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Application of Artificial Intelligence Technology in Community Empowerment to Improve Social Welfare

Maya Syafitri

Universitas Putra Abadi Langkat Indonesia

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ABSTRACT

Community empowerment through artificial intelligence (AI) technology has great potential to improve social welfare, especially in communities that have limited access to technology. This research aims to assess the application of AI technology in a community empowerment program that focuses on improving digital skills, developing small businesses, and expanding access to education. This service program was implemented in rural areas and low-income communities, using a mixed methodology approach that included surveys, interviews, and direct observation. The results of this study showed a significant improvement in participants' skills after the training, as well as the application of AI technology in market analysis and small business management which had a positive impact on business income. In addition, there was a change in participants' behavior, with more of them utilizing technology in their daily lives. The program successfully demonstrated that the application of artificial intelligence can have a far-reaching impact in improving quality of life, reducing social inequality, and creating greater economic opportunities. These findings provide a strong foundation for the development of technology-based empowerment programs that can reach more communities and provide long-term benefits.

Corresponding Author:

Maya Syafitri,
Universitas Putra Abadi Langkat Indonesia,
Jl. Letjen R. Soeprapto No.10, Kwala Bingai, Sumatera Utara, Indonesia 20814.
Email: mayasayafitri15@gmail.com

1. INTRODUCTION

Community empowerment has been a major focus of efforts to improve quality of life and social welfare, especially in developing countries. In recent decades, various initiatives have been implemented to improve access to education, health and the economy. However, while much progress has been made, there is still a significant social gap between low-income groups and those who are better off. This is particularly evident in remote, rural areas and among communities with limited access to information and technology.

Along with the rapid development of technology, especially in the field of artificial intelligence (AI), there is great potential for this technology to make a positive contribution to improving social welfare. Artificial intelligence, which encompasses various technologies such as machine learning, natural language processing, and data analytics, has been proven to optimize various sectors, ranging from health, education, to the economy. AI technology not only facilitates automation, but also enables the creation of innovative solutions that are more affordable and accessible to the wider community, including those in resource-constrained regions.

In the context of community empowerment, AI technology can act as a tool that empowers individuals and communities to improve skills, open access to new economic opportunities, and solve

complex social problems. For example, AI can be used to improve the quality of education through adaptive e-learning platforms, improve healthcare with AI-based diagnostics, and encourage entrepreneurship with data-driven market analysis.

This article aims to explore how the application of artificial intelligence technology in community empowerment can contribute to the improvement of social welfare. The research will also identify the challenges faced in its implementation, as well as evaluate the positive impacts that can be achieved if this technology is applied appropriately.

Through a deeper understanding of the application of AI technology in community empowerment, it is hoped that intervention models can be found that can serve as examples for government policies, non-governmental organizations, and the private sector in designing more inclusive and effective empowerment programs.

2. RESEARCH METHOD

This research uses a mixed methods approach, which combines qualitative and quantitative methods to gain a more comprehensive understanding of the application of artificial intelligence technology in community empowerment. This approach was chosen because it can combine the power of numerical analysis from quantitative data and the depth of insight gained through qualitative data, which allows for a thorough evaluation of the social impact of the service program.

This service program was implemented in two locations that represent communities that have limited access to technology and resources, namely in rural areas and urban areas with low-income communities. The target communities were selected based on their need for skills improvement and access to digital technology that can support their economic and social development.

Data was collected through several techniques to get a holistic picture of the effectiveness of AI technology implementation. The techniques used include: In-depth interviews with community members, local policy makers, and technology service providers to identify their needs and evaluate the impact of the implemented technology. Surveys to measure changes in participants' skills and understanding of AI technologies after the training program. Direct observation of training activities and field application of AI technology to assess how the technology is accepted and used by the community. Secondary data analysis in the form of social welfare statistics published by the local government to monitor the long-term impact of the program.

Participants in this program consist of community members, especially those in the lower-middle economic category, as well as students and young workers who have the potential to utilize technology to improve their skills and competitiveness in the job market. The program also involves local governments and non-governmental organizations (NGOs) that have experience in community empowerment, as partners who assist in information dissemination and logistical support.

The resources used in this program include hardware (laptops, smartphones, and other supporting devices) and access to AI platforms that have been tailored to the needs of the target community. AI technologies include an AI-based learning platform that can customize training materials to individual skill levels, as well as AI applications for market data analysis that help small businesses understand market trends and make more informed decisions. In addition, AI-based chatbot technology is used to provide support to participants in the form of consultations or answers to their questions related to training materials or technology usage.

With this mixed methodology approach, the research aims to provide a more complete picture of how the application of AI technology can have a significant impact on community empowerment and social welfare improvement.

3. RESULTS AND DISCUSSIONS

Analysis of Data and Feedback Gained During the Service

During the implementation of the service program, data was collected through pre- and post-training surveys, in-depth interviews, and direct observation. The quantitative survey showed a significant increase in participants' understanding and skills towards the use of AI technologies, especially in applications for market data analysis and digital learning platforms. Before the training, only about

30% of participants had basic knowledge of AI technologies, but after the training, 85% of participants reported an increased understanding of how AI works in the context of their daily lives and work. Interview feedback also indicated that most participants felt more confident in utilizing the technology to improve their small businesses or further their education.

Achievements Made

One of the key achievements of the program was the improvement of technical and digital skills among participants. For example, more than 70% of small businesses in the targeted areas started using AI-based applications to analyze market trends and manage inventory more efficiently, contributing to a 15-20% increase in their revenue within three months post-training. In addition, student trainees reported increased motivation and skills in using technology to complete academic tasks, such as using AI-based learning tools and data analysis software.

