EVALUATING THE ECONOMIC IMPACTS OF ICT LITERACY TRAINING TO EMPOWER RURAL FARMING COMMUNITIES

Chester L. Cofino[1i],
Shara Mae R. Tee[2],
Glorybe E. Alegre[3],
Guilbert Nicanor A. Atillo[4],
Dindo R. De la Peña[5]

[1]Dean,
College of Computer Studies,
[1]Central Philippines State University,
Main Campus,
Philippines
[2]Instructor,
[2]Central Philippines State University,
Main Campus,
Philippines
[3]Instructor,
[3]Central Philippines State University,
Main Campus,
Philippines
[4]Director of Extension Services,
Negros Oriental State University,
Main Campus,
Philippines
[5]Associate Professor,
[5]Negros Oriental State University,
Main Campus,
Philippines

Abstract:

This study evaluates the social and economic impacts of the ICT literacy training program conducted for the members of the Camingawan-Tagukon Farmers Association (CATAFA) in Kabankalan, Negros Occidental, Philippines. Using a mixed-methods approach, the study collected data through surveys, key informant interviews (KIIs), focus group discussions (FGDs), and document analysis to comprehensively assess the program's outcomes. Findings reveal that the training has significantly improved participants' digital literacy, productivity, and awareness of sustainable practices. Recommendations include enhancing digital access, integrating financial and environmental literacy, and providing ongoing support to ensure long-term impact.

[i] Correspondence: email chestercofino@cpsu.edu.ph

Keywords: ICT literacy, socio-economic impact, rural development, farmers' training, digital inclusion

1. Introduction

This study focuses on Camingawan-Tagukon Farmers Association (CATAFA) members who participated in the ICT literacy training program conducted by CPSU from 2019 to 2020. The geographical scope includes CATAFA's operational areas in Kabankalan, Negros Occidental, Philippines, reflecting the rural and agrarian context of the participants. The demographic scope encompasses a diverse group of farmers, office workers, small business owners, and community service workers with varying levels of exposure to and reliance on ICT tools.

The study is subject to certain limitations. First, the findings are specific to the CATAFA community and may not be fully generalizable to other rural farming groups with different socio-economic conditions. Second, the study primarily relies on self-reported data, possibly introducing biases or inaccuracies. Third, the evaluation captures the short-term impacts of the program and does not account for potential long-term changes that may occur as participants further integrate ICT skills into their professional and personal activities.

Despite these limitations, this study provides critical insights into the transformative potential of ICT literacy training conducted by CPSU- Information Technology Department for rural farming communities. It offers practical recommendations for enhancing the effectiveness and scalability of similar university extension programs.

2. Methodology

This study utilizes a mixed-methods approach, combining quantitative and qualitative data collection techniques to evaluate the social, economic, and environmental impacts of the ICT literacy training provided to members of the Camingawan-Tagukon Farmers Association (CATAFA). The mixed-methods design ensures a comprehensive understanding of the training's outcomes, capturing measurable results and nuanced insights into participants' experiences.

2.1 Data Collection Methods
Structured survey questionnaires were designed and administered. The surveys included closed-ended and open-ended questions categorized into social, economic, and environmental dimensions. Questions focused on digital tool usage, productivity improvements, income changes, environmental practices, and overall training satisfaction. The Team conducted KIIs with selected stakeholders. These interviews included ICT trainers, CATAFA leaders, and key participants, providing in-depth perspectives on program implementation, challenges, and opportunities for

improvement. The KIIs followed a semi-structured format to allow flexibility and encourage detailed responses.

The NORSU-RIDE Office Team facilitated FGDs to gather insights from diverse participant groups, including farmers, office workers, and small business owners. Discussions focused on the practical applications of ICT training, barriers to integration, and the perceived impact on social, economic, and environmental aspects of their lives. Legal officers reviewed relevant documents, such as the Memorandum of Agreement (MOA).

2.2 Respondent Selection and Sampling Technique

Purposive sampling was employed to select beneficiary respondents who completed the ICT literacy training program. This ensured representation across different roles within CATAFA, such as farmers, administrative workers, and small-scale entrepreneurs. A total of 40 participants completed the survey, while 15 individuals were involved in KIIs and FGDs.

