

“Competent Person” of the Industrial Electrical System in Malaysia

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Skilled electrical industry workers are indispensable to industries that own / operate industrial electrical appliances. This is to ensure that electrical components/appliances are properly maintained and functioning to the maximum extent possible and to meet the standards and prevent injury or death of employees due to inefficiencies. Therefore, this paper explains the importance of skilled electrical workers in Malaysia and the training that can be implemented to improve efficiency. Some of the most important things to do are coordinating training, understanding the potential and career of young people and the role of competent people internationally. The qualitative research methodology is fully utilised by which researchers analyze documents, interview and conduct observations. The participants consisted of students, related educators, industrial workers and managers of the technical field of technical training. The results of this study will help the youths who have electrical foundations and students of technical institutions with electrical/related engineering certificates should take the opportunity to become competent also referred to as "competent persons" by the Energy Commission (ST). In addition, strategic plans need to be created and utilised between Technical Institutions and Technical University as a continuation of competent knowledge and theory that can be interpreted in the context of a competent instructor.

Key words: *Electrical Industrial, Competent, Training, Qualitative, Technical Institution.*

Introduction

“Competence Persons” also known as “*Orang Kompeten*” can be defined as a person holding the certificate competency issued by the Commission Energy to perform work accordingly restrictions if any, specified in that certificate (Energy Commission, 2018). “Control of competency” is an installation or plant or electrical equipment other than owned or controlled

by the supply authority may be operated or operated except by or under the control of persons who are qualified and hold such certification as may be prescribed. The term Competence Person (CP) has long been used overseas, especially in developed countries. In Malaysia, CP is fully utilised by the Energy Commission, also known as Suruhanjaya Tenaga (ST) to recognise those who are competent in the field of electrical power engineering. The individual needs to go through the certification process and comply with all the requirements before he/she can be certified competent. Electric power engineering has become a much-needed professional field in the country.

Skilled electrical industry workers are indispensable to industries that own / operate industrial electrical appliances. This is to ensure that electrical components/appliances are properly maintained and functioning to the maximum extent possible and to meet the standards and prevent injury or death of employees due to inefficiencies. Competent Persons have to undergo a certain number of hours of training/seminars to keep their competencies or licenses valid. It is suggested that the modules for the competencies or the Continuous Professional Development points to be standardised across agencies wherever possible to ease the burdens on the industry in maintaining Competent Persons.

In Malaysia, Technical and Vocational Training (TVET) Institutions have been instrumental in training young people to be competent. Among these are the Industrial Training Institute (ITI / ILP), the Mara Institute of Skills (IKM) and several other similar institutions. Therefore, the Institution must comply with the Energy Commission's certification policies and regulations by acting as an electrical training institution with adequate and up-to-date equipment and following the certification syllabus.

Problem Statement

There is a mismatch in competency between the needs of the industry due to rapidly changing technology and competency level of a Competent Persons' availability (Suppiah, 2015). Other than that, the industrial electrical system in Malaysia is facing a significant challenge regarding the shortage of Competent Persons with sufficient knowledge and experience. However, it must be made clear that some of the existing electrical chageman are very competent and useful to the industry.

There appears to be a need to increase the knowledge and understanding the needs of Competence Person in the industrial electrical system in Malaysia. Besides that, there is a need, an urgent need to address these issues not only by energy commission but also other stakeholders, authorities, Competent Persons, owners, trainers and management.

Knowledge and understanding about such things as the needs of Competent Persons will assist researchers, industry planners and policymakers to better understand how their plans and policies are being implemented in the workplace and the factors that influence Competent Persons. Accordingly, this will assist them to plan, develop and implement systems, which can be adopted in the workplace environment of an enterprise, and achieve the planned outcomes. This could lead to the development and implementation of policies and plans on a national, state and enterprise basis to the potential and career of Competent Persons which achieve the planned outcomes effectively and efficiently.

