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Reuleut Timu Village Youth Empowerment through Service Training for Refrigeration Equipment in the Neighborhood of Malikussaleh University

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ABSTRACT

The environment of the Reuleut Campus of Malikussaleh University has a dense area along with the increase in the number of students who inhabit the area. The number of offices and boarding houses with AC facilities is an opportunity for a property as an AC service technician and the increasing need for AC Service Technicians. The purpose of the service is to provide knowledge and skills in the maintenance and repair of Split Water Conditoner (AC) to the Youth of the Environmental Village of Malikussaleh University. The implementation of Service activities was carried out with Berkat Maju Service partners located at SP KKA Dewantara District, North Aceh Regency. The training uses theoretical, practical and internship methods. In the first method, participants are given knowledge related to theory in the form of practical support materials. Practice Methods related to air conditioner maintenance and repair starting from the introduction of work aids, installation and disassembly, service and damage detection are carried out directly by providing 1 unit of air conditioner as a practice material. Internship methods are carried out to provide participants with direct experience in the field conditions alongside partners The results of the activity show an increased level of participant knowledge about cooling equipment, based on evaluation data that indicates understanding of basic cooling equipment, equipment servicing, AC disassembly, and proper Freon detection.

1. Introduction

Air conditioning, commonly referred to as AC (Air Conditioner) in Indonesia, serves as a cooling system. In contemporary settings, AC has become an essential component in both residential and commercial spaces. With the rapid advancement of technology, innovative products continue to enter the market, transforming air conditioning into both a necessity and a symbol of modern lifestyle.

An air conditioner (AC) is a system designed to reduce indoor temperature by absorbing heat from the surrounding environment [9]. Regular maintenance is essential to ensure the efficient operation of AC units, thereby providing thermal comfort to occupants and preserving the functionality of all components. Maintenance encompasses activities aimed at sustaining, servicing, and ensuring that machinery or equipment remains in optimal working condition to support uninterrupted operation in accordance with production requirements. Effective maintenance practices are necessary for both the retention and restoration of machinery or equipment, thereby facilitating optimal productivity [9].

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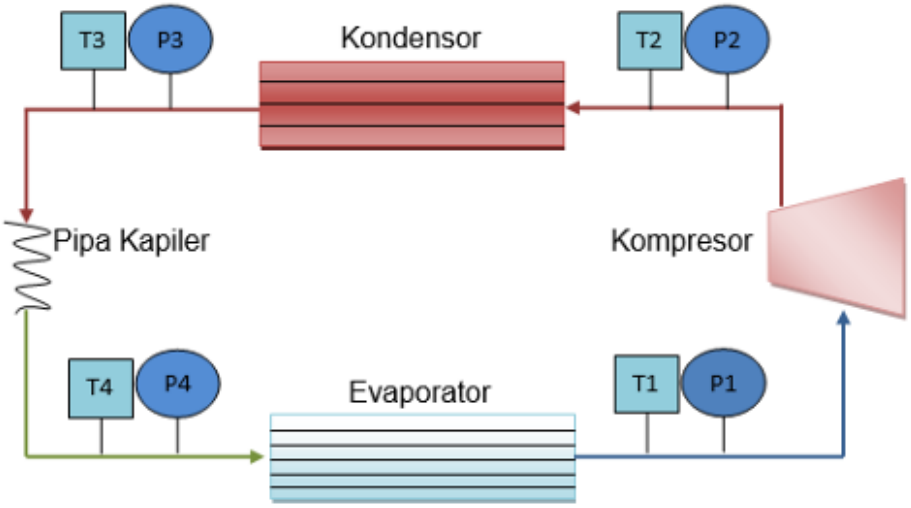

Figure 1.Schematic of Airconditioner System

The operational process of a split air conditioner involves several stages. Initially, air from the room is drawn in by a centrifugal fan in the evaporator. The incoming air then passes over coil pipes containing refrigerant liquid, which absorbs heat from the air, causing the air to cool while the refrigerant evaporates. The refrigerant vapor, having absorbed heat, is subsequently compressed by a compressor, increasing its pressure and temperature. The high-pressure refrigerant then flows into the condenser, where the absorbed heat is released into the outside air. After this, the cooled, high-pressure refrigerant passes through an expansion valve, which reduces its pressure and temperature. Finally, the cooled refrigerant returns to the evaporator to absorb heat again, and this cycle repeats continuously [1,4,6,14].

