Construction Industry Development Board

DEVELOPMENT OF A CONSTRUCTION CAREER PATH MODEL IN FULFILLING FUTURE DEMANDS AND INSPIRING YOUTHS TO ESTABLISH CAREERS IN CONSTRUCTION

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1.0 BACKGROUND

The Malaysian construction industry has shown a continuous growth in line with the country's socio-economic development process. During periods of rapid economic growth, the construction industry normally grows at a faster rate than the economy whereas during the periods of decline the industry experiences greater declines and remains in recession longer than the economy. This reflects the cumulative interaction of the multiplier and accelerated effects on demand for construction as a result of the changing economy. Hence, the country's economic development will lead to an increase in construction demand. Demand for construction output is expected to expand with the implementation of the five corridor regional development projects in Peninsular Malaysia, Sabah and Sarawak.

The ability of the construction industry in fulfilling demand placed upon it hinges on the availability and capability of the resources it requires for its operation which includes workforce, materials, plant and equipment, and finance. Workforce has always been one of the key issues faced by the industry's supply-side in fulfilling construction demand. Thus, the future effectiveness of the construction industry depends on the availability and the quality of the workforce that it educates and trains. In order to achieve the goals of Vision 2020, there is a need for a long term planning of the workforce requirements of the industry. This includes enhancing training by increasing the number of public training institutions, increasing courses relevant to current and future demand, strengthening the system of standards and quality of technical education and encourages private sector participation.

1.1 Issues

Workforce is one of the most important assets in the construction industry other than machineries, capital, materials, finance and expertise. The expansion and changes in current and future construction output have significant repercussions on

the industry's workforce. Hence, the industry is plagued by issues relating to the shortages of its workforce and the difficulty in acquiring local workforce. This has led to a high reliance on foreign workers from neighbouring countries. The group of foreign workers hired by the industry are basically unskilled who acquired their working knowledge while assisting the more experienced workers. This does not meet the Industry's Skill Standard (CIDB News, 2002). According to the Third Industrial Master Plan 2006-2020 (IMP3), labour intensive industries such as the construction industry will be encouraged to plan their human resource requirements to reduce their dependence on foreign workers.

The Tenth Malaysia Plan has pointed out that in 2009 the percentage of skilled workers in Malaysia is 25 per cent compared to 40 and 33 percent in Singapore and South Korea respectively. This reflects that the workforce in Malaysia is relatively unskilled. Thus, the perception of society towards technical and vocational education should be changed to allow the country to produce skilled human capital to fulfil the demands of the New Economic Model (NEM).

The importance of skilled labour is undeniable and the country has to develop strategies to meet the extensive demands for skilled labours. The Master Plan for Training and Skills Development 2002-2020 aim to produce approximately 5.45 million skilled workers by 2020. In order to achieve a high income-based economy, competence and expertise should be increased so that knowledge and innovation can be nurtured to become more competitive and to drive the country towards a more conducive environment. Human capital and skill development should be focused especially in the critical area of growth (JPK report, 2009).

The use of foreign workers in the construction industry is due to several factors. The Malaysia Country Report (2009) stated that the locals are not interested to work in construction sectors due to the unattractive pay structure and service terms that do not guarantee job security. In addition, there is a shortage of suitable younger generation of workforce to replace foreign workers as well as mature workers who are retiring. It is becoming increasing difficult to recruit youths in the

17-20 years age group. The numbers in this age group are declining; more are pursuing tertiary education while some are put off by their perceptions of the industry as one that offers poor working conditions, unexciting works and questionable career prospects.

The occupational analysis that has been carried out to examine the skilled human resource competency has identified 10 industrial sectors with a total of 1,051 job titles. Out of the total, 350 job titles were categorized as critical job titles and should be given priority in National Occupational Skills Standards (NOSS) development to meet the needs of the industry. 54 out of the 350 critical jobs are relevant to the construction industry.

Table 1.1: Total Programs According to Level and Industrial Sectors

Industrial Sectors	NCS	Level					Total
		1	2	3	4	5	
Transportation	-	375	289	128	15	3	810
Machinery & Manufacturing	-	259	305	174	37	14	789
Elect & electronic, telecomm & broadcasting	-	317	265	123	16	3	724
Hospitality & Tourism	-	200	204	84	6	0	464
Medical & Pharmaceutical	-	163	192	55	0	0	494
M&E Service and Maintenance	-	135	88	43	5	0	282
Textile & Apparel	-	140	108	25	2	0	275
Information Tech & Communication (ICT)	6	0	109	93	38	6	252
Building & Construction	-	107	81	39	1	0	228
Agriculture & Agro-based	-	45	54	33	5	0	137
Others	-	2	17	97	0	0	116
Business Management	-	10	12	8	35	8	73
Resource Based Industry	-	27	23	17	0	0	67
Printing	-	25	22	6	1	0	54
Educational & Training Services	-	0	0	49	0	0	49
Packaging	-	6	6	4	0	0	16
Souvenir & Small Enterprise	-	2	2	1	0	0	5
Chemical	-	0	2	2	0	0	4
Total	**6**	**1813**	**1790**	**981**	**161**	**34**	**4785**

Table 1.1 shows the total number of vocational programs according to level and industrial sector as approved by the Department of Skill Development in 2009. From the table, the number of vocational programs approved under the building and construction sector is 228 programs. This reflects that the government is committed in developing skills by developing training courses especially in construction and

other critical sectors. Table 1.2 shows the estimated requirements of skilled human resource according to sectors from 2006 until 2020 (Pelan Induk, 2008).

Table 1.2: Estimated requirement of skilled human resources in accordance with sectors

Industrial Group	Estimated Supply/Demand For Human Capital				
	2006 –07	2008 –10	2011 – 13	2014 – 17	2018 - 20
Electrical and Electronic	30,000	45,000	67,500	87,750	105,300
Packaging	-	1,000	10,000	25,000	62,500
Landscape and environment	-	1,500	5,000	10,000	20,000
Chemistry	-	1,000	5,000	15,000	30,000
Banking, finance and insurance	270	3,240	4,860	12,150	24,300
Machinery and Equipment	25,400	33,020	49,530	69,342	97,100
Small Enterprise and Souvenirs	1.000	3,000	10,000	15,000	30,000
Hospitality and Tourism	20,000	16,000	24,000	36,000	54,000
Materials	2,000	9,000	22,500	38,250	60,000
M&E Service and Maintenance	20,000	26,000	33,800	47,320	61,500
Communication. and Information Technology	25,500	33,150	43,095	56,024	84,035
Food Product and agro-based industry	-	5,000	20,000	60,000	90,000
Biotechnology	-	5,000	15,000	30,000	55,000
Textile and Apparel	10,000	20,000	30,000	35,000	50,000
Design and interior decoration	-	10,000	20,000	30,000	45,000
Transportation	25,000	30,000	40,000	56,000	67,200
Printing	1,500	5,000	10,000	20,000	35,000
Medical and Pharmaceutical	-	3,000	12,000	36,000	90,000
Building and Construction	8,500	17,000	21,000	30,000	35,000
Resource Based Industry	400	1,500	10,000	20,000	30,000
Islamic Research	-	500	10,000	20,000	35,000
Others	8,500	20,000	40,000	55,000	65,000
Total	**178,070**	**288,910**	**503,285**	**803,836**	**1,225,935**
Overall	**3,000,036**				

1.2 Problem Statement

The ability of the construction industry in fulfilling construction demand is influenced by the availability and sustainability of skilled and productive workforce. One of the significant issues faced by the Malaysian construction industry is the ability to acquire the source of supply for its workforce, train as well as retain skilled workforce. In line with this, a range of programs and incentives should be developed. The challenges are to attract the youths and retain skilled workforce for the long term and develop a pool of workforce with appropriate skills and education capable

of contributing to the future national economy in line with the national target to reduce the dependency on foreign workers.

1.3 Research Objectives

The aim of the research is to develop a construction career path model in fulfilling future demands and inspiring youths to establish careers in the construction industry. Accordingly, the objectives of the research are:

a) To develop a simple model to estimate the demands for construction workforce.
b) To identify factors hindering youths from joining the Construction Skill Training Institutes (CSTI).
c) To propose a career framework model to inspire youths to establish careers in the construction industry.

1.4 Significance of Research

The implementation of the proposed framework will assist the construction industry in developing, attracting and promoting recruitment, training the youths and the strategies to retain them in the industry. It is hoped that the career framework model will inspire youths to chart out careers in the construction industry.

