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# The Relationship Between Industrial Needs for Manufacturing Technology Certificate Program and Graduate

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**Abstract:** Manufacturing industries observed Manufacturing Technology Certificate industrial training students and graduates while they were in the industries. By the observation, Kepala Batas Community College's gradual study was conducted based on industries' responses reflecting issues on program content, industry preference for the program graduate and further study suitability, and also industry perspective towards the program. By circulated Google Forms, there are 30 responded questionnaires collected from the industries. The sum of the questionnaire score determines the Industrial Needs score value. Later, the resulting data analysed by Preliminary Analysis, Regression Analysis, and Pearson Correlation. In the preliminary analysis, Indexing Rank checks Data Normality, Correlation Coefficient Test checks for Data Validation, and Cronbach's Alpha checks Data reliability. Besides, in order to correlate input and output data, Regression Analysis measures the effect and Pearson Correlation measures the relationship. Through these analyses, the result suggests that many of the students and graduate are preferred to work in Metal-based Manufacturing Industries in medium size companies. Besides, the industries have few vacancies and rated RM1301-RM1600 as basic salary for the graduate. Furthermore, program content, program graduate preferred by the industry and suitable for further study is positively affected towards Industrial Needs score, and also reasonable relation is found between Industrial Perspective and Industrial Needs score.

**Key words:** *Need Analysis, Program Content, Manufacturing Technology.*

## 1.0 Introduction

Manufacturing technology education program graduates required proper knowledge and skills to fasten them to be an efficient worker. For similar reason, industrial training students acquiring the knowledge and skills. Thus, the term graduate in this paper meant for the program graduate and industrial training student. The properness, determines by the industries through the graduates' as their employee and student undergoes industrial training observation. As these students and graduate represent as the outcome of a program, hence while the industries grading them, they are also rating the program. Besides, the industries willing to participate in the structure development, makes the program structure is aligned with the industry needs. For example, JWR Technology (M) Sdn Bhd and Advance Micro Surface Furnishing Sdn Bhd take part as technical advisor for Manufacturing Technology Certificate (SMN) program structure development at the Kepala Batas Community College (KKKB).

Though, even these students and graduates undergo formal education approved by the industries, they still need training in a real industries environment. According to Hager (2011), this need is continuing development of knowledge and skill of formal education, which represent as a long-life learning. Thus, this training required for planning not only applying what these students learnt, still required for follow up learning planning. Moreover, their training content is planned as an informal education, but determined by the industry. In this

scenario, the graduate or student is shifted from the educational system towards individual learner, where they become masters of their own competencies (Lima & Guimarães, 2011). For the reason the program needs to be justified by the industries (Semahat & Özan, 2021) and content of training in self-designed by the industries (Marsick, 1987) without educational institution input, hence industries needs can be formulated through a Need Analysis (NA) study. NA is a standard procedure to identify an educational program needs, and is important to involve professional individual (Erdogan & Gürol, 2021). The professional individual inputs back in accessing the industry skill and knowledge needed (Serafini et al., 2015). Though, NA is a very wide scope study, it simplifies into a much focus study such as a student needs, skills required by industries, or a field specialization (Odumuyiwa et al., 2019). Hence, the interest of this study is to collect information regarding the SMN program necessity, and perceives knowledge and skills needs of the industries.

Every semester, SMN lectures' visit industries that the student undergoes industrial training to get industry feedback. The feedback is collected through a questionnaire and verbal conversation, that cover general issues on the student's technical skills and attitude. The feedback generalized that, SMN student and graduate are well accepted to work in manufacturing industries. In formal education, they studied manufacturing technology courses, in 30% to 70% ratio of theoretical and practical components. The courses include Industrial Hand-Working; Engineering Drawing (Manual and Computer Aided); Conventional and CNC Machining; Pneumatic, Hydraulic, and Electro-Mechanical; and Quality Control in three semesters. In the fourth semester, student undergoes Industrial Training in selected Manufacturing Industries. Industrial need towards the existing program content suggest a study to cover significant findings to measure and formulate the industry needs in the program.

