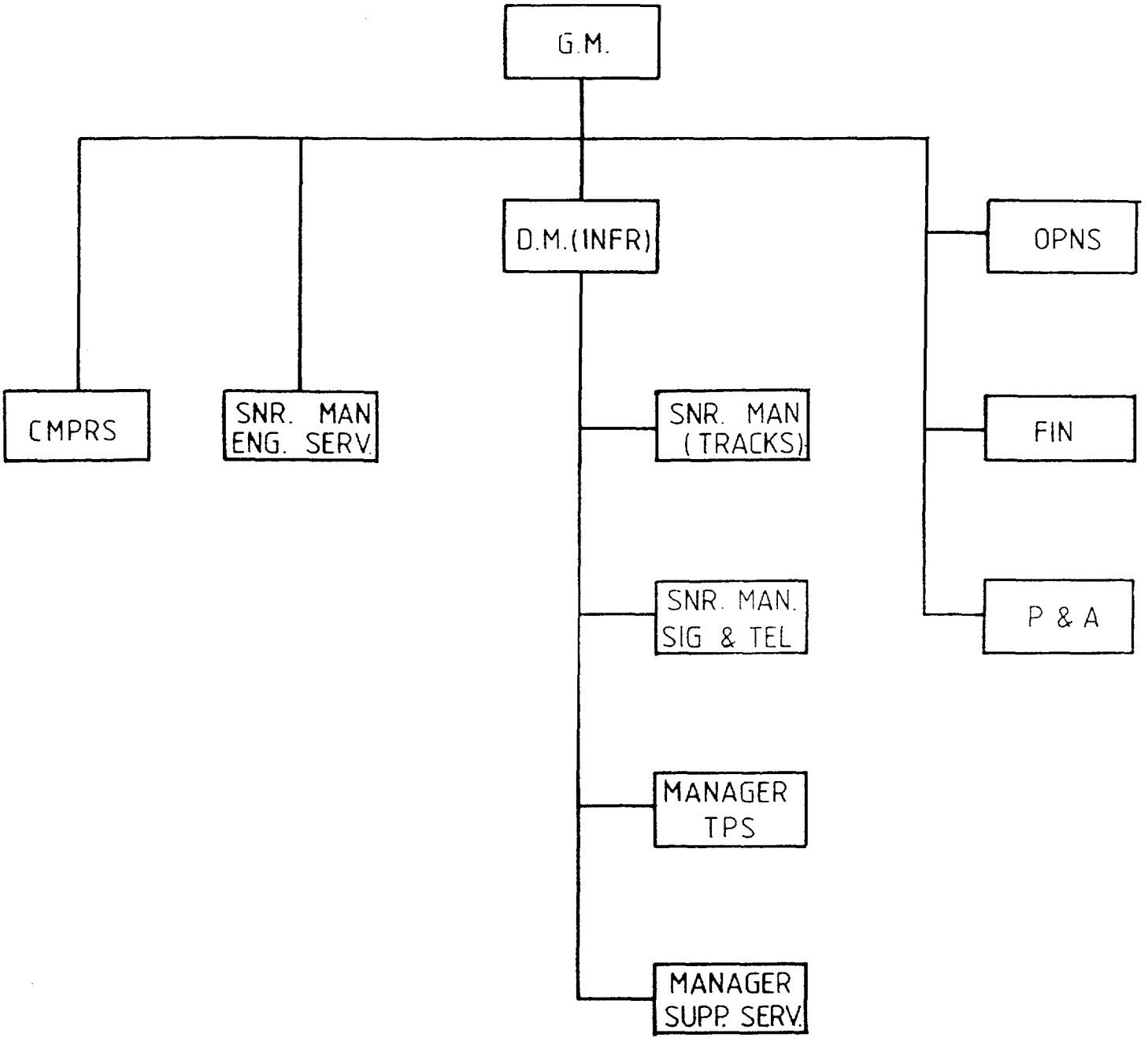
ALTERNATIVE EVALUATION

PROJECT: STREAMLINE INFRASTRUCTURE STUDY ITEM:

FUNCTION BEING ANALYZED:

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
1.	STATUS QUO	CONTINUITY, CONTROL, MODAL EQUITY,	UNION AGREEMENTS. "PARASTATAL" CULTURE. FINANCIAL INSTABILITY.	4
2.	NRZ INFR DIVISION	CONTINUITY, CONTROL, MODAL EQUITY, MORE CUSTOMER FOCUS,	"PARASTATAL" CULTURE. UNION AGREEMENTS. FINANCIAL INSTABILITY.	1
3.	PUBLIC OWNERSHIP	LESS BUREAUCRACY. ENHANCED BUSINESS CULTURE.	ALTERNATIVE RAIL COMPETION. REDUCED INTERFACE EFFICIENCY. LOSS OF CONTROL.	3
4.	GVT OWNED PVT CO.	ENHANCED BUSINESS CULTURE, MODAL EQUITY. LESS BUREAUCRACY.	ALTERNATIVE RAIL COMPETITION. LOSS OF CONTROL. REDUCED INTERFACE EFFICIENCY.	2

PROPOSED INFRASTRACTURE DIVISION



PERMANENT WAY

Related Infrastructure
- Tracks
- Signals
- Telecommunications
- TPS

PERMANENT WAY

Non-Related Infrastructure

Civil
- Estates
- Housing
- Operational Buildings
- Ancillary Services

Electrical
- Power Supplies
- Housing
- Operational Buildings
- Plant and Equipment

Signals
- Data Processing Equipment

D

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 1/95.

PROJECT SIVE PAMBILI ROAD DESIGN

LOCATION BULAWAYO

TEAM MEMBERS

SIMELA DUBE (LEADER).

SAMUEL CHIDUZA (SECRETARY)

ERASMUS MOFFAT

PHILIP NGWENYA.

CONSULTANTS

NIL

VE SIGNATURE:

DATE: 8 JUNE 1995

120

INFORMATION

ITEM UNDER STUDY: DESIGN OF ROAD. PAVEMENT

BASIC FUNCTION(S): IMPROVE ACCESS

FUNCTION(S) BEING ANALYZED: STRENGTHEN PAVEMENT PROTECT PAVEMENT

SPECIAL CRITERIA

USER'S:
- SAFETY
- REDUCE USER COSTS
- MAINTAIN ENVIRONMENT

CODES: ROAD DESIGN MANUALS

RESTRICTIONS:

NIL

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

MASTER PLAN PROPOSALS APPROVED BY MINISTER OF LOCAL GOVT. RURAL & URBAN DEV

TELEPHONE CONVERSATION REPORT

PROJECT: _____ STUDY ITEM/NO: _____

DATE: _____ PHONE TO: _____

FROM: _____ TO: _____

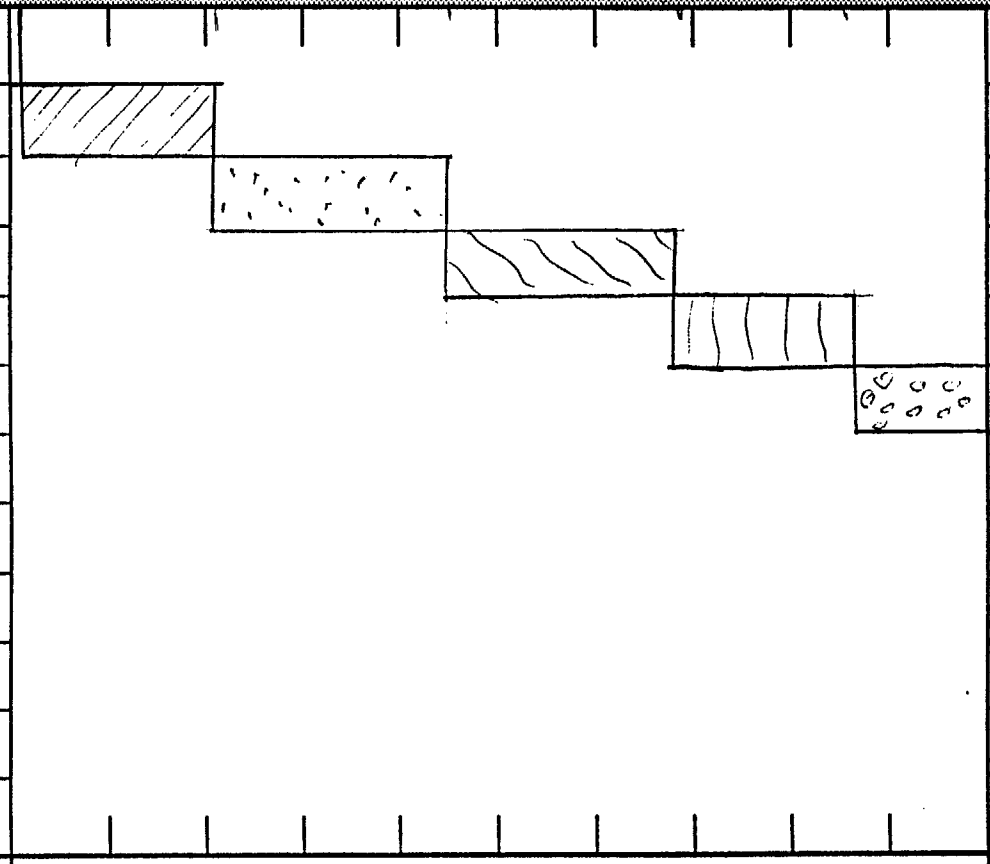
BY: _____

122

ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
ESTABLISH SITE	1.9		0.10
PREPARE ROADBED	20.7		1.10
PREPARE SUBBASE	23.5		1.25
CONSTRUCT BASE	22.5		1.20
PROTECT BASE	17.3		0.92
SAFETY	14.1		0.75
TOTAL	100%	TOTAL CONSTRUCTION COST	$ 5.32



13

FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

PROJECT: SIYA PAMBILI OUTER R. ROAD STUDY ITEM: DESIGN & CONSTRUCTION

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	
ESTABLISH SITE	MOVE	EQUIPMENT	2			(1) 100 000	1
	CONSTRUCT	CAMP			–	(2) 100 000	1
	MARK	PROFILES				(3) 100 000	1
				100 000	No change		
ROADBED PREPARATION	CLEAR	BUSH	2			(1) 1100 000	1
	REMOVE	TOPSOIL			–	(2) 1100000	1
	SHAPE	ROADBED				(3) 1100 000	1
	COMPACT	ROADBED		1100 000			
SUBBASE PREPARATION	STOCKPILE	GRAVEL				(1) 833 000	1+
	HAUL	GRAVEL	2		–	(2) NIL	1+
	SPREAD	GRAVEL				(3) NIL	1+
	COMPACT	SUBBASE		1250 000			
BASE CONSTRUCTION	STOCKPILE	GRAVEL	2			(1) 800 000	1+
	HAUL	GRAVEL			–	(2) 1200000	1
	SPREAD	GRAVEL				(3) 1200000	1
	COMPACT	BASE		1200 000			
SURFACING	SPRAY	PRIME	2			(1) 1960000	0,47
	SPRAY	BINDER			–	(2) 920000	1
	APPLY	AGGREGATE				(3) 3920000	0,23
	SEAL	SURFACE		920 000			
SAFETY	ERECT	KERBING	1			(1) 750 000	1
	ERECT	SIGNS			–	(2) 750000	1
	MARK	ROAD LINES				(3) 750000	1
	ERECT	STREETLIGHTS		750 000			

NOTES: Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate.
Initial Alternative: Mini-Brainstorm; Alternative Cost (W); Lowest known cost to satisfactorily achieve the function.
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE; POOR VALUE ITEMS SHOULD BE STUDIED!