2.0 LITERATURE REVIEW

2.1 Determinants of Construction Manpower Demand

At the project level, there are various factors determining the demand for manpower. These factors include the size of project, project type, construction methods used, complexity of the project, degree of mechanisation, management attributes and the expenditure for mechanical and electrical services (M&E). The determinants are discussed below:

2.1.1 Project size

A number of researchers reveal that the specification for manpower demand at the project level should be based on an equation taking project size (scope and scale of construction) into consideration (Lemmesany and Clapp, 1978; Persad et al., 1995; Bell and Brandenburg, 2003). It is expected that the larger the size of the project, the more manpower is required. In practice, the 'multiplier' model adopted by the Environment, Transport and Work Bureau (ETWB) explicitly exercises the relationship between construction cost and manpower requirement (Chan et al., 2006). Chan et al. (2003) also showed a strong relationship between manpower demand and project size in an analysis of 123 construction projects.

2.1.2 Project Type

The occupational labour demand for a construction project is closely related to the type of project within a particular market sector because different construction project tends to have different product mix, capital-labour ratio and fixed cost structure (Agapiou et al., 1995a; Chan et al., 2002). For example, some trade such as plasterers and more technical skilled workers are closely associated with new housing work, whereas scaffolders have more employment opportunities from general repair and maintenance activities (Briscoe and Wilson, 1993). The mix of skills also changes significantly, when construction shifts from piling work to the construction of the superstructure. `Project type and size are important factors that

dictate the extent to which specialised skills are practiced in the construction industry (Persad et al., 1995).

2.1.3 Construction Methods

The construction method of an individual project also determines the site labour input and mix of skills (Lammesany and Clapp, 1978). For instance, a residential block with traditional load-bearing external walls of brick and block requires significantly more site labour than those built by fabricated facades. The increasing use of prefabrication, off-site production activities and the use of other engineering construction methods have caused a reduction in the demand for traditional craft skills including bricklaying, plastering and carpentry (Agapiou et al, 1995a), but an increase in prefabricated element erectors (Tang et al.,2003). A study by Tam (2002) indicates that the high degree use of prefabricated components has resulted in over 40% reduction of the total demand for site operatives.

2.1.4 Project Complexity

Another apparent factor affecting labour demand at project level is the complexity or the design of the construction product. Gidado and Millar (1992) regarded complexity as a factor hindering performance on site including technical complexity of the task, amount of overall and interdependencies in construction stages, project organization, site layout and unpredictability of work on site. Based on the study by Wong et al (2006), there are four important factors that influence the demand for construction labour. It covers technology complexity of the overall project characteristics, physical site condition, buildability level and complexity of coordination work.

2.1.5 Degree of Mechanisation

Degree of mechanisation and automation is also considered to critically influence labour demand on site since labour and capital are the two type of major inputs (Ehrenbergh and Smith, 2003). In general, the more the capital inputs, the less the labour required because automation and mechanised equipment tend to be manual labour saving (McConnell et al, 2003).

2.1.6 Management Attributes

Labour requirements are also affected by contractor's management skills (Wong et al, 2003b). These skills can be divided into planning, organising and controlling (Gould, 2002). Better coordination and utilization of plan and labour on sites lead to reduction in manpower requirements (Ganesan et al., 1996). Labour saving design can be achieved through enhancement management and interfacing of different trade such as electrical and mechanical trades. Better planning of site work can avoid double handling and hence ensure efficient use of labour. For example, in laying pipes and conduits, last minutes changes due to deficiencies in design planning often result in abortive labour (Gruneberg, 1997).

2.1.7 Expenditure on Electrical and Mechanical services

It is generally recognized that the material cost for electrical and mechanical work are unrelated to labour demand (Wong et al., 2003b). However these costs can be significant and represent a huge portion of total cost in today's construction. Thus these costs should be deducted from the total project cost in order to obtain a more robust and reliable demand estimating specification.

2.2 Career in Construction

According to Robert F.Morrison and Richard M.Vousburgh (1987), the term *career* is nearly synonymous with occupation or field of work. People associate the term *career* not only with their occupation or field of work but also with their organization. They assume that the term *career* is not a static idea but is very dynamic, connoting work-related experiences over a relatively long period of time.

A career path is a broad spectrum of careers that share similar characteristics and for which employment requirements call for common interest, strengths and competencies. The groupings encompass the entire spectrum of career options, providing opportunities for all students and ability levels. Each pathway contains

hundreds of jobs at all levels of entry (Michigan Department of Career Development, 2001).

Construction industry offers high opportunities in career development. There are a spectrum of works starting from the lowest which is general labour to the upper management consisting of project manager, engineer, designer and others. However, the demands for construction workers are dependable on the type of work. The demand in some jobs is high, where as in certain other jobs are limited (William P. Spence, 1976).

Construction workers in high demand are skilled workers. They are valuable workers who can get jobs just about anywhere in the country. They feel secure because they know the demand for their jobs will remain strong for a long time and that construction jobs are not the ones being outsourced to other countries (NCCER, 2006). Researchers find that workers' skills in construction are the key to income. Earnings for technically skilled workers such as journeymen electricians and heavy equipment operator often exceed those of college grads with degrees in "soft" skills such as the humanities or social sciences (NCCER, 2006). Bureau of Labour Statistics showed that a skilled journey person earned nearly 174% more than a high school dropout, 100% more than a high school graduate and 59% more than an associate degree holder.

Another consideration is that construction workers are able to earn while they learn. During an on-the-job apprenticeship a person may earn more than $80,000 over four years while college students are spending that much or more to earn a degree and probably rolling up years of student's loan payment (NCCER, 2006). This reflects that construction is an attractive alternative for gaining advanced skills and education that lead to rewarding, high paying careers. Those entering the construction industry out of high school usually start as labourers, helpers or apprentices. While some labourers and helpers can learn their job quickly, the skills needed to become trades professional take years to learn through classes at a technical or trade school, apprenticeship or some other employer provided programs.

As Malaysia is in the process of industrialisation, the construction industry plays an important role since it provides the economic and social infrastructure for industrial production and reproduction. Basic amenities and infrastructure such as residential space, roads, airports, railways, ports, power, communication utilities, and other basic infrastructure are needed in a country for the improvement of social living standards. It is also important for all other sectors to develop and grow. The Malaysian Government has realised the importance of the construction industry as it has strong forward and backward linkages with other economic sectors (Abdul Razak, 2010).

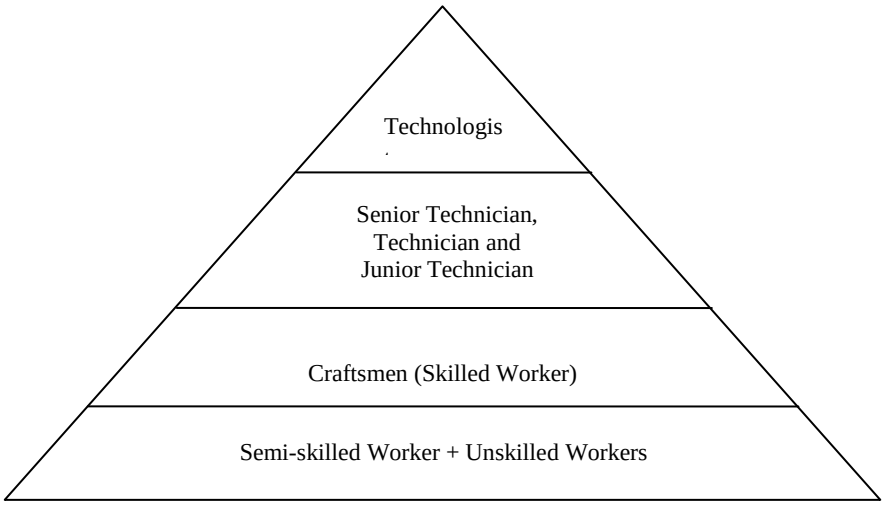

Figure 1: Manpower Pyramid

According to Wang (1987), the need for manpower can be divided into five categories: unskilled workers, semi-skilled workers, craftsmen, technicians and technologists. These categories are based on the educational level posses by an individual. Wang (1987) also stated that the manpower structure of construction sectors should be in the pyramid form with an appropriate number of unskilled workers, semi-skilled worker, craftsmen, technicians and technologists.

Construction Industry Master Plan (2005) has outlined the key components that need to be resolved in human resource challenges. Among the components are the reliance on foreign workers and the negative image of the construction industry.

