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# POSTGRADUATE EDUCATION THROUGH UNIVERSITY-INDUSTRY LINK - THE YOUNG ENGINEERS TRAINING PROGRAMME

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**Abstract**

In view of potential shortage of skilled engineers in the next century, the Malaysian government has taken a drastic turn to overcome this problem. In bringing it into fruition, the Malaysian government has already insist that a Malaysian-led joint venture companies which have secured major government projects, to provide training to the freshly graduated engineers as parts of its obligations in their contract agreement. This paper presents the experience of Universiti Teknologi Malaysia,(UTM) in setting up the special program through University-Industrial Link concept with the Linkedua Bhd which is a wholly own subsidiary company of United Engineers Malaysia Bhd. (UEM). The program is called "**Young Engineers Training Programme**" (YETP). Through this programme a freshly graduate Engineers were practically trained at site by Shimizu Corporation, the main contractor for the Malaysian-Singapore Second Crossing(MSSC) project. Apart from that, the trainees need to attend classroom lectures provided by UTM academic staff at site located at Kampung Ladang, Gelang Patah, Johor. The program was designed in such a way that it will reward the trainee with Post Graduate Diploma in Construction Management after all the requirement were met to the satisfaction of parties involved in the training program.

## 1.0 INTRODUCTION

The Malaysian basic economic (growth) development has rapidly change towards the new millennium. Looking back in the sixties, Malaysian economic basically depends on agricultural products and minerals. The effort on development of the economic growth emphasized on the expanding of agricultural product and infrastructure. While in the seventies, the government tried to modernize the economy by diversified into the electrical product oriented such as electronic and electrical goods. During this decade, foreign countries were invited to invest in production sector which was emphasized in terms of labour power to boost up the employment rate. In parallel, the government promotes the transfer of technology.

The expansion of the development in industrial sector with the emerging of civil sector involves in heavy industries was seen beginning in the eighties. The rapid increase in industrial sector in short time has led to the scarcity of the local

professionals in meeting the demand. However due to the mid-eighties recession period, the growth of the professional groups has declined. Construction industries face a significant impact during the recession.

This has caused a decline in the study of science, engineering and technology among the Malaysian students. However as the economic regains in early nineties, the efforts in extending industrial sectors were continued as can be seen in construction sectors especially which involved in mega infrastructure projects.During this moment, Malaysia is facing a problem of having a small number of experience professional as the results of eighties recession period.

According to statistic, the employment in engineering discipline in 1995 is 49,729[1] . However the country could only manage to produce about 26,570 engineers in the 7th Malaysian Plan. Malaysia needs about 83,590 engineers in the next millennium. Thus giving a shortage of 7,291 engineers which need to be taken care of. Due to this shortage, Malaysia inevitably need to turn to expatriate to fulfill the requirement.

In taking this responsibility UTM has taken a step ahead to overcome the problem by implementing a University- engineering Industrial Link scheme in training the local engineers to reduce the shortage.

## 2.0 THE YOUNG ENGINEERS TRAINING PROGRAMME

The Young Engineers Training Program (YETP) was set up in early 1995. Generally the structure of the program was reported elsewhere by Siti Hamisah and Mohd Zulkifli[4] .The progam was done at the location of the Malaysian Singapore Second Crossing Bridge (MSSC) at Kampung Ladang, Gelang Patah, Johor.Figure (1) shows the location of the project[3] .

The construction commenced on both side of the country, Malaysia and Singapore. The bridge is 1.919 km long with 1.769 km within Malaysian water while the rest is in Singapore vicinity. The construction on Malaysian site was commenced on October 1994 while in Singapore with an approach at Jalan Ibrahim Tuas in Singapore started in the early 1995. The construction cost of the bridge is about RM1.4 b including the Custom, Immigration and Quarantine, CIQ complex and a dual 3-lane carriage way in its package.

In this programme, three parties are responsible for the training, the Linkedua Malaysia Bhd.(owner) who is responsible for the setting up and selecting of the trainees for the programme, Shimizu Corp (Main Contractor) for the On Job Training and Universiti Teknologi Malaysia, whose role is to educate and facilitate them during

the training period.Apart from that, UTM role is to ensure that the element of technology transfer is being done by the main contractor. A Postgraduate Diploma in Construction Management will be awarded to the trainees after all the requirement needed has been fulfill through standard assessment by Universiti Teknologi Malaysia.

Ninety one trainees were recruited and group into five batches. Each batch completed their training in a period of nine months beginning early 1995 until at the end of 1997. At present the fifth batch has almost completed their task in classroom lectures and On Job Training and is expected to graduate in September 1997.

