

# DEVELOPING K-WORKERS' COMPETENCIES FRAMEWORK FOR UNDERGRADUATE UNIVERSITY STUDENTS

Santoso, TI.<sup>1</sup> & Hassan, R.<sup>2</sup>

<sup>1,2</sup> Faculty of Technical and Vocational Education,  
Universiti Tun Hussein Onn Malaysia,  
Johor, Malaysia

Correspondence author email: [teguhi@gmail.com](mailto:teguhi@gmail.com)

*Received August 26<sup>th</sup>, 2018; Accepted October 31<sup>st</sup>, 2018*

---

## **ABSTRACT**

*TVET graduates require appropriate competencies to be successful in the field of industrial work. Existing literature indicate that there are several models that can be used as principles in creating graduates competency model. The objective of this study is to propose a well-adjusted graduate competency models in the field of industrial work. There are some problems to be discussed in this study, namely (1) How is the gap between students competency and industrial needs? (2) What are the main dimensions of student competence? (3) What are competency elements in the 'k-worker' dimension? (4) How does one design a 'k-worker' framework? This research applied qualitative methods supported by quantitative data. This study on framework design is an exploratory study using the Modified Delphi technique from experts in the field of electrical / electronic to obtain qualitative data; supported by data from questionnaire distributed to students in four universities in Batam. The analyses were conducted through demographic analysis, descriptive analysis; qualitative data analysis from interview and document review as well as SEM. SEM analysis shows a K-Workers Model that is well-adjusted to expert and student perceptions. The study shows that there is a huge gap between students' attributes and industrial needs; students' competency levels are not meeting industry needs which are caused by multiple factors. In addition, the study plan shows that the competence dimensions and elements are needed by students. A competency model was subsequently developed for "k-workers" using Structural Equation Modelling (SEM) based on the quantitative data obtained from engineering students from four universities in Batam. The findings have significance in terms of theory, practice, and policy formation and can contribute to practices in education and training institutions, industry and employment empowerment agencies as well as testing and certification bodies.*

**Keywords:** *K-workers; competency framework; spiritual intelligence; structural equation modelling*

---

DOI: <https://10.30880/jtet.2018.10.02.006>

# 1. INTRODUCTION

There is a sudden increase on Indonesian worker outcomes; most of which are supported and produced by senior high school (SMA) graduates. Labours as SMA graduates obtain less recognition from company; while many students with inability to continue their education at elementary and secondary levels refer to urgent need for labours. There are some efforts taken by Indonesian government to solve this problem, one of which is to ensure that quality of Indonesian workers is based on the standard of competence established by the National Agency for Certification of Professions (BNSP). More than 30 million high school graduates and 10 million higher education graduates in Indonesia enter work fields in Indonesia (630.000 unemployment Bachelor, 2018). There is also rapid increase in university labours that it reaches 1 million a year while 2 million increase of labour is caused by high school graduates.

The Indonesian government has provided universal access to secondary education through a 12-year compulsory education, and increased enrolment in higher education by 2020. This means that it is necessary to reduce number of workers at secondary education level. It is also necessary for Indonesian to produce labours from higher education institutions and vocational institutions in order to produce decent technical and vocational labours. However, labour competence produced by Indonesian higher education institutions is still unable to meet industrial need of work competence (Asian Development Bank, 2015).

Therefore, it is necessary to observe and analyse education methods and competency models in Higher Education Institutions so that it will be able to meet industrial needs in Indonesia. In this context, there are various competency models produced by various developed countries. Koch (2003) in the theory of job competence has shown that it is necessary for a standard of competence to ensure the fulfilment of work standard quality. This theory emphasizes on technical competence, social competence and learning methods in mastering job proficiency. The conceptual framework of a research based on Koch in 2003 as Competency Model can be illustrated as in Figure 1.