According to the Economic Planning Unit (2009), the amount of foreign workers involved in the construction industry in 2007 and 2008 were 293,509 and 306,873 respectively. According to the Department of Statistics, as of June 2011, the Malaysian construction industry employed 1,214,000 or about 10% of the country's total employment. However, approximately 70-80% is foreign workers. This reflects that the Malaysian construction industry is still dependent on foreign workers. This dependency can cause various problems especially in terms of the quality of work that do not meet the standard required by the clients (CIDB, 2004). Thus, CIMP has pointed out that human resource is one of five key challenges that need to be resolved.

Construction Sector Council report (2003) has identified four key challenges faced by the construction industry as follows:

- Matching the projected demand for qualified trades' people with the future supply of skilled labour.
- Creating and supporting a flexible, consistent and responsive apprenticeship system.
- Creating an innovative, responsive training delivery system to maintain skill.
- Facilitating worker mobility in response to skilled labour demand across the country.

2.3 Perception towards Construction Industry

Local youths perceived work in the construction industry as a low status job. According to a report by the International Labour Office (2001), youths in Malaysia would rather be unemployed than working in the construction industry. This was due to several reasons including the working environment, wages and benefit obtained and career prospect in construction.

2.3.1 Working Environment

According to CIDB (2004), there are several causes why local workers were less keen to participate in the construction sectors. Amongst others, this include the practice of daily wage payment, uncomfortable work environment, safety at construction sites, and also due to the contractors themselves who tend to employ foreign rather than local workers. This is also supported by Bodapati and Naney (1998) who stated that the work environment in construction are not attractive where the scope of work are difficult with unsuitable atmosphere and the nature of work are sometimes considered as dangerous.

2.3.2 Wages and Benefit

According to a report by ILO (2001), in many countries, piece work is the predominant wage form for temporary workers in the construction industry. Many are forced to work long hours. Others choose to do so, either because the rates of pay are so low or simply because they want to earn as much as possible while work is available. In the United States, research has revealed that self employed construction workers are paid per shift and the shift is normally ten to twelve hours per day for six days per week.

A research conducted by Abdul-Aziz (2001) revealed that the most pressing factors concerning both local and foreign workers in construction revolved around social security, occupational safety and living conditions on site.

2.3.3 Career Prospect

According to a report by ILO (2001), the public has considered the construction sector as a sector which offers a vague career path. Dale Wissman (2002) mentioned that the construction sector was identified as a sector that has a tough job, lower pay, inadequate training and limited career path. Such factors were also reported in the London West Learning and Skill Council report (2004) as factors

hindering a career choice in the construction industry. Other factors included in the report are:

1. The image of the industry itself
2. Culture in the construction industry
3. Career prospects are not clear
4. Recruitment is not systematic
5. Lack of support from certain parties to encourage local residents to choose the construction industry as their career
6. Insufficient focus on vocational subjects at the school level
7. Lack of information resources in the schools that provide vocational training.
8. Lack of awareness among career advisors about the opportunities offered by the construction industry in terms of income and career development.

2.4 Factors Affecting Career Choice

A research conducted by Ferry (2001) showed that most youths learned about their choice of career from their parents and family. Their personal skills, aptitudes and academic efficacy also influence their career choice. Other factors influencing career choice include part time experience, teachers' advice and school career projects.

Bockert (2002) suggested that the three most influential factors contributing to career choice among teenagers are: the environment, personality and opportunity. Yahaya and Fariza (2002) discovered that students' interest, external factors, career counselling and job situation are the four factors influencing career choice. Findings from the research also indicate that job situation is the factor influencing students the most in making career choices.

Kappia et al (2005) pointed out that formal career information, family influences and informal social networks should be considered as equally important in influencing the career choice of new entrants to the construction industry. A research conducted by Chileshe and Haupt (2008) indicated that although salary, working conditions, opportunities for promotion and lifelong learning are likely to be the most important factors for high school students considering a career within the construction industry, this is also dependent on the gender of the students where salary is concerned. In particular, the study found that male students were more likely to be influenced by salary, working conditions, opportunities for promotion, status and prestige, and skills shortage than their female counterparts as a decisive factor in joining the construction industry.

Amir Awang (1982) pointed out that ambition or aspiration, self esteem, parents' occupation, prestige, socioeconomic status, parental requirements and personal characteristics such as interests and abilities as the important factors influencing the choice of vocational path among adolescents. Study conducted by (Mahdi, 1998) showed that family has a significant relationship with career choices of students instead of school and academic achievements.

3.0 METHODOLOGY

3.1 Research Design

According to Galfo (1983), research design is the overall effort which is made to carry out the purpose, solve a research problem, answer specific research questions and test hypothesis. A good research design is generally derived from six elements: a clear purpose, a strong theory base from which hypothesis, direction and scope of the study can be drawn, proper and adequate data sources, efficient methods to draw relationship to data, reliable and valid data gathering method, and effective analytical technique.

Wiseman (1999) classifies research by the method of study; the various research method or design fall under two categories which are experimental or descriptive. The descriptive studies examine the past or current status of individuals, institutions or process. On the other hand, experimental studies examine the cause-and-effect relationships. In experimental studies, variables can be manipulated by the researcher.

Based on the categorization formulated by Wiseman, this research is conducted based on descriptive study using quantitative and qualitative data obtained through survey. Survey is a systematic approach to collect, analyses, interpret and report pertinent facts and findings about the current status of persons, processes, products or programs. By using the interview approach and written questionnaires, information is gathered with a view toward sidentifying relative strengths and weaknesses of topics (Wiseman, 1999).

3.2 Instrument

According to Ellis (1994) a research instrument refers to any physical thing that is used to collect scientific data. Bell (1993) stated that research instruments are selected and devised to enable the researcher to obtain the answers. The instruments

are merely a tool to enable researcher to gather data and it is important to select the best tool for the research. For this study, the methods of data gathering consist of questionnaire survey, interviews and case studies.

3.2.1 Questionnaires

Questionnaires refer to any research instrument through which human being provide information about their live and behaviour. This information is provided either by directly responding to written question or via questions presented during a telephone conversation or a face to face interview (Ellis, 1994).

The first part of the questionnaire (Part A) consists of the classification type of questions which seek the background of each respondent. Part B and C consist of the attitudinal questions which attempt to seek the opinions of the respondents.

Questions formulated in questionnaires can be open-ended, closed-ended and scaled. An open-ended style is where the respondent is left free to give any answer and this is either written down verbatim or the interviewer is armed with a list of anticipated pre-defined answers. While in the close ended style, the respondent is asked to choose between a limited numbers of answers. Scale style is a question in which a limited choice of response has been chosen to measure an attitude, an intention or some aspect of the respondent behaviour (Hague, 1993). In the scale style, there are five types of styles normally used by the researcher as follows:

a) Verbal rating scale – these scales are the simplest of all, in which the respondents choose a word or phrase on a scale to indicate the level of their feelings.
b) Numerical rating scale – these have a very similar approach to the verbal rating except that the respondent is asked to give a numerical ‘score’ rather than semantic response.
c) The use of adjective – a variation on the verbal/semantic scale is to ask the respondents which word describes a company, a product or a person. The

adjectives could be a mixture of both positive and negative and need not be the opposite.

d) The use of the positioning statement – the respondent is asked to agree or disagree with a number of statements. It is important that the respondent is readily able to identify with one of the statements; and is not feeling that in certain circumstance one would apply and in other circumstances the other word would be more appropriate.

e) Ranking – a way to find out what is the most important to a respondent is to present a number of factors and ask which is the most important, the second most important and so on.

As for the questionnaire formulated for this research, two styles are adopted. The first is the closed-ended question and these questions are in Part A. The second style is the scaled style using the positioning statement. This style is used in Part B and Part C of the questionnaire. The structured questionnaire for this research covers 3 sections:

a) Part A covers the background of the respondents

b) Part B comprises the perception of the public towards the construction industry. The perception covers three main aspects, namely the work environment, wage and benefit, and the career prospect.

c) Part C focuses on the factors contributing to students' enrolment in construction related courses.

3.2.2 Interview Form

The interview form consists of four sections: the general information of the respondents, the supply of skilled labour by Public Skills Training Institute, measures taken to meet the manpower needs and challenges in the production of skilled workers. The distribution of questions in the structured interview form is as follows:

a) General information of the respondents

In this section, respondents should provide information regarding their background which covers their names, positions, experience gained in conducting the training program.

b) The supply of skilled labour

This section deals with the places offered in the training institute, the enrolment of trainees and graduates. Data collected was for the year 2006 until 2010. At the end of this section, the respondents were asked whether the amount of training acquired by trainees upon graduation is sufficient to prepare them for a career in the construction industry.

c) Measures taken to meet manpower needs

This section deals with the measures that have been taken by the training institutes in meeting the manpower needs by the industry. The measures taken can are categories into few categories such as the intake, learning facilities, training curriculum, the relationship between the institute and industry, and the career prospect of the trainees.

d) The challenges in the production of skilled workers

This section deals with the challenges faced by the training institutes in producing construction skilled workers. The challenges are related to administration, teachers, and trainees.