2.3 Data Analysis

Survey data were analyzed using descriptive statistics, highlighting frequencies, trends, and distributions. Cross-tabulations were performed to explore relationships between variables, such as digital tool usage frequency and productivity changes. Data from KIIs and FGDs were transcribed and thematically analyzed using coding frameworks to identify recurring themes. Key themes included digital adoption, economic opportunities, and sustainability practices. Data from surveys, KIIs, FGDs, and document reviews were triangulated to ensure the validity and reliability of findings. This approach enhanced the study's robustness by cross-verifying information from multiple sources.

2.4 Ethical Considerations

All participants were briefed on the study's objectives and their rights as beneficiary respondents, and written consent was obtained before data collection. Participant identities were anonymized during data collection, analysis, and reporting to ensure privacy. The study was conducted under the guidance and approval of the CPSU and NORSU-RIDE Office, ensuring compliance with ethical research standards.

3. Data Presentation and Interpretation

This part presents the tabulated data and interpretation of results.
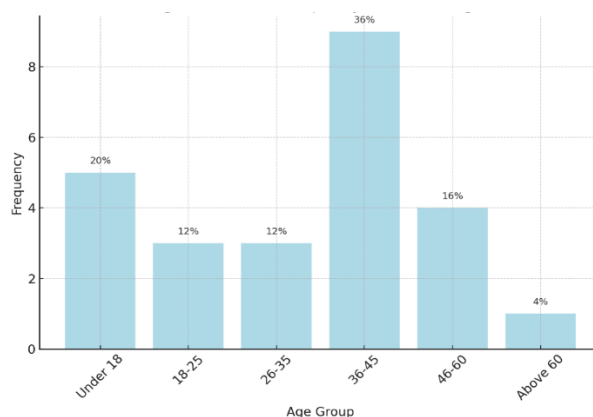
3.1 Demographic Profile

Figure 1: Age Distribution

Figure 1 illustrates the age distribution of beneficiary respondents across various age groups. The most significant proportion of beneficiary respondents (36%) falls within the 36–45 age group, indicating that this is the most represented demographic. The second-largest group is those under 18, accounting for 20% of beneficiary respondents, showing a significant presence of younger individuals. The 46–60 age group comprises 16% of beneficiary respondents, followed by the 18–25 and 26–35 age groups, each contributing 12%. The smallest representation comes from individuals above 60 years old, comprising only 4% of the beneficiary-respondents.
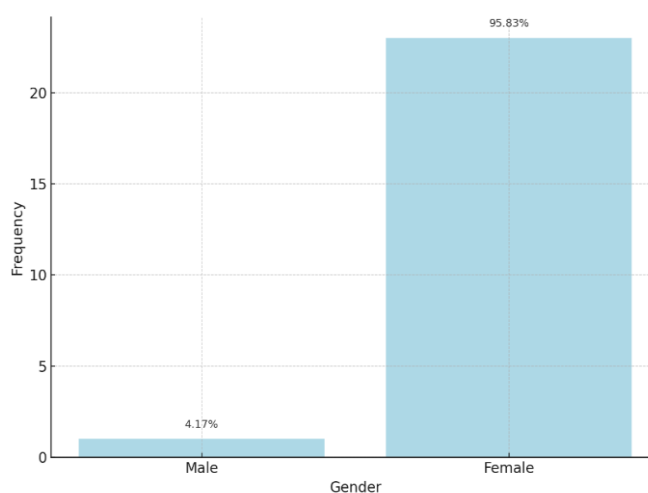
Figure 2: Gender Distribution

Twenty-three (23) or 95.83% of the participants are female, while only 4.17% are male (1 respondent), as shown in Figure 2. This significant gender imbalance suggests that the survey had a disproportionately higher female participation. Future community extension programs or initiatives might need to focus on ensuring a more balanced gender representation to ensure diverse perspectives, consider why male participation is so low, or find ways to involve more male beneficiary respondents.
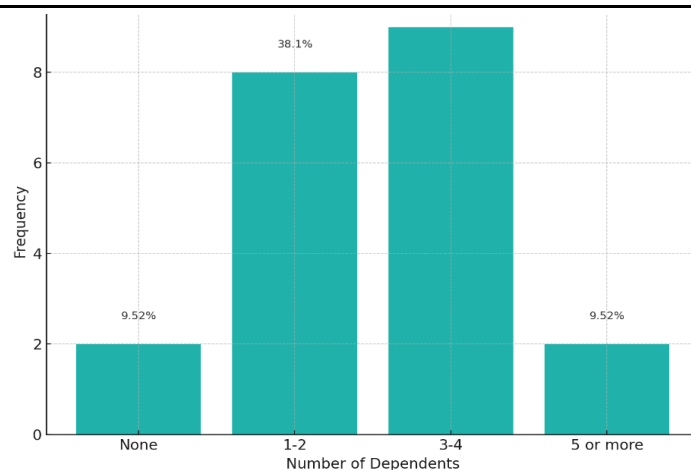
Figure 3: Number of Dependents