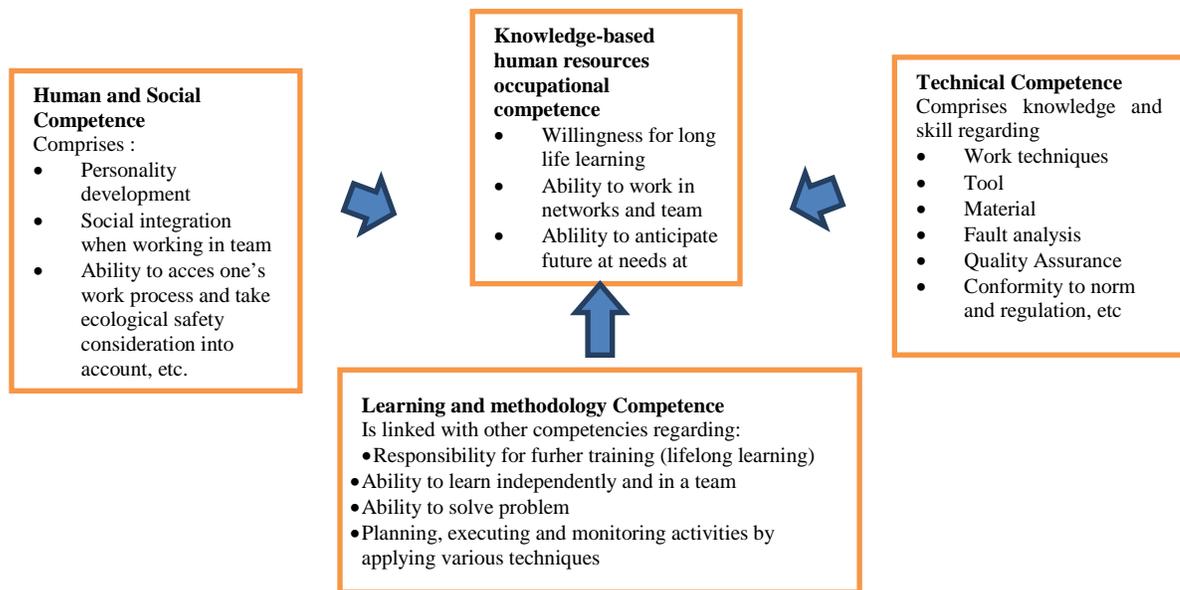


Figure 1: Occupational-based competency model (Adapted from Koch, 2003)

## 2. RESEARCH METHODS

As stated by Creswell and Clark (2007), a sequential methodology research involves a mix of quantitative and qualitative methodologies or paradigm characteristics. As a methodology, the mixed methodology implies an ideological research leading to the data collections and analyses and a mix of qualitative and quantitative approaches. Thus the research was conducted in a 5-phase mixed methods process as described in Table 1.

**Table 1: Phases, methodologies, and instruments**

Phases	Micro Phase	Methodology	Instrument
1: Analysis Phase	Literature review Educational question Research Design selecting expert panel	Reading Conversation	Expert experience note (Supervisor)
2: Designing Phase	Expert Review	Delphi Process – Focus Gathering 1	Experience Assessment note
3: Improvement Phase	Analysis 1	Assessment notes	
4: Analysis Phase	Analysis Model – SEM Analysis	Structural Equation Model	SEM Model
5: Improvement Phase	Expert Review Item Approval Analysis 2	Delphi Process – Focus Gathering 2 Assessment notes	Experience Assessment notes
5: Improvement Phase	Building Model/framework		

In Phase 1, the research problem is defined through reading process and there are also preliminary research results, searching for appropriate Research Design and selecting experts for interview. In Phase 2: Design, in this phase, the first Delphi process is conducted with an expert panel. In Phase 3: Development, which occurred after the first interview with the experts panel, the interview results are further analysed. In Phase 4, the SEM is conducted and any invalid items are removed. In Phase 5 (the final phase), items identified in the SEM process and the first interview process with expert panel are re-confirmed via interview with the second experts panel. The result of this phase is a valid model.