0 = 5320(4
1 = 5543(4
(2) = 4070(
(3) = 7070(2

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM

HOW? →

← WHY?

SPECULATION PHASE

Applied Creativity To Generate Alternatives

PROJECT: SIYE PAMBILI

STUDY ITEM / NO.:

1. REDUCE WIDTH
2. VARY SURFACING
3. DELAY CONSTRUCTION
4. PHASED CONSTRUCTION
5. VARY PAVEMENT THICKNESS
6. PROTECT ENVIRONMENT
7. STABILIZE PAVEMENT
8. VARY MATERIALS
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.

CRITERIA WEIGHTING PROCESS

PROJECT: SIVE PAMBILI STUDY ITEM / NO.: _____

	CRITERIA	RAW SCORE (WEIGHT)
A.	SAFETY	12
B.	COST	8
C.	USER COSTS	7
D.	MAINTANABILITY	15
E.	ENVIRONMENTAL IMPACT	4
F.	CONSTRUCTION TECHNOLOGY	3
G.	AVAILABILITY OF CONSTRUCTION MATERIAL	6
H.		

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H
A	A3	A2	D3	A2	A2	A3	
B		C2	D3	B4	B4	G2	
C			C1 D1	C2	C1 F1	C1 G1	
D				D4	D3	D1 G1	
E					E4	G2	
F						F2	
G							

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered
in Advantages/Disadvantages Analysis)

ANALYSIS MATRIX VEST FORM

SUBJECT: SIYE PAMBILI FUNCTION (S) IMPROVE ACCESS

COMPONENT OF:

COST / WORTH = $6416550 / $5978180 = 1,07 DISCUSSION: WORTHWHILE EXERCISE

FUNCTION FOR STUDY: CONSTRUCT FACILITIES.	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	PERFORMS SATISFIES FUNCTION	FIRST RANKING	SAFETY	COST	USER COSTS	MAINTANABILITY	ENVIRONMENTAL IMPACT	CONSTR TECH.	AVAILABILITY OF CONST. MATERIAL		TOTAL	FINAL RANKING
	15		12	8	7	15	4	3	6			
0) 1 300mm PAVEMENT CHIP + SPRAY	5 / 75		5 / 60	4 / 32	5 / 35	3 / 45	3 / 12	3 / 9	4 / 24		292	3
1) 2 200mm PAVEMENT 50mm + ASPHALT CONC	5 / 75		4 / 48	4 / 32	5 / 35	5 / 75	4 / 16	3 / 9	4 / 24		314	1
2) 3 150mm PAVEMENT SPRAY + CHIP +	4 / 60		5 / 60	5 / 40	5 / 35	3 / 45	5 / 20	3 / 9	4 / 24		293	2
3) 4 150mm PAVEMENT 100MM + ASPHALT	4 / 60		4 / 48	2 / 16	5 / 35	5 / 75	5 / 20	3 / 9	4 / 24		287	4
5												
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

128

VM/VF

ALTERNATIVE EVALUATION

PROJECT: SIYE PAMBILI RD STUDY ITEM: ROAD CONSTRUCTION

FUNCTION BEING ANALYZED: STRENGHTEN PAVEMENT

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
1	200mm PAVEMENT + 50 ASPHALT	-RESEALING AFTER 10YRS -QUICKER TO CONSTRUCT PAVEMENT	-SLOW PREMIX OVERLAY	1
2.	150 PAVEMENT + SPRAY & CHIP	- QUICK TO CONSTRUCT	-REQUIRES STRENGTHENING AFTER 7YRS HENCE DISRUPTS TRAFFIC - RESEAL AFTER 5YRS - RECONSTRUCTION FUNDS MIGHT NOT BE AVAILABLE	3
3.	300 PAVEMENT + CHIP & SPRAY	- QUICKER TO LAY SURFACE	- SLOW CONSTRUCTION PROCESS (PAVEMENT) - RESEALING AFTER 5YRS	2

COST ESTIMATE FORM

PROJECT: OPTION 1 (200 PAVEMENT + 50 ASPHALT) ITEM / NO.: _____

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST
SITE ESTABLISHMENT	1	100 000	100 000
ROADBED PREPARATION	1	1100 000	1100 000
SUBBASE PREPARATION	1	833 000	833 000
BASE CONSTRUCTION	1	800 000	800 000
SURFACING	1	1960000	1960000
SAFETY	1	750000	750000
GRAND TOTAL			5 543 000
MAINTENANCE COST			
ROUTINE (PER YR)	1	5000/YR	5000
RESEAL (SINGLE) 10th YR	1	500000	500000

COST ESTIMATE FORM

PROJECT: OPTION 2 (300 PAVEMENT + CHIP & SPRAY) ITEM / NO.: _____

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST
ESTABLISH SITE	1	100 000	100 000
ROADBED PREPARATION	1	1100 000	1100 000
SUBBASE PREPARATION	1	1250 000	1250 000
BASE CONSTRUCTION	1	1200 000	1200000
SURFACING	1	920 000	92000
SAFETY	1	750 000	750000
GRAND TOTAL			5 320 000
MAINTENANCE			
ROUTINE (PER YR)		5000	5 000
RESEALING (SINGLE) AFT 5 YRS		500 000	500 000

COST ESTIMATE FORM

PROJECT: OPTION 3 (150+ CHIP & SPRAY) ITEM / NO.: _____

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST
SITE ESTABLISHMENT	1	100 000	100 000
ROADBED PREPARATION	1	1100 000	1100 000
SUBBASE PREPARATION	1	—	—
BASE CONSTRUCTION	1	1200 000	1200 000
SURFACING	1	920 000	920 000
SAFETY	1	750 000	750000
SUBTOTAL			4070 000
MAINTENANCE COST			
ROUTINE MAINT.	1	5000/YR	5 000
RESEALING (SINGLE) 12th YR	1	500 000	500 000
RECONSTRUCTION 7th YR			
(BASE & SURFACE)	1	2670 000	2670 000

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: SIYE PAMBILI

STUDY ITEM / NO.: 1/95/SP

	ORIGINAL (OPTION 2)		ALTERNATE NO.1 (OPTION 1)		ALTERNATE NO.2 (OPTION 3)		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS	5 320 000	5320000	5543000	5543000	4070000	4070000	
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a. DESIGN 6½	345800	345800	365000	365000	264550	264550	
b. ADMIN 5	266000	266000	304000	304000	203500	203500	
TOTAL INITIAL COST IMPACT (IC)		5938000		6212000		4539000	
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ 12% Interest							
1. Year 7 PW Factor 0.4523					2903500	1313250	
2. Year 5 PW Factor 0.5674	500000	283700					
3. Year 10 PW Factor 0.3219	500000	160950	500000	160950			
4. Year 12 PW Factor 0.2568					500000	128400	
5. Year 15 PW Factor 0.1826							
Salvage Present Worth					200000	(36520)	
TOTAL PRESENT WORTH		444500		160950	3370000	1405130	
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ 12 Interest							
a. Maintenance							
Escal. Rate ____ PWA Factor 6.810	5000	34050	5000	34050	5000	34050	
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others							
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS		34050		34050		34050	
TOTAL PRESENT WORTH COSTS		6416550		6407000		5978180	

VALUE ENGINEERING PROPOSAL

PROJECT: SIYE PAMBILI

LOCATION: BYO

STUDY ITEM / NO.: 1/95/SP

ITEM'S FUNCTION(S): IMPROVE ACCESS
STRENGHTEN PAVEMS

ORIGINAL CONCEPT	VE CONCEPT
300mm Pavement + Chip & Spray	150mm Pavement + Chip & Spray and reconstruction after 7years.

COSTS	INITIAL	LIFE CYCLE	TOTAL
ORIGINAL CONCEPT	5 938 000	478550.	6416550
VE CONCEPT	4 539 000	1439180	5978180.
SAVINGS	1 399 000		438370

IMPLEMENTATION COSTS (INCLUDING REDESIGN)		
	SUBTOTAL (ROUNDED)	
	IMPLEMENTATION COSTS	
	NET SAVINGS	

VALUE ENGINEERING SERVICES TRANSWORLD

IMPLEMENTATION SHEET - SUMMARY ACTIONS - ATTACH DETAILS

FUNCTION	WHAT	WHO	WHEN
APPROVE	PROJECT PROPOSAL	CITY ENG	30/6/95
SCHEDULE	CONSTRUCTION	RDS ENG	31/7/95
REDESIGN	ALTERNATIVE	" "	30/6/2002
ESTIMATE	ALTERNATIVE	" "	" " "
BUDGET	"	" "	
COORDINATE			
TEST			

The environment you are entering carries many roadblocks, such as:

Personal risk	Is the change safe or is there risk? How much?
Change	Will turf be reshuffled? Will there be big losers? Is relearning required? Will it be traumatic or small?
Time	Will the proposal fit into present schedules for completion or delivery? Will it shorten present schedules?
Benefits	Who are the big gainers? Who are the losers? Do both individuals and the organizations benefit?

That list barely scratched the list of roadblocks that will flow across the path of implementation. Any manager knows that if one can delay a decision for just two or three weeks, the enthusiasm of a fresh idea will be dampened by the weight of habit and special interests and it will be back to business as usual. And so to sleep.

ADVANTAGES:

DISADVANTAGES:

The functions shown are suggested active verbs. Use those functions applicable to your project.

