EFFECTIVE COMMUNICATION SYSTEM AND AVIATION SAFETY: A NARRATIVE STUDY OF COMMUNITY SERVICE CONDUCTED AT SMK MUHAMMADIYAH 9 LAMONGAN

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Abstract

This study used a narrative inquiry design to reveal the outstanding participants of a community service conducted to train aviation communication and safety at SMK Muhammadiyah 9 Lamongan. This study was intended to portray the impactful benefits and contributions in determining future implications for participants' professional development. There were seven participants chosen using a purposive sampling technique by considering inclusion criteria such as being the most active participants in the program. Data were collected using interviews and the obtained qualitative data were analyzed using a thematic approach. Results showed that there were three key points of experiences perceived by the participants, namely the importance of effective aviation communication, awareness of aviation safety, and collaboration between school staffs and students. The benefits covered increasing understanding of the aviation industry, developing practical skills, increasing awareness of safety, and forming aviation people. The future implications involved implications on education and the world of aviation, and implications in the world of transportation in Indonesia. This study suggests that the community service program conducted brings more benefits for teachers, students, the headmaster, school staff, and the facilitator.

Keywords: aviation communication, aviation safety, community service, narrative inquiry

Introduction

A key component of preparing students for the competitive workforce is vocational education offered at SMK Muhammadiyah 9 Lamongan. As part of vocations, the aviation sector is one of the expanding industries that need competent workers (Kankaew, 2021). In addition to technical proficiency, this business demands a thorough awareness of flight safety and communication systems. Thus, at SMK Muhammadiyah 9 Lamongan, community service emphasizing communication systems and aviation safety is a calculated move to raise student proficiency while benefiting society.

One of the most important components that guarantees efficient flight operations is the aviation communication system (Bellido-Manganell et al., 2021). To ensure flight safety and efficiency, pilots, cabin crew, air traffic control (ATC) officers, and other relevant parties must communicate effectively. Students who study aviation-related majors at SMK Muhammadiyah 9 Lamongan must have a thorough understanding of these communication systems, including how radio frequencies, communication protocols, and the newest technologies utilized in the aviation sector (Śliwa et al., 2022). Students can gain a greater

understanding of the value of precise and unambiguous communication in emergency situations by participating in community service that focuses on aviation communication systems. Students can also participate in flight communication simulators as part of this activity, which allows them to put what they have learned in class into reality. In addition to enhancing students' technical proficiency, this increases their self-assurance in handling real-world scenarios in the workplace.

Moreover, the aviation sector cannot overlook the importance of aviation safety besides the effective communication aspect (Yıldız, 2024). Millions of people travel by air each year, and stringent protocols and systems are necessary to ensure their safety. As a school that trains students to work in the aviation sector, SMK Muhammadiyah 9 Lamongan should make sure that its students comprehend the fundamentals of aviation safety. Aviation safety-focused community service might involve a range of exercises, including emergency evacuation instruction, familiarization with onboard safety equipment, and emergency scenario simulation (Malakis et al., 2023). In addition to helping children, these events can also include the local population, such as parents and Lamongan locals, to increase awareness of the value of flight safety. Thus, the students and the larger community both gain from this community work.

One of the most difficult issues in vocational education is ensuring that students not only grasp theory, but also apply it in reality. Students at SMK Muhammadiyah 9 Lamongan have the chance to put their knowledge to use in practical settings through community service related to aviation safety and communication systems. Students can work on little projects like creating a basic communication system or performing safety checks in the school setting, for instance. Collaboration with relevant parties, including airlines, airports, or other educational institutions with comparable programs, may also be a component of this activity. In addition to creating a network that will help them in the future, this type of cooperation can give students the chance to learn from experts in the aviation sector.

Participating in community service benefits the local community as well as the students. SMK Muhammadiyah 9 Lamongan can inform the community about the significance of communication systems and aviation safety by planning events that center on these topics. For instance, the public can be educated on how good communication can avert aircraft mishaps or how following safety protocols can save lives in dire circumstances. Additionally, educating the public about employment options in the aviation business can be accomplished through community service projects. Many individuals may be unaware of the variety of jobs available in the business, ranging from

cabin staff to ATC officers to aircraft maintenance. The younger generation in Lamongan might be encouraged to seek a career in aviation by SMK Muhammadiyah 9 Lamongan by offering clear and engaging information.