The development of Reuleut Timu Environmental Village has been examined by Fakrurrazi et al. (2022) in the context of digital village services and administrative systems. Malikussaleh University has experienced continuous growth, with an increasing student population each year. This expansion has directly impacted the surrounding campus environment, including Reuleut Timu Village, leading to a rise in demand for student boarding facilities. In response, the local community has provided boarding houses equipped with various amenities, including air conditioning. As a result, there is an increasing need for AC maintenance services, highlighting the demand for skilled professionals in AC servicing (Muhammad et al.) [7].

Several studies have emphasized the importance of AC maintenance training. Ragil Sukarno et al. (2022) conducted basic maintenance training for split AC cooling systems in Pantai Mekar Village, Muara Gembong, Bekasi. Their findings indicate that the training provided participants with fundamental knowledge of AC system maintenance and motivated them to perform maintenance tasks independently. Similarly, Yenni Arnas et al. (2024) organized AC service training for students at Dirghantara Aviation Vocational School, which significantly improved their technical competencies. Additionally, Widianto et al. (2022) conducted split AC training for RW III youth organizations, successfully equipping participants with essential knowledge of AC servicing.

Despite the widespread use of split air conditioners in residential homes, most individuals lack the necessary skills to perform independent maintenance [9]. Given this background, it is crucial to provide training on split AC servicing to the youth of Reuleut Timu Village. Such training would enhance their technical knowledge and create opportunities for them to establish independent AC maintenance businesses.

2. Methodology

The method used is training by providing material, practice and work internships with the following stages:

Figure 2. The Stage of Community Empowerment Program

The first stage involves the instructor delivering theoretical material on the cooling system, service tools and their usage, as well as AC split components and their functions. In the second stage, the instructor demonstrates how to use service tools, disassemble AC components, perform maintenance, and replace Freon. Participants are then given the opportunity to practice these tasks independently. The third stage consists of a two-week internship, during which participants work with partners to gain firsthand experience in the field.

3. Activities and Results

The implementation of the training activities was conducted in two locations: theoretical sessions were held in the Mechanical Engineering Study Program Laboratory, while practical training and internships took place at the CV Berkat Maju Workshop, as illustrated in Figure 2. The theoretical instruction was delivered by lecturers, while practical sessions were supervised by instructors from CV Berkat Maju, who were students from the Mechanical Engineering and PVTM programs. The training program lasted a total of 12 days, comprising four days of theoretical instruction and practical training, followed by an eight-day internship.

The theoretical component covered the use of occupational health and safety (K3) tools, the principles and operation of air refrigeration systems, the use of service tools, and the operation of jet cleaners and vacuum pumps. Additionally, participants were introduced to Split AC systems. The practical training included the application of K3 protocols, the proper use of service tools, tubing connections, disassembly of Split AC units, Freon replacement, and welding techniques.

During the internship phase, participants were required to accompany and assist experienced technicians in providing AC maintenance and repair services directly to customers. The primary objective of the internship was to offer participants firsthand experience in real-world work environments, allowing them to observe the service process and understand professional

interactions with clients. Throughout the practical sessions, the instructor demonstrated service techniques, after which participants were required to replicate the procedures to reinforce their learning.

Figure 3. The Activities of Community Empowerment Program.

To ensure that participants developed a comprehensive understanding of air conditioner components and their operating systems, the first day of training commenced with a brief tutorial. Participants received an overview of the function and types of air conditioners, the components of Split AC units, the operational cycle of Split ACs methods for calculating air conditioning requirements for a room or building, maintenance and repair procedures, common issues encountered in Split ACs along with their solutions, and the tools used in AC maintenance.