Nine beneficiary respondents, or 42.86%, had 3 to 4 dependents, followed by 1 to 2 dependents (38.1%, eight beneficiary respondents). A smaller portion of beneficiary-respondents had no dependents or five or more dependents (9.52%, two beneficiary-respondents each). The result suggests that most beneficiary respondents are in family structures with multiple dependents, highlighting a need for extension programs to focus on family support, child care, and financial assistance for households with several dependents.
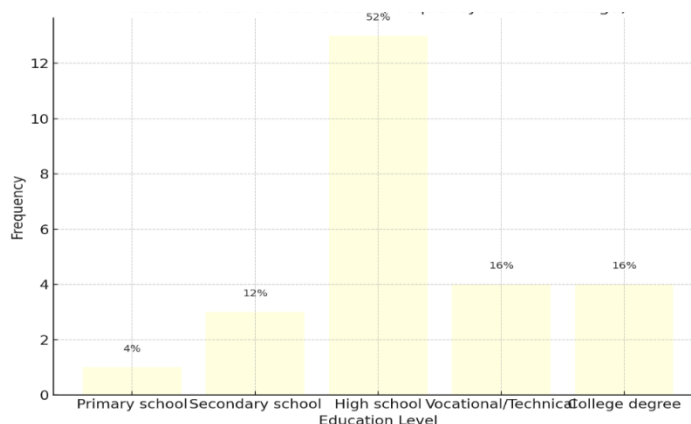
Figure 4: Educational Level

Figure 4 shows the education level distribution of the survey beneficiary-respondents. Fifty-two percent completed high school (13 beneficiary respondents), followed by 16% with vocational/technical training and college degrees (4 beneficiary respondents each). A small proportion, 12%, have completed secondary school, and only 4% have a primary school education. This distribution indicates that most beneficiary respondents have at least a high school education, with some having vocational/technical or college degrees. To further enhance their career prospects, those with a secondary or primary school education may be able to focus on advanced skill development and technical training programs provided by Central Philippine State University or any government and non-governmental entities.
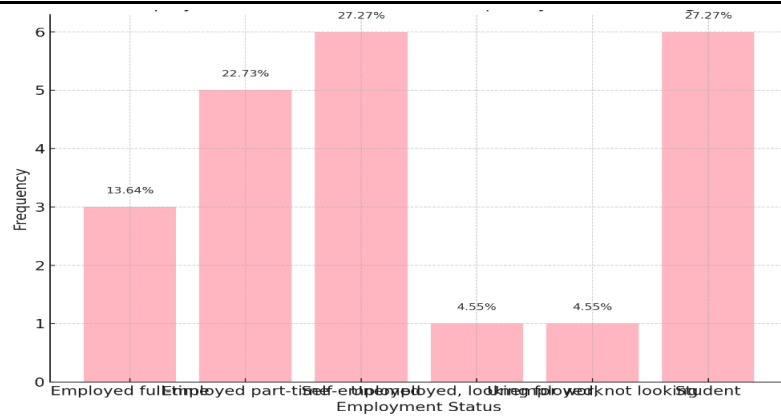
Figure 5: Employment Status

The largest groups, each accounting for 27.27% of beneficiary respondents, are students and those self-employed, highlighting a significant proportion of individuals engaged in education or entrepreneurial activities, as presented in Figure 5. Part-time employment is the most common status, representing 22.73% of beneficiary respondents, suggesting a reliance on flexible or less formal work arrangements.
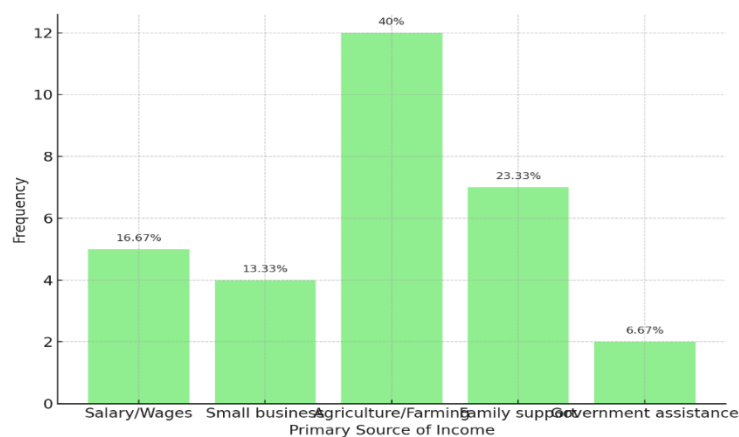