Purpose of the Study

The purpose of the study is to explain the importance of skilled electrical workers in Malaysia and the training that can be implemented to improve efficiency. Some of the most important things to do are coordinating training, understanding the potential and career of young people and the role of competent people internationally.

Literature Review

In Malaysia, the Energy Commission is a body that recognises the competence of a person or a company that plays a role in electric power. Therefore, in order for a person to be competent, they must be trained by an Institution recognised by the Energy Commission.

List of Accredited Training Centres (Electric)

The Energy Commission, under the Electricity Supply Act 1990 and Electricity Regulations 1994, has continuously accredited institutions as centres for training and competency examinations in related categories.

List of accredited institutions for part time and full time courses

1. Institut Latihan Perindustrian (ILP) and Pusat Latihan Teknologi Tinggi (ADTEC).
2. Institut Kemahiran Mara (IKM)
3. Pusat Giatmara, Pusat Komuniti Giatmara and Giatmara Prima Malaysia
4. Institut Kemahiran Belia Negara (IKBN) / Kolej Kemahiran Belia Negara (KKBN) / Institut Kemahiran Tinggi Belia Negara (IKTBN)
5. Akademi Binaan Malaysia (ABM) – CIDB Holdings Sdn. Bhd.
6. Other Institutions.

Places of Services

Competence Persons works in the government sector and the private sector. Among their workplaces are at Tenaga Nasional Berhad (TNB) and Energy Commission at headquarters

and branches nationwide. However, the amount of Competence Persons borrowed is small. There are also self-employed people, such as consultants and electrical contractors who sign up.

Competence Persons

Energy Commission (2019a) categorized Competence Persons into six categories, which is:

1. Cable Jointers also known as *Pencantum Kabel (PK)*
2. Electrical Engineers also known as *Jurutera Elektrik (JEK)*
3. Electrical Services Engineers as known as *Jurutera Perkhidmatan Elektrik (JPE)*
4. Electrical Supervisors also known as *Penyelia Elektrik (PE)*
5. Chargeman also known as *Penjaga Jentera (PJ)*
6. Wireman also known as *Pendawai (PW)*

Cable Jointer

1. Cable Jointer can be categorised into six categories, which is:

No.	Certification	Voltage Restriction
1.	PK1	Low Voltage
2.	PK2	Until 11kV
3.	PK3	Until 33kV
4.	PK4	Until 66kV
5.	PK5	Until 132kV
6.	PK6	No Restriction

2. Any cable jointing, connecting and termination must be built and made to fulfil its need for conduction, insulation, mechanic strength and its protection;
3. Any cable jointing, connecting and termination of any cable or any shielded polyvinyl chloride insulated connection must be carried out by a Cable Jointer;
4. Cable stipulated in sub-regulation (3) should include:
 - a) A cable with insulator paper content, clad in lead or aluminium
 - b) Shielded cable with insulated thermostat
 - c) Cable with mineral insulator
 - d) Cable with polymer insulator
 - e) Oil-filled cable
 - f) Gas pressure cable
 - g) Any other cable that the Energy Commission considers as a cable connection and termination which required specific skills



Electrical Engineers

There are five job scopes for Electrical Engineers:

- a) Performs, operates or has control over any work or operation of any installation.
- b) Recommends competent persons (Machinery Guards) to perform, operate or have control over any work or operation of any installation.
- c) Issue written instructions, Permit To-do Work (PTW) (if necessary) to the person working at under his control.
- d) Visit / inspect and record/report findings for the purpose of repairing/eliminating defects in electrical installations.
- e) Prepare and submit electrical installation plans, drawings and specifications.

Electrical Services Engineers

There are five job scopes for Electrical Services Engineers:

- a) Perform, control or have control over any work or operation a low voltage installation.
- b) Recommend competent persons (Machinery Keeper) to work, operate or has control over the work or operation of installation.
- c) Issue written instructions, PTW (if necessary) to the person working under his or her control.
- d) Visit / inspect and record/report findings for the purpose of repairing/eliminating defects in low voltage electrical installations.
- e) Prepare and submit plans, drawings and specifications for voltage-dependent electrical installations low does not exceed 100 A.

