Preliminary Study of Digital Manufacturing Requirement for 
*Kampus Merdeka* Apprenticeship Program

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Abstract. Students are allowed to take courses outside campus in the Kampus Merdeka program. In this regard, students need to be equipped with competence related to digital industries' needs, especially for computer science students. The purpose of this research is to conduct a preliminary study of the abilities needed by the student to execute the Kampus Merdeka program based on stakeholders' perspectives, who specifically are digital manufacturing in Papua. This research is a quantitative study that employs a survey strategy. Respondents came from various fields related to digital manufacturing, including banks, government offices, private companies, and digital start-ups. The online questionnaire was distributed, and 100 respondents gave responses related to the abilities students must possess for digital manufacturing field working. The findings of this study underline several essential abilities, including industry 4.0 framework knowledge, digital usage skills, and information communication technology (ICT) skills. The findings of this study contribute to a better understanding of the technical capabilities required by stakeholders. The results of this study can be developed into a policy of aligning the capabilities of students with digital manufacturing needs.

1. Introduction

One of the educational curriculum launched by the Indonesian government is the *Kampus Merdeka* policy or program. This program aims to accelerate innovation in the world of education, especially for Higher Education. One of the policy points of the *Kampus Merdeka* is that students can have diverse competencies, are ready to work, and are needed by industry through internships, research, teaching, and community service programs [1]. The internship program is expected to be proof that
each tertiary institution will be able to produce graduates who have high competency values, are competitive, and have character. This program can run well if there are participation and cooperation of third parties, namely industry performer. As industry performers, companies, or corporations certainly have competency standards that apply to every employee [2]. It often happens that employees or prospective workers experience a mismatch with the labor market, which is caused by the irrelevance of education in tertiary institutions with the needs in the industrial market and also the lack of connectivity between tertiary institutions and industrial markets. So there needs to be synergy and collaboration from each party to be able to overcome these employment problems.

Industrial markets that are now developing are often called industry 4.0 by utilizing all forms of information technology infrastructure [3]. The information technology industry in this era is now very developed. The benefits and uses can be felt in various sectors, such as the business sector, tourism, and education. The use and function of information technology are increasingly felt and involved in all business sectors. Both private and government companies must implement information technology in each of their activities. Various studies have been conducted to analyze the various types of industrial market needs for the recruitment of its workers, such as the use of simulations to determine the needs of workers in the transportation business sector [4]. Conduct a survey study of students to find out their understanding of the requirements and also the skills needed in the industry [5]. Then in the infrastructure development sector also the needs and technical skills of workers are essential to improve the governance of a project [6]. The participation of each employee is also needed to be able to improve each development planning process [7].

Education and skills are also an indispensable part of the industrial market to increase global competitiveness[8-10]. Productivity, level of work, and participation are also analyzed to find out the performance of each company towards its workers who are graduates from tertiary institutions [11]. Higher education is one of the media that can channel workers who have high skills and competencies. Thus, the need for curriculum development that can answer the needs of the industrial market[12-14]. The managerial and recruitment concepts for apprentices have previously been proposed by establishing a workers' training system [15].

Therefore, this research aims to analyze the various requirements and requirements needed by industry performers to obtain labor according to the fields and skills needed. This research is divided into several sections, session two is the research methodology, session three is the result, and the last is the conclusion.

2. Methodology

This research is a quantitative descriptive study to conduct a preliminary study of the abilities needed by the student to execute the Kampus Merdeka program base on stakeholders' perspectives, who specifically are digital manufacturing in Papua. Respondents of this study are stakeholder come from various fields related to digital manufacturing, including banks, government offices, private companies, and digital start-ups. Data obtained by simple random sampling through online questionnaires using Google Form. The questionnaire link is distributed to stakeholders through the WhatsApp media, and the questionnaire filling time is done in two weeks on March 2-16, 2020. Based on the online questionnaire that has been distributed, a total of 100 responses have been collected.