ADDITIONAL ITEMS FOR STUDY

Listing of Items With Potential For Improvement

PROJECT: _____ DISCIPLINE: _____

PROPOSAL DESCRIPTION	POTENTIAL SAVING

VALUE ENGINEERING PROPOSAL PLAN

PROJECT: _____ STUDY ITEM / NO.: _____

CRITERIA/IDEA MATRIX

PROJECT: _____ STUDY ITEM.: _____

LOCATION: _____ ITEM'S FUNCTION(S): _____

DISCIPLINE: _____ TEAM MEMBER(S) _____ TEL. NO.: ( ) _____

SPECULATION-ALTERNATIVES

1. (ORIGINAL CONCEPT) _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Note: Alternative Numbers are repeated at top of Matrix

MATRIX WEIGHTING OF ALTERNATIVES

CRITERIA	WEIGHT	1	2	3	4	5	6	7	8
* Satisfies Function(s)									
Desirability Rank/ Total Weighted Value									

** Satisfies function is a must criteria. Its weight must be equal to or greater than any other.*
Total weights x 4 (very good) = Minimum score for an alternative to be a satisfactory solution.

RANK VALUE: 5 = Excellent 4 = Very Good 3 = Good 2 = Fair 1 = Poor

RANK	ALT. NO.	ADVANTAGES	DISADVANTAGES	FINAL RANK

RECOMMENDED ALTERNATIVE:

VM/VF

VALUE ENGINEERING PROPOSAL

STUDY NUMBER _____

PROJECT Servicing 15000 stands

LOCATION COWDRAY PARK, BULAWAYO

TEAM MEMBERS

WINGFIELD T. VENGESAYI

RUGARA GUNDA

KUDAKWASHE E. NDORO

NEWTON MLOTSHWA

THOMAS CHIRAMBA

CONSULTANTS

BULAWAYO CITY COUNCIL

VE SIGNATURE: _____

DATE: _____

INFORMATION

ITEM UNDER STUDY _____

BASIC FUNCTION(S) _____ _____

FUNCTION(S) BEING ANALYZED _____ _____

SPECIAL CRITERIA

USER'S:

CODES:

RESTRICTIONS:

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

TELEPHONE CONVERSATION REPORT

PROJECT: _____ STUDY ITEM/NO: _____

DATE: _____ PHONE TO: _____

FROM: _____ TO: _____

BY: _____

ITEM/FUNCTION COST MODEL

PROJECT:

STUDY ITEM:

BID ITEM/FUNCTION($)	%	PERCENTAGE OF STUDY ITEM (0 10 20 30 40 50 60 70 80 90 100)	TOTAL (IN$)
ACCESS SITE	82		11 566
MAINTAIN HEALTH	9		1 269
SUSTAIN LIFE	4		564
ASSIGN AREAS	2		282
RELATE ACTIVITIES	1		141
ILLUMINATE AREA	2		282
TOTAL	100%	TOTAL CONSTRUCTION COST	$ 14 105

ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM 0 10 20 30 40 50 60 70 80 90 100	TOTAL (IN$)
TOTAL	100%	TOTAL CONSTRUCTION COST	$

FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

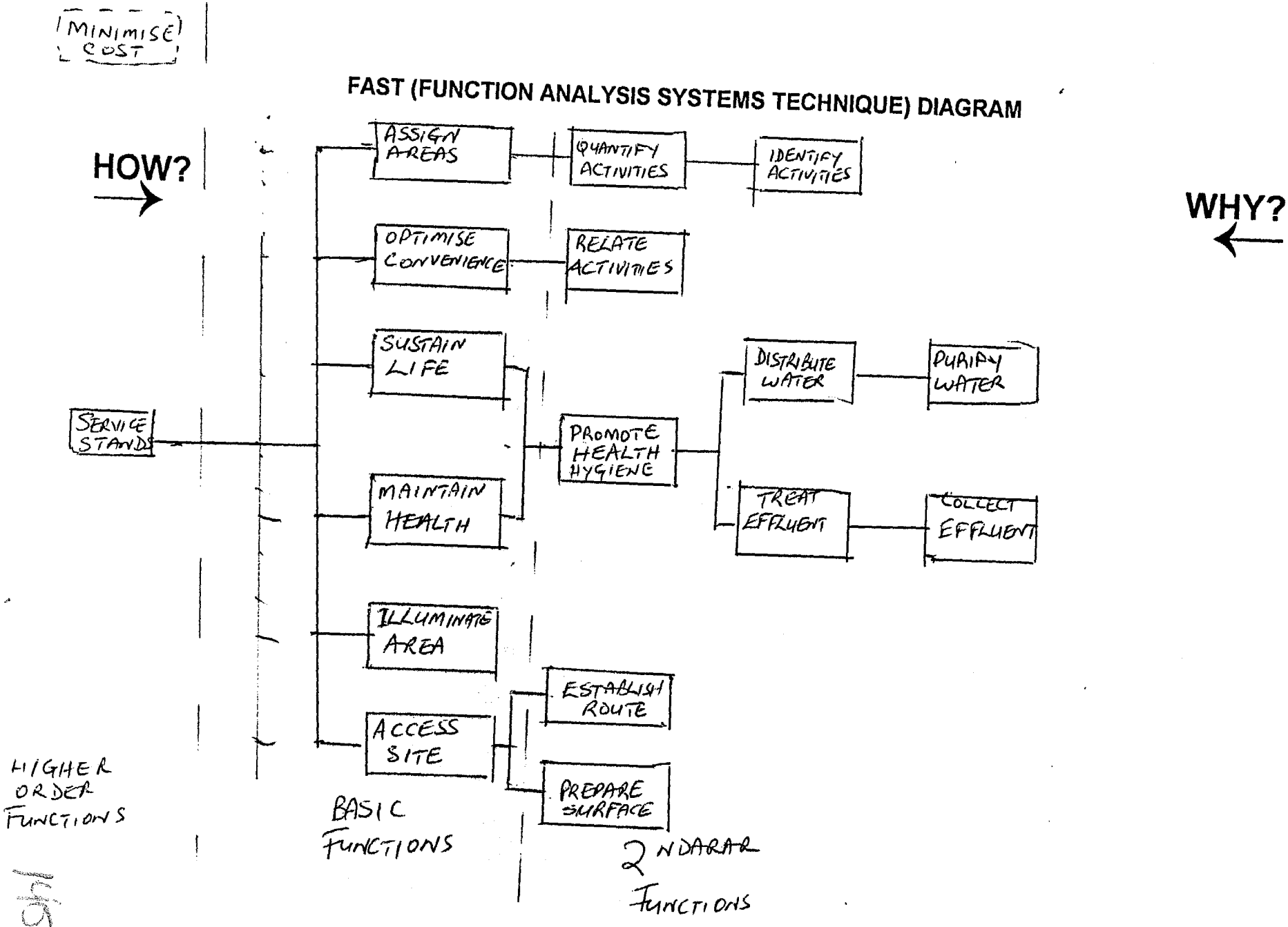
PROJECT:

STUDY ITEM:

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	
~~ACCESS SITE~~	~~ACCES~~			~~11 566~~	~~One base on bus route~~	~~578 300~~	~~2~~
SERVICE STANDS	~~PREPARE~~	~~SURFACE~~			~~Reduce width to min.~~		
	ASSIGN	AREAS			Grade and form earth		
	OPTIMISE	CONVENIENCE			roads en...		
	SUSTAIN	LIFE					
	MAINTAIN	HEALTH					
	ILLUMINATE	AREA					
	ACCESS	SITE					

NOTES: Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate.
Initial Alternative: Mini-Brainstorm; Alternative Cost (W); Lowest known cost to satisfactorily achieve the function.
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE; POOR VALUE ITEMS SHOULD BE STUDIED!

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM



SPECULATION PHASE

Applied Creativity To Generate Alternatives

PROJECT:_____ STUDY ITEM / NO.:_____

1. Surfaced bus route only
2. Surfaced bus route and earth roads
3. Surfaced bus route and gravel roads
4. 1 Base bus route and earth roads all reduced in width
5. 1 Base bus route and 1 base other roads all surfaced
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

CRITERIA WEIGHTING PROCESS

PROJECT: _____ STUDY ITEM / NO.: _____

CRITERIA	RAW SCORE (WEIGHT)
A. Safety	9 (2)
B. Capital Cost	14 (1)
C. Operating Cost / Maintainability	7 (3)
D. Quality / comfort	1 (6)
E. Environmental considerations	2 (5)
F. Material / Technology.	3 (4)
G.	
H.	

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H
A	B2	C2	A2	A4	A3		
B		B3	B3	B2	B4		
C			C2	C2	C1 F1		
D				E1 D1	F2		
E					F1 E1		
F							
G							

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered
in Advantages/Disadvantages Analysis)

ANALYSIS MATRIX VEST FORM

SUBJECT: _____ FUNCTION (S) _____

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	14	FIRST RANKING	Safety 9	Capital Cost 14	Operating Cost 7	Quality/Comfort 1	Environment 2	Technology/Material 3			TOTAL	FINAL RANKING
1 Surfaced Roads	5/70		5/45	1/14	4/28		4/8	3/9			174	III
2 Surfaced bus route and gravel roads	5/70		4/36	2/28	3/21		3/6	3/9			170	IV
3 Surfaced bus route and earth roads	5/70		2/18	3/42	2/14		2/4	3/9			157	V
4 Surfaced bus route only	4/56		1/9	5/70	5/35		1/2	3/9			181	II
5 One base surfaced bus route ~~1 base earth road~~ reduced width	4/56		2/18	5/70	3/21		2/4	4/12			195	I
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

ALTERNATIVE EVALUATION

PROJECT: _____ STUDY ITEM: _____

FUNCTION BEING ANALYZED: _____

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
1	1 base Bus route and earth roads – all reduced width	• Reduced cost • Vehicular access to all stands • Reduced construction time	• Seasonal dust & mud problems • Reduced safety • Crossing inconvenience • reduced.	1
3.	All Surfaced ~~bus route only~~ roads	• Good safety • ~~Reduced cost~~ • Long lifespan • All weather roads • minimal maintenance	• High cost • long construction time	3
2.	Surfaced bus route only	• Reduced cost • ~~minal~~ minimal construction time • reduced maintenance cost	• no vehicular access to stands • no drainage of area • adverse environmental impact	2
4.	Surfaced bus route and gravel roads	• Good safety • long life for bus route • Reduced initial cost	Seasonal dust problems	