This research adopts the semi-structured interview approach. The semi structured interview is used in interviewing the administrators of the training institutes due to its flexibility where respondents can express their opinions The interview session was recorded using voice recorder with the permission from the interviewees.

3.2.3 Case Studies

Seven construction sites in the Iskandar Malaysia region were identified as case studies in determining the demand for construction workforce.

3.3 Sample and Population for Questionnaire Surveys and Interviews

Ellis (1994) defined population as a naturally existing collection of some phenomenon, usually a collection of people living in a designated geographical area at a given point of time. While sample is defined as a subset of some population and it is normally a tiny fraction of the population which they are drawn.

The population for the questionnaires distribution of this research includes the Public Skills Training Institute which conducts construction related courses in Johor. However, due to the time constraint, only Akademi Binaan Malaysia (ABM) Johor Bahru, Kolej Kemahiran Belia Negara (KKBN) Pontian and Pusat Giat Mara (PGM) Tanjung Piai were selected for the purpose of the survey. The questionnaires were distributed to all trainees, while the semi structured interviews were carried out with the administrators of the above institutes.

3.4 Data Analysis

Both quantitative and qualitative data analysis approaches were used in this research. The quantitative data analysis is a creative engagement with the empirical data, the literature and where possible the conversation with people who provided the data (Cousin, 2009). Content analysis is adopted for the qualitative data. Cousin (2009) states that content analyses identify the frequency of particular terms, theme and explanation, found in the text.

3.4.1 Statistical Analysis

One of the statistical analysis method used in this research is the descriptive statistics. According to Chua (2006), descriptive statistics are used to describe the characteristics of a variable. The indicator used is mean, standard deviation, median, mode, normal distribution and Z scores to reflect the characteristics of a variable.

a) Mean Analysis

Chua (2006) states that mean is the average value used to represent a set of observed value. Mean are used for class interval data and ratio scale.

$$\text{Mean} = \frac{\text{Total of all score}}{\text{Number of scores}}$$

b) Determination of Class Interval

Class interval analysis is used on the Likert Scale questions with a frequency from 1 to 5. According to Kirk (2007), the size of class refers to the size of class interval or the width of the class.

$$\text{Size of Class} = \frac{\text{Upper limit} - \text{lower limit}}{\text{No of Class}}$$

3.4.2 Content Analysis

Content analysis is a way of discovering patterns and meanings from communication (Rubbin and Babbie, 2009). This method is used in analysing the interview from the Public Skills Training Institutes.

4.0 DATA ANALYSIS

4.1 Introduction

This study was conducted to develop a construction career path model in fulfilling future demands and inspiring youths to develop careers in the construction industry. In order to achieve the aim of study, three main objectives have been developed. The objectives are to develop a model to estimate the demands of construction workforce in the industry, to identify factors hindering youths in joining the Construction Skills Training Institutes (CSTI) and to propose a career framework model in inspiring youths to develop careers in the construction industry.

4.2 Supply of Skilled Manpower

This section analyses the supply of skilled and semi-skilled workforce to the construction industry in Johor in terms of the number of places offered by CSTI, enrolment of trainees, and the number of trainees who completed the courses.

4.2.1 Places Offered by CSTI

Table 4.1 shows the number of places offered according to trades by three CSTI in Johor Bahru. Akademi Binaan Malaysia (ABM) is the only training centre that offers specific training based on construction trades. Kolej Kemahiran Belia Negara (KKBN) and Pusat GiatMara (PGM) offer general training programs based on the overall job on sites.

Table 4.1: The number of places offered according to courses at CSTI

No	CSTI	Course	Places Offered					Total
			2006	2007	2008	2009	2010	
1.	ABM	Bricklaying, Plastering and Tiling	80	60	80	60	60	340
		Formwork, Concreting, and Barbending	60	60	60	60	60	300
		Carpentry (Joinery & Drywall)	60	60	60	60	60	300
		Scaffolding (Tubular and Frame)	60	60	-	-	-	120
		Building Decorative Painting	80	80	80	80	80	400
		Welding	350	300	200	200	100	1150
			690	**620**	**480**	**460**	**360**	**2,610**
2.	KKBN	Jurubina Bangunan	100	100	100	100	100	500
			100	**100**	**100**	**100**	**100**	**500**
3.	PGM	Industrial Maintenance	48	48	48	48	48	240
			48	**48**	**48**	**48**	**48**	**240**
		Total	**838**	**768**	**628**	**608**	**508**	**3050**

4.2.2 Trainees Enrolment

Table 4.2 shows the enrolment of trainees for the three CSTI in various courses. It is found that the number of enrolment is not consistent. The welding course seems to be the most popular. There are three courses from ABM which are not well received by the trainees, namely Formwork, Concreting and Barbending; Carpentry (Joinery & Drywall); and Scaffolding (Tubular & Frame). The total enrolment per year is between 200 to 400 trainees which is far below the number of places offered.

Table 4.2: Trainee enrolment in various courses

No	Training Centre	Course	Enrolment					Total
			2006	2007	2008	2009	2010	
1.	ABM	Bricklaying, Plastering and Tiling	40	45	40	35	55	215
		Formwork, Concreting, and Barbending	-	-	-	-	-	-
		Carpentry (Joinery & Drywall)	-	-	-	-	-	-
		Scaffolding (Tubular and Frame)	-	-	-	-	-	-
		Building Decorative Painting	30	25	25	25	30	135
		Welding	240	160	140	150	130	820
			310	**230**	**205**	**210**	**215**	**1,170**
2.	KKBN	Jurubina Bangunan	24	34	17	23	39	137
3.	PGM	Industrial Maintenance	31	23	22	17	18	111
			365	**287**	**244**	**250**	**272**	**1,418**

4.2.3 Trainees Graduated from Training Institutes

Table 4.3 shows the number of trainees who have successfully completed the training. From 2006 to 2010, 1,162 trainees graduated from ABM, 120 trainees from KKBN and 61 from PGM. The total number of trainees who completed their training in the period of five years is 1,343.

Table 4.3: Trainees graduated from training centre

No	Training Centre	Course	Enrolment					Total
			2006	2007	2008	2009	2010	
1.	ABM	Bricklaying, Plastering and Tiling	40	44	40	33	50	207
		Formwork, Concreting, and Barbending	-	-	-	-	-	-
		Carpentry (Joinery & Drywall)	-	-	-	-	-	-
		Scaffolding (Tubular and Frame)	-	-	-	-	-	-
		Building Decorative Painting	30	25	25	25	30	135
		Welding	240	160	140	150	130	820
			310	**229**	**205**	**208**	**210**	**1,162**
2.	KKBN	Jurubina Bangunan	20	28	18	27	27	120
3.	PGM	Industrial Maintenance	18	13	15	13	2	61
			348	**270**	**238**	**248**	**239**	**1,343**

Table 4.4 shows the overall number of courses offered, enrolment and graduates between 2006 to 2010 according to the training centres. In general, the data shows that the total enrolment for each training centre is low, far beyond the numbers of places offered. Among the three CSTI, Pusat Giat Mara shows the highest enrolment which is 46.3%, followed by Akademi Binaan Malaysia with 44.8% and Kolej Kemahiran Belia Negara 27.4%. Overall, enrolment for construction related courses is 42.3%. Hence, only 1,418 places were filled from the 3,350 places offered.

Table 4.4 also shows the numbers and percentages of trainees graduated in each training centre. ABM has the highest percentage of graduates which is 99.3 percent from the total enrolment, followed by KKBN with 87.6 percent and Pusat Giat Mara with 55.0 percent. Overall, 1,343 trainees graduated out of 1,418 enrolments, reflecting 94.71 percent.