The online questionnaire distributed to respondents contained 23 questions that were adapted from several previous studies [16-19]. The field and work experience information of stakeholders is described as in table 2.1. The questionnaire contains student Industry 4.0 framework knowledge, student Digital usage skills, and student Information communication technology (ICT) skills. The questionnaire is presented in Indonesian to make it easier for respondents to fill out the questionnaire. On the other hand, the reliability and validity had been tested through the smartpls application shows that the adapted questionnaire has a decent level of reliability (> 0.7) and validity (> 0.5) [20] as it is seen in Table 2.2.
### Table 2.1 Respondent field and work experience information

| Variables          | N  | %   |
|--------------------|----|-----|
| Gender             |    |     |
| Male               | 48 | 48.00|
| Female             | 52 | 52.00|
| Field              |    |     |
| BUMN               | 26 | 26.00|
| Private Company    | 25 | 25.00|
| Government         | 30 | 30.00|
| Start-up Digital   | 19 | 19.00|
| Experiences        |    |     |
| < 5 years          | 72 | 72.00|
| 5-10 years         | 16 | 16.00|
| > 10 years         | 12 | 12.00|

### Table 2.2 Group of competency variables

| Variables                                      | Indicator                                                                 | $\bar{x}$ | $s$  |
|------------------------------------------------|---------------------------------------------------------------------------|--------|-----|
| Industry 4.0 framework knowledge               | Students need to have knowledge related to virtual reality.               | 4.44   | 0.64|
|                                               | Mixed reality is a knowledge that students must possess.                  | 4.16   | 0.84|

The data obtained is processed through some stages. The data from google form will be saved in the form of .xls. Then, responses from stakeholders will be processed using IBM SPSS 23 software to display the mean ($\bar{x}$) and standard deviation ($s$) for the sample. The results of the processed data are then interpreted using the stakeholder competency requirements framework as follows $\bar{x}$ 0.0-1.7 (low requirement), $\bar{x}$ 1.8-3.7 (moderate requirement), $\bar{x}$ 3.8-5.0 (high requirement).

### 3. Result and Discussion

Overall results from the survey data needs that should be met by prospective employees or workers in the government sector, SOEs, the private sector, and start-up workers generally have in common. Industry 4.0 framework knowledge is a capability requirement that should be owned by prospective private workers, start-up groups, and government institutions to ensure the availability of workers and employees who are able to adapt and compete to take advantage of increasingly rapid technological advances.
| Fablab is a science that needs to be mastered | 4.52 | 0.64 |
| Students need to have sufficient knowledge of industrial concepts 4.0 | 4.64 | 0.63 |
| Students need to have knowledge related to data transmission | 4.16 | 0.84 |
| Students must have sufficient ability in the analysis system | 4.52 | 0.70 |
| Students need to have knowledge related to system design | 4.2 | 0.80 |
| Computer technology needs to be mastered by students | 4.56 | 0.81 |
| Students need to master app development | 4.36 | 0.85 |
| Students must understand the security of information system data | 4.6 | 0.64 |
| Programming the system needs to be mastered by students | 4.36 | 0.69 |
| Students need to know and use hardware | 4.64 | 0.56 |
| Knowing and using the internet is a skill that is needed by students | 4.68 | 0.84 |
| Students must have the knowledge to seek help independently | 4.36 | 0.75 |
| Knowledge of device safety is required by students | 4.4 | 0.70 |
| Students need to master knowledge related to the protection/privacy of personal data | 4.56 | 0.64 |
| Students need the ability to be able to learn new technology easily | 4.6 | 0.49 |
| Knowledge related to many different technologies required by students | 4.44 | 0.70 |
| Students must need to use technology to collaborate | 4.52 | 0.50 |
| Students must master the ability to use search engines to obtain information | 4.64 | 0.63 |
| Students need to be able to distinguish various functions from digital media | 4.48 | 0.58 |
| The ability to analyze the positive and negative impacts of media content needs to be mastered by students | 4.28 | 0.73 |
| Students must be able to consider objectivity, reliability and credibility in accessing media | 4.4 | 0.80 |

**Table 2.3 Competencies Requirement**

The results obtained indicate that the needs at a high level of ability are needed by these stakeholders. It is indicated by the absence of moderate values or low competency. The data show that there is a high competency value with the overall average being in the framework ($\bar{x} = 4.0$). It is known that virtual reality is wrong one technology in the era of industry 4.0 which is currently widely adopted.
in helping to reduce workplace risks so that the need for this group is quite high ($\bar{x} = 4.44$) this is very suitable where the highest value in this group is to have sufficient knowledge of the concept of industry 4.0 namely with a value of needs ($\bar{x} = 4.64$), while the lowest in this group is the ability of Mixed reality with a value of 4.16 mixed reality is a cross-platform capability between the real world platform and the virtual world platform where generally not so many have been applied so that the need for the lowest in the group this, but remains at high competence demand.