COST ESTIMATE FORM

PROJECT: _____ ITEM / NO.: _____

	ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST
1	clearing	1 STAND	1156	1156
2	Subgrade preparation incl drainage	1	3469.8	3469.8
3	Base 1 "	1	2891.5	2891.5
4	Base 2	1	2313.2	2313.2
5	Surfacing - Double Seal	1	1724.9	1724.9
	TOTAL			11566
	Alternative 1		3084.26	
			3084.26	
			6168.54	
	Reduce width - by 20%		4934.83	
	Alternative 2		3855.33	

LIFE - CYCLE COST ANALYSIS

Costs | Stand

Using Present Worth (PW) Costs

PROJECT: _____

STUDY ITEM / NO.: _____

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS	11566		49348		3853.3		
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a.							
b.							
TOTAL INITIAL COST IMPACT (IC)							
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ 20 Interest							
1. Year 15 PW Factor 0.0647 x 2467			2467	160.13			
2. Year ____ PW Factor ____							
3. Year ____ PW Factor ____							
4. Year ____ PW Factor ____							
Salvage 5. Year 20 PW Factor ~~				(42)			
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ ____ Interest							
a. Maintenance		9		15	3		
Escal. Rate ____ PWA Factor ____							
b. Operations				32.8			
REPLACEMENT Escal. Rate ____ PWA Factor 0.2053		2374		1013			
c. Others				(8.6)			
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor 4.5							
TOTAL ANNUAL COSTS		2383		1052.2	794		
TOTAL PRESENT WORTH COSTS							
LIFE CYCLE (PW) SAVINGS				6481			

VALUE ENGINEERING PROPOSAL

PROJECT: _____ STUDY ITEM / NO.: _____

ITEM'S FUNCTION(S): _____

LOCATION: _____

ORIGINAL CONCEPT	VE CONCEPT
Surface all roads	Bus route (1 base) & earth roads all reduced in width

COSTS	INITIAL	LIFE CYCLE	TOTAL
ORIGINAL CONCEPT	11 566	2383	47 660
VE CONCEPT	4935	1052	21 040
SAVINGS	6431	1 331	26 620

IMPLEMENTATION COSTS (INCLUDING REDESIGN)	SUBTOTAL (ROUNDED)	
	IMPLEMENTATION COSTS	
	NET SAVINGS	

VALUE ENGINEERING SERVICES TRANSWORLD

IMPLEMENTATION SHEET - SUMMARY ACTIONS - ATTACH DETAILS

FUNCTION	WHAT	WHO	WHEN
APPROVE			
SCHEDULE			
REDESIGN			
ESTIMATE			
BUDGET			
COORDINATE			
TEST			

The environment you are entering carries many roadblocks, such as:

Personal risk	Is the change safe or is there risk? How much?
Change	Will turf be reshuffled? Will there be big losers? Is relearning required? Will it be traumatic or small?
Time	Will the proposal fit into present schedules for completion or delivery? Will it shorten present schedules?
Benefits	Who are the big gainers? Who are the losers? Do both individuals and the organizations benefit?

That list barely scratched the list of roadblocks that will flow across the path of implementation. Any manager knows that if one can delay a decision for just two or three weeks, the enthusiasm of a fresh idea will be dampened by the weight of habit and special interests and it will be back to business as usual. And so to sleep.

ADVANTAGES:

DISADVANTAGES:

The functions shown are suggested active verbs. Use those functions applicable to your project.

ADDITIONAL ITEMS FOR STUDY

ting of Items With Potential For Improvement

_____ DISCIPLINE: _____

DESCRIPTION	POTENTIAL SAVING

		RECOMMENDED ALTERNATIVE:

VM/VE

F

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 6

PROJECT PACKAGE SPIN-OFFS

LOCATION ZIMBABWE

TEAM MEMBERS

C CHIVONIVONI (TEAM LEADER)

S MPOFU

P S BONDAI

T VIKI Secretary

T T KUREBWASEKA

CONSULTANTS

B KELLY

K RIKARD

VE SIGNATURE:

DATE:

INFORMATION

ITEM UNDER STUDY: PACKAGE SPIN-OFFS

BASIC FUNCTION(S): -

FUNCTION(S) BEING ANALYZED: SHED NON-CORE ACTIVITIES

SPECIAL CRITERIA

USER'S:

1. I dentify non-core business activities.
2. Study each and evaluate the best way of getting value for money from them.
3. Make implementation proposals of preferred options.

CODES:

RESTRICTIONS:

1. Legislation
2. Industrial Agreements
3. Financial Constraints
4. Managerial Commitment.

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

(i) Change In Government Policy

(ii) Economic Structural Adjustment Programme.

TELEPHONE CONVERSATION REPORT

PROJECT: _____ STUDY ITEM/NO: _____

DATE: _____ PHONE TO: _____

FROM: _____ TO: _____

BY: _____

57

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM

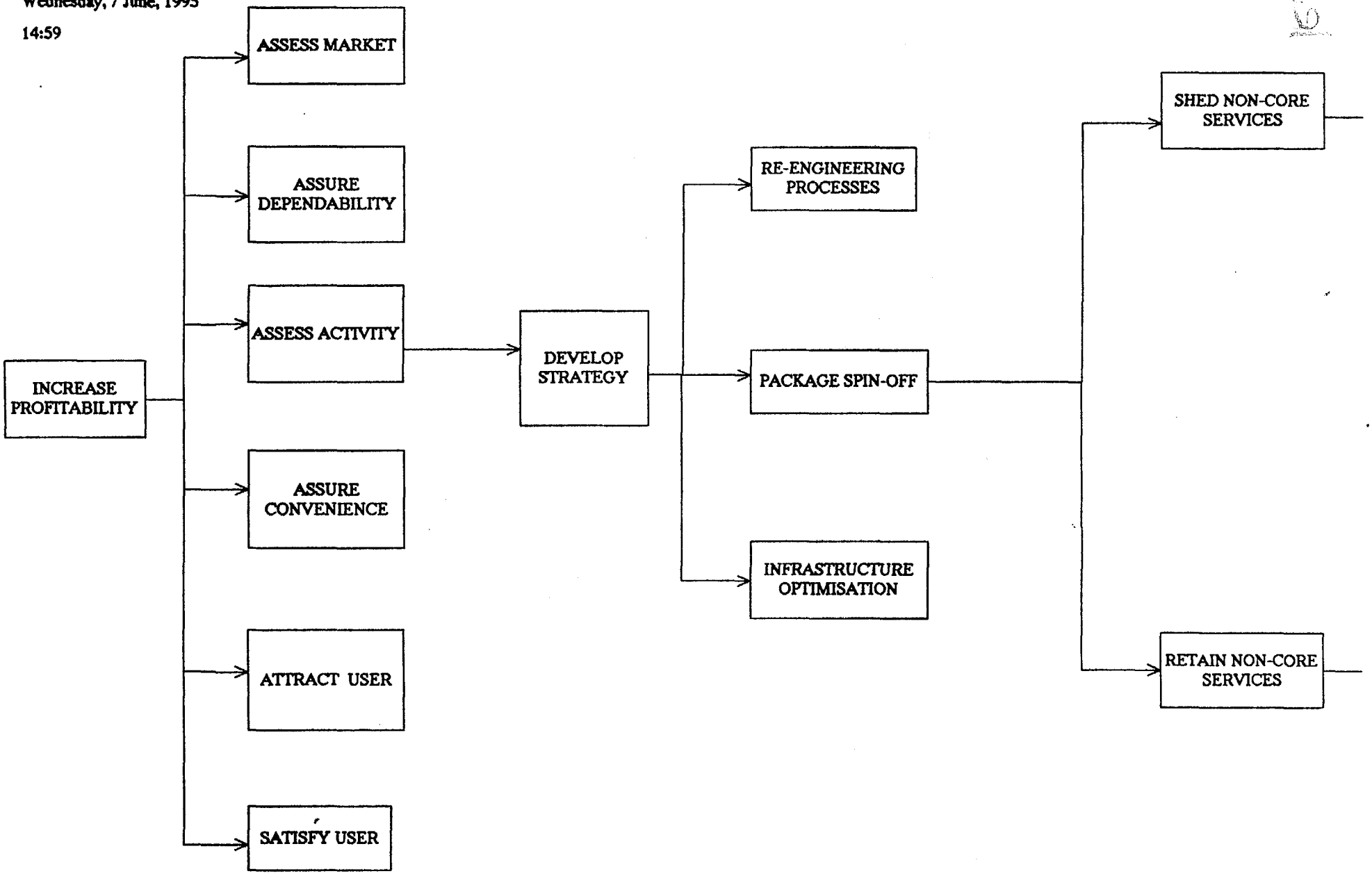
HOW? →

← WHY?