Previous NA study in higher education institutions for a program mainly involved internal stakeholders (Herlina et al.,2021; Ji, 2021; Solehan et al., 2021; Lestari, 2021), such as lecturer, student, and management staff from the institution. However, only few studies involved external stakeholders (Semahat & Özcan, 2021; Li & Fu, 2021), like experts, industry professional, and accreditation personnel. In addition, a NA study in developing the learning proses design and training observation is dominant subject (Syakur et al., 2020; Apriyanti et al., 2020; Suswandari et al., 2020; Mubai et al., 2020; Parnawati & Ulinuha, 2019; Diana & Mansur, 2018; Madkur, 2018; Hartanto & Fordiana, 2018; Aeni et al., 2018) and limited study is done to the graduate observation (Semahat & Özcan, 2021; Saragih, 2014). In the specific

area of study, high amount of NA papers focusses on English Language competency. Literature review found that current particular field of papers is in medical (McDonald et al., 2020; Harrison Dening et al., 2019; Odumuyiwa et al., 2019; Perrotta, 2019; Ning et al., 2019; Mc Carthy et al., 2019), psychological and humanitarian (Mayorgo-Sierra et al., 2020; Breman et al., 2019), and computing (Agyei, 2019; Nusawat et al., 2018). This reveals that there is no NA study focus on manufacturing industries need of their potential technical workers. Besides, no study was found focus on the manufacturing industries need based on observation toward graduate or student from an education program. Thus, this back that there is no paper attempt to do similar to this study and justifies the necessity of this study.

These findings backing a study are required to acquires responses from manufacturing industry for a program academic structure and graduate quality. In this study, the considered output or dependent parameter, i.e. Industrial Needs (IN) and inputs or independent parameters from the industries. The survey data collected based on the program and graduate that outcome of program structure begin using for the year 2017. The questionnaire's questions are classed into three clusters to define three research questions. Through the Regression Analysis and Pearson Correlation on the collected data, this paper aims to examine the effect and relationship between the independent parameters or input parameters and IN score or the output parameter.

## 2.0 Material and Methodology

### 2.1 Material

NA is the first step in developing education program content. The content development requires a future profession ready for the students (Ulucay & Demiral, 2011). Furthermore, researchers in the content development must consider potential employers' needs in their study (Semahat & Özcan, 2021). Ultimately, program content that meets the local market in technical and economic needs, will ensure employment in the profession (Ji, 2021). Teng & Zhang (2013) and Wang (2010) suggest that program content that meets local needs is significant for student future employment. The program content must be included the student profession needs. Professional development of a program's content can be done through NA for long and short term that sustain the education environment changes (Erdogan & Gürol, 2021). The NA study shall also involve experts from in the industries in providing information on content development, which will validate the study finding (Long, 2005). From this discussion, the

following hypothesis is proposed. **Hypothesis 1 (H1):** Is the program content having a significant effect on the IN score?

The potential employees are looking forward for employees with deep understanding and competent on core work with their graduated program. However, graduates are too obsessed with peer worker, which entailed them into rare position selection. Hence this resulting poor employment possibilities (Chu & Liu, 2019). Since the employers know which employees they prefer, they have worked hand-in-hand with educational institutions, so that they can get and offered jobs to the preferred employees (Keskiner, 2017). For career success the employer prefers graduate with good practical experience and soft skill development (Burnik & Košir, 2017). For instance, SMN in KKKB has program development collaboration with the industries, to validate the certificate's program structure. This is a part of the industry strives to improve their potential employees' performance that leads to enhance their profitability and sustainability (Rifai et al., 2021). However, still the industries facing difficulties in finding potential employees, due to they need the potential employees with special criteria, such as knowledge creator and innovator qualities (Sommer et al., 2017). This quality required to graduate with higher level of education, that combines higher education with a high level of vocational education (Li & Fu, 2021). Thus, the graduates should be given freedom to access education at higher levels they willing to learn (Herlinawati et al., 2021). Moreover, this can fasten the student integration into local manufacturing industries' needs. Eventually, having all of these qualities, will bring in high employee performance in the industries (Ta'Amnha et al., 2021). Based on these positive and negative blend preferences by the industries, with the graduate further study suitability, suggest following hypothesis. **Hypothesis 2 (H2):** Are the program graduate preferred by the industry and suitable for further study positively effected to the IN score?

Through NA, the required fact finding includes staff in the industries which one of the experts, concerning on the program is required (Richards, 1985). The finding should be included in the program learning outcome, so that student from the program is competent with their future working needs (Solehan et al., 2021). Besides, the experts in the field view are a valid and reliable to measure the industrial needs (Kaufman et al., 2003). By getting the experts' view towards a program, it has increased the theoretical and practical reliability in the program (Serafini et al., 2015). Their views are meaningful to the domain expert, to access insider knowledge of what successful performance in a specific occupation entails (Serafini et al.,

2015). This finding suggests **Hypothesis 3 (H3):** Is the industrial perspectives towards the program positively has a relationship towards IN score?

