




Empowerment of Dermo Youth Organization with design training, welding techniques and OHS towards the development of economic independence of village communities

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ARTICLE INFO	ABSTRACT
<p>Article history Received: 2024-03-02 Revised: 2024-05-11 Accepted: 2024-06-16 Published: 2024-06-21</p> <p>Keywords Community empowerment Occupational health and safety Training Youth</p>	<p><i>Unemployment may cause problems for those who experience it for example depression and cause other social problems including criminal acts such as thuggery. This problem can only be eliminated if the root cause of unemployment is eliminated. Eliminating unemployment must be done comprehensively although every region always has unemployment due to various factors, and it would be wiser if in overcoming the problem of unemployment and its side excesses such as thuggery, the local potential of the region and the communal approach are put forward. Handling of these social problems will be applied in Dermo Hamlet, Dau Subdistrict, where many welding workshops are located, yet there are still many people of productive age who do not have permanent jobs or are unemployed. So that the proposed Science and Technology-Based Community Service program in collaboration with Youth Organization partners in Dermo Hamlet aims to overcome these social problems through organizing design training, welding training and OHS / Occupational Health and Safety socialization. The initial capital constraints in making this business even though it is simple are related to the funding budget that is still not available to buy welding equipment and other supporting tools, besides that it is also constrained related to skills. So that in this PKM, 1 set of welding machines is provided. And the indicator of program achievement is marked by understanding of the material by giving 10 Basic Welding certificates and 10 OHS certificates from the Mechanical Engineering Study Program.</i></p>
<p>Kata kunci Karang taruna Keselamatan dan kesehatan kerja Pemberdayaan masyarakat Pelatihan</p>	<p>Pemberdayaan karang taruna dusun Dermo melalui pelatihan desain dan teknologi pengelasan serta keselamatan dan kesehatan kerja dalam rangka mewujudkan kemandirian ekonomi masyarakat desa. Pengangguran dapat menimbulkan permasalahan bagi yang mengalaminya misalnya depresi dan menimbulkan permasalahan sosial lainnya termasuk tindak kriminal seperti premanisme. Permasalahan ini hanya dapat diatasi jika akar penyebab pengangguran dihilangkan. Penanggulangan pengangguran harus dilakukan secara komprehensif walaupun setiap daerah selalu mempunyai pengangguran karena berbagai faktor, dan akan lebih bijaksana jika dalam mengatasi masalah pengangguran dan eksekusinya seperti premanisme, dikedepankan potensi lokal daerah dan pendekatan komunal. Penanganan permasalahan sosial tersebut akan diterapkan di Dusun Dermo, Kecamatan Dau, yang banyak terdapat bengkel las, namun masih banyak masyarakat usia produktif yang tidak memiliki pekerjaan tetap atau menganggur. Sehingga usulan program Pengabdian Masyarakat Berbasis Iptek bekerjasama dengan mitra Karang Taruna di Dusun Dermo bertujuan untuk mengatasi permasalahan sosial tersebut melalui penyelenggaraan pelatihan desain, pelatihan pengelasan dan sosialisasi K3/Keselamatan Kerja. Kendala modal awal dalam membuat usaha ini walaupun sederhana adalah terkait anggaran dana yang masih belum tersedia untuk membeli peralatan las dan alat pendukung lainnya, selain itu juga terkendala terkait keterampilan. Sehingga pada PKM ini disediakan 1 set mesin las. Dan indikator ketercapaian program ditandai dengan pemahaman materi dengan pemberian 10 sertifikat Dasar Pengelasan dan 10 sertifikat K3 dari Program Studi Teknik Mesin.</p> <p style="text-align: right;">Copyright © 2024, Aisyah et al This is an open access article under the CC-BY-SA license</p> <div style="text-align: right;">  </div>