Community service is crucial for developing students' character in addition to its technical benefits (Claes et al., 2022). Students learn to care about the community and the environment through this exercise. They discover that they may utilize their knowledge and abilities to help others in addition to using them for their own profit. Community service projects on aircraft safety and communication systems can help SMK Muhammadiyah 9 Lamongan foster characteristics like leadership, accountability, and teamwork. Students will gain knowledge of problem-solving techniques, teamwork, and taking charge in trying circumstances. These principles are crucial for their future professional success as well as for their civic engagement.

The aviation sector is still changing, particularly with the advancement of digital technologies. With the advent of technology like GPS-based navigation systems, communication satellites, and more advanced safety gear, communication, and flight safety systems are also changing. As a result, SMK Muhammadiyah 9 Lamongan students must possess knowledge and abilities related to the most recent advancements in technology. Students can be exposed to the newest innovations in the aviation sector through community service. Students could be invited to tour airports or cutting-edge flight training facilities, for instance. Additionally, they can work on digital technology-based initiatives like creating computer-based communication systems or analyzing flight safety data.

Therefore, this study describes how community service on communication systems and flight safety at SMK Muhammadiyah 9 Lamongan is undertaken and has a lot of potential to benefit the students, the school, and the surrounding area. With this project, students can improve their technical skills, understand the importance of aviation safety, and apply what they have learned in real-world situations. This activity can also teach the public about the importance of safety and communication systems in flight and provide employment opportunities in the aviation sector. Thus, there are three research questions postulated in this study:

1. What are the participants' experiences in conceiving knowledge of aviation communication and safety?
2. What are the benefits perceived by the participants after participating in community service?
3. What are the future implications of the community service conducted viewed from the participants?

Literature Review

Communication System in Aviation and Its Relation to Aviation Officers' Ability

The in-flight communication system is one of the most critical components that ensure smooth and safe flight operations (Singh et al., 2024). Effective communication between pilots, cabin crew, Air Traffic Control (ATC) officers, and other relevant parties is key to avoiding mistakes that can be fatal. In the aviation industry, communication is not just about exchanging information, but also involves strict protocols, the use of advanced technology, and high interpersonal skills. Hence, aviation officers, including pilots, ATC, and cabin crew, must have proficient communication skills to perform their duties well. The aviation communication system encompasses a number of areas, including emergency communication, internal aircraft communication, and communication between pilots and ATCs (Soto, 2024). To prevent misunderstandings, pilots and ATCs use standardized, unambiguous terminology while communicating on preset radio frequencies. Furthermore, the communication system incorporates technology that provides real-time information exchange, including satellite navigation systems, transponders, and other digital devices (Dave et al., 2022). Effective communication is particularly crucial in emergency situations, abrupt weather changes, and technical malfunctions. Pilots must be able to effectively convey technical issues to ATC, for instance, so that they can provide the appropriate directions and guarantee flight safety. The chance of an accident can rise dramatically in the absence of effective communication.

Aviation officers must also have strong communication skills to perform their duties effectively (Harjanti et al., 2021). In aviation, time is precious, and information must be conveyed clearly and concisely to avoid confusion. Aviation officers must be able to convey messages in easy-to-understand language, using standardized terms that have been established in the aviation industry. In addition, listening is an important part of communication. Aviation officers must be able to understand instructions or information given by their colleagues, be it from ATC, pilots, or cabin crew. Errors in listening can lead to errors in decision-making (Parnell et al., 2022). In emergency situations, aviation officers must remain calm and be able to communicate even under pressure. This ability is crucial to ensure that the information conveyed is accurate and reliable. Communication systems in aviation are constantly evolving with new technologies (Ukwandu et al., 2022). Aviation officers must be able to adapt to these technologies and use them effectively. For example, they must understand how to use digital communication systems, transponders, and modern navigation devices. Aviation is a team operation that involves many parties. Aviation officers

must be able to communicate well with their colleagues, both onboard and on the ground. Good cooperation and coordination are key to ensuring flight safety and efficiency.

Aviation safety relies heavily on an effective communication system. Any communication error, be it due to signal interference, language errors, or lack of coordination, can have serious consequences. Therefore, aviation officers must constantly train and improve their communication skills. Regular training, simulation of emergency situations, and the use of the latest technology are some of the ways to ensure that they are prepared for various in-flight situations.

