

## Social Impact of the Voltaic Arc Welding Training in Tabiazo, Esmeraldas

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### Abstract

This article analyzes the social impact of arc welding training in Tabiazo parish, Esmeraldas. The objective is to improve the technical skills and job opportunities of the inhabitants, a community that combines tourism and agricultural activities. The research employed a non-experimental quantitative design, using the Likert scale to evaluate the level of acceptance of training in a natural environment without manipulation of variables. Data were collected through participant surveys, focusing on citizen participation, organizational training development, training activity, human resources and inclusion. The results indicate a high overall satisfaction with the training: 57% rated the location and accessibility very highly, 86% were very satisfied with the

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convening, 71% rated the teamwork positively, and 93% recognized the good organization of the course. However, some areas require attention to improve the training experience and ensure more inclusive participation. In conclusion, the trainings have had a positive impact on the Tabiazo community. The Technical University "Luis Vargas Torres" of Esmeraldas has demonstrated effectiveness in the planning and execution of the project, although areas for future improvement are identified.

**Key words:** Training, Impact, Development, Education, Satisfaction.

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## **Impacto social de la capacitación en soldadura por arco voltaico en Tabiazo, Esmeraldas**

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### **Resumen**

Este artículo analiza el impacto social de las capacitaciones en soldadura por arco voltaico en la parroquia Tabiazo, Esmeraldas. El objetivo es mejorar las habilidades técnicas y oportunidades laborales de los habitantes, una comunidad que combina actividades turísticas y agrícolas. La investigación empleó un diseño cuantitativo no experimental, utilizando la escala Likert para evaluar el nivel de aceptación de la capacitación en un entorno natural sin manipulación de variables. Los datos se recolectaron mediante encuestas a los participantes, enfocándose en participación ciudadana, desarrollo formativo organizacional, actividad formativa, recurso humano e inclusión. Los resultados indican una alta satisfacción general con la capacitación: el 57% calificó muy bien el lugar y la accesibilidad, el 86% se mostró muy satisfecho con la convocatoria, el 71% valoró positivamente el trabajo en equipo, y el 93% reconoció la buena organización del curso. Sin

embargo, algunas áreas requieren atención para mejorar la experiencia formativa y asegurar una participación más inclusiva. En conclusión, las capacitaciones han tenido un impacto positivo en la comunidad de Tabiazo. La Universidad Técnica "Luis Vargas Torres" de Esmeraldas ha demostrado eficacia en la planificación y ejecución del proyecto, aunque se identifican áreas para mejoras futuras.

**Palabras claves:** Capacitación, Impacto, Desarrollo, Educación, Satisfacción.

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## INTRODUCTION

The parish of Tabiazo is located on the southeast coast of the province of Esmeraldas, bordered on the north by the Vuelta Larga Parish (Quebrada Uzanque), on the south by the Carlos Concha Parish, on the east by the San Mateo Parish and on the west by the Atacames Canton, specifically the parishes of Tonsupa and La Union. With a territorial extension of 138.37 km<sup>2</sup> and a total population estimated at 5,600 inhabitants for the year 2024, according to INEC data. Founded on February 18, 1941, Tabiazo has a humid tropical climate, influenced by the exuberance of its native forests. The coldest months are from August to December during the summer season, while the hottest months are from January to July, coinciding with the rainy season. October is the driest month, when winds blow in different directions. The average temperature ranges between 21 and 30 °C, which translates into a stable climate with no sudden temperature changes (Gobierno Autónomo Descentralizado de la Parroquia Rural de Tabiazo).

According to González (2024), a member of Tabiazo's parish council, the local population is mainly dedicated to river tourism in

the freshwater rivers and agricultural activities. This combination of natural resources and economic activities contributes to the development of an attractive agrotourism sector in the province of Esmeraldas. In addition, the cultural richness and hospitality of its inhabitants add significant value to the tourist experience in Tabiazo. The region is distinguished by its diversity of ecosystems, including primary and secondary forests, pastures, agricultural areas, as well as the presence of impressive waterfalls, rivers and estuaries that further enrich its unique landscape.

