

# Prototype of cooperation between the mechanical engineering vocational education, Medan State University with industry in implementing the independent learning policy

Selamat Riadi<sup>1,\*</sup>, Lisyanto<sup>2</sup>, dan Budi Harto<sup>3</sup>

<sup>1,2,3</sup> *Mechanical Engineering Department-Engineering Faculty-State University of Medan*

\*Corresponding author. Email: [selamatriadi.unimed@gmail.com](mailto:selamatriadi.unimed@gmail.com)

## ABSTRACT

The gap in skills required by industry and graduates of Mechanical Engineering at the State University of Medan needs to be resolved by establishing institutional cooperation. This study aims to find the right prototype of cooperation to be developed by Mechanical Engineering vocational education at Medan State university with industry and the World of Work (IDUKA) so that the implementation of the independent Learning and Independent Campus (MBKM) policy which is the focus of vocational education work becomes efficient. There are 26 companies/industry involved. The method used is survey and experimental implementation of developed cooperation prototype. The results of this study conclude: 1) The level of industry's willingness to cooperate with vocational education in Mechanical Engineering, Medan State University is 88.5% (good), 2) The industry is not willing to give recommendations to student to work in industries where Industrial job training (PKLI) is located, 3) Competence that students must have in carrying out collaboration with IDUKA are disciplined, responsible, able to read pictures, willing to work in the field, and able to work according to their fields, 4) Types of Mechanical Engineering vocational education cooperation that can be developed are PKLI, Internship, Research, and Production Services, 5) The results of the cooperation in Mechanical Engineering vocational education developed with IDUKA are good.

**Keywords:** *Vocational Education, Mechanical Engineering, Cooperation*

## 1. INTRODUCTION

Independent Learning and Independent Campus are policies of the Minister of Education and Culture that aim to encourage students to master various sciences to enter the world of work [1]. The Independent Learning Policy and Independent Campus are by Permendikbud Number 3 of 2020 concerning National Higher Education Standards. In the view of humanism, independent learning provides opportunities for students to learn autonomously or independently and be responsible for themselves [2]. In particular, the launch of the Independent Learning and Independent Campus policy on Technology and Vocational Education has the consequence that every education policy holder from the secondary level to higher education must carry out a real "Marriage" with the Industrial and Work World (IDUKA) [2], in terms of Students from every university are expected

to be ready to face the challenges of the industrial revolution 4.0 era, with the concept of an independent campus they are directed to be more ready to work, collaborate, be creative and be able to benefit themselves and other communities [4].

Education is a learning process for each individual to achieve higher knowledge and understanding of certain and specific objects [5]. Herminarto defines that vocational education is held to provide certain provisions to students so that they are ready to work [6]. In other words, vocational education is education that is oriented towards preparing students to be able to work in certain fields of work. The system is a series of components that have a linkage (interact) in a process of activities to achieve a goal. Education is transferring values, knowledge, experience and skills to the younger generation as an effort for the older generation to

prepare the life functions of the next generation, both physically and spiritually [7]. From some of the opinions above, it can be concluded that what is meant by the technological and vocational education system is a series of components that carry out the process of teaching and learning activities in the field of technology to produce skilled workers in supporting industry and trade to improve the welfare of life. The linkage between Industry and technology and vocational education can be illustrated by the following scheme [8]:

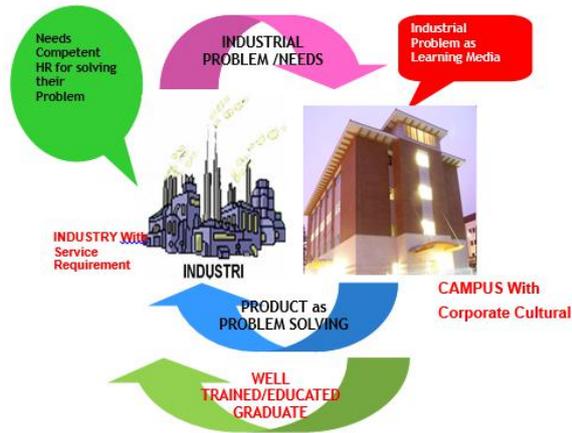


Figure 1. Vocational Education Cooperation Model and IDUKA

From the schematic above, it can be seen that there are several differences in the implementation of vocational education with other general education. According to Sugiyono [9] these differences do not only concern the definition, organizational structure, and educational goals, but are reflected in other aspects that are closely related to curriculum planning, namely (a) aspects of educational orientation, (b) justification for its existence, (c) curriculum focus, (d) success criteria, (e) sensitivity to community development, (f) logistical supplies, and (g) relations with the business community. The existence of these differences indicates the necessity for cooperation. If there is no collaboration between institutions, there will be mislinks and mismatches between the world of education and the grief-stricken which will result in losses for both parties. On the one hand, education will only increase the unemployment rate and on the other hand, Iduka institutions always find it difficult to obtain quality workers. Furthermore, if the gap between the world of education and Iduka is allowed to continue, there will be an imbalance in terms of the supply of labor in Iduka which ultimately leads to the low competitiveness of the nation in the regional and global order. Therefore, it is necessary to make efforts to ensure the type of cooperation between the Mechanical Engineering Department and the business/industry world. Cooperation in human

resource development training activities must involve various stakeholders to ensure alignment between training activities and organizational needs and goals [10].

By knowing the type of industry in understanding, the Department of Mechanical Engineering, State University of Medan can determine long-term policies and plans in preparing graduates and their institutions to contribute to the real sector in the world of work/industry.

## 2. METHODE

The research, which was carried out using a survey method and experimental model of cooperation, was designed with the following stages of treatment:

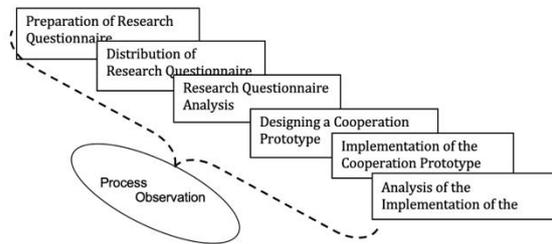


Figure 2. IDUKA Collaborative Research Design

## 3. RESULT AND DISCUSSIONS

### 3.1. Willingness of IDUKA related to Industrial Job Training (PKLI)

Of the 26 respondents who were given research questionnaires, two companies refused to cooperate with the Department of Mechanical Engineering, Faculty of Engineering. Unimed, so all items answered reluctantly. The reason given is that the PKLI for management rights has never received industrial field work practices.

Of the companies/industry that are willing/have accepted PKLI, generally they are willing to study the implementation of PKLI, Department of Mechanical Engineering, Faculty of Engineering. Unimed, provides guidance, and information to practical students as long as they do not conflict with company/industry regulations. When recommending jobs to students, practitioners are generally unwilling because the recruitment system has its own rules. In detail the form of industrial readiness with the Department of Mechanical Engineering FT. Unimed in the context of implementing PKLI can be presented in the following table:

**Table 1.** Willingness to cooperate with PKLI

NO	Willing Type	Ready (%)	No (%)
1.	Become a PKLI place partner	88,5	11,5
2.	Planning PKLI together	73,1	26,9
3.	Provide information on the implementation of PKLI	88,5	11,5
4.	Participate in guiding PKLI students	65,4	34,6
5.	Evaluating/assessing the success of PKLI students	80,8	19,2
6.	Provide recommendations to students to work in the industry where PKLI is	0	100

**3.2. Willingness of IDUKA in Curriculum Preparation**

In general, IDUKA is willing to help provide information as input in preparing the curriculum, but is not willing to discuss it directly in joint formulation. The main reason is because they feel they are not in the field to discuss the educational curriculum, while the reluctance to provide information about the product system and technology used is the reason for the company's secret. (see Table 2)

**Table 2.** Willingness of IDUKA in Curriculum Preparation

No	Willing Type	Ready (%)	No (%)
1.	Provide information on products produced by IDUKA	61,5	38,5