Table 4.4: Overall numbers of skilled workers from training centres in Johor Bahru

No	Training Centre	I	Year										Total	
			2006		2007		2008		2009		2010			
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	ABM	O	690	100	620	100	480	100	460	100	360	100	**2,610**	**100**
		E	310	44.9	230	37	205	42.7	210	45.7	215	59.7	**1,170**	**44.8**
		G	310	100	229	99.5	205	100	208	99	210	97.7	**1,162**	**99.3**
2	KKBN	O	100	100	100	100	100	100	100	100	100	100	**500**	**100**
		E	24	24	34	34	17	17	23	39	39	39	**137**	**27.4**
		G	20	83	28	70.6	18	106	27	117	27	69	**120**	**87.6**
3	PGM	O	48	100	48	100	48	100	48	100	48	100	**240**	**100**
		E	31	64.6	23	47.9	22	45.6	17	35.4	18	37.5	**111**	**46.3**
		G	18	85.7	13	56.5	15	68.2	13	76.5	2	11.0	**61**	**55.0**
Total		**O**	**838**	**100**	**768**	**100**	**628**	**100**	**608**	**100**	**508**	**100**	**3,350**	**100**
		E	**365**	**43.6**	**287**	**37.4**	**244**	**38.9**	**250**	**41.1**	**272**	**53.5**	**1,418**	**42.3**
		G	**348**	**95.3**	**270**	**94.1**	**238**	**97.5**	**248**	**99.2**	**239**	**87.9**	**1343**	**94.71**
• Note – O=Offer E=Enrolment G=Graduate														

4.3 Demand for Skilled Manpower

Formula for calculating the amount of workforce/meter square is derived from a dictionary of mathematics, written by Abdelnoor (1979). He invented a speed formula to obtain the total distance/period. The example showed the speed of the human movement:

$$\text{Speed (Distance/Time)} = \frac{\text{Distance}}{\text{Time}} = \text{Distance/Time}$$

$$= \frac{6\text{ m}}{5\text{ s}} = 1.2\text{ m/s}$$

It can be deduced from the above formula that the number of workers per one (1) square meter can be obtained by dividing the total number of workers currently in an on-going construction project by the total floor area of the project.

$$\frac{\text{Total Workforce}}{\text{Gross Floor Area (m}^2\text{)}} = \frac{\text{Number}}{\text{m}^2}$$

As the duration of each project will affect the total workforce used in the project, therefore it is necessary to divide the number of workers used in completing

1 square meter of the project by the duration of the project. Hence, workforce needed to complete 1m² of work in 1 day = number of workers/ m²/duration

Seven (7) sites were used as a basis to obtain the number of workforce required. Then, the average number of workforce/meter square is calculated. Based on the formula formulated by Abdelnoor (1979) in the dictionary of mathematics, the formulas used to obtain the mean or average is to add all set mean and divided with the available sets. The example described in the dictionary is as follows:

$$\text{Mean or Average} = \frac{2 + 3 + 4 + 5 + 6 + 7}{7} = 4$$

Deducing from the above formula, the average workforce required for one meter square (1 m²) floor area is determined by adding the workforce per meter square of every project and divide by the number of sites involved.

$$\text{Average Workforce} = \frac{\text{Workforce / m}^2\text{/duration}}{\text{Total Project Involved}}$$

Hence, in determining the demand for construction workforce in a particular area, the total floor area of project that will be carried out in the area will be divided by the expected duration of the project, and multiply with the average workforce per meter square per day.

$$\text{Workforce Demand} = \frac{\text{Gross Floor Area}}{\text{Duration}} \times \text{Average workforce needed}$$

Table 4.5 shows the summary of data related to the ratio between different categories of workers, analysis on workforce, cost, and duration of projects. Data were collected from 13 on-going projects around Johor Bahru. However, only 7 were used in the analysis due to incompleteness and inconsistency of data.

Table 4.5 Summary of analysis on workers, cost and duration of projects

Project	**Project A**	**Project B**	**Project C**	**Project D**
Cost (RM)	18,667,214.00	37,365,843.88	26,000,000.00	11,248,044.10
Type of Building	Residential Building	Educational Building	Educational Building	Educational Building
Gross Floor Area (m^2)	12,476.04	17,415.61	25,000.00	5,644.00
Duration (Day)	312	612	700	700
Estimated Total Workforce	1,425	978	810	361
Ratio				
Local : Foreign	1:18	1:26	1:11	1:11
Trade : General	12:1	7:1	6:1	8:1
M & E : Assistant	6:1	10:1	4:1	1:1
Workers/m^2	0.114	0.056	0.032	0.064
Cost/m^2	1,496.24	2,145.61	1,040.00	2,010.60
$\frac{\text{Workforce}/m^2}{\text{Duration}}$	0.000365	0.000092	0.000046	0.000091

Project	**Project E**	**Project F**	**Project G**	**Average**
Cost (RM)	61,129,914.78	16,000,000.00	11,215,027.91	-
Type of Building	Residential Building	Residential Building	Educational Building	-
Gross Floor Area (m^2)	59,624.98	11,000.00	6,898.54	-
Duration (day)	413	480	608	-
Estimated Total Workforce	2,476	1,732	376	-
Ratio				
Local : Foreign	1:14	1:14	1:10	1:15
Trade : General	7:1	18:1	2:1	9:1
M & E : Assistant	2:1	5:1	3:1	4:1
Workers/m^2	0.042	0.157	0.055	**0.0743**
Cost/m^2	1,025.24	1,452.55	1,625.71	1,542.56
$\frac{\text{Workforce}/m^2}{\text{day}}$	0.000102	0.000327	0.000091	**0.000159**

4.3.1 Project A

Project A is a residential building with 12,476.04 m^2 of GFA and a total construction cost of RM 18,677,214.00. The project duration is 312 days with 1,425 estimated number of workers. The ratio of local to foreign workers is 1:18. The construction cost per square meter is RM 1,496.24. The number of workers required to complete 1m^2 of the works for this project is 0.144 in 312 days. Hence, the number of workers needed in 1 day to complete 1m^2 of the works is 0.000365.

4.3.2 Project B

Project B is an educational building with 17,415.61m² of GFA and a total construction cost of RM 37,365,843.88. The duration of the project is 612 days with 978 estimated number of workers. The ratio of local to foreign workers is 1:26. This project used the highest percentage of foreign workers compared to the other projects. The construction cost per square meter is RM 2,145.61. The number of workers required to complete 1m² of the works for this project is 0.056 in 612 days. Hence, the number of workers needed in 1 day to complete 1m² of the works is 0.000092.

4.3.3 Project C

Project C is an educational building with 25,000.00m² of GFA and a total construction cost of RM 26,000,000.00. The project duration is 700 days with 810 estimated number of workers. The ratio of local to foreign workers is 1:11. The construction cost per square meter for this project is RM 1,040.00. The number of workers required to complete 1m² of the works for this project is 0.032 in 700 days. Hence, the number of workers needed in 1 day to complete 1m² of the works is 0.000046.

4.3.4 Project D

Project D is an educational building with 5,644.00m² of GFA and a total construction cost of RM 11,248,044.10. The project duration is 700 days with 361 estimated number of workers. The ratio of local to foreign workers in this project is 1:11. The construction cost per square meter is RM 1,010.60. The number of workers required to complete 1m² of the works for this project is 0.064 in 700 days. Hence, the number of workers needed in 1 day to complete 1m² of the works is 0.000091.

4.3.5 Project E

Project E is a residential building with 59,624.98m² of GFA and a total construction cost of RM 61,129,914.78. The project duration is 413 days with 2,476 estimated number of workers. The ratio of local to foreign workers in this project is

1:14. The construction cost per meter square is RM 1,025.24. The number of workers required to complete 1m² of the works in this project is 0.042 in 413 days. Hence, the number of workers needed in 1 day to complete 1m² of the works is 0.000102.

4.3.6 Project F

Project F is a residential building with 11,000.00m² of GFA and a total construction cost of RM 16,000,000.00. The project duration is 480 days with 1,732 estimated number of workers. The ratio of local to foreign workers in this project is 1:14. The construction cost per square meter is RM 1,452.55. The number of workers required to complete 1m² of the works in this project is 0.157 in 480 days. Hence, the number of workers needed in 1 day to complete the 1m² of the works is 0.000327.

4.3.7 Project G

Project G is an educational building with 6,898.54m² of GFA and a total construction cost of RM 11,215,027.91. The project duration is 608 days with 376 estimated number of workers. The ratio of local to foreign workers is 1:10. The construction cost per square meter is RM 1,625.71. The number of workers required to complete 1m² of the works in this project is 0.055 in 608 days. Hence, the number of workers needed in 1 day to complete 1m² of the works is 0.000091.

Overall, the average ratio of local to foreign workers is 1:15 with an average of 0.0743 workers used per square meter of the work done. The average of workers used per square meter per day is 0.000159 while the average cost per square meter is RM 1,542.56. Based on Table 4.5, the workforce utilisation in residential building is slightly higher than education building.

