CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter concludes the research findings of the proceeding chapters, their conclusions and results. It also presents recommendations for future research in training needs for employees in the constriction industry.

Continuous training is an essential requirement for engineers. It is not only for engineers, but also for the other professionals as well. On the other hand it is a requirement for the ISO 9000 standards. Today the companies engaged in construction industry also trying to acquire the ISO 9000 standards. In that case it is required to have effective training programmes to improve the company requirements.

5.2 Conclusions

1. Civil Status / Sex:

The selected sample of engineers is of the categories civil and mechanical. The percentage of male engineers is very much higher than the female engineers. There is a very high percentage of engineers in married status and very less percentage in single status and widower status.

2. Age Distribution:

The percentage of engineers in the group of age over 40 years is lesser than the group of age below 40 years. Age distribution of female is limited within a shorter range (between 35 and 44 years).

3. Working Places:

Working places of those engineers are distributed in 74% of the country. The highest percentage of engineers is engaged in work in the Colombo district.

4. Work Experience:

Past experiences of those engineers are in different fields. The fields in which they have got the experience are:

- Road construction
- Bridge construction
- Building construction
- Road design
- Bridge design

The percentage of engineers in the higher experience limits is very less. The highest percentage of engineers is in the limit of 14 years.

5. Level of Skills:

More than 50% of the engineers have obtained the level of degree or equivalent to a degree. A considerable percentage of engineers have obtained the level of P.G. diploma and above. There is a very low percentage in the level below degree. The engineers who have obtained the level of P.G. diploma and above are in the designations:

- Senior Civil Engineer
- Civil Engineer
- Mechanical Engineer

The engineers who have obtained the level of degree or equivalent are in the designations:

- Senior Civil Engineer
- Civil Engineer
- Senior Mechanical Engineer
- Mechanical Engineer
- Quarry Engineer

The engineers who have obtained the level below degree are in the designations:

- Senior Civil Engineer
- Civil Engineer
- Technician Engineer

Proportions of the male and female engineers in each skill are nearly similar.

More than 50% of the engineers are members in professional institutions. Proportions of the male and female engineers in obtaining the membership in professional institutions are similar.

6. Relevance of Areas:

When considering the relevance of each area to their present activities, there is a very high relevance in the following areas:

- Costing
- Human Resource Development
- Project Management
- Technical Skills

But there is less relevance to the computer applications and computer packages. All the engineers like to gain the training in some kind of training course.

7. Preferred Types of Training Courses:

Senior engineers have a preference to follow Masters or higher degree course. Civil engineers have a preference to follow a Diploma course. Percentage to follow short courses conducted outside the organisation and seminars is very high for all categories.

When considering Senior Civil Engineers, more percentage of male engineers prefer to follow a training course. When considering the Civil Engineers, higher percentage of female engineers prefers to follow a training course.

8. Type of Preferred Time Periods:

Most preferred type of training period for all the engineers is weekends. When considering the Senior Civil Engineers, highest percentage of them preferred to the period between 2 weeks and 2 months.

9. Preferred Areas of Training:

Highest percentage of engineers required to have training in the areas:

- Computer applications
- Computer packages

Next higher percentage of engineers required to have training in the area of project management. The maximum percentage of engineers requires training in the area of Marketing. 100% of the female engineers of the Civil engineers require training in all areas, but the percentage of the females of the Senior Civil Engineers require training is lesser.

10. Company Requirement in Providing Training:

Senior managers' requirement for giving training to their subordinates is at different time periods for different areas. They prefer to give long-term training to Project management. The highest percentage of senior managers required to give the training in the area of Compute packages, and the allowed time period is between two months and six months. Next higher percentage is in the areas of Computer applications, CAD and the allowed time period is between two months and six months.

Senior managers required to give higher-level training courses only in the area of Project management. Degree or equivalent courses are not required at all. The highest percentage of Senior managers required to give training in the area of safety and the type of course for it is Seminars / Conferences / Workshops.

Considering the above results of the case study, it is possible to prepare a training programme for the engineers engaged in this organisation. In that programme it is possible to consider, requirement of areas, to different categories in different types of courses and different types of time periods.