### 2.2 Methodology

#### 2.2.1 Demographic Survey

NA for SMN at KKKB is conducted periodically from time-to-time as directed by the Department of Polytechnic and Community College Studies (JPPKK). The design of the questionnaire is prepared by JPPKK. This is a fully structured quantitative questionnaire and a one-time cross-sectional data using Google Form application to circulate the questionnaire. Respondents were mainly in Penang state and few from Sungai Petani, Kedah from various manufacturing industries. They have to answer the questions and submit the form through online. Because of KKKB has close contact with the industries, the college can well plan the direction of this study. Once a link is circulated to the industries, they have the access to answer the questionnaire in Google Form. The close contact with the industries defining as KKKB has a good relationship in placing industrial training student to the industries. Thus, communicating between KKKB and the industries is positive, and is expected, easy to obtain feedback from this study. In addition, the college can pre-plan which industries to be selected. This is based on the current number of students undergoes industrial training and the graduate work at the particular industry. Though, they are answering the questionnaire voluntarily, KKKB keeps follow up the selected industries to response the questionnaire. However, for the industries that are not willing to participate in this study they are free to do so.

#### 2.2.2 Questionnaire Design and Usage Analyses

In current NA studies, quantitative study researchers prefer using a self-developed questionnaire. This is due to NA study has expanded into diverse areas of focus. Anyway, the mainstream of questionnaire template is not significant to be deliberated. In this study, the JPPKK In-House Developed questionnaire is used and officially directed to conduct NA study at a certain range of date. The questionnaire is very general and is customised into the program and local needs. Customization of the questionnaire includes the size of the company, company area of manufacturing, and specific questions regarding the industry needs are designed.

This study questionnaire's selected questions are divided Demographic and Specific IN survey. Demographic survey covers six and ten questions for a Specific IN survey.

Furthermore, the Specific IN survey is clustered into three issues – (i) program content, (ii) industry's preference for the program graduate and further study suitability, and (iii) industry perspective towards the program. The ten questions using five Likert's scales are clustered as follows: four questions for program content issue, four questions for industry's preference for the program graduate and further study suitability issue, and two questions on the industry's perspective to the program. Total of these ten questions score determine the IN score value.

Afterward, the data gathered from the responded questionnaire will be analysed in four stages, namely Preliminary Analysis, Regression Analysis, and Pearson Correlation. Preliminary Analysis is required in order to comply to the data requirement in Regression Analysis and Pearson Correlation. Through Regression Analysis will result a Model and the coefficient between the inputs and the output to measure the effect of the parameters. Furthermore, by Pearson Correlation, the relationship between the input and output in measured. Thus, these analyses assist this study to measure the effect and relationship.

## 3.0 Data Analysis and Findings

### 3.1 Demographic Survey Result

**Table 1.**
The 30 Manufacturing Industries Participate in Answering Electronic Questionnaire Form

| | | | | |
|---|---|---|---|---|
| Prestige Dynamics Industries Sdn Bhd | TRIO Papers Mills Sdn Bhd | Next Wave Engineering Sdn Bhd | Micron Memory (M) Sdn Bhd | Mforce Part Sdn Bhd |
| Nissei Technology (M) Sdn Bhd | Plexeco Tech Sdn Bhd | Paradigma Engineering Sdn Bhd | KCK Machinery Sdn Bhd | Ecofame Sdn Bhd |
| JWR Technology (M) Sdn Bhd | Altramax Technologies Sdn Bhd | Kb Metal Machining Sdn Bhd | Iwan Industri Factory Sdn Bhd | Florthern Sdn Bhd |
| SAM Engineering & Equip. (M) Berhad | AZE Tool Supply & Enginnering Sdn Bhd | AM Machining Tech Sdn Bhd | JWR Technology (M) Sdn Bhd | Jabil Circuit Sdn Bhd |
| CNC Manufacturing Sdn Bhd | Polytool Technologies Sdn Bhd | Fu Hao Manufacturing (M) Sdn Bhd | Dell Technologies Malaysia | Fatty Chemical (M) Sdn Bhd |
| Western Digital Media (M) Sdn Bhd | Jinko Solar Technology Sdn Bhd | Future Engineering Sdn Bhd | Excel South Asia Sdn Bhd | Mattle (M) Sdn Bhd |