PACKAGE SPIN-OFFS

Wednesday, 7 June, 1995

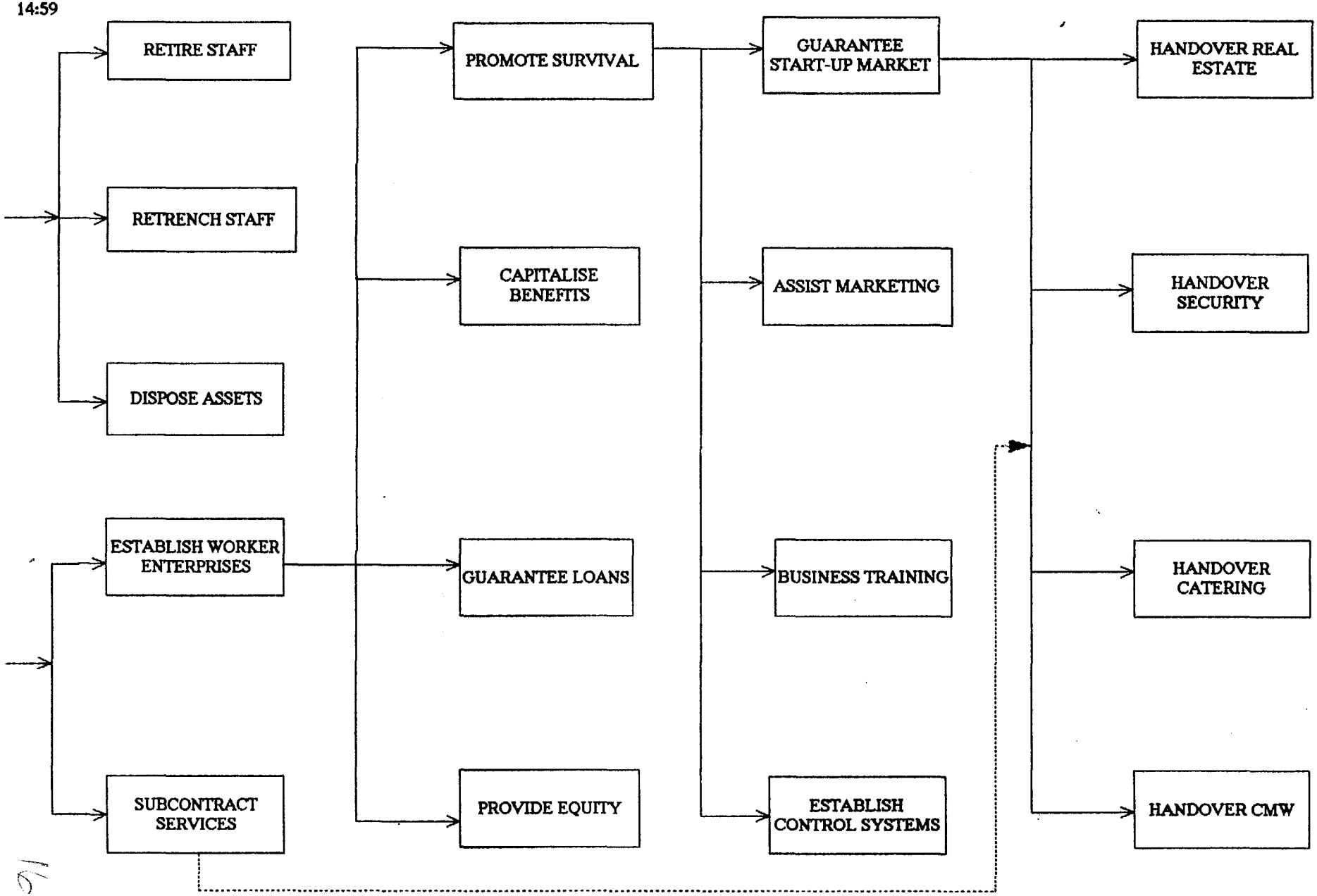
14:59



SECOND

Wednesday, 7 June, 1995

14:59



ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM 0 10 20 30 40 50 60 70 80 90 100	TOTAL (IN$)
TOTAL	100%	TOTAL CONSTRUCTION COST	$

SPECULATION PHASE

Applied Creativity To Generate Alternatives

PROJECT:_____ STUDY ITEM / NO.:_____

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

PROJECT: PACKAGE SPIN-OFF STUDY ITEM: NON-CORE BUSINESS

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	
PACKAGE SPIN-OFF NON-CORE BUSINESS	Provide	Support					
CENTRAL MAINTENANCE WORK-SHOPS.	provide	transport	B	$12 million	SUB-CONTRACT	$6.6 million	
	provide	machinery			RETAIN	$12 million	
					EMPLOYEE ENTERPRISES	$6.6 million	
CATERING	provide	food	B	$2 million	SUB-CONTRACT	$0.5 million	
					STAFF ENTERPRISES	$0.5 million	
SECURITY	safeguard	property	B	$16 million	SUB-CONTRACT	$7.2 million	
					STAFF ENTERPRISES	$7.2 million	
REAL ESTATES	manage	properties	B	$9 million	SUB-CONTRACT	$4 million	

NOTES: Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate.
Initial Alternative: Mini-Brainstorm; Alternative Cost (W); Lowest known cost to satisfactorily achieve the function.
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE; POOR VALUE ITEMS SHOULD BE STUDIED!

CRITERIA WEIGHTING PROCESS

PROJECT: PACKAGE SPIN-OFFS STUDY ITEM / NO.: 6

CRITERIA	RAW SCORE (WEIGHT)
A. WAGE/REVENUE - 35%	13 (6)
B. RETURN ON CAPITAL - 12%	25 (1)
C. INCREASE REVENUE	7 (7)
D. IMPROVE COMPETITIVENESS	3 (9)
E. ENSURE SUSTAINABILITY	20 (3)
F. REDUCE DEFICIT	14 (5)
G. REDUCE COSTS	15 (4)
H. INCREASE PRODUCTIVITY	22 (2)
I. SATISFY CUSTOMER	7 (7)
J. IMPROVE INDUSTRIAL RELATIONS	0 (10)

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H	I	J
A	B2	A4	A3	E4	F3	G3	H4	A3	A3
B		B4	B4	B3	B2	B3	H2	B3	B4
C			C4	E3	F3	G2	H3	I3	C3
D				E2	F3	G3	H3	I1	D3
E					E2	E2	E2	E2	E3
F						G2	H2	F2	F3
G							H2	G2	G3
H								H3	H3
I									I3

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered in Advantages/Disadvantages Analysis)

ANALYSIS MATRIX VEST FORM

SUBJECT: PACKAGE SPIN-OFF FUNCTION (S) -

COMPONENT OF: INCREASING PROFITABILITY

COST / WORTH = $ 39 MILLION / $ 18.3 MILLION = 2.13

DISCUSSION: INCREASE PROFITABILITY BY SHEDDING-OFF NON-CORE BUSINESS.

FUNCTION FOR STUDY: SHED-OFF NON-CORE ACTIVITIES		FIRST RANKING	DESIRED CRITERIA: RETURN ON CAPITAL	INCREASE PRODUCTIVITY	ENSURE SUSTAINABILITY	REDUCE COST	REDUCE DEFICIT	WAGE TO REVENUE RATIO	INCREASE REVENUE	SATISFY CUSTOMER	TOTAL	FINAL RANKING
ALTERNATIVES	RELATIVE WEIGHTS		25	22	20	15	14	13	7	7		
1 RETIRE STAFF			4/100	4/88	3/60	4/60	3/42	5/65	1/7	1/7	86	1
2 RETRENCH STAFF			4/100	4/88	3/60	4/60	3/42	5/65	1/7	1/7	86	1
3 DISPOSE ASSETS			2/50	2/44	3/60	2/30	3/42	1/13	5/35	1/7	56	3
4 EST. WK. ENT.			1/25	2/44	2/40	3/45	3/42	3/39	1/7	1/7	50	5
5 SUB-CON. SERVICES			1/25	3/66	3/60	3/45	3/42	1/13	1/7	1/7	53	4
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

165

ALTERNATIVE EVALUATION

PROJECT: PACKAGE SPIN-OFF STUDY ITEM: NO. 6

FUNCTION BEING ANALYZED: SHED OFF NON-CORE ACTIVITIES

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
1.	Retire Staff	1. Quick and straight forward 2. Cost-effective 3. Enhances productivity	1. Drain in expertise. 2. Retention of dead wood.	1
4	Sub-Contract	1. Infra-Structure provided by Contractor. 2. Contract Performance 3. No overheads 4. Cash from Disposed Assets.	1. Uncommitted expertise. 2. No guarantee of sustainability. 3. Monopoly pricing.	2
3.	Dispose Assets	1. Ready Cash for operations. 2. Pay-off debts	1. Dilute Capital base. 2. Less collateral security.	3
5.	Worker Enterprises	1. Social Obligations 2. Cash from Assets Disposal. 3. No Overheads.	1. Relocation of costs. 2. Start-up costs high. 3. Takes time to develop.	4
1 X.	Retrench Staff	1. Straight forward. 2. Targeted areas. 3. Enhances Productivity.	1. Expensive packages. 2. Difficult to reach agreement. 3. Poor Industrial Relations. 4. Lowers staff morale. 5. Uncertainty.	5

COST ESTIMATE FORM

PROJECT: PACKAGE SPIN-OFF ITEM / NO.: 6

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST
CENTRAL MAINTENANCE WORKSHOPS	ONE	-	$12 MILLION
CATERING	ONE	-	$ 2 MILLION
SECURITY	ONE	-	$16 MILLION
REAL ESTATE	ONE	-	$ 9 MILLION

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

PROJECT: PACKAGE SPIN-OFF

STUDY ITEM / NO.: 6

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS							
Base Cost							
Interface Costs							
a.							
b.							
c.							
Other Initial Costs							
a.							
b.							
TOTAL INITIAL COST IMPACT (IC)							
SALVAGE & REPLACEMENT COSTS							
Single Expenditures @ ____ Interest							
1. Year ____ PW Factor ____							
2. Year ____ PW Factor ____							
3. Year ____ PW Factor ____							
4. Year ____ PW Factor ____							
5. Year ____ PW Factor ____							
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ ____ Interest	$39 M.				$18.3M		
a. Maintenance							
Escal. Rate ____ PWA Factor ____							
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others ANNUAL DIFFERENCE							
Escal. Rate ____ ~~PWA FActor~~ 2.106					$20.7M		
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS 3 YEARS							
TOTAL PRESENT WORTH COSTS							
LIFE CYCLE (PW) SAVINGS						$43.6M	

VALUE ENGINEERING PROPOSAL

PROJECT: PACKAGE SPIN-OFF

LOCATION: ZIMBABWE (BULAWAYO)

STUDY ITEM / NO.: 6

ITEM'S FUNCTION(S):

ORIGINAL CONCEPT	VE CONCEPT
MAINTAIN NON-CORE BUSINESS	SHED-OFF - NON-CORE BUSINESS

COSTS	INITIAL	LIFE CYCLE	TOTAL
ORIGINAL CONCEPT	$39 MILLION	$39 MILLION	
VE CONCEPT	$18.3 MILLION	$18.3 MILLION	
SAVINGS	$20.7 MILLION	$43.6 MILLION	
IMPLEMENTATION COSTS (INCLUDING REDESIGN)		SUBTOTAL (ROUNDED)	
		IMPLEMENTATION COSTS	
		NET SAVINGS	

VALUE ENGINEERING SERVICES TRANSWORLD

IMPLEMENTATION SHEET - SUMMARY ACTIONS - ATTACH DETAILS

FUNCTION	WHAT	WHO	WHEN
APPROVE			
SCHEDULE			
REDESIGN			
ESTIMATE			
BUDGET			
COORDINATE			
TEST			

The environment you are entering carries many roadblocks, such as:

Personal risk	Is the change safe or is there risk? How much?
Change	Will turf be reshuffled? Will there be big losers? Is relearning required? Will it be traumatic or small?
Time	Will the proposal fit into present schedules for completion or delivery? Will it shorten present schedules?
Benefits	Who are the big gainers? Who are the losers? Do both individuals and the organizations benefit?