Figure 6: Source of Income

Results in Figure 6 illustrate that the primary sources are agriculture or farming, accounting for 40% of beneficiary respondents, and highlight their significant role in sustaining livelihoods. Family support is the second most prevalent source, contributing to 23.33% of beneficiary-respondents' income, indicating a reliance on assistance from relatives. Salaries or wages are also the primary income source for 16.67% of beneficiary respondents, reflecting formal or informal employment opportunities. Small businesses provide income for 13.33% of beneficiary-respondents, showcasing entrepreneurial activities as a livelihood option. Lastly, government assistance is the least expected source, supporting 6.67% of beneficiary-respondents.
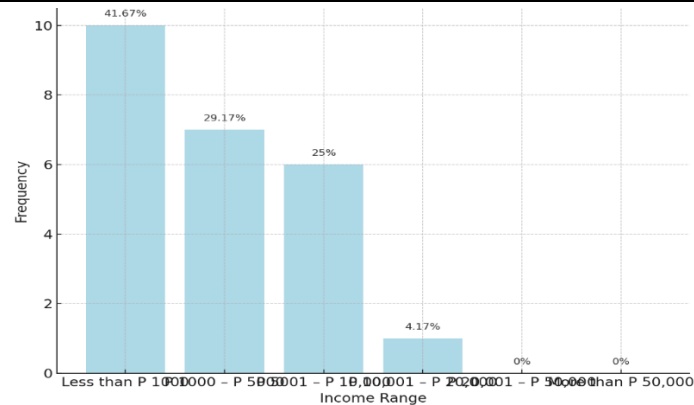
Figure 8: Income Range

The above figure reveals the income distribution of beneficiary respondents, showing that a significant majority fall within the lower income brackets. The largest group, comprising 41.67% of beneficiary respondents, earns less than P10,000, highlighting widespread low-income levels. This is followed by 29.17% of beneficiary respondents who earn between P10,000 and P20,000, indicating a moderate income range. A smaller proportion, 25%, earns between P20,001 and P30,000, while only 4.17% of beneficiary-respondents report incomes between P30,001 and P40,000. Notably, no beneficiary-beneficiary-respondents are in the higher income categories of P40,001 to P50,000 and above P50,000. These findings emphasize that most beneficiary-respondents face financial constraints, with very few achieving higher income levels.
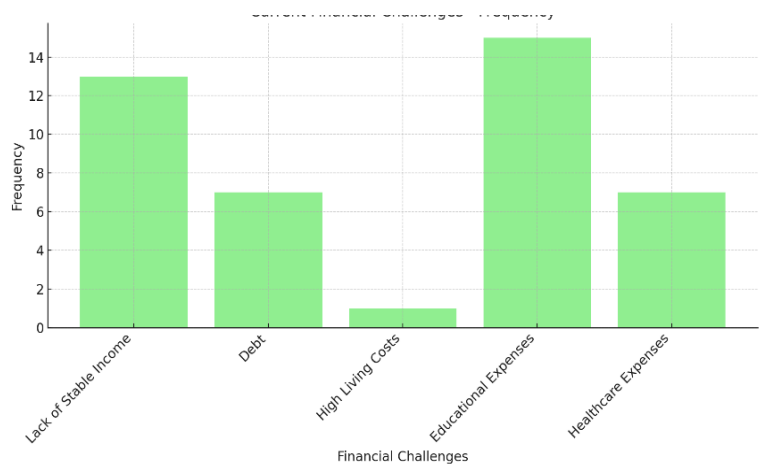

Figure 8: Current Financial Challenges

Figure 8 highlights the financial challenges faced by beneficiary respondents, with educational expenses emerging as the most significant issue, followed closely by the lack of a stable income. These two challenges indicate considerable financial strain for many individuals. Healthcare expenses are also notable, though less frequent than educational costs and income instability. Debt is a moderately reported challenge, suggesting that while it affects some, it is not as widespread. On the other hand, high living costs appear to be the least pressing financial concern among beneficiary respondents. In summary,

the findings point to a need for strategies to improve income stability and make education more affordable to alleviate these financial burdens.