According to Montaña (2022), "The province of Esmeraldas, located on the northern coast of Ecuador, is characterized by its natural, cultural and ethnic richness". However, despite this vast potential, the province is confronted by a series of challenges that restrict its socioeconomic progress and negatively impact the quality of life of its residents.

According to Vera and Cuenca (2024), in Ecuador, the diversity of established enterprises has arisen from the need to generate income in an economy that lacks job opportunities. Informality and lack of knowledge about entrepreneurship are the main causes that have given rise to most of these ventures. However, their implementation has contributed to the economic and social development of Ecuadorian families, as evidenced in Esmeraldas, specifically in the rural parish of Tabiazo. In this context, the inhabitants seek to carry out activities for their daily sustenance by acquiring skills in electrical welding.

According to Bergamasco, (2024). Electric arc welding training is one of the most common fusion processes for joining metals. This method involves the application of intense heat, which causes the metal at the joint between the two parts to melt and mix directly, or more frequently, with an intermediate molten filler metal. In Tabiazo, the development of these skills would offer the

opportunity to perform metal constructions in the field of locksmithing, as well as repairs in domestic installations. In addition, it would allow the welding of equipment such as agricultural machines, widely used in the locality.

The University "Luis Vargas Torres" of Esmeraldas, in full harmony with the principles promoted by UNESCO, approaches this issue in a rigorous manner, highlighting the importance of the "social responsibility" of higher education institutions and, especially, the concept of "social relevance of education". It stresses the need for society to participate more actively in university work, and at the same time recognizes that universities have a greater responsibility to the society they serve. This implies a mutual commitment, where the university and the community support and collaborate to achieve an education that is truly relevant and beneficial to all involved (Villavicencio et al.,2014, p.89).

The Continuous Training and Technical Consultancy project, led by the Mechanical Engineering career, has as its main objective to promote the socioeconomic development of the province of Esmeraldas. This project focuses on providing training and technical support in fundamental areas that cover social, technological and environmental aspects, in order to promote the integral progress of the Esmeraldas community. The Universidad Técnica Luis Vargas Torres, in its commitment to regional progress, has conceived this initiative as a significant contribution to enhance the skills and knowledge of the inhabitants of the province. Through this community outreach project, it seeks to stimulate an active and positive participation in society, leading the community towards a horizon of growth and integral improvement (Luis Vargas Torres University of Esmeraldas community outreach project).

For Quispe (2022), the way to identify the needs and gaps in knowledge related to arc welding, it is possible to collect

information effectively using quantitative methods, such as surveys, which allow to accurately measure the level of knowledge and skills of the participants. "Through quantitative approaches, it is feasible to segment and analyze in detail the different levels of learning and skills acquired during the training process." This approach provides a more complete understanding of the areas that require attention and improvement, which in turn helps to design more targeted and effective training strategies.

The main objective of this article is to conduct a comprehensive analysis of the social impact indicators used to evaluate arc welding training activities in the Tabiazo parish, aimed at the community. These trainings consisted of four practical days, during which it was concretely demonstrated how voltage is applied to the workpiece and the 6011 welding electrode to create an arc between these two elements. "The results observed in this study will make it possible to establish the relevance and social pertinence of the trainings carried out through community outreach projects, shedding light on their positive impact on the lives of the beneficiaries and on society in general" (Ramirez, C. A. 2022).

## **METHODOLOGY**

This study follows a non-experimental quantitative research design, conducted in a field setting through direct observation. It is classified as exploratory, as it examines a setting in its natural state without intervention or manipulation of variables. The focus of the study was on the evaluation of the impact of arc welding training in the province of Esmeraldas, specifically in Tabiazo, and how the linkage program contributes to the improvement of the working conditions of local entrepreneurs. Both the level and modality of training were analyzed within the context of a project of linkage with society (Garofalo et al, 2022).

The methodological approach is based on deductive reasoning. Initially, it starts from the contextualization of the current situation in terms of knowledge and practices of electric arc welding. Then, we proceeded to the quantitative measurement of the acquired skills by means of a Likert scale. This analysis is applied with the purpose of objectively evaluating the level of competence to perform welding, specifically to those who participate in the training in Tabiazo, province of Esmeraldas (Castañeda, 2022).