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INTRODUCTION

Employment has an important role in the survival of society therefore high unemployment will always be a social problem that needs to be resolved and become a public nightmare. Unemployment can also cause problems for those who experience it such as depression and cause other social problems including criminal acts (Sabiq & Apsari, 2021). In general, unemployment is caused by an imbalance between the number of available jobs or employment opportunities and the number of labor force or job seekers. This imbalance can have an impact on economic conditions and community life (Basrowi, 2019), causing political and social instability (Di & Di, 2021). This problem has also occurred in the area where this Science and Technology-Based Service partner is aimed at Youth Organization in Dermo Sub-district. With prioritized problems that will be resolved related to unemployment and economic improvement with workshops on design, welding and OHS. Hopefully, Dermo residents, especially young people, can be empowered and play an economic role in their own community. The output of this program is a paper published in the Sinta Journal and module copyright work. This service program will be carried out with the support of the CoE (Center of Excellence) Welding Inspector owned by the UMM Mechanical Engineering Department, support in terms of equipment facilities, instructors and students are involved. In line with the goal of achieving IKU2, namely students gaining experience outside the campus with a conversion value of 4 credits for 1-month PMM (Student Community Service) Lecturer Partners, besides that IKU3 lecturers doing activities outside the campus will be able to apply their work directly in the community, as well as IKU5 lecturers and students get recognition.

Generally, these cafes are owned by entrepreneurs or even wealthy students who come from out of town. Likewise, the employees are their fellow students. Meanwhile, Dermo's young men generally quit school after graduating from high school or vocational school. Many then work in self-employment, become construction workers while others become unemployed. The unavailability of job opportunities in their own neighborhood is a clear inequality. Moreover, after the reformation period, the nation's economic and politic condition has worsened (Saragih, 2022) (Aswicahyono & Christian, 2017)(Tarmidi, 2003) (Purwoko, 2010). Not only is there an economic crisis, but there is also a moral crisis. The increase in population density, the increasing number of unemployed people, supported by the increasing poverty rate, has resulted in a person not having fear in committing crimes(Sugiarti, 2014)(Ishak, 2013)(Freeman, 1991) (Youth et al., 2020) . Due to economic pressure, many people take shortcuts by using any means to get money. This problem has led to higher crime rates, especially in densely populated urban areas (Notohamidjojo, 2011). These conditions may have triggered some of the recent events that occurred in the Dau area, such as cases of brawls or clashes among youths (<https://malangposcomedia.id/sekelompok-pemuda-bentrok-di-dau/>), cases of alcohol that claimed lives (<https://suaraindonesia-news.com/pesta-miras-akhir-pekan-tiga-warga-dau-tewas/>), and other cases that are quite alarming. Gangsters and street crime are social problems that originate from the mental attitude of people who are not ready to accept jobs that are considered less prestigious. Gangsters in Indonesia have existed since the Dutch colonial era, in addition to acting as vigilantes, the perpetrators of gangsterism have also utilized several local champions to carry out low-level acts of thuggery which generally commit street crimes such as theft with threats of violence, extortion, rape, persecution, committing acts of violence against persons or goods in public and even committing murder or premeditated murder, public drunken behavior, which of course can disturb public order and cause unrest in the community. Cases of thuggery develop due to marginalization and lack of education. One of them is due to the communal nature of Indonesian society and especially the people of Dau Sub-district where communal rules such as autonomous rules are effective in preventing certain crimes (Arifin, 2016).

Data from the Central Bureau of Statistics shows that the demographics and economic potential of Dau Sub-district need to be considered. The population of productive age (15-64 years old) is 72% (50,862 people) while the economic potential of Dau Sub-district is supported by agriculture, tourist areas, hotels and restaurants, and industries that absorb a lot of labor from the productive age (BPS Malang, 2020). For the industrial sector, especially for small industries, there are many welding workshops, most of the work is related to the manufacture of fences, doors, trellises, and accessories related to flower plants with the peculiarity that the workers involved in this industry are mostly residents around the workshop. As an alternative to the above products, products related to accessories related to flower plants need to be explored because if the industry only relies on the manufacture of doors, fences, and trellises, it will only rely on orders, which are sometimes not continuous in volume. Although the area is known as a center for welding workshops, there are still many people of productive age who are unemployed. If left unchecked, the unemployed productive-age population, if not handled quickly and appropriately, could potentially fall into unlawful activities such as thuggery. In the view of the proposer, if this unemployed population is trained in metal welding skills, it will be very useful for them to get jobs in the metal welding industry or even set up their own workshops if they have enough technical and capital assets.