### 2.1. Research instruments

There are two instruments in this research namely, an interview protocol for qualitative data and a questionnaire for quantitative data. The interview protocol is a part of rules and questions to be asked during the interview process with expert panels. While the questionnaire presents a list of questions to be posed to the respondents who are students from four universities. Respondents were asked to give their response using the Likert scale format in the questionnaire.

The quantitative data are analysed by SEM to develop the competency model. It is chosen based on its variable characteristics. This model is a systematic integration of phenomena; the model shows an analogy, applies a more advanced system to an underdeveloped system (Valentine, 1982). Sharma (1996) mentions SEM as a second-generation method of multivariate methods. Structural models such as causal models, causal analysis, simultaneous equation models, and covariance structure analysis have been widely known in the management investigations. SEM is often defined as a combination of factor

analysis and path analysis. The rules of SEM criteria can be seen in the table below. The validity test parameters used in this study are shown in Table 2.

**Table 2: Validity test parameters in the SEM-PLS Measurement Model**

<b>Validity</b>	<b>Parameter</b>	<b>Rule of Thumb</b>
<b>Convergent</b>	Loading factor	More than 0,7
<b>Validity</b>	Average variance extracted (AVE)	More than 0,5
	Communality	More than 0,5
<b>Discriminant</b>	AVE root and Correlation of latent	AVE root > Correlation of latent
<b>Validity</b>	modifier	modifier
	Cross loading	More than 0,7 in one variable

Source: Adapted from Chin (1995)

## 2.2. Population and samples

Respondents for the qualitative and quantitative data were selected using nomination and stratified sampling method respectively.

### 2.2.2 Nomination sampling method (respondents for qualitative data)

As the Delphi's method depends on expert's opinion, it is important to choose the right experts. In some cases, Delphi participants are selected through a "nomination" process (Streveler, et al, 2003). Expert panels are selected based on their will, willingness and ability to express their opinions and include extensive experience on the issues being discussed (French et.al, 2002). In accordance with the criteria, the panels are selected from seven company experts; for focus group, there is one panel; for second focus group, there are seven experts for investigation purposes. To improve the sample, the following standards are applied as a standard guidance in determining expert panel reviews. The criteria for selecting respondents for qualitative data are as follows:

- i. Respondents consist of industrial entrepreneurs.
- ii. They have worked with the industry for at least 10 years.
- iii. They have a background in electrical or electronic fields.
- iv. An individual must work more than 10 years in the electronics / electrical field or must have worked for more than 10 years in electronics / electrical.
- ii. An individual must master the knowledge of electronic / electrical subjects; or;
- iii. Selected panels need to show willingness in conducting the interview.

Although there is relatively limited number of experts with knowledge about the inquiry, Delphi's panel size requirements are the simplest and practical panel for 7 members (up to 7 members, Bandur, 2016). In this study, the researchers use 9 expert panels.

