

VALUE ENGINEERING IN SAUDI ARABIA

Overview & Applications in Public and Private Sectors

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Abdulaziz has over 17 years experience in Project Management, Design Reviews, Life Cycle Costing and Value Engineering (VE) of large Construction projects. He participated and led more than 50 VE Workshops in Construction. He lectured on VE in many VE training seminars and workshops. He has specialized in computer applications in VE and project management. He wrote the first VE book written in Arabic (and the only one yet) titled: *Value Engineering: Concept and Techniques*. He is the VP of the VE division of the Saudi Engineering committee, which represents the SAVE Saudi Arabian Chapter and Director of Prince Salman Social Center. Abdulaziz Holds BS (1982) & MS (1987) degrees in engineering from the USA. He is a member of SAVE, IEEE, PMI, ASHRM and the Saudi Computer Society.

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ABSTRACT

Value Engineering/Management approach has been acknowledge and overwhelmingly spread out over the past decade in the kingdom of Saudi Arabia (KSA). However, as many as 300 projects across the Kingdom have been value engineered and more than 1.5 Billions of US\$ dollar have been saved.

This paper/panel overviews value methodology and its impact on public and private sectors alike. The first panelist will interestingly be devoting his part on governmental implications due to applying VE and the powerful technique were utilized as a convincing tool for enhancing project function and optimizing cost. While the second part of the presentation will give highlight on History of VE in Saudi Arabia and then focused on how effectively the VE technique is used on the private projects and hence resulting in wide acceptance among the stakeholders. Within the same forum, the third speaker panelist shed some lights on VE influence on Saudi Engineering practices. Finally, the fourth panelist will close the presentation by over viewing the history of VE education and training programs over the past 20 years in the public and private sectors in Saudi Arabia.

1. VE PROGRAMS IN GOVT. SECTOR

Due to the worldwide successful applications of VE in various engineering projects such as roads, construction, maintenance...etc, the concerned governmental departments decided to benefit from such methodology by establishing a VE program to upgrade the level of projects, improve services and control expenses. Reasons behind adopting VE technique in governmental sector are to: control cost, Search for better alternatives at lower cost, eliminate unnecessary cost, reserve our national resources and finally train qualified Saudi engineers in VE application.

1.1. VE Program Objectives:

The main objectives are to:

- Conduct VE studies on government's projects in order to be executed at the lowest cost with maintaining required functions and performance.
- Prepare a budget assessment for project together with evaluation of different economical alternatives feasible for execution.
- Value Engineer some managerial procedures and regulations through generating proposals and alternatives to upgrade performance and quality.

- Develop a training plan on VE technique to be spread and applied in government sector

1.2. Work Methodology

Programs' studies based on firm principles and methods accordingly to VE methodology. Projects are selected for VE study according to the following bases:

- Eliminating of unnecessary cost as a result of over-designs to meet project's requirements.
- Evaluate and review project's functions, technical specifications, economical value & control costs against required functions and performance.
- Minimizing cost when project budget is inadequate for the execution without affecting the functions of the project.
- Improve project's performance and quality.

1.3 Achievements

VE Programs successfully accomplished most of their goals within allocated time. Approximately 300 projects are studied, their total cost exceeded 1.5 billions US\$, included various fields such as multipurpose buildings, residential compounds, stores, warehouses, water & sewerage, irrigation, maintenance, road and services. The results of studies were: money savings, Performance improvement and quality control, Best utilization of national resources, Familiarization with VE methodology

2. VE IN PRIVATE SECTOR

VE, in Saudi Arabia, started in 1975 where a small group of engineers, from General Directorate of Military Works (GDMW) of the Ministry of Defense and Aviation (MODA), attended the first VE Training Workshop in USA. That marked the transfer of this management technology from the USA to Saudi Arabia. VE faced a slow start, but once people tasted the successful results of it, VE spreading like a fire in a haystack. The person behind all this was the GDMW director general at that time, Dr. Abdulaziz Al-Otaishan (Ret. Gen.). He tasted the benefit of it while he was studying in USA. Against all odds, He was successful to recruit Certified Value Specialist to start the first VE program.

