Developing the Indonesian Qualifications Framework's descriptors for Electrical Engineering as the basis of the Recognition of Prior Learning (RPL)

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Zamtinah[1] and E Supriyadi[2]

[1,2] The Electrical Engineering Education Study Program, Faculty of Engineering, Yogyakarta State University, Indonesia.

Email: zamtinah@uny.ac.id

Abstract. This study aims to: 1) describe the mechanism of the level 2 IQF (the Indonesian Qualifications Framework) descriptor development for electrical engineering, and 2) formulate a set of detailed-level-2 descriptors for electrical engineering. The method used to develop the descriptors is brainstorming between the researcher and several experts from both academicians and practitioners. Meanwhile, the method to formulate the IQF descriptors for electrical engineering is literature review referring to The Indonesian National Work Competency Standard (*SKKNI*) and focus group discussion involving experts from academicians, Professional Certification Institute Gema PDKB, the Association of Indonesian Electrical Works (*APEI*), Consortium for Electrical Installation Safety (*KONSUIL*), and industry practitioners such as PT. LEN Bandung, PT. Bukaka Teknik Utama, PT. Schneider Electric Indonesia, and PT. Smart Energi Semesta. The descriptors are in the form of the guttman scale questionnaire. The questionnaire was then tested on limited-scale respondents. The KR 20 method was employed to examine the reliability and resulted in $r_{11} = 0.9$; thus, the guttman scale questionnaire was considered "very reliable". The respondents consisted of 8 academicians, 8 electrical engineering teachers at vocational high schools, and 8 industrial practitioners. The collected data were then analyzed descriptively. This study resulted in a set of level 2 IQF descriptors which were designed according to the taxonomy of electricity system, namely electric power transmission system descriptors, electric power distribution system descriptors, and electric power utilization descriptors. In regard to electric power transmission system, 103 out of 154 (67%) descriptors were approved by more than 80% of respondents; for electric power distribution system, 83 descriptors (75%) were approved by more than 80% of respondents; and for electric power utilization system, 61 descriptors (94%) were approved by more than 80% of respondents

1. Introduction

The Indonesian ratification of Recognition of Prior Learning (RPL) at various conventions might put Indonesia in an open and vulnerable position in various sectors, one of which is in labor or human resources sector. The ratification is also predicted to gradually weaken the Indonesian labor protection policy. More foreign workers will flood the job market in this country, whereas Indonesian workers cannot compete internationally or even domestically for having no competency required by the labor market. Job seekers can no longer rely solely on a diploma without having specific competencies.

The expectation that Indonesian workers (Indonesian: *Tenaga Kerja Indonesia, TKI*) are recognized for their skills rely heavily on the government's policy to implement the Indonesian National Qualifications Framework (IQF). The IQF needs to be translated into a more detailed and operational descriptor tailored to the needs of each field including the electrical engineering. Workers in the field of electrical engineering generally work in the processing industry and services (installation and maintenance and repair).

The IQF reflects one's learning outcomes obtained through: 1) formal education, 2) training, 3) work experience, and 4) independent learning. This policy is not intended to create new social stratification, but rather to strenghten the quality and identity of the Indonesian people through the national education and training system [1] .

The existing IQF descriptors are considered too general; thus, a set of more specific IQF descriptors is needed specifically for level 2 qualifications in electrical engineering. The detailed descriptors can be used as a basis for recognizing prior learnings and work experiences in technical engineering for vocational high school graduates.