Another technical problem encountered in supporting the diversification of welded products in order to be competitive with other welding workshops is the ability to produce other products such as flower container accessories. Limited knowledge and innovation about design and unfamiliarity with the various welding methods and techniques needed to produce various types of accessories can make product diversification efforts unattainable. Almost all welding workshops use metal arc welding with various types and brands of welding machines combined with using generic electrodes to weld various types of raw materials. Various forms of materials such as plates, tubes, and solid cylinders require certain electrode

diameters with certain current settings and certain welding techniques. This expertise can be obtained from training and educational institutions, but unfortunately most of the workers or prospective workers who join this industry mostly do not come from graduates of these two institutions which means that welding skills are obtained from a self-taught process. As a result, the quality of welds between welders is not uniform due to the difference in expertise. The side effect is that they are very unfamiliar with OHS (Occupational Health and Safety), which is something that must be applied in all lines of industry (Benjamin O. Alli, 2008). So, it is deemed necessary to improve this welding skill by providing technical assistance and the implementation of OHS.

Against the background of these conditions, this science and technology-based service program targets empowerment, especially in the youth community, by cooperating with the Dermo Youth Organization, by conducting workshops on design, welding and OHS. Thus, the main problem of Partners is the existence of economically marginalized and economically unproductive youth communities, which are very vulnerable to thuggish practices. Partners are empowered with the method of 1) organize design training, 2) organize welding training, and 3) OHS socialization.

The lecturer and PMM (Student Community Service) students together with partners have carried out several activities, including identifying youth who need skill enrichment for work readiness. Designing training mechanisms, selecting venues and developing businesses The training chosen was welding practice. Specifically, designing and welding steel wire into flower shelves. With the aim of making this form of product easier to market. Since Malang is known for its cool weather, various flowers are able to grow well, and as a result, the demand for flower shelves is very high. In addition, the café area in Dermo hamlet will be more beautiful if it is colored with various live flowers, so that in this program the Youth Organization can sell its products to café owners. With trainings, as well as entrepreneurship development, it is hoped that the Dermo Youth Organization community can play a role in this business. It is also necessary to carry out a technical assistance process regarding OHS in the welding process and in the welding industry.

Unemployment as the main priority to overcome can be resolved within 1 year by empowering local residents who have not been absorbed by employment with several stages, providing training on basic welding methods and techniques is one solution. Training on occupational safety and health management is also provided. Since the Dau sub-district is known as a center for small industries, especially the fence welding industry, it was deemed necessary to utilize this advantage to solve the unemployment problem. Welding workshops are growing in Dau Sub-district along with the development of settlements in both villages and housing estates. This requires a lot of demand for fences, trellises, doors, and canopies that are made using welding methods. These workshops are mostly small welding workshops with a workforce of between two and four people including the owner. Sometimes, workers who feel they have the skills and business capital take the initiative to open a welding workshop. This new business inevitably requires new welders and the abandoned workshop needs to replace the outgoing welders. According to information from Karang Taruna, welding workshops accept welders based on the principle of recommendation and preferably those who already have experience.

This recruitment pattern makes it difficult for someone who has never had welder experience to fill this demand. Instead of the demand for welders being filled by local youth, it could be filled by welders from other areas and still leave the problem of unemployment in Dermo Hamlet. Therefore, efforts were made to equip the youth with practical skills in welding. If they have expertise in welding, it can be used as an entry ticket to fill vacancies. Furthermore, there can be a scroll of benefits such as the establishment of new workshops when business actors feel they already have business capital and both technical and managerial abilities.

As new welding workshops emerge, the constant growth of settlements is seen as a challenge that needs to be considered to maintain the continuity of the welding workshop business process. Therefore, other alternatives to keep the business process running need to be considered. This can be done by diversifying products, and one that is proposed is a new product such as a plant shelf. This product is seen as a solution to open insights for Youth Organization members who want to work in the welding field both as workers (welders) and as business owners that welding workshop products are not only in the form of fences, doors, trellises, and canopies but can take other forms. The choice of this alternative product is based on the idea that Dau Subdistrict and Malang Regency in general have natural resources, where is perception The beauty of a city cannot be separated from the image problems of city users. Thus Malang is branded as a beautiful city (Sayoko & Wikantiyoso, 2019). Then the flower garden arrangement efforts or ornamental plants which in order to make the beauty at home or public places, always use equipment in the form of a shelf or stand which is generally made for iron which is shaped in such a way and put together by the welding method. In addition to the need for this shelf, it can be more promising for its sustainability also because its size tends to be compact so that this product can meet both the needs around Dau Subdistrict or other more distant areas because it is easier to deliver.

Although promising, the success of products such as this flower holder is highly dependent on the design. If the design is up-to-date and according to market tastes, it can be expected that this product will sell well in the market. But if not, it will be a problem later in marketing. Therefore, it is necessary to be briefed on the basic design of the flower holder, its trends and how to perform the welding process due to the different materials and sometimes complicated shapes.