The outcomes of this training program demonstrated significant improvements in participants' technical competencies. Participants successfully performed flaring for nepel connections and measured AC compressor pressure using a manifold gauge. They also demonstrated the ability to conduct Freon charging, service air conditioners by removing and cleaning indoor filters, and effectively remove and clean outdoor air filters. Additionally, they acquired the skills to measure the current in the compressor. These results indicate that the training program effectively enhanced participants' practical knowledge and ability to perform essential AC maintenance and repair tasks.

The evaluation was conducted through the administration of questionnaires to participants both before and after the training. The assessment focused on fundamental knowledge of air conditioning systems, the use of service tools, and AC maintenance procedures. As illustrated in Figure 4, the evaluation results indicate a significant improvement in participants' skills in AC maintenance. These findings underscore the importance of continuing and expanding training programs to further enhance technical competencies in this field.

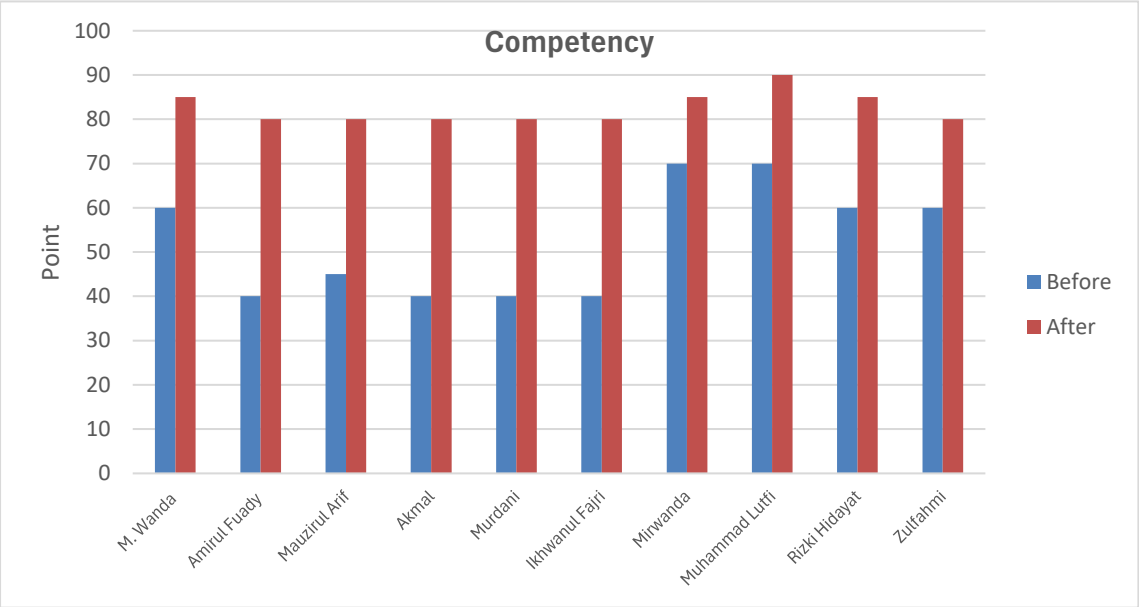

Figure 4. Comptency of participants

4. Conclusions

The training program yielded significant benefits for participants, particularly in enhancing their theoretical understanding and practical skills in Split AC servicing. This initiative provided participants with a foundational knowledge base and essential technical competencies necessary for AC maintenance and repair. Participants exhibited a high level of engagement throughout all stages of the training, from theoretical instruction to hands-on practice under the supervision of the instructor. During the practical sessions, they successfully demonstrated the ability to perform basic maintenance on Split AC units. Overall, the training effectively equipped participants with fundamental knowledge of AC system maintenance while fostering their confidence and motivation to undertake maintenance tasks independently. Furthermore, the evaluation results indicated a substantial improvement in the community's AC maintenance skills, underscoring the importance of continuing and expanding similar training programs to further develop technical expertise in this field.

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