4.4 Perception towards the Construction Industry

It is important to gain an insight into the trainees' perception towards the construction industry in determining the factors hindering youths from joining the Construction Skilled Training Institute (CSTI). 100 questionnaires were distributed to 44 trainees from Akademi Binaan Malaysia (ABM), 48 from Kolej Kemahiran Belia Negara (KKBN) and 8 from Pusat GiatMara (PGM) Tanjung Piai, Pontian.

4.4.1 Respondents' Background

Respondents' background includes information related to the CSTI and course enrolment, educational background, reasons for selecting the course and information about the course.

a) CSTI and course enrolment

The distribution of respondents according to CSTI and courses is shown in Table 4.6.

Table 4.6: Respondents' Training Centre and Course

CSTI	Course	Frequency	Percentage
ABM	Bricklaying, Plastering and Tiling	14	14%
	Carpentry, concreting and bar bending	1	1%
	Formwork and drywall	1	1%
	Building Decorative Painting	2	2%
	Welding	14	14%
	Formwork	12	12%
KKBN	Building Technology (Jurubina Bangunan)	48	48%
PGM	Industrial Maintenance	8	8%
Total		**100**	**100%**

b) Educational Background

All respondents have various academic qualifications. Table 4.7 summarises the highest academic qualifications obtained by trainees. It was observed that only PGM consists of trainees with secondary school qualifications while the

other two centres consist of trainees with various academic backgrounds including primary school qualification.

Table 4.7: Trainees' Academic Qualification

CSTI	Academic Qualifications					Total
	Standard 6	Form 3	PMR	SPM	Others	
ABM	4	6	0	27	7	44
%	9%	14%	0%	61%	16%	100%
KKBN	1	1	1	45	0	48
%	2%	2%	2%	94%	0%	100%
PGM	0	0	3	5	0	8
%	0%	0%	38%	62%	0%	100%
Total	**5**	**7**	**4**	**77**	**7**	**100**
%	**5%**	**7%**	**4%**	**77%**	**7%**	**100%**

Table 4.8 shows the educational background in building technology among trainees. It can be deduced from Table 4.8 that 75% of the trainees have knowledge in Building Technology.

Table 4.8: Educational Background in Building Technology

Training Centre	Yes	No	Total
ABM	12	32	44
%	27%	73%	100%
KKBN	11	37	48
%	23%	77%	100%
PGM	2	6	8
%	25%	75%	100%
Total	25	75	100
%	25%	75%	100%

c) Reasons for selecting the course

The trainees have cited several reasons for selecting the course in CSTI. 58% of the trainees are interested in the particular course; 23% have had relevant experience to the course; 11% chose the course as a preparation to enter the construction industry. Only 7% of the trainees stated that they have no other choice.

Table 4.9: Reasons for selecting the course

Training Centre	Reason				Total
	Preparation before entering the industry	Interested in courses offered	Has relevant experience to the course	No choice	
ABM	8	21	11	4	**44**
%	18%	48%	25%	9%	**100%**
KKBN	3	31	12	2	**48**
%	6%	65%	25%	4%	**100%**
PGM	0	6	1	1	**8**
%	0%	75%	12.5%	12.5%	**100%**
Total	**11**	**58**	**23**	**7**	**100**
%	**11%**	**58%**	**23%**	**7%**	**100%**

d) Information about the course

The methods used in gaining information about the course vary between the trainees. 27% of the trainees obtained the information through websites followed by 25% from friends, and 20% through the interaction with others from the industry. Some of the trainees knew about the courses from their parents, interaction with teachers and school.

Table 4.10: Modes of gaining information about the course

Training Centre	Modes of getting information						Total
	Website	**Friends**	**School**	**Interaction with Teachers**	**Interaction with others from industry**	**Parents**	
ABM	5	12	2	8	13	4	44
%	11%	27%	5%	18%	30%	9%	100%
KKBN	20	10	3	2	4	9	48
%	42%	21%	6%	4%	8%	19%	100%
PGM	2	3	0	0	3	0	8
%	25%	37.5%	0%	0%	37.5%	0%	100%
Total	27	25	5	10	20	13	100
%	27%	25%	5%	10%	20%	13%	100%

4.4.2 Perception towards Construction Industry

Table 4.11 indicates the perception among trainees in terms of working environment, wage and benefit, and career prospects. It reflects that perceptions on career prospect are the most important and crucial that needs to be improved.

Table 4.11 Perception towards construction industry

Perception Aspect	Mean	Significant Ranking
Working Environment	2.848	2
Wage and Benefit	2.831	3
Career Prospect	3.057	1

a) Working Environment

Table 4.12 summarises trainees' perceptions with regards to working environment in the construction industry. *Working in construction industry requires high skills* are the most perceived item by trainees in relation to working environment. On the other hand, Table 4.12 shows that trainees' perception on being looked down by society scored the lowest mean, reflecting that this item is not crucial in influencing youths in joining the construction industry.

Table 4.12: Perception towards working environment in construction industry

No	Items	Response					Mean
		TD	D	LA	A	TA	
1.	Construction jobs known as a difficult, dirty and dangerous	12	25	36	21	6	2.84
2.	Working in construction industry requires high skill	4	7	14	51	24	3.84
3.	Working in construction industry will expose workers to accidents	20	25	21	24	10	2.79
4.	Workers need to move from one site to another	10	36	28	24	2	2.72
5.	Working in construction will be looked down by society	42	32	11	9	6	2.05
	Total Average						**2.84**

Note: TD - totally disagree; D – disagree; LA – less agree, A – agree; TA – totally agree

b) Wage and Benefit

Table 4.13 shows the mean of responses from trainees with regards to their perceptions on wages and benefits. The highest perception is that *salary is based on working days*. This seems to parallel the findings by Chileshe and Haupt (2008), deducing that mode of salary to be received is one of the important determining factors for the youths entering the construction industry.

Table 4.13 Trainees' perceptions on wages and benefits

No	Items	Response					Mean
		TD	D	LA	A	TA	
1	Salary does not commensurate with work done	16	23	26	23	12	2.92
2	Salary is based on working day	4	4	22	63	7	3.65
3	No system in wage determination	16	29	22	23	10	2.76
4	No rewards provided	21	23	20	21	15	2.86
5	No annual bonuses	25	29	20	18	8	2.55
6	No sick leave facilities	30	29	13	23	5	2.44
7	Welfare of employees not well taken care of	19	26	26	23	6	2.71
8	Provision for annual leave are not available	22	27	15	25	11	2.76
	Total Average						**2.831**

c) Career Prospect

Table 4.14 shows the trainees' perceptions on career prospects in the construction industry.

Table 4.14 Trainees' perceptions on career prospects

No	Items	Response					Mean
		TD	D	LA	A	TA	
1	Career paths in construction are less clear	14	22	38	21	5	2.81
2	PTI graduates will only serves as skilled worker	6	17	36	36	5	3.17
3	Industry are more interested in employing foreign workers	17	25	21	22	15	2.93
4	Promotion are solely based on experience	4	9	9	54	24	3.85
5	Certifications are less important in promotion	15	23	31	25	6	2.84
6	Contractors are not concerned with certification when employing workers	19	26	27	22	6	2.7
7	Construction industry offers limited opportunities	8	23	31	27	11	3.1
	Total Average						**3.057**

From the findings, it can be deduced that trainees are more concerned with issues related to what they will become after graduating, promotion and opportunities. Although the mean on their perceptions on promotion are based on experience and that certifications are less important in promotion are low, they tend to reflect the low enrolment in the training centres.

4.4.3 Factors Hindering Youths from joining CSTI

Table 4.15 shows the ranking of factors hindering youths from joining CSTI. From the table, the source of information is the major factor with a mean of 3.458, followed by internal factors and external factors with a mean of 3.748 and 3.822 respectively.

Table 4.15: Factors hindering youths from joining CSTI

Factor	Mean	Significant Ranking
Source of the information	3.458	4
Internal Factor	3.748	3
External Factor	3.822	2
Course Benefit	4.032	1

a) Sources of information

Table 4.16 tabulates the mean scores for sources of information about the courses conducted at the various CSTI.

Table 4.16: Sources of information

No	Items	Response					Mean
		TD	D	LA	A	TA	
1	Enough information related to the course was obtained before registration	2	5	27	51	15	3.72
2	Teachers provide information on careers in the construction sector while at school	9	18	23	43	7	3.21
3	Related careers were promoted in the media	6	10	36	42	6	3.32
4	Information about the course can be accessed easily	5	6	23	58	8	3.58
							3.458

On the whole, sources of information regarding the courses are a major factor influencing youths in joining the training centres.

b) Internal Factors

Table 4.17 shows the internal factors that may hinder youths from joining CSTI. The finding seems to indicate that the trainees who are undergoing the courses at the various CSTI are willing to enter the construction industry. This is based on the mean scores for the various statements as listed in Table 4.17.