Electrical Supervisors

There are five job scopes for Electrical Services Engineers:

- a) Work, control or has control over the work or operation of an electrical installation subject to restrictions on its certificate of competency.
- b) Issue written instructions, PTW (if necessary) to the person working under his or her control.

Chargeman

Examination Procedure for Certified Chargeman Competency

Examination level

1. Theory
2. Practical
3. Oral

Note: Candidates are required to pass all the examination level as above in order to be Certified Chargeman Competency.

Approval to repeat the examination

1. Candidates who failed in the examination (practical and/or oral) will be allowed to repeat the examination within two years.
2. Example of examination repeats:

No	Theory	Practical	Oral	Result
1	G	TB	TB	Repeat theory
2	L	L	G	Repeat oral only
3	L	G	TB	Repeat practical and oral

Wireman

Three Phase Wireman (PW3)

1. Requirements are as follows:-
 - a) Possess certificate for Single Phase Wireman Competency (PW1/PW2) for at least 1 year from the date of issuance;
 - b) At least 1-year working experience in electrical wiring with an electrical contractor/private wiring unit registered with the Energy Commission or working with Government Departments/Agency and possess complete logbook based on working experience;
 - c) Certificate for Single Phase Wireman Competency (PW1/PW2) should be registered with the Energy Commission.
2. A candidate who has passed the Three Phase Wireman Competency Examination (PW3) and possess Certificate of Single Phase Wiremen with testing endorsement (PW2) will qualify to get a Certificate of Three Phase Wireman Competency with testing endorsement (PW4), subject to the settlement of the examination fee.

Methodology

This study is the study using a qualitative approach. In this study, researchers used the method to collect as many descriptive data to obtain an accurate picture of Competence Person of the industrial electrical system in Malaysia. For this purpose, the method used in this research through interviews, observation and analysis of relevant documents. Qualitative researchers typically rely on all three of these methods for collecting information that is observation, interviews and documentary evidence (Bogdan & Biklen, 2003).

This study used a qualitative case study method. The case study method is a suitable method used for this study, as recommended Merriam (1998) stating that the case study was to understand more deeply the situation and give meaning to those involved. Study participants were selected for data collection is made up of students, related educators, industrial workers and managers of the technical field. A total of industrial workers and managers of the technical field who have been participating in the study, also is an expert on what is being studied by researchers because they are directly involved in the process of teaching and learning in the PAV program.

The process of data collection and analysis through an in-depth interview conducted involving seven steps as mentioned by Kvale (1996) including thematizing (required thematic scope), designing (questionnaires in the interview protocol and remarks) interviewing (the process of interview), transcribing (transcribing to verbatim text) analysing (reading the transcribe and identifying the theme), verifying (concurring data credibility) and reporting (writing reports). Qualitative case study strategy in this research aided by software ATLAS/Ti to manage and organise the data.

Findings

Table 1 below is a summary of the number of Competent Persons in Johor:

No.	Competent Persons	Number of Competent Persons
1.	Cable Jointers also known as <i>Pencantum Kabel</i> (PK)	92
2.	Electrical Engineers also known as <i>Jurutera Elektrik</i> (JEK)	58
3.	Electrical Services Engineers as known as <i>Jurutera Perkhidmatan Elektrik</i> (JPE)	11
4.	Electrical Supervisors also known as <i>Penyelia Elektrik</i> (PE)	23
5.	Chargeman also known as <i>Penjaga Jentera</i> (PJ)	3139
6.	Wireman also known as <i>Pendawai</i> (PW)	2172
	Total	5495

Table 1 above shows that there is 5495 Competent Person in Johor. The highest number of Competent Person in Johor are Chargeman with 3139 people, while the lowest number of Competent Person are from the Electrical Service Engineer category with only 11 persons. This indicates that the requirements for an Electrical Service Engineer are high compared to other posts. They are the Competent Persons that the state of Johor desperately needs.