Aviation Safety

Aviation safety refers to a set of measures, procedures and standards designed to prevent accidents, incidents, and other risks in flight operations (Cheng & Shyur, 2025). It covers all aspects, from aircraft maintenance, air traffic management, and crew training to the enforcement of safety regulations. The goal is to ensure that every flight operates with minimal risk to passengers, crew, and the public on the ground. Aviation safety has enormous benefits, both economically and socially (Ansell, 2023). First, aviation safety increases public confidence in air transportation, which is one of the safest modes of transportation in the world. Second, by reducing the risk of accidents, the aviation industry can avoid large financial losses due to aircraft damage, lawsuits, or operational disruptions. Third, aviation safety also protects human life, both passengers and crew, as well as the communities around airports (MoghimiEsfandabadi et al., 2023). In addition, the implementation of strict safety standards also encourages technological innovation and improves the quality of human resources (HR) in the aviation industry. While technological advances have significantly improved aviation safety, current challenges are often influenced by human resources, particularly aviation officers. Some of these challenges include Skills and knowledge limitations, human error, human resource gaps, and differences in training standards. Aviation safety is a key foundation in the aviation industry that aims to minimize risk and ensure the safety of all parties (Parnell et al., 2022). While the benefits are immense, current challenges, especially concerning human resources for aviation officers, need to be addressed through continuous training, improved global standards, and the use of technology to support human performance. Thus, the aviation industry can continue to maintain its reputation as a safe and reliable mode of transportation.

Methods

This study used a narrative inquiry research design to reveal the experience obtained from several activities in the conducted community service. This study used a descriptive approach to portray the experience. There were

seven participants involved in this study consisting of a program facilitator, a tenth-grade student, an eleventh-grade student, a twelfth-grade student, a headmaster, a teacher, and a school's administration staff. They were chosen using a purposive sampling technique. Table 1 conveys the details of the participants' backgrounds.

Table 1. Participants' backgrounds

Category	**Participant (Code)**	**Description**
Collaborator	Program facilitator (P1)	Mastering aviation communication, understanding aviation safety, having relevant education background to aviation, being an aviation practitioner in Surabaya, and being a guest lecturer in one of aviation schools
School staffs	Headmaster (P2)	Leading the school for more than three years, having a concern on aviation industries, and supporting school programs that introduced aviation lives
	Teacher (P3)	Teaching multimedia that was relevant to aviation communication devices and having an eagerness to develop aviation learning materials
	Administration staff (P4)	Working at the school for more than 4 years, being familiar with aviation, and having an intention to introduce aviation at the school
School students	Tenth-grade student (P5)	Having an interest in aviation, being involved in a multimedia class, and being a high achiever among the tenth-grade students
	Eleventh-grade student (P6)	Having an interest in aviation, being involved in a multimedia class, and being a high achiever among the eleventh-grade students

	Twelfth-grade student (P7)	Having an interest in aviation, being involved in a multimedia class, and being a high achiever among the twelfth-grade students

The six school staff and students participated actively during the community service program. They also showed learning eagerness during the delivery of materials regarding aviation communication and safety. These six persons were also suggested by P1 to be interviewed to look at the experience and benefits of the program undertaken. To support the study's narrative inquiry design, this study used an interview draft as an instrument with semi-structured questions. Before participating in the interview, all participants P1-P7 were given a consent form and asked to complete it without any physical or psychological influences. The obtained data were then analyzed using thematic analysis.

Procedures for Conducting Community Service

The community service was conducted over two days. On the first day, all participants were introduced to the objectives of the community service. They were engaged in a friendly introductory stage, including where the committee came from, who was the facilitator, and how they should participate in the program. Then, they were given a mini-test in the form of small talk to look at their schemata of aviation communication and safety. As a result, many of them knew the aviation domain but still needed further clarification of theories and practices regarding aviation communication and safety. Afterwards, they were trained in aviation communication and how to do it effectively on the first day. At the last session of the first day, the participants were given a small quiz to look at how far their comprehension was after getting the materials. On the second day, they started the program with a small introduction to aviation safety. Similarly, they were given a theory underpinning and relevant practices. At the end of the second day of training, they were engaged with the facilitator to have small reflections and a brief discussion session. In the following process, the committee asked the six school staffs and students to participate in this narrative inquiry study.

Results

Experience in Conceiving Knowledge of Aviation Communication and Safety

Community service focusing on effective aviation communication and aviation safety at SMK Muhammadiyah 9 Lamongan provided a valuable experience for students, teachers, and school staff. This activity not only increased the understanding of the importance of communication and safety in aviation,

but also provided an opportunity to practice the knowledge in a real scenario. The following is a summary of the experience gained during this community service training.