Next is in the field of Digital usage skills needs; this is undoubtedly a group of basic needs that must be owned by prospective employees and private workers. The ability to use digital technology is a basic knowledge that is closely related to industry technology 4.0 so that the level of competency needs provided by stakeholders is also considerable, namely the value of high competency.

The highest value in this group of needs is on Knowing and using the internet is the ability required by students, with the achievement of the required competency values, namely ($\bar{x} = 4.68$) middle position in this group of needs is Students must need to use technology to collaborate with grades ($\bar{x} = 4.52$) in the field of industry 4.0 work collaboration is something that must be done by both workers and employees in order to create more optimal work results. While the lowest competency needs in this group are students must know to seek help independently with the value ($\bar{x} = 4.36$) according to the researchers' needs in this field is mandatory. However, the result is why it is smaller than other needs in this group because of the assumption that working in collaboration slightly overrides knowledge to seek help independently. However, it is still a high competency requirement with a relatively high value.

Finally, this study evaluates the field of Information communication technology (ICT) skills. Similar to the two previous field groups, ITC skills are mandatory abilities that must be possessed by workers in the information and communication technology field. The focus on this group of midwives is related to the ability of students to use information technology, find credible information, and the ability to analyze the information obtained. We all know that one source of chaos that occurs is often caused by incorrect information. Therefore, especially government institutions, as policymakers and private workers, in general, must put the competence to obtain correct information is mandatory. So the value obtained in this group of needs is also very high, namely in the group of high competencies. As for the highest competency requirements in this group, Students must master the ability to use a search engine to obtain information that is the lowest value ($\bar{x} = 4.64$) is the ability to analyze information obtained with a value ($\bar{x} = 4.28$) while the other two competencies are almost the same, i.e. ($\bar{x} = 4.40$) and ($\bar{x} = 4.48$).

| Variables                              | Government institution | Private institution |
|----------------------------------------|------------------------|---------------------|
| Industry 4.0 framework knowledge       | 4.48                   | 4.35                |
| Digital usage skills                   | 4.51                   | 4.54                |
| Information communication technology (ICT) skills | 4.60                   | 4.31                |
| $\bar{x}$ Total                        | 4.53                   | 4.40                |

**Table 2.4 Competency requirements based on the stakeholder work field**

Related to the research on the level of ability needs that must be possessed by stakeholders in the government sector as well as BUMN and private workers and start-up groups, at first glance, there is an anomaly between the level of needs needed.

An anomaly that occurs according to the research is the higher level of ability that must be possessed by students who will later work in the realm of government and BUMN compared to the level of ability needed in the realm of private workers and start-up groups. Anomaly is seen because the level of ability that must be possessed by private workers and start-up groups must be higher.
because they are always encouraged to continue to invest and for that required skills related to industry 4.0 frame, digital usage skills, ICT skills and also the ability to learn more independently high compared to students who will later work in the government and SOE sectors.

However, this data is considered reasonable by researchers because, in general, the government sector in the Papua region employs personnel in the field of information technology for all types of existing jobs [21]. Most government sectors do not share their information technology personnel specifically in each field of work that is controlled by workers or employees, in general, in the government assume that someone who is involved in information technology (computerized) work should be able to do all branches of work in Information Technology science and communication. So that the survey values to be obtained will generally be the same, namely at high values [22-23]. While in the private sector and start-up groups will specialize in the field of work following their main competencies in the field, so that in terms of the value of the level of needs expected by workers and star-ups will fare from the high to the low according to the focus of the work start group -up and private workers.

Thus the correct education and understanding need to be more socialized, especially to stakeholders of government institutions where workers in the field of information technology should be in this case prospective apprentices and prospective employees in the government area assigned or employed according to their field of expertise.

**Conclusion**

Based on the results of a study conducted, it is known that the level of competency required by stakeholders in students related to the three competency groups that have been asked is included in the very high category of value above ($\bar{x} = 4.0$) which is at the level of high competency ($\bar{x} 3.8-5.0$) This means that the competencies stated in the results table above must be highly mastered by students in the apprenticeship process based on an independent campus curriculum. Other findings in this study also illustrate the need for more socialization and education to institutions in hiring internship students according to the level of competency needed. Understanding the needs of stakeholders in government and private companies as a reference in developing an independent campus curriculum is an appropriate step in order to achieve a curriculum that is suitable to the needs, especially for the needs of the Papua region.

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