That list barely scratched the list of roadblocks that will flow across the path of implementation. Any manager knows that if one can delay a decision for just two or three weeks, the enthusiasm of a fresh idea will be dampened by the weight of habit and special interests and it will be back to business as usual. And so to sleep.

ADVANTAGES:

DISADVANTAGES:

The functions shown are suggested active verbs. Use those functions applicable to your project.

ADDITIONAL ITEMS FOR STUDY

Listing of Items With Potential For Improvement

PROJECT: _____ DISCIPLINE: _____

PROPOSAL DESCRIPTION	POTENTIAL SAVING
COMPUTER BUREAU BLACKSMITH SHOP PLATER WELDER SHOP MACHINE SHOP WORKSYARD CENTRAL ELECTRICAL WORKSHOP TARPAULINS SHED.	ACTIVITIES INTER-TWINNED WITH OTHER CORE-BUSINESS. SEPARATE EXERCISE REQUIRED.

VALUE ENGINEERING PROPOSAL PLAN

PROJECT: PACKAGE SPIN-OFF STUDY ITEM / NO.: 6

1. Retirement Exercise to continue.

2. Dispose of Assets.

3. Sub-contract Services.

4. Establish Worker Enterprises.

5. Retrenchment to be undertaken as a last resort (Problems of implementation).

NB

Cross functional team to be set up immediately to pursue options 2, 3, and 4.

G

VALUE ENGINEERING PROPOSAL

STUDY NUMBER 7

PROJECT UPGRADE TELECOMS SYSTEM ON N.R.Z

LOCATION NRZ

TEAM MEMBERS

D. SCOTT

R. WABATAGORE

L. MKANDHLA

C. NCUBE

GEORGE TYAMZASHE

CONSULTANTS

NIL

VE SIGNATURE:

DATE: 08.06.95

173

INFORMATION

ITEM UNDER STUDY: UPGRADE TELECOMS ON NRZ

BASIC FUNCTION(S): TELECOMS

FUNCTION(S) BEING ANALYZED: _____

SPECIAL CRITERIA

USER'S:

CODES:

RESTRICTIONS:

DESIGN HISTORY: (RESPONSIBILITIES, COMMITMENTS, STATUS, ETC.)

TELEPHONE CONVERSATION REPORT

PROJECT: _____ STUDY ITEM/NO: _____

DATE: _____ PHONE TO: _____

FROM: _____ TO: _____

BY: _____

ITEM/FUNCTION COST MODEL

PROJECT: STUDY ITEM:

BID ITEM/FUNCTION(S)	%	PERCENTAGE OF STUDY ITEM 0 10 20 30 40 50 60 70 80 90 100	TOTAL (IN$)
TOTAL	100%	TOTAL CONSTRUCTION COST	$

176

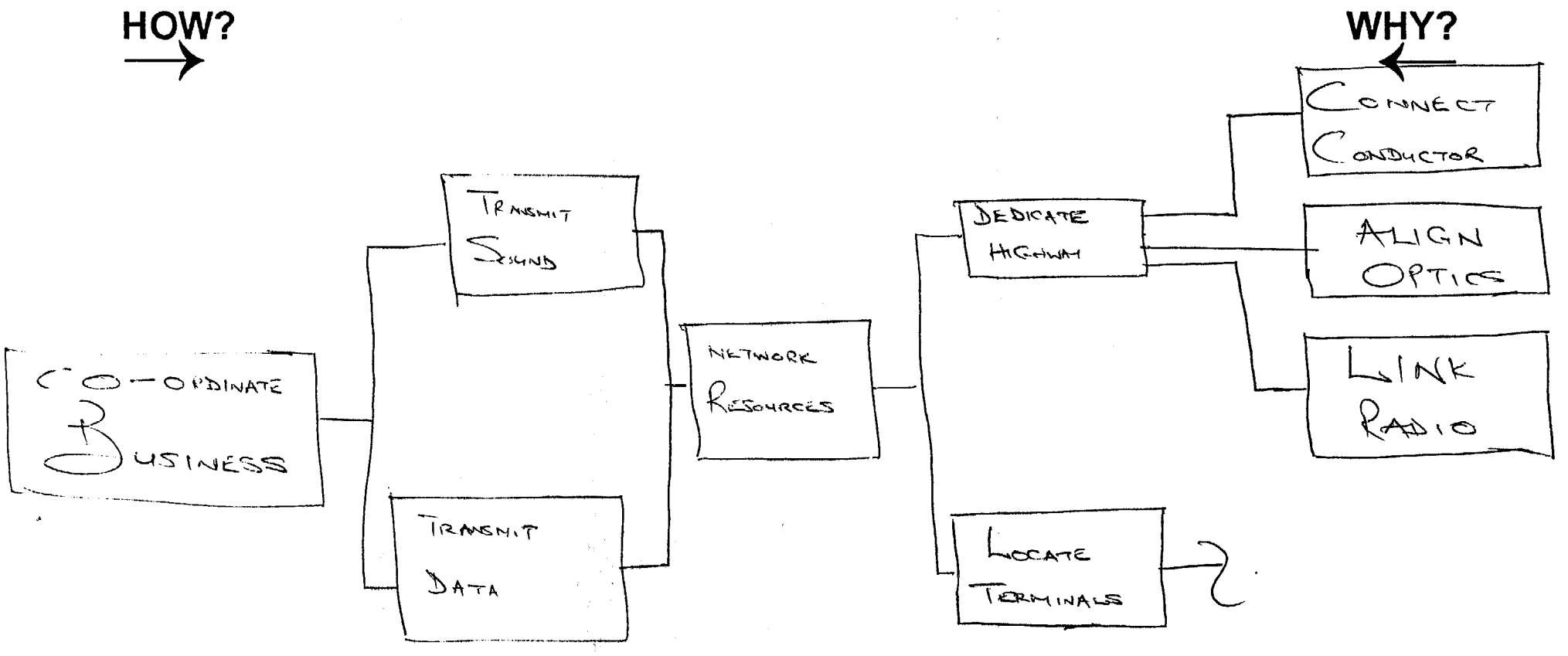
FUNCTION ANALYSIS AND COST/WORTH WORKSHEET

PROJECT: UPGRADE SYSTEM (TELECOMS) STUDY ITEM:

ITEM OR COMPONENT	FUNCTION(S)			PRESENT	WORTH		V.I.
UNDER STUDY	VERB	NOUN	TYPE	COST(S)	INITIAL ALTERNATIVES(S)	ALTERNATIVE COSTS	
UPGRADE SYSTEM	TRANSMIT	INFORMATION					
	COORDINATE	BUSINESS					
METALLIC TRANSMISSION SYSTEM	PROVIDE	HIGHWAY					
CONTROL EQUIPMENT	CODE	INFORMATION					
	ROUTE	MESSAGES					
HIGHWAY	SUPPORT	LOAD					
	ELEVATE	WIRE					

NOTES: Type of Function: B= Basic, 2nd = Secondary; Present Cost (c) is From Estimate.
Initial Alternative: Mini-Brainstorm; Alternative Cost (W); Lowest known cost to satisfactorily achieve the function.
V.I. is Value Index (C/W); C/W<1 = GOOD VALUE; POOR VALUE ITEMS SHOULD BE STUDIED!

FAST (FUNCTION ANALYSIS SYSTEMS TECHNIQUE) DIAGRAM



SPECULATION PHASE

Applied Creativity To Generate Alternatives

PROJECT:_____ STUDY ITEM / NO.:_____

1. UPGRADED COPPER
2. FIBRE SUSPENDED
3. FIBRE BURIED
4. RADIO
5. SATELLITE
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

CRITERIA WEIGHTING PROCESS

PROJECT: _____ STUDY ITEM / NO.: _____

CRITERIA	RAW SCORE (WEIGHT)
A. VANDAL PROOF	21 (1)
B. IMMUNITY FROM ELECTRICAL INTERFERENCE	1
C. MAINTAINABILITY	12 (2)
D. CAPACITY	8 (3)
E. FLEXIBILITY	6 (5)
F. COMPATIBILITY	7 (4)
G. OPERATING ECONOMY	1
H. RELIABILITY	

How Important

4 - Major preference
3 - Medium preference
2 - Minor preference
1 - Letter/Letter - no preference
each scored one point

	B	C	D	E	F	G	H
A	A_4	A_1 C_1	A_4	A_4	A_4	A_4	~~A_1~~ ~~H_1~~
B		C_3	D_3	E_2	F_2	G_1 B_1	
C			C_3	C_3	C_1 F_1	C_2	
D				D_1 E_1	D_1 F_1	D_3	
E					E_1 F_1	E_2	
F						F_2	
G							

Note: Drop Criteria with a Raw Score of 1
(Critieria which gets dropped may be considered
in Advantages/Disadvantages Analysis)

ANALYSIS MATRIX VEST FORM

SUBJECT: _____ FUNCTION (S) _____

COMPONENT OF: _____

COST / WORTH = $ / $

DISCUSSION: _____

FUNCTION FOR STUDY:	DESIRED CRITERIA											
ALTERNATIVES / RELATIVE WEIGHTS	SATISFIES FUNCTION (MUST SPECS)	FIRST RANKING	VANDAL PROOF	IMMUNITY FROM ELEC INTERFERENCE	MAINTAINABILITY	CAPACITY	FLEXIBILITY	COMPATIBILITY	OPERATING ECONOMY	RELIABILITY	TOTAL	FINAL RANKING
	21		21	1	12	8	6	7	1			
1 UPGRADE COPPER	2/42		1/21	1/1	3/36	1/8	3/18	2/14	5/5		145	4
2 FIBRE SUSPENDED	4/84		2/42	5/5	3/36	5/40	1/6	4/28	3/3		244	3
3 FIBRE BURIED	4/84		3/63	5/5	3/36	5/40	1/6	4/28	3/3		265	2
4 RADIO	5/105		4/84	4/4	4/48	5/40	5/30	4/28	2/2		341	1
5												
6												
7												
8												
9												
10												
11												
12												
13												

Excellent-5 Very Good-4 Good-3 Fair-2 Poor-1 (VEST)

VM/VE

121

ALTERNATIVE EVALUATION

PROJECT: _____ STUDY ITEM: _____

FUNCTION BEING ANALYZED: _____

NO.	SELECTED ALTERNATIVES	ADVANTAGES	DISADVANTAGES	IDEA RATING
3	FIBRE SUSPENDED	- EFFICIENT - LIGHT	- LABOUR INTENSIVE - EXPOSED - PRONE TO ADVERSE WEATHER CONDITIONS. - VANDALPRONE.	3
2	FIBRE BURIED	- EFFICIENT - HIDDEN	- LABOUR INTENSIVE - FAULT LOCATION DIFFICULT	2
1	RADIO	- CHEAP - DIRECT - FREE PASSAGE - BROADCAST	NONE	1

COST ESTIMATE FORM

PROJECT:_____ ITEM / NO.: _____

ITEM / DESCRIPTION	QTY.	UNIT COST	TOTAL COST

Using 10% factor

LIFE - CYCLE COST ANALYSIS

Using Present Worth (PW) Costs

Ex(Ani) Local Fibre Suspended. RADIO.