Importance of Effective Aviation Communication

One of the main aspects learned in this training was the importance of effective communication in the aviation industry. Clear, precise, and protocol-compliant communication was key to ensuring the safety and efficiency of flight operations. During the training, students, teachers, and school staff were taught about: Standard Aviation Language, Communication Protocols, and Use of Communication Technology. With regard to Standard Aviation language, participants were introduced to standard phrases and terms used in aviation communications, such as "Roger," "Mayday," or "Standby." This helped reduce the risk of misunderstandings that can have fatal consequences. This was relevant to the following snippet.

> "*I know some aviation technical vocabularies used in aviation communication, such as mayday*." (P3, snippet 1)

Concerning communication protocols, participants learned about the sequence and structure of communication between pilots, Air Traffic Control (ATC), and cabin crew. For example, how to provide a weather report, request permission to take off, or communicate an emergency situation. Regarding the use of communication technology, participants were also introduced to communication devices used in aviation, such as radios, transponders, and navigation systems. They learned how to use these tools effectively to ensure the information delivered is accurate and timely. In training scenarios, students and other participants were allowed to practice this communication through simulations. For example, some students acted as pilots, while others acted as ATCs. They must communicate clearly and according to protocol to complete certain missions, such as taking off, landing, or dealing with emergency situations. This experience provided a deep understanding of how critical communication is in aviation. This experience is supported by the following snippet.

> "*The program is so fun because I can practice how to communicate between pilots and ATC officers*." (P6, snippet 2)

Awareness of Aviation Safety

Apart from communication, this training also emphasized the importance of aviation safety. Participants were taught that safety was the top priority in the aviation industry, and everyone had a role to play in ensuring this. Some important points studied included: Standard Safety Procedures, Risk Management, and the Role of Human Factors. Concerning Standard Safety Procedures, participants were

introduced to the safety procedures that must be followed before, during, and after the flight. This included aircraft inspection, use of safety equipment, and emergency evacuation procedures. This statement is supported by the following snippet.

> "*Now, I completely understand about how to make a safe flight. It includes safe aircraft so I learn how to do aircraft inspection*." (P5, snippet 3)

Concerning Risk Management, participants learned how to identify and reduced risks in flight operations. For example, how to deal with sudden weather changes, technical problems, or other emergency situations. Concerning the Role of Human Factors, this training also highlighted the importance of human factors in aviation safety. Participants were taught to stay calm, focus, and work together in high-pressure situations. In training scenarios, participants were invited to practice safety procedures, such as emergency evacuation or the use of safety equipment on an airplane. They were also given case studies of real aviation incidents to analyze and discuss. This helped them understand how small mistakes can have a big impact on flight safety. This experience is supported by the following snippets.

> "*The program trains me, and my students, about how to overcome emergency situations. Not only during the flight in the air, but also when aircraft is on the ground*." (P2, snippet 4)

> "*I need to teach them about how to cope with emergency situation wherever the aircraft is located. So, they will know what to do*." (P1, snippet 5)

Collaboration between School Staffs and Students

One of the interesting aspects of this training was the collaboration between students, teachers, and school staff. This activity not only involved students as the main participants, but also involved teachers and school staff to actively participate. This created an inclusive learning environment and encouraged teamwork. This experience is supported by the facilitator of the community service program.

> "*The class is heterogenous. This makes opportunity for teachers and students to work together during the training*." (P1, snippet 6)

Students were given an active role in the simulation, such as being a pilot, ATC, or cabin crew. They learned how to make quick decisions, communicate clearly, and work together in teams. Teachers and school staff acted as facilitators or observers during training. They provided feedback and guidance to students while also learning about the importance of communication and safety in aviation. After each simulation session, participants were invited to discuss and reflect on their experiences. This helped deepen their understanding of the material they had studied. Community service training on effective aviation communication

and aviation safety at SMK Muhammadiyah 9 Lamongan was a very valuable experience. This activity not only increased participants' knowledge and skills but also created awareness of the importance of communication and safety in aviation. Through collaboration between students, teachers, and school staff, this training succeeded in creating a dynamic and inspiring learning environment. It was hoped that this experience could become a foundation for participants to contribute more to the aviation industry in the future.

Benefits of Participating in Community Service

Participating in community service that focused on the topic of effective aviation communication and aviation safety provided many benefits for students, teachers, and staff of vocational schools, especially at SMK Muhammadiyah 9 Lamongan. This activity not only increased understanding of two critical aspects of the aviation industry but also provided valuable practical experience. Here are some of the main benefits that could be obtained from participating in this training.