Because the first VE Program started at the government (specifically in a military organization), VE did get a deserved recognition. One main reason is because the successful results of the VE studies could not be published since most of the projects were studied

where confidential. Another reason was because Saudi Arabia construction industry was blooming in late 70's and early 80's. Therefore, there were many construction companies, design offices and consultants with one objective in mind was build, build, build. There was not enough time allocated to review these projects not to mention VE. Hence, VE created many opponents from those who do not what VE is and from those whom objective was to build and review later.

Private sector, mainly in the construction industry, knew about VE since early 80's. But they did not apply it, fully, due to the lack of VE expertise and specialists. Companies were forced to contract with a consultant office or with individuals from the USA at a very high fee.

Saudi Value specialists were preaching about VE, trying to has people use and apply VE, by choice. There was difficulty then, but now people are using and applying VE by force. Meaning they were looking for more way to optimize their expenditures due the existing sever economic hardship. VE is now the choice, but had we done VE to those Mega-projects then, we would have been in a better situation.

Nowadays, there are many Saudi who specializes in VE (4 CVS and 8 AVS); and many VE programs were established at the government and at large Saudi companies.

Because of the Quality revolution and since VE methodology is used to identify and initiate improvements that establish an attitude and awareness of TQM. Because of the VE-TQM synergy, Private industry has fully embraced VE.

VE is applied regularly at the rate of 2-3 VE workshops a week averaging a saving of 5-20% for each particular project. VE became an integrated work program in many governmental organizations and many large scales Saudi companies, to name a few: Saudi Arabian Oil Company (Saudi Aramco), Saudi Arabia Petrochemical Company (SABIC) and many construction companies.

Because of the successful VE applications in Saudi Arabia, VE also spread even more to cover all the Arabian Gulf countries, Egypt and Lebanon. The application of VE expanded to cover not only construction industry but also areas like operation and maintenance, industrial company management, training and social work.

3. VE TRAINING IN Saudi Arabia

In compliance with general objectives of the VE Programs and the importance of conducting study simultaneously with training, therefore, such programs set up plans to train Saudi professionals to acquaint modern work techniques. Training program is the vital key in qualifying VE specialists through holding on-job training.

Figure 1. Shows briefly the roadmap of value engineering (VE) training in KSA. It goes back to 1975 where two of engineering officers at General Directorate of Military Works (GDMW), Ministry of Defense and Aviation (MODA) were flown to U.S.A to attend a VE training program (one week workshop) which was organized by U.S. Corps of Engineers.

In 1982, the first VE training seminar was held in Riyadh, Saudi Arabia with assistance from a well-known VE consulting firm. Overwhelmingly, 150 engineers and professionals have been attended.

GDMW in 1985 decided, and after a wide spread success of VE concept in KSA to set up its own VE training department as a permanent program with allocated budget. The program yet to be developed and VE consultant was invited to accelerate, wipe out any hurdles, and finally and most critically, to convince the top management with go ahead. Essentially, the main purpose of establishing VE department was not to deliver only seminars and workshops, but to utilize and implement such a powerful, and specialized cost control technique in (MODA)'s MEGA projects across the Kingdom and especially during the economical boom in the 80's.