The target population of this study is composed of the participants or beneficiaries who were previously registered through a Google platform. Initially, there was a group of 20 pre-registered participants. However, at the time of carrying out the questionnaire application, 14 of these registrants participated, as detailed in Table 1. These 14 participants make up both the population and the sample to which the questionnaire will be applied. The choice of this sample is based on social impact indicators previously used for the evaluation of projects of linkage with society, which were developed by Cioppo and Bello at the Agrarian University of Ecuador (2018).

Participants were informed that the Luis Vargas Torres University, in charge of the arc welding training in Tabiazo, will carry out the publication of a scientific article based on the results obtained from this linkage activity. In this context, consent was obtained from the authorities and the community for the application of the questionnaire. It is important to emphasize that the confidentiality of the respondents' answers was guaranteed, and at no time will personal data be collected on the form.

This approach rigorously conforms to human rights and the well-being of the people involved, who are treated as research subjects with the utmost responsibility and respect for ethical values. This approach reflects the commitment not to cause any harm to the

participants, maintaining the principles of justice, impartiality and equity throughout the survey process as a research instrument (Regulations of bioethics and biosafety in scientific research of the Technical University "Luis Vargas Torres" of Esmeraldas).

A questionnaire consisting of 19 questions was used, designed to evaluate various dimensions that are part of the impact variables on the beneficiaries of the linkage project. These dimensions addressed include participation, organization, human resources and continuing education. Participants express their responses in the survey through a scale comprising five levels: 1 (Strongly Agree), 2 (Somewhat Agree), 3 (Neither Agree nor Disagree), 4 (Somewhat Disagree) and 5 (Strongly Disagree). In addition, data related to gender and age indicators are collected for a more complete and contextualized analysis of the results.

**Figure 1.** Citizen participation in the linkage with society.





**Note:** The figure shows the development of the outreach activity in the rural parish of Esmeraldas Tabiazo, carried out by the Technical University "Luis Vargas Torres" of Esmeraldas.

Within the methodology used to process the results of the survey in the context of outreach in Tabiazo, the Likert scale is used as an essential tool. This scale allows participants to express their opinions and evaluations in relation to various aspects, providing a quantitative structure for data collection. Each survey question is presented with a series of statements, and respondents select their level of agreement or disagreement on a scale ranging from "strongly disagree" to "strongly agree." "The development of questionnaires and scales demonstrates that thinking in purely quantitative or qualitative terms is an increasingly theoretical exercise and less and less consistent with the search for a deep understanding of social phenomena; thus, the Likert scale is presented as essential for cataloging qualitative data" Costa et al. (2024).

To process the survey results in the context of linkage in the Tabiazo parish, Microsoft Excel is used as a fundamental tool. This software allows for the efficient organization, tabulation and analysis of the data collected through the survey. The results are entered into spreadsheets, where statistical calculations can be made, graphs and comparative tables can be generated, and trends and patterns in the respondents' answers can be evaluated. In addition, Excel facilitates the generation of reports and visualizations that help to clearly and concisely understand the survey findings, which in turn contributes to informed decision making and the formulation of recommendations in the context of community engagement (Malitasig et al., 2017).

## RESULTS

The results are shown in a consolidated table, elaborated from the survey instrument, which covers various dimensions, such as citizen participation in the electric welding linkage, formative development and training activities. It also includes aspects related to human resources, both trainers and students, as well as gender, age and ethnicity of the participants. The training impact indicators are presented in a clear manner, expressed in absolute values and percentages. This detailed structuring of the data facilitates an effective understanding of the results, which in turn simplifies the interpretation and analysis of the participants' perceptions of the training and its impact on the Tabiazo community.