Enhancing Understanding of the Aviation Industry

One of the biggest benefits of participating in this community service was the increased understanding of the aviation industry, especially in terms of communication and safety. For students, this was an opportunity to learn technical aspects that might not be fully covered in the regular curriculum. They learned about communication protocols and safety protocols. In communication protocols, participants understood how effective communication between pilots, Air Traffic Control (ATC), and cabin crew could affect the safety and efficiency of a flight. While in safety protocols, participants also learned about the safety standards that must be followed at every stage of a flight, from pre-flight preparation to emergency situations. For teachers and school staff, this activity provided new insights into the latest developments in the aviation industry. This allowed them to update their teaching materials and provide relevant information to students. The benefits of enhancing understanding of the aviation industry are supported by the following snippet.

> "*I finally know that safety protocols should be introduced to students as soon as possible*." (P3, snippet 7)

Practical Skills Development

This community service not only focused on theory but also provided an opportunity to practice the skills learned. Some of the practical skills developed included: communication skills, teamwork skills, and problem-solving skills. In communication skills, participants learn how to communicate clearly, concisely, and according to protocol. This is very important in high-pressure situations, such as when facing an emergency. In teamwork skills, in simulations, students,

teachers, and school staff must work together to complete a certain mission. This trained their ability to collaborate and coordinate with others. In problem-solving skills, participants were invited to face challenging scenarios, such as technical problems or sudden changes in weather. This trained their ability to think quickly and make the right decisions. These skills were not only useful in the context of aviation, but could also be applied in everyday life and future careers. This benefit is supported by the following snippet.

> "*It is important to decide a fast response toward any emergency situations because it affects our lives*." (P7, snippet 8)

Raising Safety Awareness

Safety is a top priority in the aviation industry, and this community service helps raise awareness of the importance of this aspect. Participants learn that safety is not just the responsibility of the pilot or ATC, but also involves all parties, including the cabin crew, technicians, and even passengers. Participants are taught how human error can cause flight incidents and how to reduce these risks through effective communication and strict safety procedures. In addition, in the simulation, participants experience the importance of discipline and concentration in critical situations. This helps them understand that every action, no matter how small, can have a big impact on safety.

Forming the Character of Aviation People

Community service is not only about learning technical skills, but also about building character and social awareness. Through this activity, participants learn to: be responsible, caring, and contributing. Participants understand that every role in the aviation industry has a great responsibility to ensure the safety of all parties. They are also invited to think about how their actions can affect the safety and comfort of others, both on the plane and on the ground. By learning and practicing the science of aviation communication and safety, participants can contribute to society by raising awareness of the importance of these aspects. Additionally, for vocational high school students who are interested in pursuing a career in the aviation industry, this community service is a very valuable first step. They get a real picture of how the industry works and what skills are needed. Some specific benefits for students include: exposure to the world of work, inspiration and motivation, and increased self-confidence. Students get practical experience that is similar to real situations in the aviation industry. This helps them prepare themselves for future challenges. Through simulations and interactions with facilitators, students can be inspired to pursue a career in aviation, such as becoming a pilot, ATC, or aircraft technician. By successfully completing the training scenario, students feel more confident in their ability to deal with real situations. This

benefit is supported by the following snippet.

> "*As aviation officers, it is important to be critical and have a social awareness. This will determine the success of aviation safety, too*." (P2, snippet 9)

Apart from internal benefits, this community service also contributes to the surrounding community. By raising awareness of the importance of aviation communication and safety, participants can share this knowledge with family, friends, and the wider community. This helps create a safer environment and awareness of the importance of critical aspects of aviation. Participating in community service on effective aviation communication and aviation safety provides many benefits for students, teachers, and staff of SMK Muhammadiyah 9 Lamongan. This activity not only improves technical knowledge and skills, but also builds character, social awareness, and collaboration between parties. In addition, this activity prepares students for careers in the aviation industry and makes a positive contribution to society. Thus, this community service is a valuable investment that will have a long-term impact on all participants.

Future Implications

Participating in community service that focuses on effective aviation communication and aviation safety not only provides immediate benefits for students, teachers, and staff of vocational schools, but also has significant long-term implications. This activity can affect three main areas: education, the professional world of aviation, and the world of transportation in Indonesia.

Implications in the World of Education

Community service on aviation communication and safety had great potential to bring positive changes in the education system, especially in vocational schools that had aviation-related majors. This training could be the basis for developing a curriculum that was more relevant to the needs of the aviation industry. Materials on effective communication and aviation safety could be integrated into special subjects or programs. This would ensure that students not only understand the theory but also had the practical skills needed in the world of work.