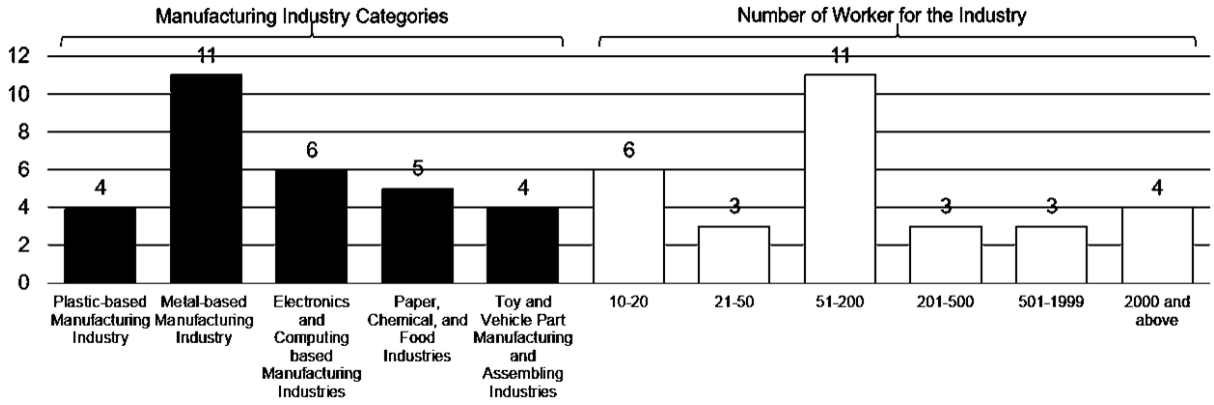


***Figure 1:*** *Respondents in Manufacturing Industry Categories and Number of Worker*

Initially, the circulated questionnaire involved 55 numbers of manufacturing industries. However, only 30 answered questionnaires are returned, as in Table 1, represents 54.5% answering rate. The Demographic finding of the industry shown in Figure 1, is approximately 33% of the respondents come from Metal-based Manufacturing Industries. Though, there are respondents come from big companies (13.2%) with above 2000 employees, but the majority of the respondents (33.3%) come from medium manufacturing industries with 50-200 number of employees. Besides, the respondents suggest the graduate is good in machining work (50%) and the least is for general technician work (3.3%). Moreover, the graduate is most suitable to post them as file, production, and automation technician (50%), and not suitable to work as a product designer (0%). This is due to office work such as preparing technical documentation or designing which required higher mathematical skills are not adequate for them. This survey also suggests that job available for the graduate, mainly with 3-4 persons (56.7%), and their suitable basic salary is in the range RM1301-RM1600 (50%) as shown in Figure 2.