## 3.0 TRAINING PROGRAMME SCHEDULE

The objective of the training program is to encompass areas in human and conceptual skill which involve personal integrity through self observed and retrospection and also the basic knowledge as a business man in the world of construction industry. To achieve the target, UTM and Linkedua have designed a course structure which enable the trainees to develop their skills and knowledge in the Construction Management field. In order for the trainees to obtain their post graduate diploma, 18 credit hours should be completed within the training period. Out of that, 85% of the task will be from the input of On Job Training. During this training the trainees are subdivided into four groups which are rotated to every section for a period of 8 weeks. Sections involved in the training programmes are Piling, Engineering Planning and Procurement, Superstructure, Quality Assurance and Quality Control. Each group will undergo all the typical training such as supervision, analyses and trouble shooting in each of the section until the training programme completed.

The learning process through On Job Training will be accredited into credit hours depending on the total hours of training during the due course. For the whole On Job Training, the trainees will be accredited with 9 credit hours from the field training. Basically the training programmes are categorized into three main areas.

(1) Construction Laws and Contracts
(2) Engineering Project Analysis
(3) Construction Site Management and Safety Control

However due to the facts that not all of the On Job Training will have the enough input from these three areas due to time constraint so in order to fulfill the academic requirements, trainees need to write a report containing the above three element to supplement their knowledge for the accreditation purposes. 5 credit hours will be accredited from their report writing. Viva voce will be conducted by UTM to evaluate the trainee's knowledge in these three areas. Details for the process of accreditation for the training program is as shown in Table1.0.

Apart from that, the trainee will also attend a full time lecture of 3 credit in Construction Project Management. The 45 hours classroom lectures were conducted throughout the whole training course. Evaluation through examination and coursework were carried out accordingly.

In giving a clear scenario concerning the training on site, several numbers of seminars and lectures which involve in all relevant topics with site (see Table 2.0) such as substructures design system, superstructures design, quality control, computing were conducted by various agencies such as UTM, Shimizu Corp., government and private agencies during the training period. The time allocated for these seminars during training program is 56 hrs which is equivalent to 1 credit. The results of overall activity based on the credit hour for the program is as shown below :

| | | |
|---|---|---|
| 1. | Practical Training | 9 credits |
| 2. | Supplementary Report | 5 credits |
| 3. | Seminars | 1 credits |
| 4. | Classroom Lectures | 3 credits |
| | Total | 18 credits |

With this input, the trainees were eligible to be awarded with Post Graduate Diploma in Construction Management from UTM provided that the trainees successfully fulfill the evaluation requirements.

In future if the trainees decide to pursue their Master Degree in Construction Management at the University, these number of credit hours are transferable.

## 4.0 CONCLUSION

In achieving the needs for an experience engineers, University-Industry Partnership shows a promising way of solving the problems. In the Young Engineers Training Programme apart from training the young engineers to expedite the process of technology transfer, the trainees were also being awarded with a Post Graduate Diploma in Construction Management with repeat to their capability in meeting the University award requirement. At the end of the training period ninety one numbers of local young engineers that have been trained to seek for invaluable experience will be the frontier in fulfilling the Malaysian vision 2020.