Teachers and school staff involved in this training gained new insights into the latest developments in the aviation industry. They could share this knowledge with students, thereby improving the quality of teaching. In addition, teachers could also develop more interactive learning methods, such as simulations and case studies, to make the learning process more interesting and effective (see snippet 10).

> "*I personally have an insight about how to integrate aviation communication and safety into my teaching and learning process*." (P4, snippet 10)

This community service not only taught technical skills, but also formed the character of students. They learned about responsibility, discipline, teamwork, and safety concern. These values became a strong foundation for their personal and professional development in the future. This activity could open the door to further collaboration between schools and the aviation industry. For example, schools could partner with airlines, airports, or flight training institutions to provide students with internships or advanced training. This could prepare students to enter the workforce with more confidence.

Implications in the Professional Aviation World

The aviation industry ws a growing sector that required skilled and competent workers. Community service in aviation communication and safety could have a positive impact in preparing the younger generation to contribute to this industry.

Students who took this training had a better understanding of the importance of communication and safety in aviation. This made them better prepared to face challenges in the world of work, whether as pilots, ATC, cabin crew, or aircraft technicians. Thus, the aviation industry could get a more competent and professional workforce. Additionally, human error was one of the main causes of aviation incidents. By understanding the importance of effective communication and strict safety procedures, vocational high school graduates who took this training could help reduce the risk of human error. This would contribute to improving overall aviation safety.

> "*After knowing the aviation communication and safety, I could prepare myself to be the next professional aviation officers*." (P6, snippet 11)

This training could also encourage students to be more interested in the latest technology in the aviation industry, such as digital communication systems, satellite navigation, and modern safety equipment. They could become agents of change that bring innovation and improve the efficiency of flight operations. By having a skilled and safety-conscious workforce, the Indonesian aviation industry might improve its reputation at the global level. This could attract more investment and international cooperation, which ultimately drives economic growth.

Implications in the World of Transportation in Indonesia

As an archipelagic country, Indonesia was highly dependent on the transportation sector, including air transportation. Community service on communication and aviation safety had a positive impact on improving the quality of the transportation system in Indonesia.

By increasing awareness of the importance of communication and safety, this activity contributed to reducing the number of aviation accidents in Indonesia. This would make air transportation safer and more

trustworthy for the public. This statement is supported by the following snippet.

> *"I am so happy to be the facilitator of this program. I can be part of Indonesia's transportation to educate citizens about the importance of being aware of air transportation in our country."* (P1, snippet 12)

This training also encouraged the government and private sector to pay more attention to the development of airport infrastructure, including communication systems and safety equipment. With skilled workers, airports in Indonesia could operate more efficiently and meet international standards. Air transportation played an important role in connecting remote areas in Indonesia. By improving the quality of human resources and safety systems, this activity might support the government's efforts to improve connectivity between regions. This further encouraged economic growth and equitable development. This community service was not only beneficial for participants, but also for the wider community. By sharing knowledge about communication and aviation safety, participants can raise public awareness of the importance of these aspects. This created a stronger safety culture at the community level. This implication is supported by the following snippet.

> *"I agree that educating the next generation of transportation agents in Indonesia can be started by conducting training program like this community service program. It is free but meaningful."* (P4, snippet 13)

Participating in community service on effective aviation communication and aviation safety has broad future implications, both in education, the professional aviation world, and the transportation world in Indonesia. In education, this activity can encourage the development of relevant curricula, improve the quality of educators, and build student character. In the professional aviation world, this can improve the quality of human resources, reduce the risk of human error, and encourage technological innovation. Meanwhile, in the transportation world, this activity can improve air transportation safety, airport infrastructure development, and inter-regional connectivity. Thus, this community service is not just a training activity, but also a long-term investment that will have a positive impact on the development of the aviation and transportation industry in Indonesia. Through collaboration between schools, industry, and government, this activity can be the first step in creating a safer, more efficient, and more sustainable future in the aviation sector.

Discussion

Community service focused on the topic of aviation communication and safety plays an important role in increasing awareness and skills related to two critical aspects of the aviation

industry (Alharasees et al., 2023). Effective communication and aviation safety are the main foundations that ensure smooth and safe flight operations. In the context of education, this community service provides an opportunity for students, teachers, and school staff to learn standard communication protocols, safety procedures, and the latest technology used in the aviation industry (Dinçer, 2023). Through simulations and practical training, participants can understand how important clear and precise communication is in avoiding errors that can be fatal (Stuart et al., 2022). In addition, this activity also emphasizes the importance of safety as a top priority, which not only involves the flight crew but also all related parties, including passengers and the public on the ground. Thus, this community service is a means to build a culture of safety and effective communication, which is very much needed in the aviation industry (Cahill et al., 2023).