The IQF is structured from the lowest to the highest qualifications based on work competency and mastery of knowledge achieved through education or skills acquired through training. Figure 1 shows the IQF level achieved through four pathways i.e., autodidact, certification of professional organizations such as the Indonesian Engineers Association (PII), formal education, and work experience in the industry.
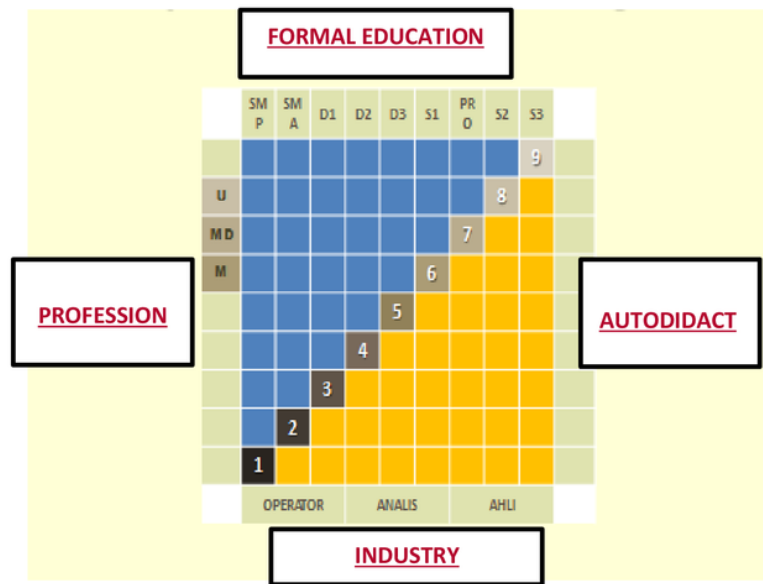

Figure 1. Improving IQF level trough various pathways [1]

The equivalence between learning outcomes obtained through three higher education pathways (academic, vocation, profession) and the IQF levels is presented in Figure 2.
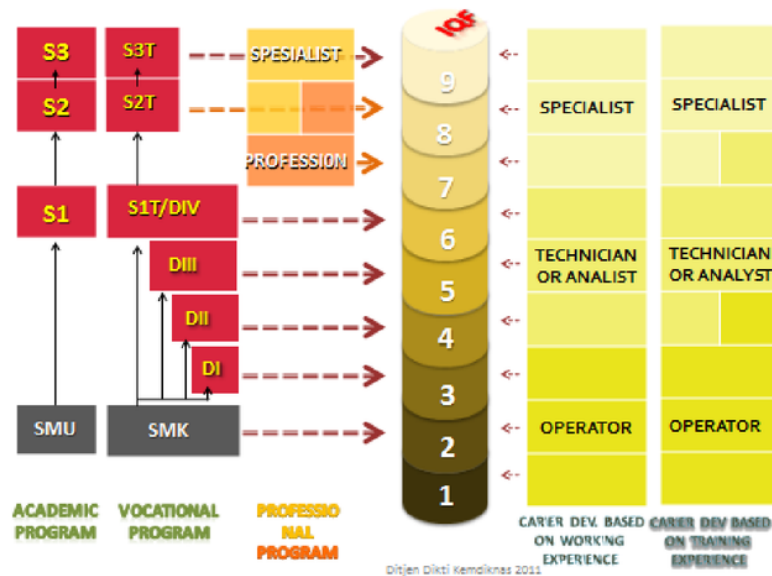
Figure 2. The equivalence between education and IQF qualification levels [2]

2. Literature Review

2.1. The IQF Descriptors

All the qualifications consist of several levels and each level has its own descriptors. According to Moon's opinion referred to by the Directorate General of Higher Education, Ministry of National Education Republic of Indonesia (2011), level descriptors are: *"descriptions of what a learner is expected to descriptions of what a learner is expected to achieve at the end of a level of a study achieve at the end of a level of a study. Levels are hierarchical stages that represent increasingly challenging learning to a learner. The term 'level' is now used instead of 'years of study', since a student on a part-time program may study for six years to reach the same qualification as that achieved by another full-time student in three years. Aims indicate the general direction or orientation of a module, in terms of its content and sometime its context within a progamme. An aim tends to be written in terms of the teaching intentions or the management of the learning."* [2]

The general descriptors of the IQF are as follows: 1) devotes to God Almighty; 2) possesses excellent morals, ethics and personality in completing her/his jobs; 3) acts as a proud and loving citizen and supports world peace; 4) is capable of working in teams and attests compassion to social, community and environmental issues; 5) respects the diversity of cultures, views, beliefs, and religions as well as appreciates patent and property rights; and 6) esteems law enforcement and demonstrate the spirit to prioritize the interests of the nation and the wider community.