According to the 'Training Needs Assessment of the construction industry (year 2001 - 2005)' by ICTAD, Computer applications and Computer packages have been requested by the employees engaged in the construction industry as one of the areas with highest priority by all occupations, but employers have not identified it as important. In this organisation also, these two areas have been identified, as an area required more training by engineers as well as senior managers. But it is seen that these two areas are not so relevant to these engineers in their present activities.

Therefore these two areas can be identified as important to provide the training and meanwhile there should be a way of gaining the benefits to the company by improving the relevance to the present activities.

According to the 'Training Needs Assessment of the construction industry (year 2001 - 2005)' by ICTAD, Project management also has been identified by both the employees and employers as an area needing further training. In this organisation also both Engineers and Managers have identified this area as an area required training.

According to the results of this analysis it is seen that there is a need for training in all the areas by the Engineers. With these results a training programme to suit their requirements could be prepared. For different seniorities, different types of training programmes could be given.

Project management is highly relevant to all the Engineers. According to the Senior Managers, Engineers require long-term higher degree courses for this area.

5.3 Recommendations

1. The employees surveyed are from 74% of the country where their working places and 100% of them require training. This shows the impact of training requirement of the employees for their day-to-day activities. On the other hand the company management also has shown the requirement of training for the employees in the different areas.

   In this research activity it is not discussed with any other out side parties where these employees are involved in work, regarding the training requirements for this company. Hence the individual needs must have become the training needs in this survey. Therefore any other future activities may include the involvement of outside parties also, to get more accurate picture.

2. For this organisation these results could be used to make a programme to give the training to Engineers in future, considering the company requirements as well as employees' relevance to each area, and preferences of the engineers to the areas, courses and time periods (if the organisation does exists). The

results of this case study has some similarities with the results of the 'Training Needs Assessment of the construction industry (year 2001-2005)' by ICTAD. Hence this methodology can be used satisfactorily, for any other construction organisation also to improve their training programmes.

3. Further to the areas quarried in this survey, some other areas such as Quarry operations can be included to improve the questionnaire.

   In future studies, further to this, the followings can be added as improvements:

   - A preliminary survey to identify the areas
   - Discuss about the sponsorship in the questionnaire
   - Discuss about the job satisfaction in the questionnaire

4. To improve the training programmes continuously, the companies can request a report from the participants, on the training after completing the training. A questionnaire can be forwarded to the employees completing any training programme to get their views on the training course, whether it is useful or not in the future.

5. There is a preference of the employees to have short courses. It is shown in comparing the 'Training Needs Assessment of the construction industry (year 2001-2005)' by ICTAD, with the RC & DC Engineers.

   At present universities provide long-term training courses rather than short courses. So the government can request the Universities also to arrange more short-term courses to improve the capacity of providing the training to the professionals.

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ANNEX 1

Questionnaire – 1

My no-.....
Date - 10/12/2001

Survey on "**Training Needs Analysis of Professionals in R.C.&D.C.**" as a part of the M.Sc. research project by Mrs. C. Jayathilake.

Part-1

Organisation – RC & DC

Please tick applicable cage as shown.☒

1.0. Personal Details

1.1. Age as on 31st Dec. 2001: .....years

1.2. Sex:

- ☐ Male
- ☐ Female

1.3. Marital status:

- ☐ Single
- ☐ Married
- ☐ Other -

..... (separated/widower/widow)

1.4. Number of dependants:.....

1.5. Permanent residence (District/ Province):.....

2.0.Employment Details

2.1. Designation:.....

2.2. Position:

- ☐ Deputy General Manager
- ☐ Senior Engineering Manager
- ☐ District Manager
- ☐ Divisional Engineer
- ☐ Project Manager
- ☐ Project Engineer
- ☐ Site Engineer
- ☐ Mechanical Engineer
- ☐ Electrical Engineer
- ☐ Quantity Surveyor
- ☐ Office Engineer
- ☐ Other-

.....