Behavioral changes are also evident, especially in terms of the adoption of new technologies by people who were previously unfamiliar with the use of digital tools. People are now more open to technology and are starting to integrate it into their daily lives, such as using AI-based chatbots to get information about social services or find solutions to simple health problems.

Implications of Service Results for Society or Related Fields

The impact of applying AI technologies in community empowerment has far-reaching implications, both for the target communities and for the development of more inclusive social policies. Socially, the improvement of digital skills among people who previously had limited access to technology opens up opportunities for them to engage in the digital economy, improve their living standards, and reduce social inequality. Economically, the use of technology to optimize small businesses and improve the quality of public services contributes positively to local economic sustainability.

In the field of education, the implementation of AI-based learning platforms enables more equitable access to quality education, regardless of the geographical location of the participants. This can accelerate education equity in remote areas that often experience limitations in terms of facilities and qualified teaching staff.

Comparison with Previous Service Results

When compared to the results of previous community service programs, the application of AI technology in this program shows more significant success. Previous service programs, which focused more on conventional skills training without involving digital technology, did not have the same impact in terms of long-term behavior change and increased access to economic opportunities. This program successfully overcame the challenges faced by previous projects, especially in terms of scalability and sustainability. For example, by using AI to personalize learning, participants are able to get materials that match their level of understanding, which cannot be achieved with traditional training methods.

Overall, these results show that the application of artificial intelligence not only improves people's technical skills but also promotes a cultural change that is more open to technology and its utilization for social and economic betterment.

Percentage of Skill Improvement

One way to measure the effectiveness of a training program is to calculate the percentage increase in participants' skills based on the results of surveys or tests conducted before and after the training. The formula is:

$$Percentage\ Increase = \frac{(Post - Training\ Score - Pre - Training\ Score)}{Pre - Training\ Score}\ x\ 100$$

Pre-Training Score: The average score of participants before training.
Post-Training Score: The average score of participants after the training.
Example: If a participant's pre-training average score is 40 and post-training average score is 70, then:

$$Percentage\ Increase = \frac{(70 - 40)}{40}\ x\ 100 = 75\ \%$$

This shows a 75% increase in participants' skills after the training.

Participants' Skill Achievement Before and After Training

Participants	Pre-Training Score	Post-Training Score	Skill Improvement (%)
Participants 1	40	70	75%
Participants 2	45	75	66.7%
Participants 3	50	80	60%
Participants 4	30	60	100%
Participants 5	55	85	54.5%
Average	40	74	71.4%

The table above shows that the average increase in participants' skills is 71.4% after attending the training. This illustrates the positive impact of the service program in improving participants' digital skills.

Social Impact of Technology Use

The following table shows the changes in behavior and use of AI technologies by participants in their daily lives after the training.

Indicator	Before Training (%)	After Training (%)	Change (%)
Use of technology for business	30%	70%	+40%
Use of learning apps	25%	60%	+35%
Confidence in using technology	40%	80%	+40%
Access to social information and services	20%	55%	+35%
Total Improvement	-	-	+40%

This table shows that there was a significant increase in the use of technology by the target community after the service program. For example, the use of technology for business increased by 40%, indicating that participants are more confident and more capable of using technology to develop their business after the training.

Formula for Calculating the Percentage Increase in Small Business Income

In addition to improving skills, one indicator of the success of the service is the increase in income from small businesses participating in the training program. The formula for calculating the percentage increase in income is:

$$Percentage\ Increase = \frac{(Post - Training\ Income - Pre - Training\ Income)}{Pre - Training\ Income}\ x\ 100$$

Example: If the small business income before the training was Rp 1,000,000 per month, and after the training increased to Rp 1,500,000, then:

$$Income\ Increase = \frac{(1.500.000 - 1.000.000)}{1.000.000}\ x\ 100 = 50\ \%$$

This shows that the income of small businesses that participated in the training increased by 50% after the program.

Increased Small Business Income

Small Business	Pre-training Income (IDR)	Post-Training Income (IDR)	Increase in Revenue (%)
Business 1	1.000.000	1.500.000	50%
Business 2	800.000	1.200.000	50%
Business 3	1.200.000	1.800.000	50%
Business 4	600.000	1.000.000	66.7%
Business 5	1.500.000	2.000.000	33.3%
Average	1.020.000	1.500.000	46.7%

The table above shows an average increase in revenue of 46.7% among the small businesses involved in the training. This indicates that the application of AI technology in market analysis and business management can have a significant impact on the economic success of participants.

4. CONCLUSION

Based on the results of the service program that has been implemented, it can be concluded that the application of artificial intelligence (AI) technology in community empowerment has a significant impact in improving the skills, behavior change, and social welfare of participants. Through the use of AI technology, participants who previously had limited access to information and technology successfully improved their digital skills, which in turn influenced small business development and educational opportunities. Survey and interview results showed a substantial improvement in the understanding and use of AI technologies, with an average skill improvement of 71.4%.

The program has also recorded a positive economic impact, especially in increasing the income of participating small businesses. With the implementation of AI-based applications for market analysis and business management, most businesses experienced an increase in revenue of around 46.7%. This shows that AI technology can provide practical and affordable solutions to improve the competitiveness of small businesses, as well as expand their access to wider market opportunities.

In addition, the behavioral changes that occurred in the target communities, such as the increased use of technology for various daily purposes (both for business and education), showed that the application of AI can accelerate inclusive social transformation. Participants are more open to technology and are able to integrate it into their lives, which is an important step towards reducing social disparities and improving their quality of life.

Overall, the results of this service prove that artificial intelligence technology, if applied appropriately, can have a broad positive impact on community empowerment, not only in terms of improving technical skills, but also in terms of improving social and economic welfare. This success provides a strong foundation for further development of technology-based empowerment programs in the future, with the potential to reach more communities and create broader social change.

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