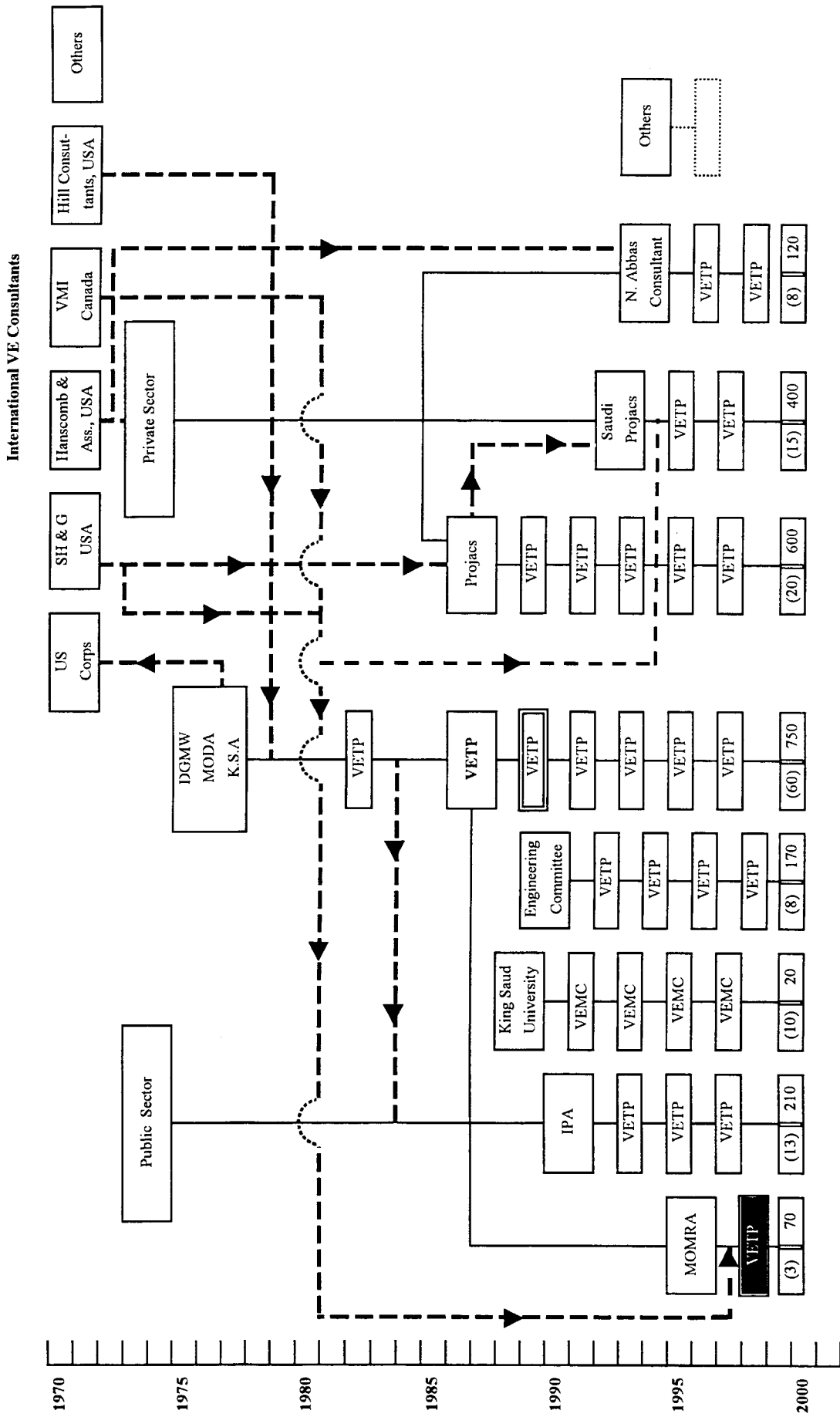
One year later, the VE dept. was finally founded in GDMW and (Called VE Division) training programs kept on going as per plan. In 1990 the division has fully and independently operated by Saudi certified VE specialists.

3.1. GDMW National Training Strategy

Despite the great success of VE in terms of money savings and training of a large number of Saudi engineers, architects and other professionals, the government was reluctant to regulate or enforce other public engineering departments to clearly apply VE in there contracts.

Alternatively, GDMW courageously took the lead in spreading out the approach among other public and private sectors throughout a well managed, and long range training plan. In several occasions, GDMW had prosperously addressed the issue to interested

Figure-1 : VE Training Roadmap in Saudi Arabia



Total No. of Training Seminars and workshop = 137
 Total No. of Participants = 2340

(Example - Training Program)
 Nos of Seminar or Workshops: (13) 210
 Number of Participants: (13) 210

governmental organizations, universities and other businesses whom gradually welcomed and accepted the approach. The following part elaborates on VE training in public and private sectors in KSA .