Table 4.17: Internal factors.

No	Element	Response					Mean
		TD	D	LA	A	TA	
1	I prefer a challenging work environment	4	9	11	57	19	3.78
2	I have talent in carpentry work	2	9	29	50	10	3.57
3	I understand why I chose this course	3	5	10	52	30	4.01
4	I have no problem working away from home	6	8	25	39	22	3.63
	Total Average						**3.748**

c) External Factors

The third factor is the external factors. For this factor, 5 questions were asked. Table 4.18 shows the result obtained from the analysis.

Table 4.18: External Factors

No	Items	Respond					Mean
		TD	D	LA	A	TA	
1	Encouragement from family	4	7	10	45	34	3.98
2	There are family members involved in construction sectors	5	20	19	41	15	3.41
3	Exposure to construction and building related subjects in school	4	5	16	54	21	3.83
4	Positive views of society towards careers in construction	2	9	22	44	23	3.77
5	The success stories of friends involved in the construction industry	3	2	12	46	37	4.12
	Total Average						**3.822**

Table 4.18 tabulates the external factors that may hinder youths from joining CSTI and their respective mean scores. The overall mean scores for external factors are higher than internal factors and sources of information, reflecting that the external factors play a crucial role in either encouraging youths to join CSTI or hindering them from joining CSTI.

d) Course Benefit

Table 4.19 shows the benefits offered by CSTI to trainees in order to attract them to undergo the training in CSTI. The most influential benefit is the ability to interact with those involved in the construction industry. Overall, trainees viewed benefits gained from the course as the most important factors influencing their decisions in joining CSTI. Hence, the availability and nature of benefits offered by the training centres can also hinder youths from joining CSTI.

Table 4.19: Benefits gained from the courses

No	Items	Respond					Mean
		TD	D	LA	A	TA	
1	Fees are borne by other parties	6	8	18	35	33	3.81
2	Monthly allowances given to trainees	4	5	9	44	38	4.07
3	Training and classes are conducted on construction sites giving first-hand experience	6	2	9	49	34	4.03
4	The course will facilitate access to the industry	1	4	11	52	33	4.11
5	The course enables interaction with those involved in the construction industry	3	1	11	49	36	4.14
	Total Average						**4.032**

5 DISCUSSIONS, CONCLUSION AND RECOMMENDATION

Discussions are based on the objectives of the research as follows:

5.1 Workforce Demand and Supply in the Construction Industry

The discussions on the demand and supply of construction workforce are based on the analysis of courses conducted by CSTI and the estimation of workforce requirements in the 7 case studies. ABM offers 6 training programs while KKBN and PGM offer only 1 program each. The total number of places offered by these training institutes is 3,050 from 2006 to 2010. 2,610 places or 85.6% of the total are provided by ABM. Throughout the years, the data shows various trends in the provision of courses by CSTI. For instance, 3 out of 5 courses offered by ABM maintained their number of places offered between 2006 and 2010. However, the number of places offered for the Bricklaying, Plastering and Tiling course has decreased from 80 in 2006 to 60 in 2010. The course on Scaffolding is no longer offered from 2008 onwards. Nevertheless, KKBN and PGM managed to maintain the number of places offered for their courses from 2006 to 2010

The enrolment data shows that out of 3,050 places offered, only 1,418 or 46.5% were taken up by trainees. Comparatively, PGM recorded the highest take-up rate of 46.3%, followed by 44.8% and 27.4% for ABM and KKBN respectively. It was also discovered that 3 courses comprising of formwork, concreting and barbending, carpentry, and scaffolding offered by CIDB recorded zero enrolment from 2006 to 2010.

With regards to the number of trainees graduated from the courses offered by the responding CSTI from 2006 to 2010, from the total enrolment of 1,418, 1,343 or 94.7% of them completed their training. Trainees from ABM recorded the highest rate of completion at 99.3%, with 100% completion rate for building decorative painting and welding courses. KKBN achieved 87.6% rate of completion for trainees while PGM only managed to achieve 55%.

The total number of workforce determined from the case study projects and the total number of trainee graduates from the three CSTI reflects a mismatch between the supply of local workforce and the local demand for workforce. Although the data may not be accurate, but it provides an indication on the scenario of demand and supply of construction workforce. It can be inferred from the study that the efforts taken by CSTI in providing training to youths is at an acceptance level. However, further actions need to be taken in ensuring that the contents of courses are relevant and fulfill the needs of the industry. The government may consider providing more allocation to promote the opportunities and benefits for careers in the construction industry to school leavers. This is to ensure the availability of a sufficient pool of workforce for the construction industry as well as to avoid unutilized resources such as the unfilled places at the various training centres.

The research has also formulated a simple method to estimate the demand of construction workforces. Based on the 7 projects in Iskandar Malaysia taken as case studies, the average ratio of local to foreign workers is 1:15 with **the average workforce of 0.0743 used per square meter of work done. The average workforce used per square meter per day is 0.000159.**

These constants will enable the total number of workforce to be estimated based on the size of floor area by using the formula as;

$$\beta = 0.0743\alpha$$

where β = demand of construction workforce, and

α = the size of floor area (m2) developed.

The demand of construction workforce can also be estimated based on the size and construction duration;

$$\beta = 0.000159\alpha\delta$$

where δ = construction duration (days)

Although this will not give the exact number of workforce needed, it would at least provide an indication of the estimated number of workforce required. This would further provide a basis to the relevant organisations in identifying the sources of supply in acquiring the required workforce.

5.2 Factors Hindering Youth from joining the Construction Skill Training Institutes (CSTI)

As pointed out in the previous section, trainees joining the respective training centres were mainly influenced by benefits gained from the courses, followed by external factors, internal factors, and sources of information about the courses. On the other hand, these factors can also act as the factors hindering youths and school leavers from joining the training centres. In attracting youths and school leavers to join CSTI, there should be a proper channel where benefits to be gained from the courses, information about the courses, opportunities for careers in the construction industry as well as benefits and remunerations from such careers can be clearly explained and passed to them. In addition, efforts should also be taken to eradicate the negative image and perceptions of the industry.

5.3 Proposing a Career Path Model & Framework for Inspiring Youths to Establish Careers in Construction

5.3.1 Developing a sufficient pool of skilled construction workforce

In order to fulfil the demand for construction workforce in the various trades, it is important to instil interests in youths at the school level. At this pre-training stage, it must be ensured that the teachers are given sufficient information on the career prospects in the construction industry. This is to ensure that the teachers will be able to give good advice to students, especially the targeted group, i.e those who do not perform well or not interested in to pursue their studies. They can be channelled into the technical and

vocational courses provided at CSTI. Emphasis should also be given to develop a more comprehensive syllabus and contents of the vocational subjects taught at schools where relevant job-based education can be applied.

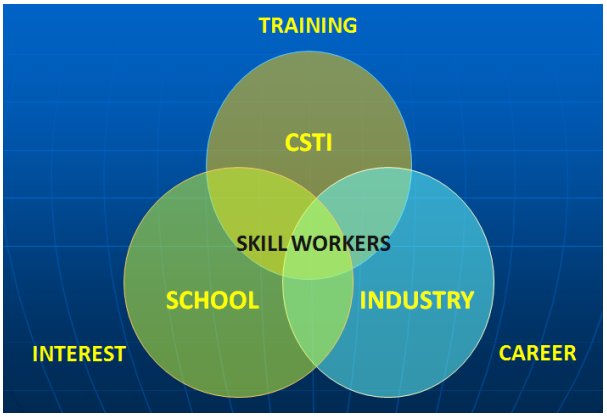

Figure 5.1: Entities and their roles in building the skill workforce

The courses conducted at CSTI should be relevant to the current trends and demands of the industry. Research or survey should be carried out to ensure that courses offered by CSTI meet the demand both in terms of course contents and numbers of workforce required. This will help the Government to determine the annual target in producing skilled workers. The management and trainers of all CSTI must work together in the effort to develop a pool of skilled trainees in various trades related to the construction industry. Another aspect that needs a serious consideration and action is related to the level of academic qualifications among the trainers in all CSTI.

From the study, it was found that most of the trainers have minimal academic qualifications and exposure to the real practices of the industry. The interest of the youths joining CSTI should continuously be enhanced by organising activities and career day. Industry players such as CIDB, contractor organisations, developers, manufacturers etc. should be involved as to provide a platform for all parties to interact and exchange ideas and foster the relationship between the schools, CSTI and the industry at large.