2.3. Place of work (District): .....

2.4. Work experience in years as on 31st.Dec.2001: .....

2.5. Work experience in :

	No. of Years
Road construction	
Bridge construction	
Building construction	
Designing	

3.0 Present Level of Skills

3.1. The highest educational qualification (Tick for the relevant cage):

Diploma	IESL	Degree	PG Diploma	Masters Degree

3.2. Details of higher education:

Course	Institution	Specialised field	Year of completion

3.3. Professional qualifications:

Institution	Type of membership	Year obtained

Part-2

Please tick applicable cage, as it is relevant to you, in each area given below.

Area / Sub Area		Extremely Relevant	Very Relevant	Somewhat Relevant	Less Relevant	Not Relevant at all
1) Technical skills-						
1.1	Handling survey instruments and Setting out					
1.2	Interpretation of construction drawings					
1.3	Plant and equipment management including proper utilization of machinery					
1.4	The method of construction and the sequence of activities					
1.5	Design of temporary works (coffer dams, sheet piles, etc.)					
1.6	Construction equipment and methods					
1.7	Construction technology					
1.8	Understanding specifications					
1.9	Other-					
1.9.1	1.					
1.9.3	2.					
1.9.3	3.					
2) Financial Management-						
2.1	Purchasing material and equipment					
2.2	Cost controlling and monitoring					
2.3	Cost accounting (including stock control, pricing etc.)					
2.4	Financial accounting					
2.5	Evaluating financial performance					
2.6	Working capital management					
2.7	Financial planning					
2.8	Other-					
3) Costing-						
3.1	Unit rate analysis.					
3.2	Estimating					
3.3	Cost accounting					
3.4	Inventory control					
3.5	Stock control					
3.6	Other-					

Area / Sub Area		Extremely Relevant	Very Relevant	Somewhat Relevant	Less Relevant	Not Relevant at all
4) Human Resource Management						
4.1	Time management					
4.2	Delegation					
4.3	Leadership					
4.4	Managing personal stresses					
4.5	Negotiations					
4.6	Motivation					
4.7	Other-					
4.7.1	1.					
4.7.2	2.					
4.7.3	3.					
5) Communication Skills						
5.1	Presentations					
5.2	Conducting meetings					
5.3	Written communication					
5.4	Proficiency in English language					
5.5	Other-					
6) Project Management						
6.1	Project planning techniques					
6.2	Resource planning					
6.3	Project team building					
6.4	Quality management					
6.5	Risk management					
6.6	Cost control and monitoring					
6.7	Other-					
7) Contract Administration						
7.1	Preparation of claims					
7.2	Preparation of monthly valuation					
7.3	Handling disputes					
7.4	Contract documents					
7.5	Contract law					
7.6	Labour law					
7.7	Contract procedure					
7.8	Site records					
7.9	Arbitration					
7.10	Other-					

Area / Sub Area		Extremely Relevant	Very Relevant	Somewhat Relevant	Less Relevant	Not Relevant at all
8) Quality Control and Assurance						
8.1	Required tests and inspection					
8.2	Standards					
8.3	Statistical methods in quality control					
8.4	Site supervision					
8.5	Quality controle documentation (including forms, check lists)					
8.6	Remedial and corrective action					
8.7	ISO 9000 Quality management system					
8.8	5-S method					
8.9	Continuous improvement					
8.10	Other-					
8.10.1	1.					
8.10.2	2.					
9) Marketing and Selling Skills						
9.1	Relationship building with clients					
9.2	Competitive bidding					
9.3	Market analysis					
9.4	Public relations					
9.5	Other-					
10) Industrial Safety and Fire Protection						
10.1	Knowledge in safety equipment					
10.2	Site safety					
10.3	Dealing with accidents					
10.4	Fire protection					
10.5	Occupational health					
10.6	Other-					
10.6.1	1.					
10.6.2	2.					
10.6.3	3.					