3.2. VE Training in Public Sector

The public parties who have shown great interest in VE are presented in Figure 1 as follows:

3.2.1 King Saud University (KSU)

KSU is the oldest and largest university in KSA. founded in 1957 with 2 faculties Arts and Sciences. Currently, KSU hosts more than 10 colleges and faculties with an average annual graduation of 45,000 students. As an educational institution, VE training started in 1988 at College of Engineering. Staffs have considered VE to be taught first at post-graduation scheme; Master degree as one of its Construction Management courses. Soon afterwards they are becoming more confident and willing to participate in VE consultation out side the university where they were invited to contribute into governmental projects Healthcare, Educational facilities & infrastructures.

3.2.2 The Saudi Engineering Committee (EC)

The Saudi Engineering Committee operates as a Saudi Society of Engineers. It was established in 1982 and regulates licenses to Consulting and Engineering Offices and provides professional services to its members. Currently, the registered Offices exceeds 2000 and with 4000 subscriber members. The relation to VE training goes back to 1989 when the author, the first Head of Training and Programs at EC, had approached the General Directorate of Military Works (GDMW) to accept the invitation to launch the first of its kind - VE training program series. (3-day each "Introduction to VE") in the 3 largest cities of the Kingdom: Riyadh, Jeddah, and Dammam.

Dr. Stephen Kirk, SAVE Int. current president, was the main Instructor and was assisted by two Saudi CVS's. The level of attendance was extremely marvelous and great enthusiasm among consulting engineers and architects have shown. Accordingly, the Engineering Committee had realized how significant is the VE approach and hence plans to carry on scheduling annual training programs for its members. Since 1994, the EC coordinates with the (SAVE Int. - Saudi VE local chapter) for the selection of VE seminars, workshops topics, and Instructors / facilitators.

3.2.3 The Institute for Public Administration(IPA)

It is purely governmental training center, the Institute's mission is to upgrade and enhance the skills and talent of the Civil Service Employees. It is founded in 1961 and annually runs over 100 courses and seminars of different disciplines. The first connection with VE training was recorded in 1990 were it considered to be taught under engineering programs which represents only about 5% of the Institute's overall training schedule. Till the end of 1998, the VE section have arranged 13 programs (called 4 weeks Module) and as many as 210 governmental engineers and professionals were participated. In one occasion (Dec. 1997), the Institute had organized a one-day symposium on VE entitled "VE between Reality and Applications", and the attendees had exceeded 300.

3.2.4 Ministry of Municipals and Rural Affairs (MOMRA)

MOMRA is the 2nd largest Ministry, after Ministry of Defense & Aviation, whom acknowledged VE approach. In 1995, the Value Engineering department has been established by two former MODA'S (CVS's) staff. MOMRA' top officials were highly convinced that municipal's high cost projects can be better off and well managed by utilizing value engineering powerful technique. Much details on MOMRA training program will be presented later on the second part of this paper.

3.3. VE Training in Private Sector

Since 1987, at the rate of 2-3 VE seminars or workshops are conducted every month in KSA and the gulf countries. As a result more than 2000 persons have been trained.

However, it is extremely amazing to conclude that public sector have tremendously dominating the VE arena in the Kingdom, contrary to some other western countries as it was published.

3.4. Private Sector: VE Training is the key for successfully business

From the previous narrative and descriptive part of the private VE training in KSA. It reveals that all of the training providers are specialized Construction and Project management firms. The reason behind was the uncertainties of VE future in the Kingdom in its early days and lack of government (regulations or incentives) support for local companies. Moreover, not too many Value Consultants and CVS's were available.

Strategically speaking, most consultant offices use VE training programs to promote their other Services. Accordingly, more than 200 VE training workshops

(Mod 1 and Mod 2) have been conducted by private sector since VE started in KSA.

3.5 MOMRA'S Training Program

MOMRA'S Training Program (MTP) effectively commenced in Feb. 1998. The lag period between 1995 and 1998 was maturely enough to prove the merit of the powerful technique and its accompanied sound results for opponents and critics to whom have some doubts about VE in the Ministry and other public sectors alike.

With budget constraints and limitation at most of government administrations, Ministry's top official became aware of ongoing and future spending. Consequently, they have agreed that any project exceeds SR. 30 million (US\$ 8 million) should be value engineered.