There should be a comprehensive policy and direction from the government with regards to construction skilled workers. For instance, there is a need to establish a one

stop centre related to local skilled workers. All skilled workers can register themselves at the centre based on their area of specialisation and at the same time, the industry players can publish their needs. This centre can act as a medium to match both parties. It is suggested that a policy requiring contractors to employ a certain percentage of local skilled workers before recruiting foreign workers be established. In addition, contractors need to prove that they have employed local skilled workforce before they can renew their licences.

Incentives should also be given to any contractor's organisation that has employed a certain percentage of local skilled workers in recognition of their efforts and commitments towards the national aspiration to reduce the dependency of foreign workers. A practical approach should also be taken to encourage school leavers to join CSTI and grant them with the appropriate recognition after completing their training and establish proper scale of salaries. It is believed that, this combined with other possible incentives will attract more youths to join CSTI and help fulfil the demands for skilled workforce in the construction industry.

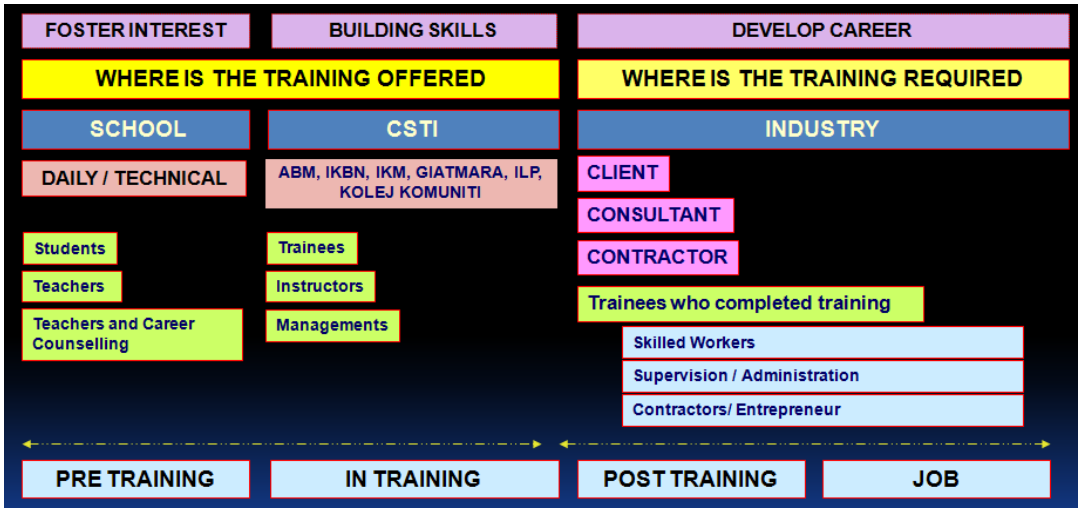

Figure 5.2: Implementation framework

After deliberating the issues substantially within each entity, it is necessary to ensure that all parties come together and establish a way that can contribute to instilling

the interest of youths to venture into various career opportunities offered by the construction industry.

5.3.2 Career framework development

Developing career paths in the construction industry covers both vertical and horizontal movements. This is illustrated in Figure 5.3; horizontal movement is for trainees who are keen into career advancement through working experience, beginning from skilled workers up to the level of management as a project manager. Provision of clear career paths will provide opportunities for graduates from CSTI to know their prospects for the future. Unfortunately at the moment, there is no clear system to which direction CSTI graduates can venture into. Hence, the low interest towards establishing and developing their career in construction industry. The situation is further complicated by the lack of policy and enforcement by the relevant authorities in ensuring that local contractors prioritise the local skilled workforce in the job market.

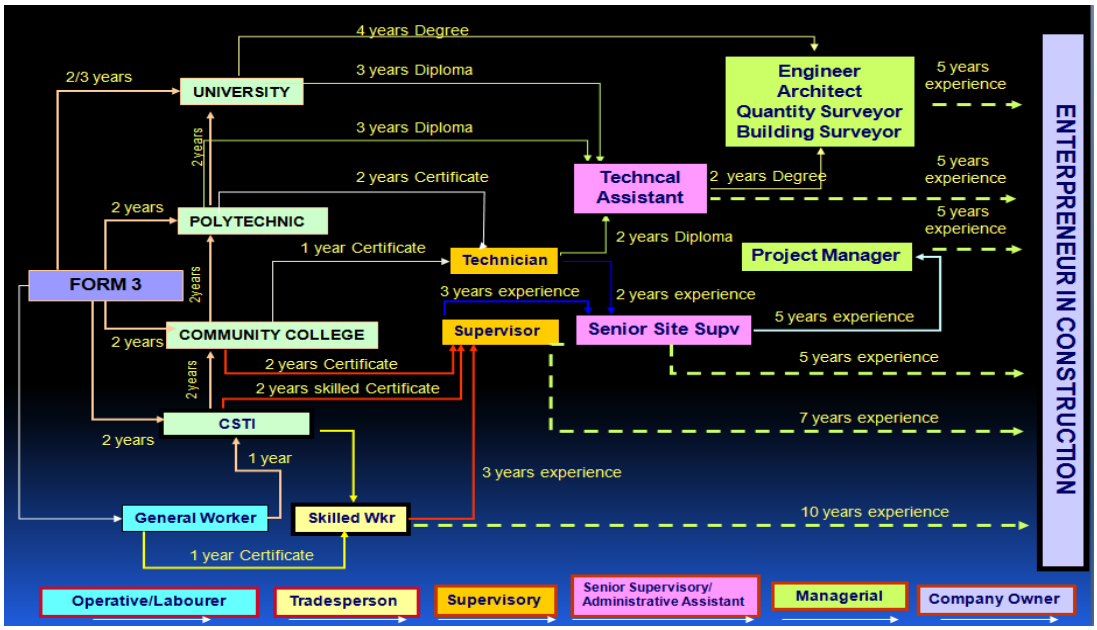

Figure 5.3: Career Path Model

Horizontally, after completing the training program, graduates from CSTI should be accepted by the industry as skilled workers and after a few years of experience and meeting certain conditions set with regards to their experience and knowledge should enable them to be promoted to the supervisory level. Those who remain committed should be able to go further up to the management level.

While vertical movement is the path provided for the trainees who are more likely to develop themselves through academic qualifications. For trainees who wish to pursue their study, they should be given the opportunity. They should be considered for entrance into polytechnics or other institutions offering diploma programs. Then, they can proceed to the undergraduate level at universities that offer the appropriate and related programs with the skills they possessed. Prior to that, every CSTI need to review their conditions for recruitment of trainees so that it is consistent with the higher level institutions.

In addition, CSTI graduates also have the opportunity to become entrepreneurs if that is of interest to them. Skills possessed by graduates from CSTI, coupled with experience gained from construction sites and relevant networking should enable them to become contractors.

The career framework established shows the prospective advancement route from one level to another. Other factors such as the duration, types of experience required, and the modules to be undertaken are not discussed in this research. It is also important for all trainees who have graduated and join the industry to keep a log book as proof of their services and experiences. Currently, there is no standard system of evaluation used in determining recruitment of skilled workforce in the construction industry. In fact, there are no conditions imposed to the industry with regards to hiring workforce with the appropriate skill certification that is valid and recognized by the government. As a result, the industry players are free to choose anyone who can benefit them which is generally foreign workers where they can pay lower wages.

Hence, the recommendations established from this study are summarised as follows:

	Recommendations	**Proposed Strategies**
1.	Instil interests related to construction related careers among youths at the school level	• Establish proper career guidance package to be distributed to schools • Review current syllabus on vocational related subjects taught in school • Carry out promotional programs especially in eradicating negative perceptions of the industry.
2.	Enhance courses conducted by CSTI	• Undertake survey on current industry requirements in terms of the nature of skills required and establish the demand for the respective trades • Review and improve current course contents to ensure relevancy to current and future demands • Innovate mode of delivery so that trainees can acquire maximum knowledge and on-the job experience • Elevate the academic qualifications and industrial experience of trainers at CSTI
3.	Ensure graduated trainees establish and develop their careers in the construction industry	• Establish programs that can continuously foster and enhance trainees' interests in construction during the in-training stage
4.	Establish security and attractiveness of careers in construction	• Establish a one-stop centre related to construction skilled workers where sharing of common knowledge is possible • Formulate policies with regards to contractors' compulsory hiring of local skilled construction workers • Implement and/ or improve existing guidelines in relation to renumeration for construction skilled workers
5.	Provision of a clear career path in construction	• Implement the career path model as proposed in this study

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