Community service on aviation communication and safety provides great benefits for the development of education and aviation (Ng, 2022). In the world of education, this activity helps improve the quality of the curriculum by including materials that are relevant to industry needs. Students not only learn theory, but also gain practical experience through simulations and training, which prepares them to face challenges in the world of work. Teachers and school staff also gain new insights into the latest developments in the aviation industry, which they can share with students. In addition, this community service encourages collaboration between schools and industry, opening up opportunities for internships, advanced training, and other collaborations (Malhotra et al., 2023). In the world of aviation, this activity contributes to improving the quality of human resources (HR). Students who take part in this training will have better communication skills and safety awareness, which are highly needed in the aviation industry. This can reduce the risk of human error, increase operational efficiency, and encourage technological innovation. Thus, this community service is not only beneficial for participants, but also for the aviation industry as a whole.

Although community service on aviation communication and safety provides many benefits, several challenges need to be overcome to improve aviation HR in Indonesia. First, limited access to the latest training and technology is a major obstacle (Timonora & Ariyanto, 2022). Not all schools or educational institutions have adequate facilities and resources to conduct this kind of training. Second, the gap in the quality of education between urban and rural areas is also a challenge (Prayitno et al., 2023). Students in remote areas may not have the same access to training and information about the aviation industry. Third, differences in training standards between educational institutions and industry can create

gaps in students' understanding and skills (Raharjo & Pudjiastuti, 2024). To overcome these challenges, collaborative efforts are needed between the government, industry, and educational institutions. For example, the government can provide financial and infrastructure support to organize training in remote areas. The aviation industry can play an active role in providing training and internship facilities for students. Meanwhile, educational institutions need to continue to update their curriculum and teaching methods to match industry developments. By overcoming these challenges, Indonesia can improve the quality of its aviation human resources and compete globally.

This study is limited to the implementation of community service carried out at SMK Muhammadiyah 9 Lamongan, East Java. The experience of learning new things related to aviation community and safety materials is certainly based on the experience gained by participants including teachers, principals, school staff, and students. Of course, this does not represent the entire population of SMK Muhammadiyah 9 Lamongan. However, the generalization of these results is very relevant to the context of implementing community service in general. Learning experiences, benefits, and future implications can be applied to other community service contexts.

Conclusion

This study concludes that the implementation of community service on the topics of aviation communication and safety undertaken at SMK Muhammadiyah 9 Lamongan provides knowledge transfer opportunities in the forms of experience, benefits, and implications. Additionally, this study concludes that the experience involves the importance of effective aviation communication, awareness of aviation safety, and collaboration between school staffs and students. Regarding the benefits of community service, this study obtains four aspects: increase understanding of the aviation industry, develop practical skills, increase awareness of safety, and form aviation people. Meanwhile, this study points out three essential implications of the implementation of community service: implications on education and the world of aviation, and implications in the world of transportation in Indonesia. By looking at these trends, benefits, and future implications, it is essential to conduct community service in the aviation domain.

References

[1] Alharasees, O., Jazzar, A., Kale, U., & Rohacs, D. (2023). Aviation communication: the effect of critical factors on the rate of misunderstandings. *Aircraft engineering and aerospace technology*, *95*(3), 379-388.

[2] Ansell, P. J. (2023). Review of sustainable energy carriers for aviation: Benefits, challenges, and

future viability. *Progress in Aerospace Sciences*, *141*, 100919.

[3] Bellido-Manganell, M. A., Gräupl, T., Heirich, O., Mäurer, N., Filip-Dhaubhadel, A., Mielke, D. M., ... & Schnell, M. (2021). LDACS flight trials: Demonstration and performance analysis of the future aeronautical communications system. *IEEE Transactions on Aerospace and Electronic Systems*, *58*(1), 615-634.

[4] Cahill, J., Cullen, P., & Gaynor, K. (2023). The case for change: aviation worker wellbeing during the COVID 19 pandemic, and the need for an integrated health and safety culture. *Cognition, Technology & Work*, *25*(1), 75-117.

[5] Cheng, C. B., & Shyur, H. J. (2025). Introduction to Flight Safety. In *Flight Safety Management: Quantitative and AI Approaches* (pp. 1-17). Singapore: Springer Nature Singapore.