Cable Jointers also known as Pencantum Kabel (PK)

The Table 2 below is summary of the number of Cable Jointers in Johor:

No.	Competent Persons	Malay	Chinese	Indian	Singh	Total
1.	Pencantum Kabel 1 (PK-PK1)	45				45
2.	Pencantum Kabel 2 (PK-PK2)	18		2		20
3.	Pencantum Kabel 3 (PK-PK3)	27	1	3	1	27
	Total					92

Table 2 shows that there is 92 Cable Jointers in Johor. The highest number of Cable Jointers in Johor are PK-PK1 Cable Jointers with 45 persons, while the lowest number of Cable Jointers are from PK-PK2 Cable Jointers with only 20 persons. This indicates that the requirements for a PK-PK2 Cable Jointers are high compared to other posts. They are the Cable Jointers that the state of Johor desperately needs.

Electrical Engineers also known as Jurutera Elektrik (JEK)

The Table 3 below is a summary of the number of Electrical Engineers in Johor:

No.	Competent Persons	Malay	Chinese	Indian	Singh	Total
1.	Jurutera Elektrik Kompeten 1 (JK-JK1)	4	1			5
2.	Jurutera Elektrik Kompeten 2 (JK-JK2)	8	5	1	2	16
3.	Jurutera Elektrik Kompeten 3 (JK-JK3)		1			1
4.	Jurutera Elektrik Kompeten 4 (JK-JK4)	5	2	2	1	10
5.	Jurutera Elektrik Kompeten 5 (JK-JK5)	10	6	5		21
6.	Jurutera Elektrik Kompeten 6 (JK-JK6)	3	1		1	5
	Total					58

Table 3 shows that there are 58 Electrical Engineers in Johor. The highest number of Electrical Engineers in Johor are JK-JK5 Electrical Engineers with 21 persons, while the lowest number of Electrical Engineers are from JK-JK3 Electrical Engineers with only one person. This indicates that the requirements for a JK-JK3 Electrical Engineers are high

compared to other posts. They are the Electrical Engineers that the state of Johor desperately needs.

Electrical Services Engineers as known as Jurutera Perkhidmatan Elektrik (JPE)

The Table 4 below is summary of the number of Electrical Services Engineers in Johor:

No.	Competent Persons	Malay	Chinese	Indian	Singh	Total
1.	Jurutera Perkhidmatan Elektrik 2 (JP-JP2)	4	1	1		6
2.	Jurutera Perkhidmatan Elektrik 4 (JP-JP4)	2	2			4
3.	Jurutera Perkhidmatan Elektrik 5 (JP-JP5)	1				1
	Total					11

Table 4 shows that there are 11 Electrical Services Engineers in Johor. The highest number of Electrical Services Engineers in Johor are JP-JP2 Electrical Services Engineers with six persons, while the lowest number of Electrical Services Engineers are from JP-JP5 Electrical Services Engineers with only one person. This indicates that the requirements for a JP-JP5 Electrical Services Engineers are high compared to other posts. They are the Electrical Services Engineers that the state of Johor desperately needs.

I'm an engineering manager for a solar farm in Perak. We use Electrical Services Engineers to handle gear switches for eclectic supplies. To turn off this system requires a KP because this is a must for switching gear.

From the above narratives, it shows that needs of Electrical Services Engineers to perform, control or have control over any work or operation a low voltage installation.

Electrical Supervisors also known as Penyelia Elektrik (PE)

Table 5 below is a summary of the number of Electrical Supervisors in Johor:

No.	Competent Persons	Malay	Chinese	Indian	Singh	Total
1.	Penyelia Elektrik (PE-PE1)	12	8		3	23
	Total					23

Table 5 shows that there is 23 persons in the position of Electrical Supervisors in Johor with 12 Malays, eight Chinese and three Sigh. This indicates that the requirements for Electrical Supervisors are high and desperately needs.