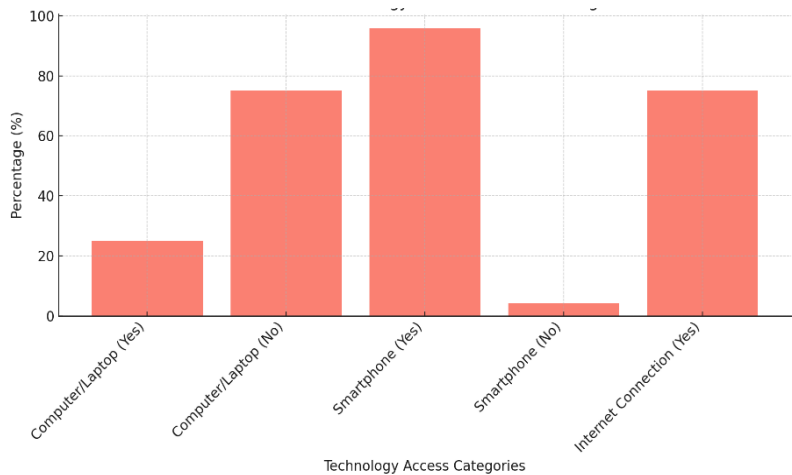## 3.2 ICT Access, Usage, and Experience

Figure 9: Current Financial Challenges

Figure 9 illustrates the beneficiary respondents' percentage distribution of access to various technology categories. It reveals that a relatively small percentage of individuals have access to computers or laptops, while most lack such access. In contrast, smartphones are widely accessible, with most beneficiary-respondents owning only a tiny fraction, reporting no smartphone access. Furthermore, internet connectivity is also relatively high, with a considerable percentage of beneficiary respondents having access to the internet. These findings suggest that while smartphones and internet connectivity are prevalent, the surveyed population's access to computers or laptops remains limited (Correa *et al.*, 2020).
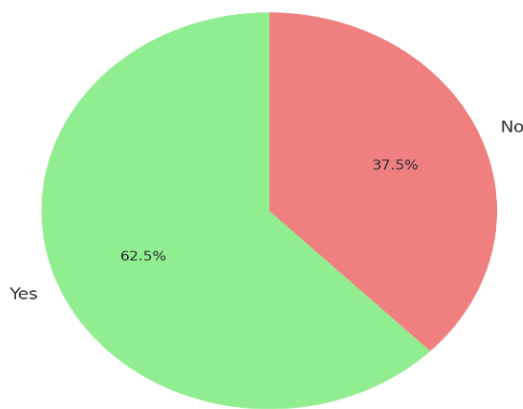

Figure 10: Computer Experience

Figure 10 reflects the beneficiary respondents' computer experience, with 62.5% indicating they have computer experience ("Yes"), while 37.5% reported having no computer experience ("No"). This suggests that most beneficiary respondents are familiar with or have some experience using computers, which could imply a potential for utilizing technology in their activities *(Chama & A, 2023)*. However, 37.5% of the beneficiary respondents without computer experience highlight that a significant portion of the population may require support or training to use technology effectively.
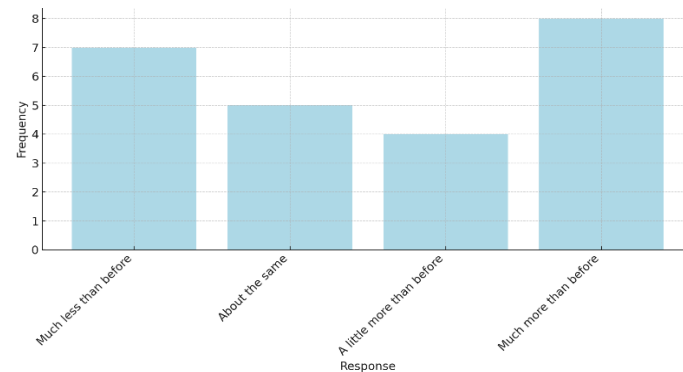