**Table 1. Results of beneficiary survey.**

Nro	QUESTIONS	Very much in agreement	Somewhat in agreement	Neither agree nor disagree	Somewhat in agreement	Strongly disagree	Total
1	How do you rate the place where the training activity took place and its accessibility?	8	5			1	14
2	How satisfied are you with the means and time of advance notice with which you were summoned to this activity?	12	1		1		14
3	Teamwork during the training.	10	4				14
4	Active participation in working groups.	10	3		1		14
5	How do you rate the organization of the course carried out by the Universidad Técnica Luis Vargas Torres?	13	1				14
6	How do you rate the classroom conditions for learning?	7	5	1	1		14
7	Duration and schedules of the course	9	4		1		14
8	There was due attention from the instructor to the participants.	12	1		1		14
9	How do you rate the knowledge acquired?	12	2				14
10	Methodology used during the practices	10	3	1			14

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11	Do you believe that the training objectives were met?	9	5				14	
12	The contents were applied in the practical activities.	10	2	1		1	14	
13	Do you think it is necessary to receive further training on new topics?	13	1				14	
14	What are your positive expectations regarding the link between the University and the community?	14					14	
15	The realization of this course has provided the opportunity to be trained in Electric Arc Welding.	13	1				14	
16	Gender	Masculino	13	Femenino	1		14	
17	Mark the age range you are in	18-25	26-35	36-45	46-60	61 o mas	0	
18		3	8	2	1		14	
19			Mestizo	Montubio	Afroecuatoriano	Indígena	Blanca	0
			11	2	1		14	

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Citizen participation in the linkage with society in accessibility and place of the activity. The majority of respondents (8) rate the place where the training activity took place and its accessibility very highly, while 5 somewhat agree. However, one person disagrees (1). This suggests that most participants were satisfied with the venue and its accessibility, but it is important to address the concerns of the person who showed disagreement in order to improve the experience in the future.

As satisfaction with the convening, the majority of respondents (12) were very satisfied with the means and time in advance they were convened to the activity, indicating good planning and communication by the organizers. However, one person disagreed (1), suggesting that there may be areas for improvement in communication or planning for future activities.

For formative organizational development, teamwork during training; the majority of respondents (10) indicate a high degree of

satisfaction with teamwork during training, while 4 somewhat agree. This suggests that the teamwork dynamic was effective for the most part, but there is still room for improvement in collaboration and communication among participants.

When active participation in working groups is assessed, a majority of respondents (10) indicate having actively participated in working groups, suggesting positive engagement by most participants. However, 3 respondents indicate somewhat agreement, which may indicate that some participants may have had difficulty participating actively. In addition, one person shows disagreement (1), suggesting that there may have been some challenges in working group participation that need to be addressed.

The dimension organizational formative development Course organization, The vast majority of respondents (13) positively evaluate the organization of the course conducted by the Universidad Técnica Luis Vargas Torres, indicating good planning and execution by the institution. Only one person shows some discrepancy (1), which could be a minor concern compared to the overall positive perception.

Classroom Conditions for Learning, the majority of respondents (7) rate the classroom conditions for learning positively, while 5 somewhat agree. However, two respondents show some disagreement (1 each), suggesting that there may have been some deficiencies in classroom conditions that need to be addressed to improve the learning experience.

Regarding course duration and schedules, the majority of respondents (9) seem to be satisfied with the course duration and schedules, indicating a good balance between course duration and time availability for participants. However, 4 people show some agreement, which could indicate that some participants might have had difficulties with the duration or schedules of the course. In

addition, one person shows disagreement (1), which suggests that there might have been some problems related to the duration or timing of the course that need to be addressed.

This dimension is very important training activity, Instructor Attention; the vast majority of respondents (12) indicate that they received due attention from the instructor during the course, suggesting a high quality of teaching delivery and attention to the needs of the participants. However, one respondent shows discrepancy (1), which could be a minor concern compared to the overall positive perception.

The Rating of knowledge acquired, the majority of respondents (12) positively rate the knowledge acquired during the course, suggesting that the course was effective in conveying relevant information and skills. However, 2 respondents somewhat agree, which could indicate that some participants may not have been completely satisfied with the knowledge acquired.

Regarding the Methodology employed during the internship, the majority of respondents (10) seem to be satisfied with the methodology employed during the internship, suggesting that the approach used was effective for the participants' learning. However, 3 people show some agreement, which could indicate that some participants might have had some reservations or difficulties with the methodology used. In addition, one person disagrees (1), suggesting that there may have been significant problems with the methodology that need to be addressed.