Furthermore, considering that welding work is carried out using electricity and high heat that could potentially endanger operators and people around them, Occupational Safety and Health (OHS) is introduced (Permenaker No. 12 of 2015). The main purpose of the implementation of OHS (electricity) is to 1) protect the safety and health of labor and other people who are in the workplace environment from potential electrical hazards. It is also intended to 2) create electrical

installations that are safe, reliable and provide safety for the building and its contents, and 3) create a safe and healthy workplace to encourage productivity.

In addition, to introduce the importance of wearing Personal Protective Equipment (PPE). This PPE must be worn by welding operators when welding (Arsyad et al., 2019). PPE is an important part of the effort to implement OHS in the welding workshop. If examined, welding hazards can be distinguished based on the welding process, hidden hazards and other hazards. Hazards originating from the welding process can come from machine operation, electricity, fire, arc welding radiation, welding fumes and explosions. While hidden hazards can come from working with tools that are not commonly used, working in confined spaces, poor electrical or gas connections, hot metal and others.

The above potential hazards need to be introduced to welding operators and business owners so that work accidents can be avoided as early as possible. This is important because work accidents are always detrimental, especially to the personnel who experience them and the welding workshop both materially and non-materially. The implementation of OHS is inseparable from the quality of work that has standards as stated in the Permenaker both regarding Electrical OHS Permenaker Number 15 of 2015 (Ida, 2021) and on Occupational Safety in Law of the Republic of Indonesia Number 1 of 1970 (State, 2005). Improving the quality of this work can be done by carrying out work in accordance with OHS welding standards and providing training on the importance of Safety and Work in the field of welding.

This community service program is designed to provide the community in the vicinity with knowledge and technology on welding process which is become one of strenght in Mechanical Engineering - UMM through one of its flagship program, namely CoE Welding. There a several community service in Malang which give training in welding but in majority it is designed to solely give the skills in welding without further giving training on designing of the product and OHS. Both designing of product and OHS become the strength of this community service.

The importance of the community to play a role looking for a solution is what is expected from the DPPM-UMM Service program. As Community Empowerment academic community, devotees have plunged into the community like doing women empowerment (Iis Siti Aisyah et al., 2018), assistance to entrepreneurs small/MSMEs in assisting P-IRT certification (Iis Siti Aisyah & Evanale, 2019) and stunting prevention program (Iis Siti Aisyah, 2021) and assisting in implementation OSHC toward Halal Certification for UMKM (I S Aisyah et al., 2023). On this time Community Service conducted by Students (PMM Mitra Lecturer) 2022 and 2023 University of Muhammadiyah Malang guided by Iis Siti Aisyah, Ali Mokhtar, Dini Kurniawati and Nur Hasanah. This community service is conducted to support SDGs 1 No Poverty, SDGs no 8 Decent Work and Economic Growth, and SDGs no 10 Reduce Inequalities.

METHOD

Dermo is the name of a village in Mulyoagung, Dau District, Malang Regency in where the program of community service is implemented. In this hamlet, culinary tourism is developing with the growth of cafés along the main road of Dermo hamlet, shown in Figure 1.



Figure 1. Main axis of Dermo highway

The program was implemented in May-July 2023 in collaboration with Karang Taruna Dusun Dermo. The program is started by preparation phase. In this phase, an identification of targeted beneficiary which is youths who need skill upgrade and enrichment for job readiness. The results of this phase is used to design training topics and mechanism to delivers. Also, the training modules is prepared in accordance with level knowledge of trainee in design of product and welding process. The training modules consist of theory of welding, introduction and familiarization to welding apparatus, procedure to choose proper welding parameter, i.e. voltage, current, polarity, and welding distance, and also the knowledge of metal in welding and size of welding rod in accordance with metals to weld. All these knowledge is essential for welder to produce sound weld.

After the first training in welding technology then the second one take place in which the trainees learn to design welded products. The products is directed to other than commonly found products in Mulyoagung Village such as fences,

gates, doors, canopies or trellis but other type of products in forms of plant's rack regarding the competition of previous products is tighter. For the training purpose, trainee is tasked to design and produce simple plant's rack. In this training also covers Intellectual Properties (IP) of design. The last steps in the training is training and socialization of related OHS and welding practice. To measure the success of program, trainee is evaluated by doing test of competency in welding and OHS. Successful trainee is awarded certificate by Welding Center of Excellence (CoE) of Mechanical Engineering UMM.