Figure 11: Frequency of Computer Use

Figure 11 shows the frequency of computer use among beneficiary respondents compared to before, categorized into four responses: "Much less than before," "About the same," "A little more than before," and "Much more than before." The highest frequencies are observed in the categories "Much less than before" and "Much more than before," each having a significant number of beneficiary respondents. This indicates a polarized trend, where many individuals use computers significantly less or significantly more than before. Fewer beneficiary respondents selected "About the same" or "A little more than before," suggesting that only a minority have experienced minimal changes in their computer usage or slight increases.
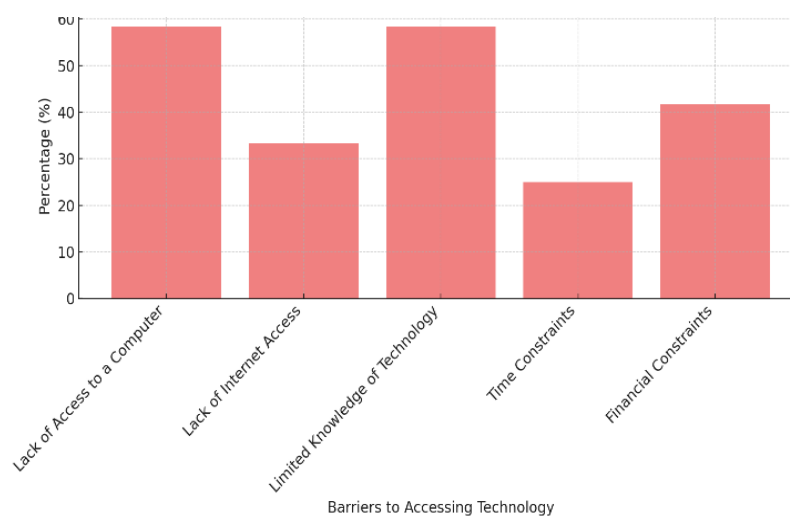

Figure 12: Barriers to Access to ICT Tools

Figure 12 presents the percentage distribution of barriers to accessing technology among beneficiary respondents. The most significant barrier, affecting over 50% of beneficiary respondents, is the lack of access to a computer, indicating that this is a primary challenge in technology adoption. Limited knowledge of technology is another significant barrier, similarly impacting many beneficiary respondents, highlighting a gap in technical skills or familiarity with digital tools (Neumeyer *et al.*, 2021). Financial constraints also pose a considerable challenge, affecting nearly half of the beneficiary respondents, suggesting that affordability hinders technology access *(Mittal & Raman, 2021)*. Lack of internet access is another notable barrier, although it affects fewer beneficiary respondents than the challenges above (Castillo *et al.*, 2023). Time constraints are the least significant barrier, with the smallest percentage of beneficiary respondents citing it as an issue.

Overall, the findings suggest that the primary obstacles to technology access are physical availability (computers), knowledge, and financial capability, with time constraints being a less pressing concern. Addressing these barriers could significantly improve technology access and utilization among beneficiary respondents.
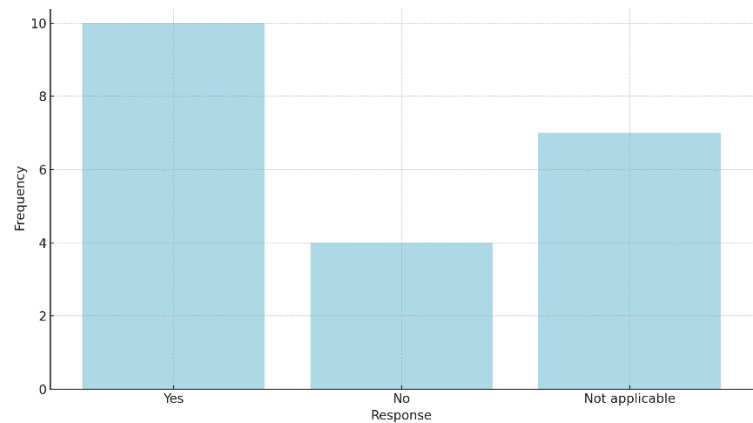
3.3 Economic Impact

Figure 13: Job Opportunities Improvement

Figure 13 illustrates beneficiary respondents' perceptions of the economic impact of improved job opportunities following ICT training, categorized as "Yes," "No," and "Not applicable." Most beneficiary respondents indicated "Yes," demonstrating that the ICT training positively influenced their job prospects. This suggests that the training gave participants valuable skills that enhanced their employability and access to job opportunities in a technology-driven environment (Ghanbaripour *et al.*, 2024). A few beneficiary respondents selected "No," indicating that the ICT training did not directly impact their job opportunities. This could be due to factors such as a lack of relevant job openings, personal circumstances, or additional barriers to employment. A significant portion chose "Not applicable," which may reflect beneficiary respondents who are not

actively seeking employment or whose current roles are unaffected by job market changes.