Area / Sub Area		Extremely Relevant	Very Relevant	Somewhat Relevant	Less Relevant	Not Relevant at all
11) Computer Packages						
11.1	Excel					
11.2	Word					
11.3	Access					
11.4	Other-					
11.4.1	1. ……..					
11.4.2	2. ……..					
11.4.3	3. ……..					
12) Computer Applications						
12.1	In project planning					
12.2	In costing					
12.3	Estimating and tendering					
12.4	Management information systems					
12.5	Other-					
12.5.1	1. ……..					
12.5.2	2. ……..					
12.5.3	3. ……..					
13) Computer Aided Drafting						
13.1	AutoCAD knowledge					
13.2	Other Drafting Packages-					
13.2.1	1. ……..					
13.2.2	2. ……..					
13.2.3	3. ……..					
14) Any other training areas required						
14.1	……..					
14.2	……..					

Part-3

1) If you need training in any area specified above what type of course do you prefer?

A - Masters or higher degree

B - Degree or equivalent

C - Diploma

D - Short course /Training program (in house)

E - Short course /Training program (out house)

F - Seminars / Conferences / Workshops

Please tick the relevant cage,

Area	A	B	C	D	E	F
1.Technical Skills						
2.Financial Management						
3.Costing						
4.Human Resource Management						
5.Communication Skills						
6.Project Management						
7.Contract Administration						
8.Quality Control and Assurance						
9.Marketing and Selling Skills						
10.Industrial Safety and Fire Protection						
11.Computer Packages						
12.Computer Applications						
13.Computer Aided Drafting						
14. Any other training areas required:-						

2) What is the time period you can allow to follow the training?

A- Week ends

B- Less than two weeks

C- Between two weeks and two months

D- Between two months and six months

E- Between six months and nine months

F- Between nine months and one year

G- Over one year

Please tick the relevant cage,

Area	A	B	C	D	E	F	G
1.Technical Skills							
2.Financial Management							
3.Costing							
4.Human Resource Management							
5.Communication Skills							
6.Project Management							
7.Contract Administration							
8.Quality Control and Assurance							
9.Marketing and Selling Skills							
10.Industrial Safety and Fire Protection							
11.Computer Packages							
12.Computer Applications							
13.Computer Aided Drafting							
14. Any other training areas required:-							

3) Training already had in the past-

Area:

1. Technical Skills
2. Financial Management
3. Costing
4. Human Resource Management
5. Communication Skills
6. Project Management
7. Contract Administration
8. Quality Control and Assurance
9. Marketing and Selling Skills
10. Industrial Safety and Fire Protection
11. Computer Packages
12. Computer Applications
13. Computer Aided Drafting
14. Any other training areas:
    a. .....
    b. .....

Areas Covered (Give the Numbers from Above List)	Year	Duration	Type of Training			
			PG Diploma	Diploma	Certificate	Attended only (no certificate)

ANNEX 2

Questionnaire – 2

To be filled by the senior managers of the Road Construction and Development Company.

If your subordinates (engineers) need training in any area specified below,

1) What type of course would you prefer to allow?

A - Masters or higher degree

B - Degree or equivalent

C - Diploma

D - Short course / Training programme (in house)

E - Short course / Training programme (outside the organisation)

F - Seminars / Conferences / Workshops

Please tick the relevant cage.

Area	Course					
	A	B	C	D	E	F
1.Technical Skills						
2.Financial Management						
3.Costing						
4.Human Resource Management						
5.Communication Skills						
6.Project Management						
7.Contract Administration						
8.Quality Control and Assurance						
9.Marketing and Selling Skills						
10.Industrial Safety and Fire Protection						
11.Computer Packages						
12.Computer Applications						
13.Computer Aided Drafting						
14. Any other training areas required:-						

2) What type of period would you prefer to allow?

A - Week ends

B - Less than two weeks

C - Between two weeks and two months

D - Between two months and six months

E - Between six months and nine months

F - Between nine months and one year

G - Over one year

Please tick the relevant cage.

Area	Period						
	A	B	C	D	E	F	G
1.Technical Skills							
2.Financial Management							
3.Costing							
4.Human Resource Management							
5.Communication Skills							
6.Project Management							
7.Contract Administration							
8.Quality Control and Assurance							
9.Marketing and Selling Skills							
10.Industrial Safety and Fire Protection							
11.Computer Packages							
12.Computer Applications							
13.Computer Aided Drafting							
14. Any other training areas required:-							