### 2.2.3. Stratified sampling method (respondents for quantitative data)

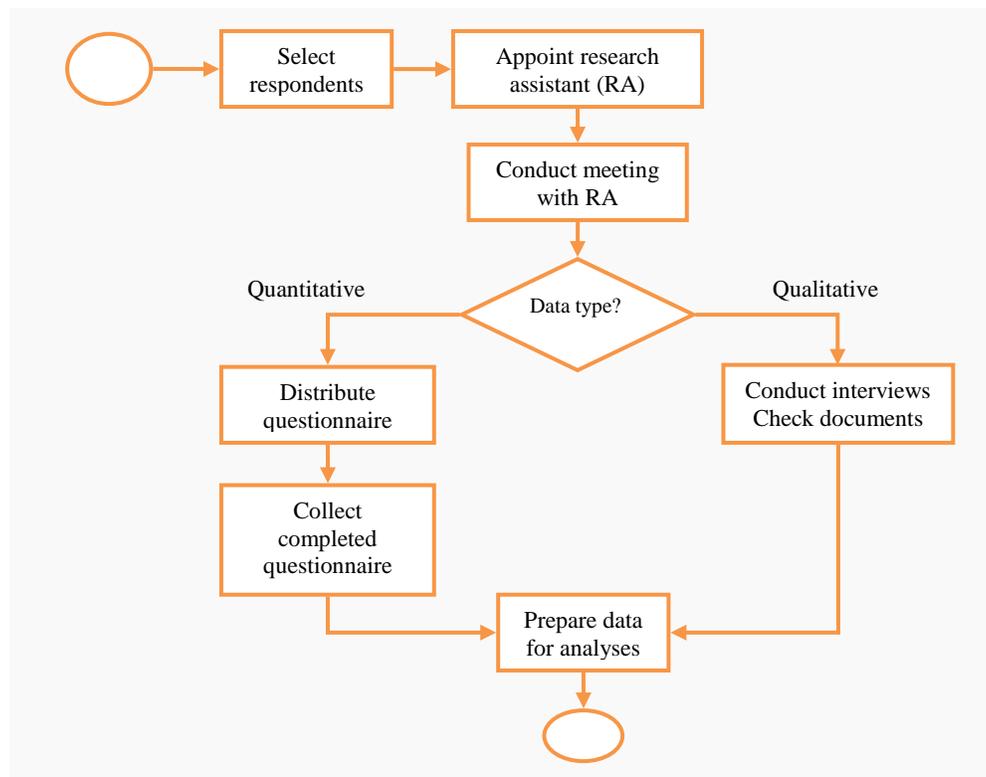
The sampling method is sample selection process from target population or refers to individual selection process from target population (Shamsuri, 2004). Ferdinand (2014) states that everyone in sampling frame is divided into "stratified" (group or category), then in each category, it is selected a simple random sample or systematic sample. Theoretically, there will be smaller estimation standard error if the observed variables are more homogeneous (Sanusi, 2011). Stratified samples are used when there are differences in characteristics among the existing strata, and the differences influence on the study variables (Abdullah, 2015). There are 301 respondents as the research samples. There are four universities that are used by the researchers to collect data as shown in Table 3.

**Table 3: Locations for data collection**

No	University
1	Putera University of Batam (UPB)
2	International University of Batam (UIB)
3	University of Riau Island (UNRIKA)
4	University of Batam (UNIBA)

### 2.3 Data Collection

The stages of qualitative and quantitative data collection are presented in the Table 3. The qualitative data are collected through interviews and document reviews called as Delphi Process. The Delphi process used is Modified Delphi with 2 sections. The first section of data collection is the interview, so is the second part. The second part of data collection process is the confirmation process. The quantitative data are collected through questionnaire instruments. The questionnaires are distributed to 4 universities for SEM-model analysis. The data collection process can be seen in Figure 3.



**Figure 3: Flowchart for data collection process**

### 2.4 Data analysis

Data analysis is performed on several analyses, namely:

- (1) Demographic Analysis. All respondents are grouped based on gender, work experience, qualifications, majors, final year of study, origin of the university, origin of graduates.
- (2) Descriptive Analysis. Each instrument item is seen by its mean (average). There are 5 categories of mean, namely extremely bad, bad, enough, good and very good.

- (3) Qualitative Analysis; it is collected through interview and document review; ones through transcript analysis will be make the themes.
- (4) Quantitative Analysis, through Structural Equation Modelling (SEM). The final result is certainly a valid and reliable model. Each item in the model will be eliminated if it is invalid.