Overall, the results highlight the positive economic impact of ICT training for a significant portion of participants while also emphasizing the importance of addressing the needs of those who did not experience similar benefits or for whom job opportunities are not currently relevant.
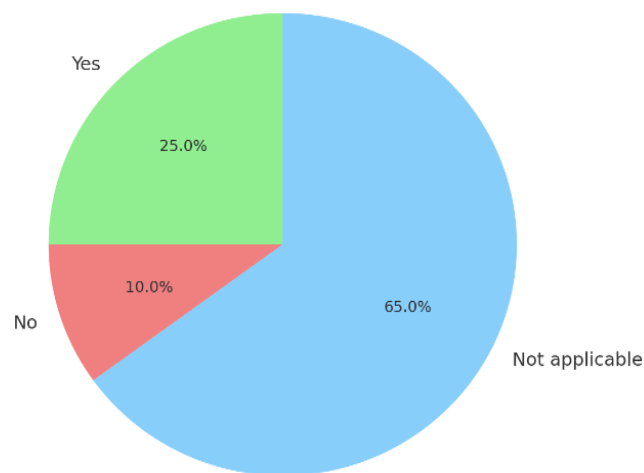

Figure 14: Impact of ICT Training on Income and Job Promotions

The results illustrate the perceived impact of ICT training on income or promotions among beneficiary respondents. The largest segment, 65%, indicated "Not applicable," suggesting that many beneficiary respondents are in roles or circumstances where ICT training does not directly influence income or promotion opportunities. This likely reflects farmers or non-salaried beneficiary-respondents who find promotions uncommon or are not actively employed. A smaller but meaningful portion, 25%, responded "Yes," indicating that ICT training has positively impacted their income or career advancement. Meanwhile, 10% of beneficiary respondents answered "No," suggesting that ICT training has not resulted in income improvements or promotions for some participants. This may highlight challenges in translating training into tangible economic benefits, possibly due to external factors such as job market limitations or a mismatch between skills and job requirements (Vasilescu *et al.*, 2020).
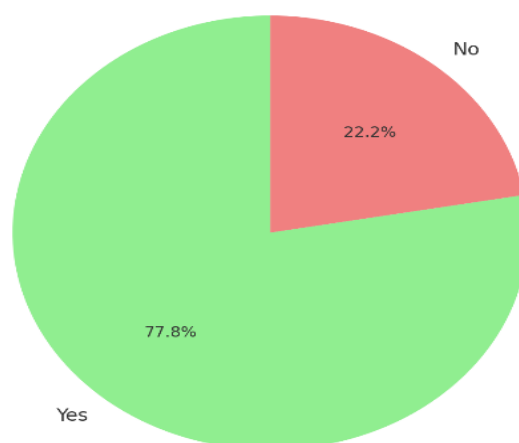
Figure 15: Enhance Business Production and Process

Most beneficiary respondents, 77.8%, reported that ICT training positively impacted their productivity and efficiency ("Yes"). This suggests that ICT skills have enabled them to perform tasks more effectively and efficiently, particularly for store clerks and daycare workers, where digital tools can streamline inventory management, administrative work, and communication. On the other hand, 22.2% of beneficiary respondents answered "No," indicating that the training has not significantly influenced their productivity. This group may include individuals, such as some farmers, whose jobs do not heavily rely on ICT or lack the infrastructure to integrate digital tools into their daily work.

4. Conclusion

CPSU's ICT training programs have demonstrated significant potential in addressing the socio-economic challenges faced by CATAFA members. By equipping members with digital and financial literacy skills, these programs contribute to strengthening agribusiness, promoting gender inclusivity, and enhancing household income stability.

The ICT training provided by the CPSU-Information Technology Department has fostered digital literacy and self-sufficiency among many CATAFA members. However, barriers such as limited access to digital tools and infrastructure must be addressed. The program can further enable members to integrate technology into their daily activities and improve their livelihoods by expanding training to include applications specific to agriculture and administrative tasks.