No	Willing Type	Ready (%)	No (%)
2.	Provide information about the competencies required by IDUKA	69,2	30,8
3.	Develop a curriculum with the Department of Mechanical Engineering FT. Unimed and (IDUKA)	46,2	53,8
4.	Provide data on the need for workers who are equivalent to Mechanical and/or Automotive Engineers	69,2	30,8
5.	Provide information on the technology used by IDUKA	38,5	61,5

**3.3. Willingness of IDUKA in the Provision of Practical Facilities and Infrastructure**

If observed carefully, actually IDUKA is only willing to provide facilities/infrastructure as a place for PKLI to the Department of Mechanical Engineering, Faculty of Engineering. Unimed, while other material things are not willing. In detail about this information can be seen in the following table:

**Table 3:** IDUKA Willingness in Providing Practical Practices

No	Willing Type	Ready (%)	No (%)
1.	Come if invited to discuss student practice facilities/infrastructure	84,61	15,39
2.	Collaborate in providing facilities and infrastructure for PKLI student practice	96,15	3,85
3.	Giving rewards (salary/honor) to PKLI students	0	100

**3.4. Cooperation that IDUKA wants with the Department of Mechanical Engineering, FT. Unimed**

The form of cooperation desired by IDUKA for the Department of Mechanical Engineering FT. Unimed in general is in the field of business unit development and production (53.8%) while those

who are willing to cooperate in industrial training (including PKLI and internships) are 88.5%.

**3.5. Competencies that must be possessed by students of the Department of Mechanical Engineering FT. Unimed**

Furthermore, about the information on competencies that must be possessed by students of the Department of Mechanical Engineering FT. Unimed at IDUKA, in general, is disciplined, responsible, able to read pictures, willing to work in the field, and able to work according to their field.

**3.6. Implementation of the Cooperation Model of the Department of Mechanical Engineering FT. Unimed with IDUKA**

From the results of the survey conducted, the model of cooperation that can be developed according to the potential and objective conditions attached to the two institutions is PKLI, Internship, and Program Development. This objective condition is based on the reason that the first and second cooperation models were chosen because they are able to increase the competitiveness of graduates while the third cooperation model leads to strengthening the capacity of the Mechanical Engineering Department. The selected companies are PT. PT. Graha Mazindo Mandiri for PKLI, PT. Metapoly Bandung for Interns, and PT. Karya Mulia Utama Medan for Program Development (Production Unit).

**3.7. Implementation of PKLI**

Some of the findings obtained from the results of monitoring and evaluation carried out on the implementation of PKLI students majoring in Mechanical Engineering are: 1) Students need more initial preparation for understanding drawings and technical terms in the field, 2) The implementation of PKLI which has taken place so far is generally still a survey. , if you want to practice directly in the field at least it takes at least 3 months (equivalent to 3 credits), 3) The contents of the PKLI report have not been updated, 4) Clear and straightforward regulations are needed in the PKLI collaboration between the Department of Mechanical Engineering and the IDUKA, 5) It is necessary sharpening goals/targets in student PKLI proposals because so far they are still general, 6) Limited funds for supervisors in conducting field visits in the context of monitoring and evaluating the implementation of student PKLI.

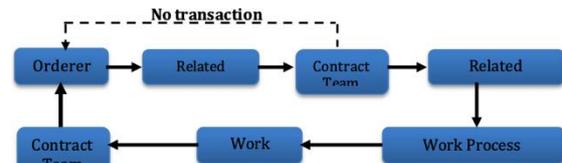
**3.8. Implementation of Internship Cooperation**

The implementation of internship cooperation in this company can be categorized to students and teaching staff (lecturers) of the Department of Mechanical Engineering, Faculty of Engineering. Unimed. The design carried out on the student system is not much different from the implementation of PKLI, namely by submitting a proposal, while for lecturers by submitting a Term of Reference (TOR) activity. The findings obtained in the implementation of this internship include the following: Circle Process time required at least 3 months, while the types of work that can be developed include Sparepart and Repair Rate Time, Customer Satisfaction Index, Man Power/HRD, Training, and so on. While the material that needs to be understood beforehand is the provision of analytical methodology from a Circle Process of a problem.