PROJECT: TELECOMS SYSTEM

STUDY ITEM / NO.:

	ORIGINAL		ALTERNATE NO.1		ALTERNATE NO.2		
	Estimated Costs	Present Worth	Estimated Costs	Present Worth	Estimated Costs	Present Worth	REMARKS
COLLATERAL / INITIAL COSTS							
Base Cost	INITIAL	400M	INITIAL	445.	INITIAL	290M	
Interface Costs	EXPANSION				LOST.		
a.	MAINT		MAINT	1,434	MAINT.		
b.	15YRS 10M	2.39	15YRS - 6M		25YRS - 4M	.368M	
c.	Vandalism		Vandalism		Vandalism		
Other Initial Costs	15YRS 25M	5.975	15YRS - 20M	4.78M	INTERFERENCE		
a.	Interference		INTERFERENCE		1M.	0,092M	
b.	15YRS 10M	2.39	1M 0,239	0,239			
TOTAL INITIAL COST IMPACT (IC)					TRAINING		
SALVAGE & REPLACEMENT COSTS	Recovery		TRAINING		.1M	0,042	
Single Expenditures @ ____ Interest	(100M)	-13,1M	1M	0,239			
1. Year ____ PW Factor ____			Recovery		Recovery		
2. Year ____ PW Factor ____			(20M)	-2,62	25YRS (40M)	-3716M	
3. Year ____ PW Factor ____					PW 0,101		
4. Year ____ PW Factor ____							
5. Year ____ PW Factor ____							
Salvage Present Worth							
TOTAL PRESENT WORTH							
ANNUAL COSTS (Based on Present Worth of Annuity)							
Annual Costs @ ____ Interest							
a. Maintenance							
Escal. Rate ____ PWA Factor ____							
b. Operations							
Escal. Rate ____ PWA Factor ____							
c. Others							
Escal. Rate ____ PWA FActor ____							
d. Others							
Escal. Rate ____ PWA FActor ____							
TOTAL ANNUAL COSTS							
TOTAL PRESENT WORTH COSTS		397,6.		448.9M		290.6M	
LIFE CYCLE (PW) SAVINGS							

VALUE ENGINEERING PROPOSAL

PROJECT: _____ STUDY ITEM / NO.: _____

ITEM'S FUNCTION(S): _____

LOCATION: _____

ORIGINAL CONCEPT	VE CONCEPT

COSTS	INITIAL	LIFE CYCLE	TOTAL
ORIGINAL CONCEPT			
VE CONCEPT			
SAVINGS			
IMPLEMENTATION COSTS (INCLUDING REDESIGN)		SUBTOTAL (ROUNDED)	
		IMPLEMENTATION COSTS	
		NET SAVINGS	

VALUE ENGINEERING SERVICES TRANSWORLD

IMPLEMENTATION SHEET - SUMMARY ACTIONS - ATTACH DETAILS

FUNCTION	WHAT	WHO	WHEN
APPROVE			
SCHEDULE			
REDESIGN			
ESTIMATE			
BUDGET			
COORDINATE			
TEST			

The environment you are entering carries many roadblocks, such as:

Personal risk	Is the change safe or is there risk? How much?
Change	Will turf be reshuffled? Will there be big losers? Is relearning required? Will it be traumatic or small?
Time	Will the proposal fit into present schedules for completion or delivery? Will it shorten present schedules?
Benefits	Who are the big gainers? Who are the losers? Do both individuals and the organizations benefit?

That list barely scratched the list of roadblocks that will flow across the path of implementation. Any manager knows that if one can delay a decision for just two or three weeks, the enthusiasm of a fresh idea will be dampened by the weight of habit and special interests and it will be back to business as usual. And so to sleep.

ADVANTAGES:

DISADVANTAGES:

The functions shown are suggested active verbs. Use those functions applicable to your project.

ADDITIONAL ITEMS FOR STUDY

Listing of Items With Potential For Improvement

PROJECT: _____ DISCIPLINE: _____

PROPOSAL DESCRIPTION	POTENTIAL SAVING

VALUE ENGINEERING PROPOSAL PLAN

PROJECT: _____ STUDY ITEM / NO.: _____

CRITERIA/IDEA MATRIX

PROJECT: _____ STUDY ITEM.: _____

LOCATION: _____ ITEM'S FUNCTION(S): _____

DISCIPLINE: _____ TEAM MEMBER(S) _____ TEL. NO.: ( ) _____

SPECULATION-ALTERNATIVES

1. (ORIGINAL CONCEPT) _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Note: Alternative Numbers are repeated at top of Matrix

MATRIX WEIGHTING OF ALTERNATIVES

CRITERIA	WEIGHT	1	2	3	4	5	6	7	8
* Satisfies Function(s)									
Desirability Rank/ Total Weighted Value									

** Satisfies function is a must criteria. Its weight must be equal to or greater than any other.*
Total weights x 4 (very good) = Minimum score for an alternative to be a satisfactory solution.

RANK VALUE: 5 = Excellent 4 = Very Good 3 = Good 2 = Fair 1 = Poor

RANK	ALT. NO.	ADVANTAGES	DISADVANTAGES	FINAL RANK

RECOMMENDED ALTERNATIVE:

VM/VE

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The systematic manner in which a problem is diagnised and options at solving it arrived at.

2. Future Value Management/Value Engineering Workshops would be better if:-

Project work commences from the onset and lectures placed in between.

3. I would like to see Value Management/Value Engineering training be made available to:-

Middle Management level of NRZ, Junior Engineers & Officers. A 'critical mass' must be reached before it can become effective, accepted and implementable on NRZ.

4. General comment:-

A very good well presented course.

17

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

There is an obvious need for overhauling practices at NRZ and this course provides a systematic, logical & clinical way of going about this. The course comes in the background of a recent call for a haphazard ~~a~~ reduction in staff. We must think again.

2. Future Value Management/Value Engineering Workshops would be better if:-

a) they cover a significantly greater proportion of NRZ managers and line managers. Some may not ~~understan~~ use the course method but at least they will understand what is going on.
b) they include Union leaders. For no reason other than exposing them to what management is doing

3. I would like to see Value Management/Value Engineering training be made available to:-

A core of ~~large~~ NRZ personnel to sustain the effort initiated.

4. General comment:-

A very fine course presented by able specialists who whose humour to good effect.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

excellent instructors & new material

2. Future Value Management/Value Engineering Workshops would be better if:-

we had more time

3. I would like to see Value Management/Value Engineering training be made available to:-

all engineers and more railway officials

4. General comment:-

on a one to ten scale a ten + (plus)

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The thrust at Managers to analyse Situations, cost them and determine Course of Action.

2. Future Value Management/Value Engineering Workshops would be better if:-

Amble time is made available to simulate specific Scenarios.

3. I would like to see Value Management/Value Engineering training be made available to:-

All officers and Supervisors

4. General comment:-

Course material provided would assist in revisiting exercises

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

IT CAN READILY BE APPLIED IN MY FIELD OF WORK. IT WAS RELEVENT. THE WORKSHOP ACTIVITIES ADDRESSED REAL PROBLEMS/PROJECTS. THE CONCEPT BEING TALKED ABOUT IS/WAS MULTIDISCIPLINARY - NOT SPECIFIC TO ONE FIELD.

2. Future Value Management/Value Engineering Workshops would be better if:-

THE TEAMS/PARTICIPANTS ARE MORE MIXED. THERE WERE FAR TOO MANY RAILWAY PARTICIPANTS COMPARED WITH PARTICIPANTS FROM OTHER COMPANIES.

3. I would like to see Value Management/Value Engineering training be made available to:-

ALL RAILWAY OFFICERS INCLUDING SENIOR MANAGEMENT

4. General comment:-

THE COURSE WAS PRESENTED WITH A LOT OF FLAIR. THE PRESENTATION WAS VERY GOOD. THERE WAS ALOT OF INTERESTING, DIVERSE BUT RELEVANT INFORMATION THROWN IN.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

THE CHALLENGES IT GIVES IN ANALYISING SITUATION IN ORDER TO IDENTIFY OPPORTUNITIES

2. Future Value Management/Value Engineering Workshops would be better if:-

IF TIME COULD BE EXTENDED.

3. I would like to see Value Management/Value Engineering training be made available to:-

ALL RAILWAYS OFFICERS AND SUPERVISORS

4. General comment:-

The COURSE WAS AN EYE OPENER FOR ANALYSING THE WORK SITUATION FOR CONTINUOUS IMPROVEMENT.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

VE is a new concept.
Problems are simplified to basic functions

2. Future Value Management/Value Engineering Workshops would be better if:-

More time to allow more interaction between lecturer and participants

3. I would like to see Value Management/Value Engineering training be made available to:-

To lower levels of management i.e. junior engineers and officers.

4. General comment:-

This is a course I would recommend to all large organizations

18

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

IT is a practical course and does result in an organisation cutting costs without sacrificing quality

2. Future Value Management/Value Engineering Workshops would be better if:-

More local authorities were involved

3. I would like to see Value Management/Value Engineering training be made available to:-

Engineers
NGO's

4. General comment:-

The facilities were good and the food too!
The instructors generated excitement in their presentation.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

THE APROACH TO PROBLEM SOLVING WHICH IS OPEN TO DIVERSE VIEWS AND FUNCTIONAL ANALYSIS OF A PROBLEM

2. Future Value Management/Value Engineering Workshops would be better if:-

PARTICIPANTS ARE GIVEN ENOUGH NOTICE TO PREPARE PROJECTS FOR VALUE ANALYSIS IN ORDER TO BRING ADEQUATE DATA.

3. I would like to see Value Management/Value Engineering training be made available to:-

HEADS OF MINITRIES IN GOVERNMENT AND AS MANY SENIOR CIVIL SERVANTS AS POSSIBLE

4. General comment:-

I BELIEVE VM/VE IS A VERY USEFUL TOOL FOR PROJECT APPRAISAL AND WILL HAVE A SIGNIFICANT IMPACT IN ZIMBABWE

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It provided an alternative method of evaluating projects/ideas.