The training program has had a positive social impact by fostering connections among members and promoting personal and professional growth. Despite these successes, there remain gaps in integrating ICT into non-technology-intensive roles, such as farming. CPSU can maximize its training programs' social and economic benefits by tailoring them to specific job-related needs and focusing on empowering individuals across diverse occupational contexts.

ICT training has improved productivity, efficiency, and job opportunities for CATAFA members in technology-reliant roles. However, its application remains limited to traditional farming practices. Tailored training and investments in infrastructure and market access are necessary to integrate technology into agriculture and maximize economic outcomes for all members.

The ICT training has effectively raised environmental awareness among CATAFA members, reducing paper usage and adopting sustainable practices such as e-waste recycling and resource conservation. However, integrating environmentally sustainable digital tools into farming practices remains a challenge. Expanding the program to include modules on sustainable agriculture and providing ongoing support can enhance ecological and economic benefits.

Acknowledgements

Creative Commons License Statement

Conflict of Interest Statement

The author declares no conflict of interest.

About the Author(s)

Chester L. Cofino, IT Lecturer and researcher in the field of IT, focusing on Machine Learning, Education Technology, and Cyber Security.

Shara Mae R. Tee, is an instructor at Central Philippines State University with a bachelor's and Master's degree in Information Technology. She is currently pursuing her Doctorate in IT at the State University of Northern Negros (SUNN) and is a Licensed Professional Teacher and CSPE passer. She is currently focusing on Blockchain Technology and Education Technology-related studies.

Glorybe E. Alegre, graduated with a Bachelor of Science in Information Technology from Central Philippines State University (CPSU), Kabankalan City. She finished her Master's in Information Technology (MIT) at Northern Negros State College of Science and Technology, now State University of Northern Negros (SUNN), Sagay City, Negros Occidental, and is currently enrolled in Doctor in Information Technology (DIT) at State University of Northern Negros (SUNN), Sagay City, Negros Occidental.
Guilbert Nicanor A. Atillo, an Associate Professor 5 at Negros Oriental State University – Main Campus, is the Director of Extension Services.
Dindo R. De la Peña, a faculty member of the College of Education at Negros Oriental State University – Main Campus.

References

Castillo, A., Rivera-Hernandez, M., & Moody, K. A. (2023). A digital divide in the COVID-19 pandemic: information exchange among older Medicare beneficiaries and stakeholders during the COVID-19 pandemic. *BMC Geriatrics*, *23*(1). https://doi.org/10.1186/s12877-022-03674-4

Chama, A., & A., S. (2023). *Digital Literacy Skills of Teachers: A Study on ICT Use and Purposes*. https://doi.org/10.32388/7VMIK7

Correa, T., Pavez, I., & Contreras, J. (2020). Digital inclusion through mobile phones?: A comparison between mobile-only and computer users in internet access, skills and use. *Information, Communication & Society*, *23*(7), 1074–1091. https://doi.org/10.1080/1369118X.2018.1555270

Ghanbaripour, A. N., Talebian, N., Miller, D., Tumpa, R. J., Zhang, W., Golmoradi, M., & Skitmore, M. (2024). A Systematic Review of the Impact of Emerging Technologies on Student Learning, Engagement, and Employability in Built Environment Education. *Buildings*, *14*(9), 2769. https://doi.org/10.3390/buildings14092769

Mittal, V., & Raman, T. V. (2021). Examining the determinants and consequences of financial constraints faced by Micro, Small and Medium Enterprises' owners. *World Journal of Entrepreneurship, Management and Sustainable Development*, *ahead-of-print* (ahead-of-print). https://doi.org/10.1108/WJEMSD-07-2020-0089

Neumeyer, X., Santos, S. C., & Morris, M. H. (2021). Overcoming Barriers to Technology Adoption When Fostering Entrepreneurship Among the Poor: The Role of Technology and Digital Literacy. *IEEE Transactions on Engineering Management*, *68*(6), 1605–1618. https://doi.org/10.1109/TEM.2020.2989740

Vasilescu, M. D., Serban, A. C., Dimian, G. C., Aceleanu, M. I., & Picatoste, X. (2020). Digital divide, skills and perceptions on digitalisation in the European Union—Towards a smart labour market. *PLOS ONE*, *15*(4), e0232032. https://doi.org/10.1371/journal.pone.0232032.