Chargeman also known as Penjaga Jentera (PJ)

Table 6 below is a summary of the number of Chargeman in Johor:

No.	Competent Persons	Malay	Chinese	Indian	Singh	Total
1.	Penjaga Jentera Sistem Voltan Rendah (PJ-A0)					1325
2.	Penjaga Jentera A1 (PJ-A1)					684
3.	Penjaga Jentera A2 (PJ-A2)			1		
4.	Penjaga Jentera A4 Sistem Voltan Rendah (PJ-A4)					484
5.	Penjaga Jentera A4-1 (PJ-A4-1)					61
6.	Penjaga Jentera A4-2 (PJ-A4-2)					64
7.	Penjaga Jentera B1 (PJ-B1)					53
8.	Penjaga Jentera B4 (PJ-B4)					97
9.	Penjaga Jentera Bo-1 (PJ-B0-1)					32
10.	Penjaga Jentera Bo-2 (PJ-B0-2)					37
11.	Penjaga Jentera Bo (PJ-B0)					301
	Total					3139

Table 6 shows that there are 3139 Chargeman in Johor. The highest number of Chargeman in Johor are PJ-A0 Chargeman with 1325 persons, while the lowest number of Chargeman are from PJ-A2 Chargeman with only one person. This indicates that the requirements for a PJ-A2 Chargeman are high compared to other posts. They are the Chargeman that the state of Johor desperately needs. Level A1 chargeman deals with high-power industrial or low-voltage industrial appliances. Peering ensures that the electric current flows smoothly and the electrical equipment is in good working condition. They also follow the procedure of executing the equipment maintained in a good and safe condition. Level A4 chargeman is also important, and they control and ensure the implementation of high voltage electrical

current flow. Electrical service engineers are not needed as they will only supervise the chargeman on duty. However, their responsibility is very high within an organisation/company.

I'm a project manager for a solar farm in Malacca. ST set chargeman B4 to level 33Kv. This is to ensure that each installation meets the standards set. after installing the power supply installation system, we will do Testing and commissioning for him to operate the system. So here is the need for OK to control the process of energizing the AC system from TNB substation. Before back-energizing, this KP will check voltage, current, frequency, protection before closing the switch. Operate the defense system (ON OFF), in the event of a fire, OK can disconnect the power supply, cut off the voltage.

From the above narratives, it shows that needs of Chargeman to ensure that each installation meets the standards set. Testing and commissioning (T&C) will be done after installing the power supply installation system to operate the system.

Wireman also known as Pendawai (PW)

Table 7 below is a summary of the number of Wireman in Johor:

No.	Competent Persons	Malay	Chinese	Indian	Singh	Total
1.	Pendawai Elektrik Fasa Tunggal (PW-PW1)					317
2.	Fasa Tunggal Dengan Endorsan Dan Pengujian (PW-PW2)					693
3.	Pendawai Elektrik 3 Fasa (PW-PW3)					103
4.	3 Fasa Dengan Endorsan Dan Pengujian (PW-PW4)					1056
5.	3 Fasa & Papan Tanda Dengan Endorsan Dan Pengujian (PW-PW6)	2	2			3
	Total					2172

Table 7 shows that there is 2172 Wireman in Johor. The highest number of Wireman in Johor are PW-PW4 Wireman with 1056 persons, while the lowest number of Wireman are from PW-PW6 Wireman with only three-persons. This indicates that the requirements for a PW-



PW6 Wireman are high compared to other posts. They are the Wireman that the state of Johor desperately needs.

Discussion

Competence Persons have to undergo certain amount of hours of training/seminars to keep their competencies or licenses valid. It is suggested that the modules for the competencies or the Competent Persons be standardised across agencies wherever possible to ease the burden on the industry in maintaining the needs of Competent Person.

Conclusion

The results of this study will help the youths who have electrical foundations and students of technical institutions with electrical/related engineering certificates should take the opportunity to become competent also referred to as Competent Persons by the Energy Commission. In addition, strategic plans need to be created and utilized between Technical Institutions and Technical University as a continuation of competent knowledge and theory can be interpreted in the context of a competent instructor.

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