The detailed IQF descriptors for level 2 are as follows: 1) is capable to carry out specific task using tool, information and commonly defined working procedure, and demonstrate performance with measurable quality under direct supervision of her/his supervisor; 2) possesses basic operational and factual knowledge for being capable to choose available solutions suitable for commonly existed problems; and 3) is responsible for her/his own job and can be assigned to perform responsibility in supervising other persons.

The parameters of each IQF descriptor are as follows: 1) competencies are abilities in cognitive, psychomotor, and affective domains that are fully reflected in behavior or in carrying out an activity; 2) scientific/ knowledge coverage is the level of breadth, depth, and complexity of certain knowledge that must be possessed; thus, the higher a person's IQF level, the wider, deeper, and more sophisticated knowledge he has; 3) the method and qualification level is the ability to use knowledge, skills and methods that must be mastered in carrying out a particular task or work, including intellectual skills; and 4) managerial competency reflects one's managerial abilities and attitudes required in carrying out a task or job, as well as the level of responsibility in the field.

2.2. Recognition of Prior Learning (RPL)
In the Indonesian Qualifications Framework (IQF) context, Recognition of Prior Learning (RPL) is defined as a process of recognizing learning outcomes through self-learning process, life experiences, or non-formal education by the formal education sectors. To fulfill the legal mandate authorized by the National Education Law for the purpose of lifelong learning or career advancement, RPL is aimed at providing wider opportunities for individuals into the education pathways.

According to the Revocation of Education and Culture Minister Regulation (*Permendikbud*) no.73, RPL is a mechanism in recognizing the prior learning outcomes obtained from work experiences, non-formal education, or informal education by formal education sector. RPL aims to: 1) recognize learning outcomes from non-formal education, informal education, and/ or work experience as a basic to advance formal education; 2) recognize learning outcomes from other education outside the Ministry of Culture and Education system for the purpose of equivalency of degree awarded; and 3) recognize experts whose qualifications are equal to master or doctorate holders as lecturers [3].

In conclusion, RPL is a process of recognizing one's work experiences and learning outcomes obtained from workplace, formal education, and non-formal education for the purpose of equivalency of degree awarded. The assessment of RPL can be administered through demonstrations, examinations, portfolio assessment, site visits, or performance assessments.

3. Method

The key respondents involved in this study are academicians, practitioners, and members of professional association as well as experts in electrical engineering who were involved in the competency test or the Professional Certification Institute (*LSP*). The criteria for determining the key respondents are as follows: 1) the respondents are experts in their fields; 2) the respondents are still actively involved with activities related to the information needed in the study; 3) the respondents highly concern about the investigated issues and labor issues; 4) the respondents have sufficient time to participate in the study.

The Guttman scale questionnaire was used to collect data concerning respondents' approval of the level 2 IQF descriptors for electrical engineering. The respondents were to choose one out of two options i.e., agree ('Y') or disagree ('T') in response to the statements in the questionnaire.

Documentation method is also used to obtain data on the competency standards of electrical engineering that have been developed by government institutions or formal institutions as well as those developed by professional associations. The standard competency documents that will be examined include competency standards from the Indonesian National Work Competency Standards (*SKKNI*), competency standards from PLN, and competency standards from the Ministry of Energy and Mineral Resources [4] [5].

The collected data on the level 2 IQF descriptors were analyzed based on the frequency of respondents' choices. The Delphi technique was used through two-cycle questionnaire distributions. In the first cycle, the agreement criteria are set at 60%. It means that the descriptor which was approved by less than 60% of respondents are considered invalid.

In the second cycle, the agreement criteria are set at 80%. It means that the descriptor which was approved by less than 80% of respondents are considered invalid and would not be used as the level 2 IQF descriptors for electrical engineering.

The results of the second cycle questionnaire were then discussed in a Focus Group Discussion involving academicians and practitioners to reach a consensus on the level 2 IQF descriptors for electrical engineering. Furthermore, the data was analyzed using descriptive statistics.