### 3. RESEARH RESULTS

Based on the descriptive analysis, the researchers obtain the number of respondents consisting of four universities and consisting of faculties in the universities as follows:

**Table 3: Respondent Demographics**

Category	Frequency	Percent (%)
<b>Universities</b>		
Putera Batam University (UPB)	72	24
Internasional Batam University (UIB)	76	25
Riau Island University (UNRIKA)	77	26
Batam University (UB)	76	25
Total	301	100
<b>Faculty</b>		
Electrical Engineering	79	26
Civil Engineering	60	20
Informatics System	41	14
Mechanical Engineering	47	16
Industrial Engineering	20	6
Informatics Engineering	37	12
Computer Engineering	16	5
Architecture	1	0.3
Total	301	100

### 4. DISCUSSION

#### 4.1. Student competencies

There is a huge gap between student and industrial needs; the competence is not as expected. This is due to several factors including: (1) Less focused curriculum content, (2) Many unused courses, (3) Theories studied on campus are not applicable in the industry, (4) the supply provided by the campus is still inadequate , (5) Student mind set has been structured, (6) Internship Practice, (7) Ability of current student, (8) lack of Hard Skill. This is consistent with the results of previous research, according to Levin (1989), skills are acquired through education. School main function is to prepare workers to meet labour demand and skill. Educational curriculum should therefore be designed to prepare workers for work compatibility. Guzman (2008) stated role of higher education sector is to supply appropriate skills for graduates in workplace and to create awareness of work ability.

#### 4.2. Needs of Indonesian labour competence

Industrial parties require high-competence students in the sense of preparedness to participate in industry upon graduating, but the reality is, industry has to train university graduates (On Job Training) before university graduates are ready to work. This is due to several factors: (1) Facing the ASEAN Economic Community, (2) Soft Skill is more dominant, (3) Communication and electrical competence, (4) Polytechnic pay more attention to surrounding industrial needs, (5) Solving problem and Attitude, (6) Competence is appropriate but not enough, (7) high competence needs. This is in line with the results of

previous research, according to Russo and Osborne (2004), students globally are expected to: (1) Understand the world from multiple perspectives, (2) Understand international dimension, (3) Intercultural, 4) Demonstrate awareness and adaptability related to other cultures, (5) Develop lifelong global competencies. The same thing is conveyed by Crossman and Clarke (2009); the importance of recruiting personnel with knowledge and understanding of cultural issues as well as capability to manage relationships and diverse labour cultures. Company has an interest in students with real-world experience with other cultures (Mathery, 2004). According to Harden et al (2015), experiences abroad enhance employability. There are needs for talents and graduates of trained university graduates who are ready to work in global economy (Bybbe and Fuchs, 2006) and employers seek graduates with the ability to contribute to economic competitiveness in a global context (Cranmer, 2006). Entrepreneurs tend to value of soft skills in new employees more than technical skills (Crawford et al, 2011; Alston et al, 2009), while communication skills tend to enhance employability (Matulcikov & Brevenikova, 2015).

### 4.3. The main dimensions of student competence

Some results of interviews with expert panel create nine dimensions, namely: (1) Knowledge / thinking ability, (2) Mind set, (3) Leadership, (4) Willingness / Continuous learning desire, (5) Technical, (6) Communication (7) Mental, (8) Adaptation to the surrounding environment and (9) Social. There are many categories of competence dimensions. According to BNSP (National Agency for Professional Certification), it has stated that superior human resources have three competencies, namely (1) technical competence, (2) spiritual competence and (3) social competence (Moehariono, 2014). The technical competence is the competence that employees must possess in accordance with their technical duties. The spiritual competence refers to discipline, dedication, integrity and loyalty, work ethic, work motivation. While the social competence refers to the ability to work together, ability to get along and communicate, ability to coordinate, ability to appreciate other opinions and ability to cooperate with team.

### 4.4. Development of a 'K-worker' framework

From the data analysis conducted in this quantitative research using questionnaires that are distributed for Structural Equation Modelling (SEM) variance, it is obtained the "k-workers" competence model as described in Figure 4.