RESULTS AND DISCUSSION

Program Preparation

Training preparation for a youth organization involves careful planning and consideration of the organization's goals, the needs of its members, and the desired outcomes of the training. The training preparation start from identification of the audience, involve surveys and interviews of the Karang Taruna's leader. Then create the training plan, preparing the training materials or modules. Also provide the welding experienced trainers.

Designing a simple plant shelf

The product specified as a welding learning is a simple multi-tiered plant shelf as shown in Figure 2. The shelf is built using esser solid iron material which is easy to weld.

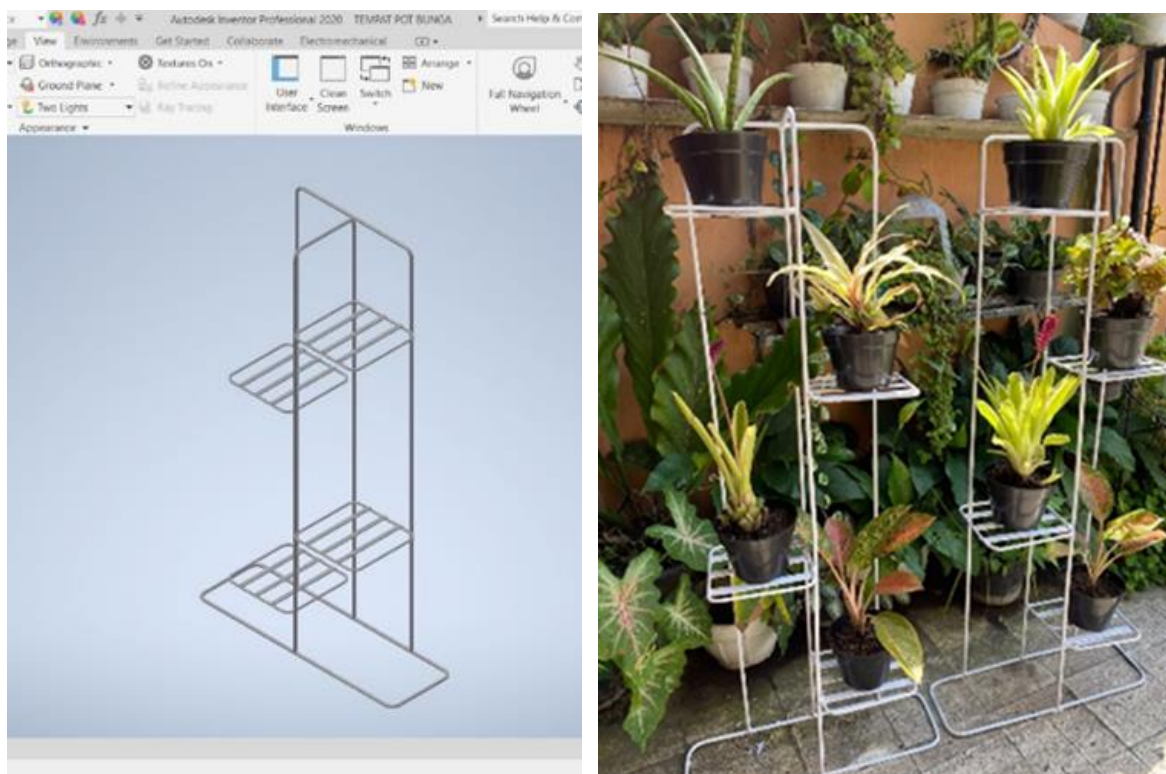


Figure 2. Design drawing of plant shelf (left) finished shelf (right)

Welding skills debriefing

In performing the metal welding process, welding machine operators need to know the metal welding technology itself. Some of the mechanisms for implementing the solution to the provision of welding skills are the proposed activities carried out:

1. Provide an introduction to electric welding machines and their auxiliary devices.
An introduction to electric welding machines and their auxiliary devices is necessary because welding machines have several types in addition to components and control buttons that need to be adjusted to a certain position so that the current used is in accordance with the material to be welded as well as the type and diameter of the electrode. If an operator is not familiar with the buttons and features of the welding machine, it cannot be expected that the resulting weld product will be optimal. Knowledge of input voltage, input power and maximum output power is very important to know whether the input electrical power both from home / workshop electricity (from the PLN network) and electric generators is sufficient to operate an electric welding machine for the amount of current selected. This is very important because if the input power is not able to meet the needs of the electric welding machine setting, it will cause the source power to be overloaded.
2. Provide an introduction to welding parameters such as setting voltage, current, polarity, and welding distance.
It is necessary to do this because good weld results cannot be separated from good welding parameter settings. The input voltage for DC Inverter type welding machines usually corresponds to the grid/generator voltage of