4. Results and Discussion

The results of this study is a development mechanism and level 2 IQF descriptors for electrical engineering. The descriptor development mechanism refers to theoritical studies, field studies specifically in the electrical engineering field, and studies on the Indonesian National Work Competency Standards (*SKKNI*), and FGD involving academicians and practitioners.

The academicians consisted of electrical engineering teachers at vocational high schools, lecturers in charge of power plant, electric power transmission and distribution systems, analysis of electric power systems, electric power protection systems, and installation of electric power utilization courses.

The practitioners involved in this study are experts from professional associations such as the Indonesian Electrical Workers Association (APEI), the Indonesian Electrical Contractors Association (AKLI), the Consortium for Electrical Installation Safety (CONSUIL), LSP Gema PDKB, as well as industry practitioners such as PT. LEN Bandung, PT. Bukaka Teknik Utama Bogor, PT. Schneider Electric Indonesia Cikarang, PT. Smart Energi Semesta Tangerang, and PT. PLN Persero Semarang.

The data on Level 2 IQF descriptors for Electrical Engineering is presented in Table 1.

Table 1. The Approved Descriptors by respondents

Electricity Engineering Sub-System	The total number of Descriptors	The descriptors approved by more than 80% respondents (Academicians and Practitioners)	
		in number	in %
Electric power transmission	154	103	67 %
Electric power distribution	111	83	75 %
Electric Power Utilization	65	61	94 %

Table 1 shows that the descriptors for Electric Power Utilization were the mostly approved descriptors. As many as 61 out of 65 descriptors (94%) were approved by more than 80% respondents. The 4 descriptors that were not approved were: 1) small-scale processing industry in lighting installations; 2) CCTV installation; 3) analysis of disturbances in the security system; and 4) damage repair for security system.

It is worth nothing that the descriptors for small-scale processing industry in lighting installations were only approved by 57% of respondents from academicians. On the other hand, all respondents (100%) from industrial practitioners approved this descriptor. The practitioners considered that the vocational high school graduates or the level 2 IQF workers need to master this descriptor. Unfortunately, the end calculation shows that the descriptor for small-scale processing industry in lighting installations is considered invalid because it is approved by only 78.5% of respondents.

Figure 3 depicts the descriptors for Electric power transmission sub-system. As many as 154 descriptors (66%) were approved by 81% practitioners.
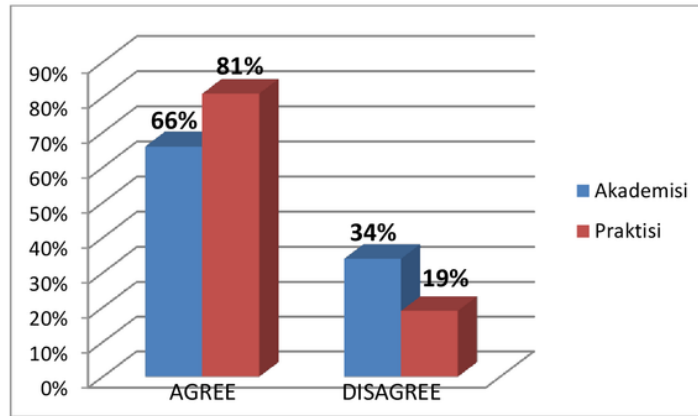
Figure 3. The percentage of descriptors for Electric power transmission system
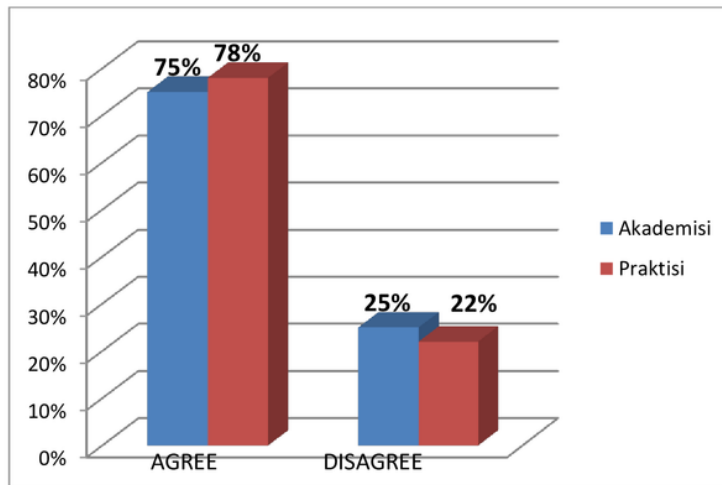