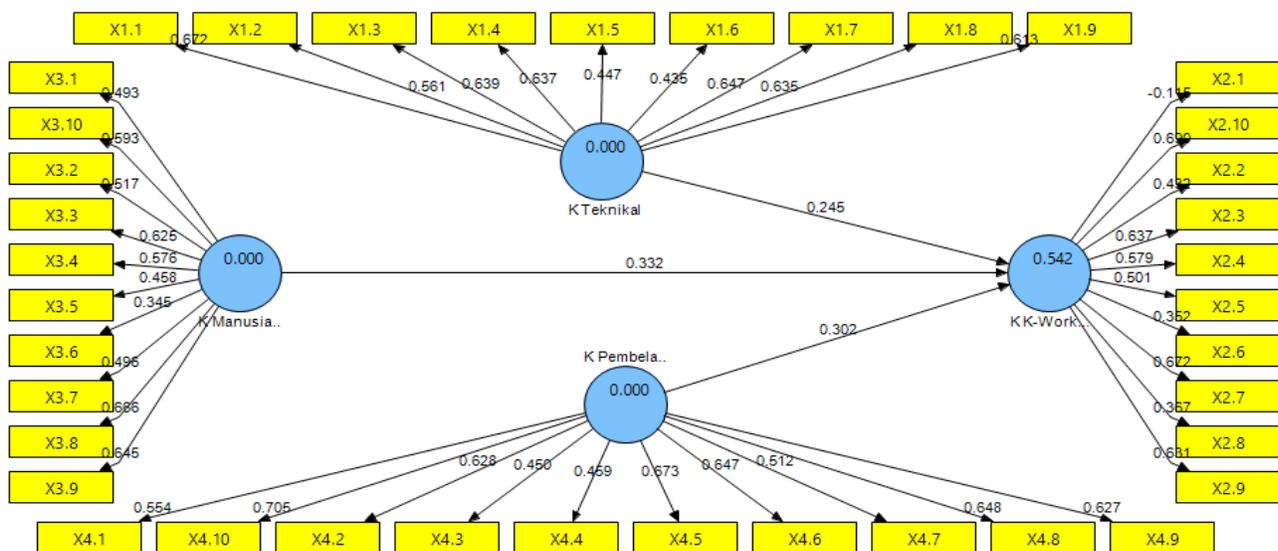


Figure 4: Model generated through engineering students' questionnaires

From the complete model, it is determined that technical competency has nine indicators; human and social competencies have 10 indicators; learning competencies have 10 indicators and k-worker competencies have 10 indicators. Further validity testing and data recalibration established the final result where technical competencies are confirmed with seven indicators, human and social competencies with six indicators, learning competence with eight indicators and k-workers competency with six indicators. The established model expanded further on the existing model, the *Pancasila* Competence (Indonesia Basic) which consists of two types of competence, namely spiritual competence and social competence. Spiritual and social competences are the transformation of the habitual-based mind set, aiming to form a productive, believing, contributively, creative and innovative human.

## 5. CONCLUSION

The development of a new framework for graduate competencies serves a crucial role, therefore it is important to identify any other competencies required by industries to adjust to the industrial revolution in the future. This is obtained from quantitative analysis through questionnaire as well as qualitative analysis through interviews and Delphi studies. From the Delphi's study, it results 71 elements of student competence. Furthermore, this study determines need for an education system at the university to prepare their technical graduates with the identified competence. The original model of this research is K-workers model which consists of 4 dimensions, namely K-Workers' Competencies, Technical Competencies, Human and Social Competencies and Learning and Methodology competencies. There are new findings from the existing model which is Spiritual Competence which this competence will prevent workers from doing any bad deeds. K-Worker's competence consists of related work, skills and personality. Technical competence consists of technical competencies in conducting daily tasks, Human and Social Competencies consist of competencies in relating to others and Learning and Methodology competencies consist of how to learn something new throughout the life.