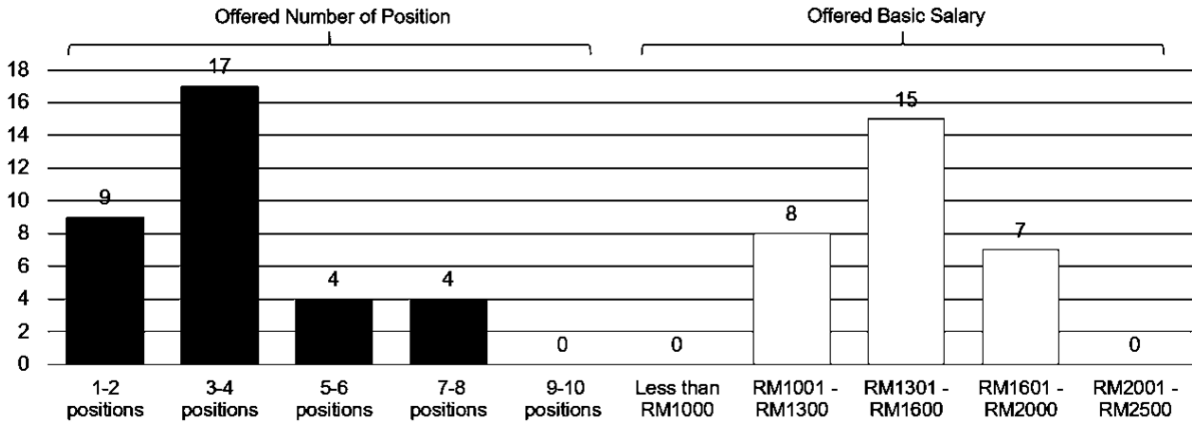


***Figure 2:*** *Offering Number of Position and Basic Salary Rate*

### 3.2 Preliminary Data Analysis for Specific IN Survey

Preliminary data analyses are required for following data analyses, includes data normality, validation and internal data reliability. Data normality is checked by Indexing Rank; then data validation is checked by Correlation Coefficient Test, later Cronbach's Alpha is used to check the data reliability. Normality check by Indexing Rank calculates the correlation percentage, founds that all parameters Q1-Q10 and IN score are high normal distribution. The percentage of correlation for each parameter is above 90%. Moreover, the overall correlation percentage is above 90%, exactly 91.37% is considered significant normal distribution. In validity check, Correlation Coefficient Test using 5% (0.514) with correlation significant from R Table (rTable) selected value, requires calculated correlation significance (rCount) must be

greater than rTable for a valid data. This test result shows the validity of Q1-Q10 and IN score data at excellent rCount. In general, the lowest rCount value is +0.5573 and the highest value is +0.5921. Besides, for IN score, the rCount value is still valid at +0.5784. Statistically, rCount value +0.5 and below +0.7 is representing a moderate uphill linear relationship. Cronbach's Alpha calculates value between 0.00 and +1.00, tells how close of a tested collected data as a group. The overall Cronbach's Alpha value of the data in IN survey is 0.8423 which rated as good reliability. Because of normal distribution, good validity and good reliability of data is required hence no data modification needed. Furthermore, for this condition of data, statistically effective for using in the following Regression and Pearson Correlation Analysis.

### 3.3 Specific IN Survey Regression Analysis and Pearson Correlation

Series of Regression Analysis is conducted for testing H1 and H2, and the result is shown in Table 2. It consists empirical value of coefficient, standard deviation, and p-value. The coefficient for all independent parameters are shown positive or upward relation to IN score. Besides, the value of R Square is one and p-value is below than 0.05 for data regarding to H1 and H2. These results indicate that the values are significantly effective on IN score. Moreover, the Standard Deviation for H1 and H2 data are very low which represent the data dispersion is close to the population value. Hence, this supports H1 and H2.

**Table 2.**
Regression Analysis Result

| Hypothesis | Coefficients | Standard Deviation | p-value |
|---|---|---|---|
| **H1:** Is the program content having a significant effect on the IN score? | +0.599 | 0.554 | Below 0.05 |
| **H2:** Are the program graduate preferred by the industry and suitable for further study positively effected to the IN score? | +0.574 | 0.434 | Below 0.05 |

Correlation Analysis is concerned with the degree of relationship between variables (Kurtulus, 2004). Coefficients value of the correlation is varying between -1 and +1 values which measures the relationship strength between Industrial Perspective and IN score. Since the coefficient is positive (+0.6873), it means IN increases as Industrial Perspective value increases and vice versa. There was a significant linear (2-tailed) at 0.000 and positive correlation between Industrial Perspective and IN score at a moderate correlation strength level of 68.73%. The hypothesis **H3** was accepted based on this result.

**4.0 Discussion and Conclusions**

By Demographic Surveys the highlight is many of the graduates are working in medium size company with 50-200 employees and Metal-based manufacturing industries. In addition, the graduate is fitting to work with hand-on rather than designing work, and they also less suitable for office work. Besides, though the vacancy number and salary rate for the graduate is low, yet it is at the favourable scale to them in our nation current economic status.

In the primary analysis, normality, validity, and consistency of the collected data is in accepted value, hence this resulted effective analysis. Furthermore, Regression Analysis closes that the program content, program graduate preferred by the industry and suitable for further study is positively effected towards IN score at significant level. Moreover, Pearson Correlation concludes that Industrial Perspective and IN score are in positive relation at reasonable value.

Through the limitation and constrain found in this study, for future research following suggestions is proposed. The researcher is advised to rise the number of respondents, and expand the geographical wider area such as norther region of Peninsular of Malaysia. Besides, researchers also are advised to pick a stratified sampling method that divides the sample into smaller group in order obtained broader and generalized information. In addition, instead of collecting data through questionnaires, researchers are advised to conduct an interview session with the respondents to get more comprehensive information.

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