240V/50Hz so there is no need to adjust it. Depending on the thickness of the material and the diameter of the electrode, the choice of the amount of electric current used needs to be chosen correctly. The greater the current selected, the greater the power drawn from the source as well as the power applied to the electrodes. This will cause the heat generated by the welding machine as a result of plasma transfer from the electrode tip to the workpiece will be even greater.

3. Provide basic knowledge of metal materials and electrode equivalents used in the metal welding process. It is also important to discuss the compatibility of the specimen material with the electrode because the success of metal welding is strongly influenced by the molten metal deposit (droplet) which in turn is the result of electrode selection, welding parameters and material. The diameter of the electrode used should not be thicker than the thickness of the specimen because there is a possibility of penetration which will result in the weld being difficult to form / settle. Similarly, the shape of the joint and the welding position need to be considered in choosing the combination of workpiece and electrode (Junaidi: 2018).

The activity is shown in figure 3. For the effectivity of learning, the training is held in Manufacturing Laboratory, Mechanical Engineering Department, Faculty of Engineering, UMM.



Figure 3. Left during briefing before practice, right Welding Practice

Providng Occupational Health and Safety (OHS) training

For solutions to empower members of the Dermo Youth Organization that are in accordance with providing OHS welding training, the program offered in this Community Service is carried out with the following mechanism:

1. Provide understanding through training on welding standards
2. Provide an understanding of Personal Protective Equipment (PPE) and how to use it.
3. Provide an understanding of First Aid and Light Fire Extinguishers (APAR) and how to use them.

The OSH training was carried out with the help of PMM students, shown in Figure 4. The training also held in Mechanical Engineering department.



Figure 4. Occupational Health and Safety Training

Evaluation and provision of welding machines and certificates

In the implementation of these programs, partners actively participated in both the survey phase of partner problems, the preparation of program proposals, following the program being implemented and providing feedback for each program implementation. In addition to actively participating in the program, partners also fulfilled their obligations to prepare the venue for the first training at the Hamlet Hall, and the second training at the Mechanical Engineering Lab, Partners also helped mobilize their members to participate in implementing this program.

For programs related to welding expertise, the evaluation carried out is to test the absorption of training material in the form of pre and post tests for the training provided. Basic competency tests will also be given at the Center of Excellence Welding Inspection at the Department of Mechanical Engineering, Faculty of Engineering, University of Muhammadiyah Malang. In addition, feedback from participants regarding their satisfaction with the training material provided was also sought, resulting in the following results in the table below.

The provision of 1 set of welding machines is intended to motivate them to continue to perfect their welding skills. And plant rack products are also given along with Basic Welding competency certificates issued by the Mechanical Engineering Study Program. Shown in figure 5.



Figure 5. Closing the event, participants receiving Basic Welding competency certificates

From the indicator of program, the training gives significant boost to the knowledge to the material for welding. The trainee also pass the examination of proficiency in welding with all the participants (10 people) is awarded certificate. As programmed, the OHS training give similar results in which all participant pass the exams. From this results, it can be concluded that the training is delivered as expected. From others publication, all also report similar reports regardless of the training targets such as high school students (Mamungkas et al., 2020), workers (Risdiyanto et al., 2023), youths (Martawati et al., 2023), craftsmans (Sudjono et al., 2020), and villagers (Muzaki et al., 2021). For OHS, similar results also is obtained. From the interview, trainee acknowledge the importance of OHS and this finding similar such as villagers (Tri Widodo & Ismail Fardiansyah, 2023), workers (Suharso et al., 2023) (Yoto et al., 2020), welders (Putri & Tjahjono, 2022), and workshops (Putri & Tjahjono, 2021).

CONCLUSION

All design training, welding training and OHS socialization activities have been carried out successfully. After 4 meetings, participants were able to practice welding well. And it is proven that this program can produce business practitioners who are skilled in correct and effective welding techniques, and thus achieve efforts to empower young people towards building

the economic independence of rural communities. With the certificate they have obtained, hopefully they can have a career in the welding industry around the Dermo area.

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