When asked about meeting the objectives of the training, the majority of respondents (9) believe that the training objectives were met, indicating that the training was effective in achieving the expected results. However, 5 respondents somewhat agree, which may indicate that some participants may have mixed opinions on whether the training objectives were fully achieved.

Within the application of the contents in the practical activities, the majority of the respondents (10) indicate that the application of the contents in the practical activities took place, suggesting that the practices were aligned with the theoretical contents and were effective in putting into practice what was learned. However, 2 people show some agreement, and one person shows disagreement (1), suggesting that there might have been some deficiencies in the application of the contents that need to be addressed.

Within the dimension human resource-trainers (student) need to receive another training in new topics, the vast majority of respondents (13) consider that it is necessary to receive another training in new topics, indicating an interest and a willingness to continue learning and developing professionally. Only one person disagrees (1), which could be an exception.

Positive expectations regarding the linkage of the University with the community, the question does not have numerical answers, but it seems to be an opportunity for the participants to express their expectations. It is important to review the responses to better understand how the community perceives the relationship between the university and the community, as well as to identify areas for improvement or opportunities for collaboration.

For the benefits of taking the Electric Arc Welding course, the majority of respondents (13) indicate that taking the course has provided them with the opportunity to be trained in Electric Arc Welding, suggesting that they are satisfied with the learning experience and recognize the value of the course in terms of acquiring relevant skills. Only one person shows discrepancy (1), which could be an exception.

Within the aspects of inclusion, gender; the majority of participants identify their gender as male (13), while only one person identifies

as female (1). This may reflect a gender disparity in activity participation or simply the demographic composition of the population surveyed.

Age range: The age distribution of participants is as follows:

- 18-25 years: 3 participants.
- 26-35 years: 8 participants
- 36-45 years: 2 participants
- 46-60 years: 1 participant
- 61 years and older: 1 participant

This distribution shows a significant concentration of participants in the 26-35 age range, followed by a considerable number in the 18-25 age range. The other age ranges have more limited representation.

Ethnicity: The majority of participants identify themselves as mestizos (11), followed by Montubios (2), Afro-Ecuadorians (1) and indigenous (1). There are no participants who identify themselves as white. This ethnic distribution reflects the ethnic diversity of Ecuador's population, with a predominance of mestizos, followed by other minority ethnicities.

In summary, the table provides useful information on the demographic composition of the participants in the activity. It reveals a majority of male participants, a concentration in the age range of 26-35 years, and an ethnic diversity represented by mestizos, montubios, Afro-Ecuadorians and indigenous people. This demographic analysis may be useful to better understand the target audience of the activity and tailor future initiatives accordingly.

## CONCLUSIONS

Citizen participation in linking with society and the accessibility of the activity site in Tabiazo received a predominantly positive rating. Of the 14 respondents, 57% (8) rated the site and its accessibility very highly, while 36% (5) somewhat agreed, and only 7% (1) disagreed. This suggests that while most participants were satisfied with the venue and its accessibility, it is essential to address individual concerns to improve future experiences.

In terms of satisfaction with the convening, 86% (12) of respondents were very satisfied with the means and time in advance they were convened to the activity, indicating good planning and communication by the organizers. However, 7% (1) disagreed, suggesting areas for improvement in communication or planning of future activities to ensure more effective convening.

Regarding the formative organizational development and teamwork during the training, 71% (10) of the respondents indicated a high degree of satisfaction, while 29% (4) somewhat agreed. This result suggests that the teamwork dynamic was mostly effective, although there is room for improvement in collaboration and communication among participants to optimize training development.

Active participation in working groups was also evaluated positively, with 71% (10) of respondents indicating active participation, 21% (3) somewhat agreeing and 7% (1) disagreeing. This reflects positive engagement by the majority, although some participants may have faced difficulties in becoming actively involved, suggesting the need for strategies to encourage greater inclusion and participation.

Finally, the assessment of the organization of the course conducted by the Universidad Técnica Luis Vargas Torres was highly positive, with 93% (13) of respondents rating the organization favorably.



Only 7% (1) showed some discrepancy, indicating a minor concern compared to the overall positive perception. This underscores the effectiveness of the planning and execution of the course, although there is always room for small improvements to address any individual concerns.

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