2. Future Value Management/Value Engineering Workshops would be better if:-

A concise example was chosen and fully worked out with the concept being emphasised.

3. I would like to see Value Management/Value Engineering training be made available to:-

Planning Branch - who are responsible for co-ordinating and approving Capital Projects

4. General comment:-

A simple and effective tool for decision analysis.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

IT PROVIDED AN ENLIGHTENING AND LOGICAL METHODOLOGY OF ASSESSING CURRENT PROBLEMS WITH THE VIEW OF IMPROVING ON THEM WITHOUT SACRIFICING THE ORIGINAL BASIC FUNCTION AND QUALITY.

2. Future Value Management/Value Engineering Workshops would be better if:-

THESE WERE CONCENTRATING ON MORE PRACTICAL EXAMPLES.

3. I would like to see Value Management/Value Engineering training be made available to:-

ALL OFFICERS ON N.R.Z.

4. General comment:-

THIS WAS A WONDERFUL LEARNING EXPERIENCE WHICH WILL ADD VALUE TO MY FUNCTION.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The concept of value engineering as this was new to me and the areas where it can be applied

2. Future Value Management/Value Engineering Workshops would be better if:-

(1) A specific organisation is dealt with on its own i.e excluding participants from other organisation are excluded

(2). Period is extended e.g. to two week

3. I would like to see Value Management/Value Engineering training be made available to:-

All officers (grade 1 to 3) in the National Railways Zimbabwe

4. General comment:-

Value engineering is a concept which is universally applicable. The presentation was excellent.

193

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

The format the course was presented by the two presenters.

2. Future Value Management/Value Engineering Workshops would be better if:-

the course took a bit longer to allow for emphasis in certain areas like the cost part of it.

3. I would like to see Value Management/Value Engineering training be made available to:-

Heads of some of these organisations here present inorder to make it possible for appreciation of its values and easier implementation.

4. General comment:-

I wish the presenters could try and make a follow up in future or organise more advance materials for the present group.

194

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It taught me new ways of project/problem analysis. VE/VM is a usable tool for current organisational efforts.

2. Future Value Management/Value Engineering Workshops would be better if:-

1) Time is lengthened by at least another week.
2) Live organisational problems/projects are analysed with information available.

3. I would like to see Value Management/Value Engineering training be made available to:-

All managers as it inculcates the need to focus on functions with a view of cost reduction with no compromise to reliability, safety, performance etc. It teaches managers the art of teamwork, creativity, innovation and the need for clarity in problem analysis.

4. General comment:-

It would be beneficial to avail participants (interested) the opportunity of advancing this technique further

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It introduced a completely new concept which is an extremely ~~used~~ useful tool for management. It is also very versatile in terms of application.

2. Future Value Management/Value Engineering Workshops would be better if:-

Projects to be tackled are advised in advance to enable gathering of information and data

3. I would like to see Value Management/Value Engineering training be made available to:-

NRZ staff in the grade below Branch Head (which attended this course).

4. General comment:-

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Being able to identify opportunities for cost reduction where none were clearly apparent.

2. Future Value Management/Value Engineering Workshops would be better if:-

Allowed more time with course tutors to allow more hands on experience. Life Cycle costing would have been appreciated to a greater extend.

3. I would like to see Value Management/Value Engineering training be made available to:-

All managers in production related fields in the Organisation

4. General comment:-

Value engineering a must for future to enhance competitiveness.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

the practical approach where groups worked on various projects.

2. Future Value Management/Value Engineering Workshops would be better if:-

held away from workplaces.

3. I would like to see Value Management/Value Engineering training be made available to:-

Senior Executives as well to enable them to appreciate.

4. General comment:-

With the available time given the workshop was quite a success.

117

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

THE BEST OF THE BEST SOLUTIONS TO A PROBLEM IS BROUGHT OUT.

2. Future Value Management/Value Engineering Workshops would be better if:-

A LITTLE MORE TIME IS ALLOWED

3. I would like to see Value Management/Value Engineering training be made available to:-

THE CITY TREASURERS ARCOMNTANTS AND ENGINEERS AND SENIOR EXECUTIVES OF COUNCILS

4. General comment:-

THE COURSE PRESENTERS ARE "SMART"

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

HOW THE PRESENTERS CONDUCTED THE COURSE AND TEAM PRESENTATIONS ON VALUE MANAGEMENT PROJECTS.

2. Future Value Management/Value Engineering Workshops would be better if:-

DURATION OF LECTURES IS REDUCED TO ABOUT 1 HOUR PER LECTURE. IF A LECTURE IS TO TAKE 2 HOURS SAY, A BREAK SHOULD BE INTRODUCED IN BETWEEN.

3. I would like to see Value Management/Value Engineering training be made available to:-

ENGINEERS/TECHNICIANS/ARCHITECTS IN THE MINISTRY OF PUBLIC CONSTRUCTION AND NATIONAL HOUSING (ZIMBABWE)

4. General comment:-

THE COURSE WAS WORTH ATTENDING. IT TOUCHED ON VITAL AREAS AND I BELIEVE I WILL BE ABLE TO DO MY DUTIES BETTER WHEN I RETURN TO MY ORGANISATION.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   The fast diagram and analysis.

2. Future Value Management/Value Engineering Workshops would be better if:-

   More time is allocated to each area of discussion.

3. I would like to see Value Management/Value Engineering training be made available to:-

   Both top and middle management of organisations

4. General comment:-

   The time allocated was rather short thereby leaving participants without tools for hands-on evaluation.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

the manner in which all participants were involved in the activities — enhanced team work.

2. Future Value Management/Value Engineering Workshops would be better if:-

examples on life cost cycles were practised on three occasions so as to reinforce learning and application.

3. I would like to see Value Management/Value Engineering training be made available to:-

N.R.Z Station Heads i.e. Grade 2 & Grade 1 Officers and those involved in Project Work. In particular the Project Team on the Planning levels study and Work Study & Planning Officers.

4. General comment:-

Course facilitators Messrs Hikaard and Kelly were dynamic, professional in their presentation and extremely helpful in imparting their skills and knowledge to participants.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Clarity in the presentation and directness as everything was said to the point

2. Future Value Management/Value Engineering Workshops would be better if:-

Time for seminars/workshops is increased to 2 weeks so that an in-depth study is made on case studies.

3. I would like to see Value Management/Value Engineering training be made available to:-

Officers below my grade grade 1 Officers to give them an appreciation of this new Thinking

4. General comment:-

Value Management/Engineering is indeed a good technique of instilling into Managers ability to think in other terms be adaptive to the ever changing business world environments.

205

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

Mr Richard and Mr Kelly outstanding presentations and the work problems

2. Future Value Management/Value Engineering Workshops would be better if:-

we had more railway examples

3. I would like to see Value Management/Value Engineering training be made available to:-

all of my supervisors and our professional institutions

4. General comment:-

By far the best training ever given to us! - we need more

201

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

its focus on reduction of unnecessary costs & improvements in performance without compromising quality.

2. Future Value Management/Value Engineering Workshops would be better if:-

Practical examples were introduced when new concepts/stages are covered. Practical examples/assignments were taken to completion, time permitting.

3. I would like to see Value Management/Value Engineering training be made available to:-

all officers, in the 1st instance & Supervisors.

4. General comment:-

Good course, good participants and excellent facilities & administration

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It enabled me to look at issues slightly differently.

2. Future Value Management/Value Engineering Workshops would be better if:-

More practical cases could be gone through in the presentation.

3. I would like to see Value Management/Value Engineering training be made available to:-

More officers in the NRZ.

4. General comment:-

In a mixed group, there was need to place less emphasis on NRZ

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   its ability ~~to~~ to present information in a compact form

2. Future Value Management/Value Engineering Workshops would be better if:-

   each participant would bring problems for discussion, and not a chosen few

3. I would like to see Value Management/Value Engineering training be made available to:-

   technicians and accountants in local authorities

4. General comment:-

   this course has opened my mental eyes. I wish I could find more material to read and be able to practice this provocative way of thinking. the presenters were excellent.

-07

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

   Its Comparison of Criteria used and the alternatives at the same time

2. Future Value Management/Value Engineering Workshops would be better if:-

   MORE CASE STUDIES ARE AVAILED

3. I would like to see Value Management/Value Engineering training be made available to:-

   ALL DOWN TO THE FOREMAN

4. General comment:-

   This HAS BEEN REAL VALUE

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

PRESENTERS, IT HAS RELEVANCY TO OPERATIONS OF THE MUNICIPALITIES

2. Future Value Management/Value Engineering Workshops would be better if:-

~~WHE~~ MORE TIME COULD ALLOWED FOR CASES STUDIES. I.E. SOME REPORTS PREPARED BEFORE COMMENCEMENT. TO MINIMIZE WRONG ASSUMPTION.

3. I would like to see Value Management/Value Engineering training be made available to:-

THE MANAGEMENT OF LOCAL AUTHORITIES
TOWN CLERKS, TOWN TREASURERS, TOWN ENGINEERS
DIRECTOR OF HOUSING & COMMUNITY SERVICES
CHAIRMANS OF COUNCIL COMMITTES.

4. General comment:-

It would good to have ~~fd~~ more literature about VE/VM in the country to ~~cop~~ reinforce the subject. Even monthly journals if their any.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

the approach to problem solving ~~and~~ which self checking

2. Future Value Management/Value Engineering Workshops would be better if:-

we could start from scratch an exercise applicable to the organisation right to the end instead of examples that might not bear relevance to the organisation

3. I would like to see Value Management/Value Engineering training be made available to:-

all officers and supervisors on NRZ

4. General comment:-

The course could be run in a shorter period if ~~a~~ story telling could be minimised.

210.

VALUE MANAGEMENT/VALUE ENGINEERING

COURSE EVALUATION

BULAWAYO, ZIMBABWE

04 - 08 JUNE, 1995

1. The thing I liked most about this course was:-

It encouraged teamwork, free and sincere exchanged of ideas and also provided a framework to enhance knowledge. ie Also provided a systematic and analytical way of managing systems.

2. Future Value Management/Value Engineering Workshops would be better if:-

More time is given in explaining essential details on such things as Team working - and analytical skills.

3. I would like to see Value Management/Value Engineering training be made available to:-

The generality of NRZ officers as they are the ones who will generally be called upon to perform the majority of the activities.

4. General comment:-

Starting on a Sunday was not very helpful - however the course should be made available to more people if the correct culture is to be develop.