Growing demand on continuous municipal works and services (water networks and sewage treatment plants, roads & bridges rehabilitation, solid waste, and storm water projects) had strongly forced VE department to accelerate its training program. This will also support government's national policy in "Saudization" campaigns by allowing more Saudi engineers to take vital roles in VE studies and became more qualified and hence encourage them for certification.

3.5.1 The Program's Objective

The 4 months, training program is basically designed to ascertain the following objectives. (1) Pre-qualify VE staff team members working at VE department. (2) Train Saudi qualified engineers working at public sector with preference given to MOMRA'S Staff. (3) Spread out VE concept and applications among governmental agency engineers and other professionals.

Figure 2. Illustrates the F.A.S.T diagram for the training program to enable participants to fully understand the essence of VE.

With regard to the training program's main components it was decided that only 3 candidates of each training session are to be accepted. Each candidate have to be a Saudi national holding at least a B.Sc. in Engineering or equivalent, with at least 5 years of experience, particularly in design and can speak and write in English language.

The essence of the program was mainly divided into two parts as shown in the flow model diagram (Figure3).

The first part consists of three training courses namely as follows:

- A 24 hrs. Value engineering Theory
- A 40 hrs. approved VE Workshop (Module-1)
- A 24 hrs. approved VE Seminar (Module-2).

The second part is VE Projects where the trainee participate in at least two VE studies of mediums to large sized projects. Figure 3 indicates where these projects occur. This will enable trainees to gain the maximum benefits after the first 4 weeks of familiarization with VE technique.

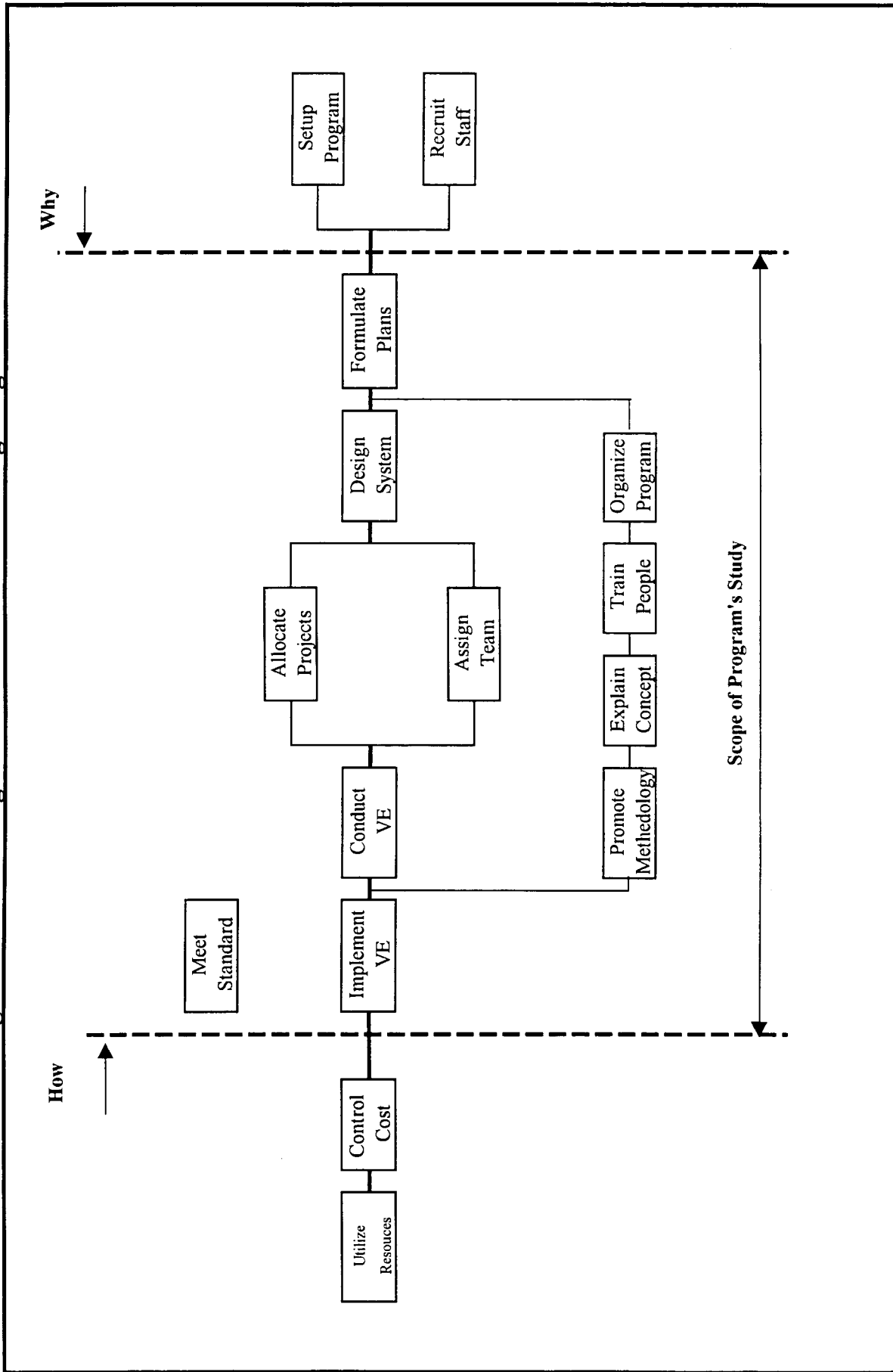
The training staff at VE department, MOMRA was selected from a high caliber of experienced professionals with 2 CVS's, 1 AVS, 5 engineers with Ph D., MS and BS.