In term of research importance, each researcher needs to elaborate the reasons why the study is considered important (Yusof, 2003). Accordingly, Creswell (2008) has suggested that the research importance expressed in three aspects, namely additional knowledge and literature, improvement of practice and policy formation. Therefore, the research purpose is to achieve the objectives as stated above. In this regard, it is necessary to implement this study because of its significance in theoretical aspects, practices, and policy formation. The results of this research play an important role for certain parties, particularly Education and Training Institutions, Industry and Employment Empowerment and maintenance of testing and certification.

## References

- Allen, J. & R. Van der Velden. (2001) Educational mismatches versus skill mismatches: effects on wages, job satisfaction and on-the-job search. *Oxford Economic Papers*, 3 (2001), 434-452.
- Alston, A.J., D. Cromartie, D. Wakefield & C.W. English. (2009). The importance of employability skills as perceived by the employers of United States' land grant college and university graduates. *Jour. of Southern Agr. Education Research* 59, 56-69.
- Asian Development Bank (2015), Education in Indonesia: Rising to the Challenge, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264230750-en>
- Bandur, A. (2016). Qualitative Research – Methodology, Design and Data Analysis Technique With NVIVO 11 Plus, Jakarta: Mitra Wacana Media
- Bybee, R.W. and B. Fuchs. (2006). Preparing the 21<sup>st</sup> century workforce: A new reform in science and technology education. *Jour. of Research in Science Teaching* 43(4), 349-352.
- Chin, W. W. (1995). Partial Least Square is to LISREL as principal component analysis is to common factor analysis. *Technology Studies* 2, 315-319
- Crawford, P., S. Lang, W. Fink, R. Dalton & L. Fielitz. (2011). Comparative analysis of soft skills: Perceptions of employers, alum, faculty and students. East Lansing, MI: Michigan State Univ.

- Cranmer, S. (2006). Enhancing graduate employability: Best intentions and mixed outcomes. *Studies in Higher Education* 31(2), 169-184.
- Creswell, J. W., & Clark, V. L. (2007). *Designing and Conducting Mixed Methods Research*. London: SAGE Publications.
- Jogan, K.S. & D.R. Herring. (2007). Selected potential employers' assessment of competencies taught in the D.E. King Equine Program at the Univ. of Arkansas. *Jour. of Southern Agr. Education Research* 57(1), 29-42.
- Koch, M. (2003). K-Worker Occupational Competence. *Working Paper in Action Oriented Learning-Trainee Centered Teaching: In services Technical Teacher Training at GMI Programme Seminar*. Malaysia: Dual System Project (DSP), GMI and KUiTTHO.
- Levin, J. A., A. Rogers, M. Waugh & K. Smith (1989) Observations on educational electronic networks: Appropriate activities for learning. *The Computing Teacher*, 17-21.
- Matulcikova, M & Brevenikova, D. (2015). Knowledge And Skills of Professional Communication as The Employability Support Factor. *European Scientific Journal*, 11(1), 253-266
- Moeherson, E. (2014). *Performance Assessment Based on Competence, Revised Edition*. Jakarta: PT. Rajagrafindo Persada
- Raybould, M., &Wilkins, H. (2005). Over qualified and under experienced: Turning graduates into hospitality managers. *International Journal of Contemporary Hospitality Management*, 17(3), 203–216.
- Sharma, S. (1996). *Applied Multivariate Technique*. Toronto: Jon Wiley & Sons, Inc.
- Stewart, J., & Knowles, V. (2000). Graduate recruitment: Implications for business and management courses in HE. *Journal of European Industrial Training*, 25(2/3/4), 98–108.
- Valentine, E.R. (1982). *Conceptual Issue in Psychology*. George Allen & Unwin,; London
- 630.000 Bachelors are being unemployment (2018, March). *Pikiran Rakyat* newsletter. Retrieved from <http://www.pikiran-rakyat.com/pendidikan/>