## ACKNOWLEDGMENT

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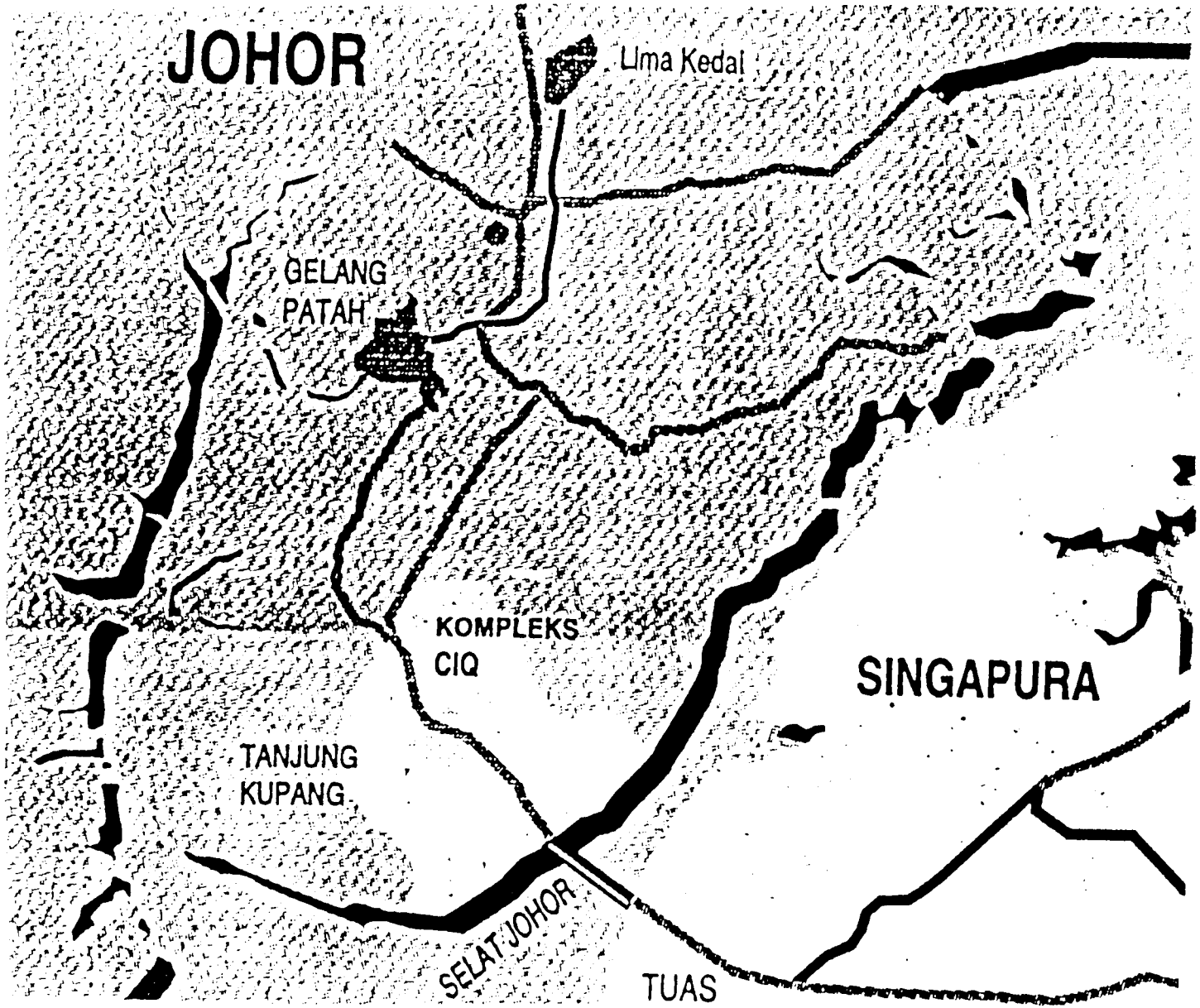


Figure 1.0 Location of the MSSC Project at Kampong Ladang, Gelang Patah

## Table 1 : On Site Duty Schedule

| Site Selection<br><br>Engineering Section | Activity Code | Activity | Minimum Training Hour | Remark | Requirement |
|---|---|---|---|---|---|
| | A-01 | Programming | 48 | | To Construct Comprehensive Programme |
| Environment Section | A-02 | Planning | 48 | | To Construct Overall Construction Plan |
| | A-03 | Design | 24 | | To Check Overall Design |
| Q.C. Section | A-04 | Q.S | 24 | | To Control Overall Progress |
| Survey Section | B-01 | Environment Control | 24 | | To Monitor And Advise Requirement |
| | B-02 | Quality Control | 24 | | To Check Quality Requirement |
| Piling Section | B-03 | Survey | 24 | | To Monitor And Advise Requirement |
| | B-04 | Safety | 24 | | To Monitor And Advise Requirement |
| Substructure Section | | | | | |
| | C-01 | Piling Planning | 24 | | To Establish Method Of work |
| Super Structure | C-02 | Piling Supervising | 360 | Two out of three | To Monitor, Supervise, Instruct & Record |
| | C-03 | Temp. Work Design | 48 | | To Check Construction Method |
| Safety Section | C-04 | Piling Quality Control | 48 | | To Monitor & Record Quality Aspects |
| | D-01 | Substructure Planning | 24 | | To Establish Method of Work |
| | D-02 | Substructure Supervising | 360 | | To Monitor, Supervise, Instruct & Record |
| | D-03 | Temp. Work Design | 48 | | To Check Construction Method |
| | D-04 | Substructure Q.C. | 48 | | To Monitor & Record Quality Aspects |
| | | | | subject to construction schedule | |
| | E-01 | Superstructure Planning | 24 | | To Establish Method Of Work |
| | E-02 | Superstructure Supervising | 360 | | To Monitor, Supervise, Instruct & Record |
| | E-03 | Temp. Work Design | 48 | | To Check Construction Method |
| | E-04 | Superstructure Q.C. | 48 | | To Monitor & Record Quality Aspects |
| | F-01 | PC Segment Q.C. | 48 | | To Monitor & Record Quality Aspects |
| | | | 1248 | | |