[6] Claes, E., Schrooten, M., McLaughlin, H., & Csoba, J. (2022). Community service learning in complex urban settings: challenges and opportunities for social work education. *Social Work Education*, *41*(6), 1272-1290.

[7] Dave, G., Choudhary, G., Sihag, V., You, I., & Choo, K. K. R. (2022). Cyber security challenges in aviation communication, navigation, and surveillance. *Computers & Security*, *112*, 102516.

[8] Dinçer, N. (2023). Elevating aviation education: A comprehensive examination of technology's role in modern flight training. *Journal of Aviation*, *7*(2), 317-323.

[9] Harjanti, W., Wahjoedi, T., Sari, A. K., & Setiadi, P. B. (2021). Work Experience, Interpersonal Communication on Performance and Use of Information Technology, Aircraft Maintenance Companies. *Ekuitas: Jurnal Ekonomi Dan Keuangan*, *5*(4), 1-20.

[10] Kankaew, K. (2021). *Human Capital Development in Services Job: A Modelling from the Airlines Industry*. Horizon Books (A Division of Ignited Minds Edutech P Ltd).

[11] Malakis, S., Kontogiannis, T., & Smoker, A. (2023). A pragmatic approach to the limitations of safety management systems in aviation. *Safety science*, *166*, 106215.

[12] Malhotra, R., Massoudi, M., & Jindal, R. (2023). An alumni-based collaborative model to strengthen academia and industry partnership: The current challenges and strengths. *Education and Information Technologies*, *28*(2), 2263-2289.

[13] MoghimiEsfandabadi, M. H., Djavareshkian, M. H., & Abedi, S. (2023). Significance of aviation safety, its evaluation, and ways to strengthen security. *International Journal of Reliability, Risk and Safety: Theory and Application*, *6*(2), 37-45.

[14] Ng, D. T. K. (2022). Online aviation learning experience during the COVID-19 pandemic in Hong Kong and Mainland China. *British*

journal of educational technology, *53*(3), 443-474.

[15] Parnell, K. J., Wynne, R. A., Plant, K. L., Banks, V. A., Griffin, T. G., & Stanton, N. A. (2022). Pilot decision-making during a dual engine failure on take-off: Insights from three different decision-making models. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *32*(3), 268-285.

[16] Prayitno, H., Prabowo, A. S., Supardam, D., & Wiyono, D. S. (2023). Study of API Banyuwangi Seaplane Operations with Connectivity Analysis and Flight Optimization Methods for Outermost, Remote and Underdeveloped Regions in Indonesia. *Riwayat: Educational Journal of History and Humanities*, *6*(3), 914-926.

[17] Raharjo, S. N. I., & Pudjiastuti, T. N. (2024). Indonesia in the BIMP-EAGA: Assessing connectivity development in reducing inequality. *SUVANNABHUMI*, *16*(1), 175-203.

[18] Singh, S., Sharma, S. K., & Parti, R. (2024). Role of Aviation Infrastructure in Aviation Operation. In *New Innovations in AI, Aviation, and Air Traffic Technology* (pp. 212-245). IGI Global.

[19] Śliwa, R. E., Dymora, P., Mazurek, M., Kowal, B., Jurek, M., Kordos, D., ... & Unnthorsson, R. (2022). The latest advances in wireless communication in aviation, wind turbines and bridges. *Inventions*, *7*(1), 18.

[20] Soto, J. Y. (2024). *Communication Performance Analysis of Air Traffic Control and International Inbound Flights in the United States* (Doctoral dissertation, Inter-American University of Puerto Rico (Puerto Rico)).

[21] Stuart, J., Aul, K., Bumbach, M. D., Stephen, A., De Siqueira, A. G., & Lok, B. (2022, March). The effect of virtual humans making verbal communication mistakes on learners' perspectives of their credibility, reliability, and trustworthiness. In *2022 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)* (pp. 455-463). IEEE.

[22] Timonora, S., & Ariyanto, W. (2022). Training of Indonesian National Police Pilots to Improve Competence, Professionalism and Aviation Safety. *KnE Social Sciences*, 354-369.

[23] Ukwandu, E., Ben-Farah, M. A., Hindy, H., Bures, M., Atkinson, R., Tachtatzis, C., ... & Bellekens, X. (2022). Cyber-security challenges in aviation industry: A review of current and future trends. *Information*, *13*(3), 146.

[24] Yıldız, E. (2024). Navigating the Skies: Unraveling Communication Challenges in Diverse Aviation Accidents. *Antalya Bilim Üniversitesi Uluslararası Sosyal Bilimler Dergisi*, *5*(1), 14-3