Figure 4. The Percentage of descriptors for Electric Power Distribution System

Figure 4 depicts the descriptors for electric power distribution sub-system. As many as 112 descriptors (75%) were approved by 78% practitioners.
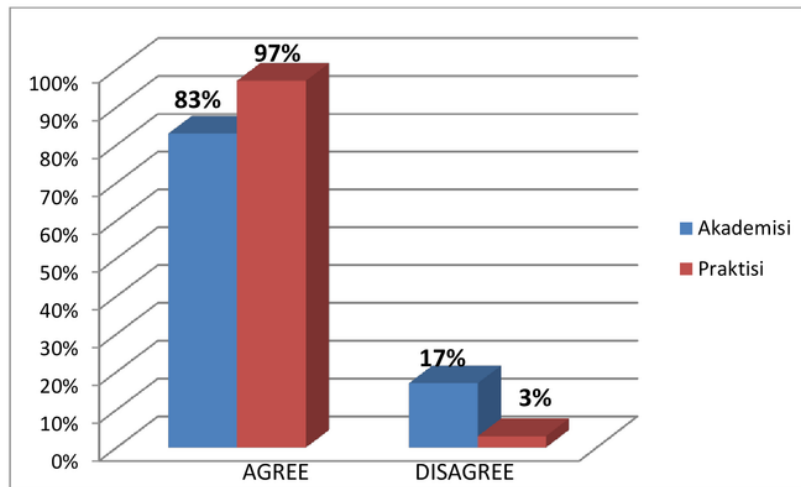
Figure 5. The Percentage of descriptors for Electric Power Utilization

Figure 5 depicts the descriptors for Electric Power Utilization sub-system. As many as 83% of descriptors for this sub-system were approved by 97% practitioners.

Figures 3, 4, and 5 shows that there were more descriptors approved by practitioners than descriptors approved by academicians.

5. Conclusion

The level 2 IQF descriptors were designed according to the taxonomy of electricity system, namely electric power transmission system descriptors, electric power distribution system descriptors, and electric power utilization descriptors.

In regard to electric power transmission system, 103 out of 154 (67%) descriptors were approved by more than 80% of respondents; for electric power distribution system, 83 descriptors (75%) were approved by more than 80% of respondents; and for electric power utilization system, 61 descriptors (94%) were approved by more than 80% of respondents. The complete list of the level 2 IQF descriptors for electrical engineering was presented in the attachment file.

6. References

[1]   Direktorat Jenderal Pendidikan Tinggi 2010 Indonesian Qualification Framework Handbook (IQF) -1st EDITION (Kementerian Pendidikan Nasional Republik Indonesia)
[2]   Direktorat Pembelajaran dan Kemahasiswaan Direktur Jenderal Pendidikan Tinggi Kemdikbud RI 2010/2011. Sosialisasi Kerangka Kualifikasi Nasional Indonesia/ Indonesian Qualification Framework
[3]   Permendikbud RI No. 73 Tahun 2013 tentang Penerapan Kerangka Kualifikasi Nasional Indonesia Bidang Pendidikan Tinggi
[4]   Direktorat Pembelajaran dan Kemahasiswaan Direktur Jenderal Pendidikan Tinggi Kemdikbud RI 2010/2011. Sosialisasi Kerangka Kualifikasi Nasional Indonesia/ Indonesian Qualification Framework.

[5]   Keputusan Menteri Tenaga Kerja Transmigrasi dan Koperasi Republik Indonesia No. KEP.170/MEN/IV/2007 tentang SKKNI Sektor Listrik Sub Sektor Ketenagalistrikan.

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