## Table 2 : Classroom Syllabus

| Term Name | Term Objective | Duration | Class Room Topics | Instructor | Hour | Date | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | A | | B | | C | | D | |
| | | | | | | Seminar | CPM | Seminar | CPM | Seminar | CPM | Seminar | CPM |
| Basic Term | Human Skill | 2 weeks | Opening | LINK, PLB | | 15/1/95 | | 15/7/95 | | 1/1/96 | | 14/7/96 | |
| | | | English Incentive Course | ELSI | 80 | | | | | | | | |
| Developmental | Technical | 29 weeks | Construction General | SHIMIZU, UTM | 4 | 6/5/95 | | 9/9/95 | | 16/3/96 | | 14/9/96 | |
| Term | Knowledge | | Foundation-Design & Cons. | RANHILL, UTM | 4 | 20/5/95 | | 23/9/95 | | 20/4/96 | | 12/10/96 | |
| | | | Bridge-Design & Cons. | ACER, UTM | 4 | 10/6/95 | | 7/10/95 | | 11/5/96 | | 19/10/96 | |
| | | | Prestress | VSL | 4 | 24/6/95 | | 4/11/94 | | 1/6/96 | | 16/11/96 | |
| | | | Road Work | UTM | 8 | 1/7/95 | | 18/11/95 | | 22/6/96 | | 30/11/96 | |
| | | | Survey | UTM | 4 | 15/7/95 | CPM | 16/12/95 | | 20/7/96 | | 14/12/96 | |
| | | | Cons. Project Management | UTM | 48 | | 22/7/95 Site 09:00 | | | | | | |
| | | | | | | | 29/7/95 Site 09:00 | | | | | | |
| | | | Programming | UTM | 4 | 5/8/95 | 5/8/95 Site 10:00 | 13/1/96 | | 3/8/96 | | 18/1/97 | |
| | | | | | | | 12/8/95 Site 09:00 | | | | | | |
| Advanced | Basic | 17 weeks | | | | | | | | | | | |
| Term | Managemental | | Planning | PLB | 4 | 19/8/95 | 19/8/95 Site 14:30 | 10/2/96 | | 10/2/96 | | 25/1/97 | |
| | | | | | | | 26/8/95 Site 14:30 | | | | | | |
| | | | Safety | SHIMUZU, UT | 4 | 2/9/95 | 2/9/95 Site 11:00 | 2/3/96 | | 2/3/96 | | 15/2/97 | |
| | | | | | | | 9/9/95 UTM 09:00 | | | | | | |
| | | | Environment | UTM, SHIMUZ | 4 | 16/9/95 | 16/9/95 Site 10:30 | 23/3/96 | CPM | 23/3/96 | CPM | 22/2/97 | CPM |
| | | | | | | 20/9/95 | 23/9/95 UTM 09:00 | | | | | | |
| | | | Quality Control | SHIMUZU | 4 | 30/9/95 | | 30/9/95 | Mar-96 | 10/8/96 | Sep-96 | 10/8/96 | Mar-97 |
| | | | | | | | 7/10/95 UTM 09:00 | | | | | | |
| | | | Labour Law | SHIMUZU | 4 | 14/10/95 | 14/10/95 Site 14:00 | 14/10/95 | | 17/8/96 | | 17/8/96 | |
| | | | | | | | 21/10/95 Site 09:00 | | | | | | |
| | | | Risk Analysis | SHIMUZU | 4 | 28/10/95 | | 28/10/95 | | 24/8/96 | | 24/8/96 | |
| | | | Contract | LINK | 4 | 11/11/95 | | 11/11/95 | Jun-96 | 31/8/96 | Dec-96 | 31/8/96 | Jun-97 |
| | | | Project Management | PLB | 4 | 25/11/95 | | 25/11/95 | | 7/9/96 | | 7/9/96 | |
| | | | Assessment | LINK,SHIMUZU | 4 | 2/12/95 | | 6/7/96 | | 21/12/96 | | 5/7/97 | |
| | | | Closing Ceremony | LINK, UTM | 4 | | | | | | | | |