Evaluation methods were properly designed for this purpose to check and verify the ability of trainees in coping with the training system in all parts. Among these are quizzes, exams, and assignments in additions to a routinely engineering problem solving practices. At the end of each stage (Monthly), a comprehensive report is written and recorded. Other evaluation parameters were considered i.e. performance, teamwork spirit, time management, seriousness, credibility and ethics. By the end of the 4 months program, a final detailed report on each trainee is documented and presented for discussion with the VE department's director for final results and approval.

VE training & research division tries its effort not to leave any missing gaps or information regarding the training process. Therefore, by designing a full training manual for such a program, trainees will be able to adequately using the 4 months scheduled program. The main chapters are given, as follows:

- Value Engineering Department
- The Training Program (Part 1-Theoretical)
- The Training Program (Part 2- Practical)
- Training Process Evaluation
- Pre-Qualification for SAVE Int. certification

Figure-2 : FAST Diagram for MOMRA's Training Program



COURSE	PROJECT	7th WEEKS	VE TRAINEE			VE Consultant			VE STAFF		
			WEEKS	VE TRAINEE	VE Consultant	VE STAFF	WEEKS	VE TRAINEE	VE Consultant	VE STAFF	
Intro. to VE			FEBRUARY 98	W 1	Induction		Reception & Welcome			Instructing	
				W 2	VE Attending						
				W 3	Familiarizing with VE		Preparation & Coordination				
				W 4	Familiarizing with VE		Working with Trainees				
MOD-1 Workshop	Project 1 Solid waste management And city cleaning		MARCH 98	W 5	Preparation to Project - 1	Preparation & Leading	Preparation				
				W 6	Participating in Project - 1	Brainstorming & Evaluation	Brainstorming & Evaluation				
				W 7	Attending & Participating	Workshop Instructing	Supervising & Participating				
				W 8	Finalizing & Reporting	Finalizing & Reporting	Finalizing & Reporting				
VE Seminar	Project 2 Road maintenance and rehabilitation or Sewage network		APRIL 98	W 9	Preparation to Project - 2	Leading & Performing	Preparation				
				W 10	Participating in Project - 2	Leading & Performing	Brainstorming				
				W 11	Participating in Project - 2	Leading & Performing	Development				
				W 12	Attending	Instructing	Supervising				
				W 13	Finalizing & Presentation	Leading & Performing	Finalizing & Presentation				
			MAY 98	W 14	Graduation Research Assignment		Supervising				
				W 15	Finalizing Reports		Wrapping Project Reports				
				W 16	Application SAVE / AVS		Supervising SAVE Application				
				W 17	Graduation & Farewell Party		Grad. Party			Close-out	

FIGURE 1. LOWY MODEL OF VE TRAINING COURSE