In general, IDUKA response to students or lecturers who carry out PKLI, surveys, research, or internships at IDUKA is good. This means that the implementation of the program is still within the agreed corridor and complies with company regulations. However, in terms of productivity and quality of findings, it still requires more intensive improvement from various perspectives

**3.9. Implementation of Program Development Cooperation**

The implementation of program development cooperation is carried out by making a work contract in carrying out a job. This collaboration model involves the Service and Production Unit which is formed in the Laboratory/Workshop of the Department of Mechanical Engineering, Faculty of Engineering. Unimed. The workflow of this contract system can be described in the following scheme:



**Figure 3:** JTM FT Production Unit Process Flow. Unimed

In practice, this cooperation has limitations in terms of funds, manpower, and technical support tools. All of this ultimately leads to the timing of the completion of the work that is not right. While technically, generally the type of work can be done well, because there is no "Reject" in the work contract.

Principles of vocational education that is attached to the mission of the Department of Mechanical

Engineering FT. Unimed basically stipulates multiple measures of educational success, namely: (1) measures of success in educational institutions (in-school success standards) which include aspects of students' success in meeting curriculum requirements. (2) The measure of success in the community (out-school success standards) is determined by success after working in actual work.

Conceptions such as the one above lead the education system to also become a dual system that requires cooperation between the world of education and the world of business/industry based on functions, processes, organizations, and behaviors. In detail, the cooperation between education and IDUKA above demands consequences regarding the existence of (1) a strong partnership with IDUKA Parties, (2) a joint program with industrial education institutions; (3) Evaluation of concrete and original learning experiences (not abstract and imitation) with scientific experience in universities; (4) Personnel from educational and industrial institutions; (5) co-financing by educational institutions and industry.

The results showed that 88.5% of industries were willing to plan PKLI for students of the Department of Mechanical Engineering, FT Unimed. This is a green light for education managers to follow up the single-oriented education management system into dual education management (Department of Mechanical Engineering and IDUKA). Likewise, the reluctance of industry to be involved in curriculum preparation (46.2%) illustrates so that the Department of Mechanical Engineering can proactively pursue information in the business/industry world in designing its curriculum, because basically, the industry does not object to providing technical information as long as it is not related to other matters. company confidential matters. As for cooperation in the provision of educational facilities/infrastructure, the industry is generally not willing to contribute or contribute materially. This situation is indeed difficult to bridge, because of the different orientations of the two institutions where education is non-profit-oriented while the industry is profit-oriented. For this matter, it is necessary to find a model of cooperation so that it meets the point of contact between the needs of the two institutions which have different orientations.

In the implementation of the cooperation model developed in this study, it turns out that the point of contact between educational institutions (Department of Mechanical Engineering) and industry can be found. Implementation of student PKLI and internships in the industry can be done if the time and resources are designed periodically. In this case, the industry will look for appropriate types of work for students/lecturers, while studying and providing

opportunities for students/lecturers to achieve the gains proposed in the activity proposal. Likewise, the model of cooperation in program development, especially on job/order work carried out between industry and the mechanical engineering department, turns out to be just a matter of developing and rearranging owned resources and institutional management in the field of cooperation with industry or other stakeholders. That is, the point of contact of cooperation between higher education institutions and the business/industry world in principle can be done well.

#### 4. CONCLUSION

Based on the description of the research results that have been described in the previous section, the following conclusions can be drawn:

1. In general, the industry (IDUKA) is willing to cooperate with the Department of Mechanical Engineering FT. Unimed in the context of organizing the PKLI and Internship Programs
2. Types of potential and cooperation between the Department of Mechanical Engineering and IDUKA that can be developed are the development of business and production units (53.8%) and the field of industrial training (including PKLI and internships) is 88.5%.
3. In general, the attitude and response of IDUKA towards students or lecturers who carry out industrial field practice (PKLI), surveys, research, or internships in companies/industries is good.
4. Forms of Competence that must be possessed by students of the Department of Mechanical Engineering FT. Unimed in carrying out collaboration with IDUKA is disciplined, responsible, able to read pictures, willing to work in the field, and able to work according to their field.
5. The form/model of cooperation between the Department of Mechanical Engineering and the IDUKA Party that was developed (PKLI, Internship, and Service and Production Unit Program Development) can be implemented properly.

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