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Factors Influencing Trust in Geothermal Energy Projects: Case of Seven Projects in East-Africa

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ABSTRACT

Geothermal energy is widely considered a clean and renewable energy source, yet it faces significant social opposition in several countries, including Japan, Kenya, Greece, and Switzerland, among others. These challenges are often linked to trust issues. East African countries are actively developing their geothermal energy resources; however, some projects, such as the Olkaria IV and Akiira geothermal energy projects in Kenya, have faced social resistance. This study investigates the factors influencing trust in geothermal energy projects by analyzing public participation materials included in the Environmental and Social Impact Assessment (ESIA) reports of seven geothermal projects in the East African region.

The findings indicate that trust issues predominantly concern corporate trust (34.67%), technological trust (33.33%), and procedural trust (28.67%). Correlation and chi-square analyses revealed that these concerns are linked to employment, corporate support (such as corporate social responsibility projects), environmental and social risks, and public engagement.

This study emphasizes the importance of fairness and transparency in employment, corporate social responsibility activities, and public engagement, as well as the necessity of communicating and mitigating environmental and social risks both before and during the implementation of geothermal energy projects. It recommends that policymakers establish clear, transparent guidelines for public engagement and strengthen legal frameworks regarding land ownership and resettlement to reduce conflicts. Additionally, corporates should focus on enhancing transparency in corporate practices and ensuring procedural fairness to foster trust with local communities and leaders.

Keywords

Geothermal Energy;
Social Acceptance;
Community Trust;
Environmental and Social Impact Assessment;
East Africa

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1. Introduction

Geothermal energy development, considered a clean energy source, is facing, social opposition in many countries worldwide, like Japan [1], Germany [2], Switzerland [3], and more recently, Kenya [4]. Despite the specificities of each territory, project reality, and scope, opposition to geothermal energy projects primarily stems from concerns about environmental and social impacts, as well as a general distrust from local communities towards the technology.

Consequently, Trust has become a crucial factor in getting social support from local communities for geothermal energy projects [5–7]. Indeed, trust is a key component of community acceptance, with distributive justice and procedural justice, which both influence the acceptance of renewable energy projects by communities [8].

Geothermal energy technologies are becoming increasingly popular in developing countries due to their capacity to provide baseload power, reduce greenhouse gas emissions, promote the adoption of clean

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technologies, and enhance energy independence [9]. Among these countries, East African nations are actively pursuing the development of this resource, benefiting from their vast geothermal generation capacity, estimated at up to 15,000 MW, due to the Great East African Rift system, which provides the ideal conditions for the development of this resource [10]. But only Kenya produces this energy on a large scale, with a capacity of 983 MW in 2023 [11]. Other countries, such as Djibouti, Ethiopia, and Tanzania, are also engaged in the development of this resource.

However, like other countries around the world, controversies concerning the development of geothermal energy projects have arisen in Kenya, particularly in Olkaria, the country's main geothermal energy development prospect [4]. According to Hughes and Rogei [12], the expansion of geothermal energy in Olkaria has led to "conflicts over equitable resource use, environmental degradation, health impacts on humans and animals, forced resettlement, access to benefits such as jobs, housing, and profit sharing, as well as issues related to human and land rights, and community representation". Additionally, environmental impacts, inclusion in the decision-making process, social and environmental benefits, and grievance mechanisms have all influenced community acceptance of the controversial Olkaria IV project [13]. Furthermore, this controversy was exacerbated by inadequate community engagement, misinformation, and manipulation, which resulted in trust issues and opposition from the community [4].

Abdi et al. [14] also highlighted that geothermal energy developers viewed the loss of trust as a major barrier to community acceptance. Furthermore, these controversies highlight the necessity to better understand the driving factors of trust in geothermal energy projects across the East African region. However, literature lacks empirical studies related to the factors influencing trust.

This paper aims to address gaps in the literature and provide an initial examination of the factors influencing trust in geothermal energy projects in East Africa. We analyzed concerns from communities included in environmental and social impact assessment (ESIA) reports collected during public participation activities. A mixed-methods approach was employed, combining qualitative content analysis (QCA) of meeting minutes included in ESIA reports and statistical methods to quantitatively analyze the themes and categories generated through QCA.

This study is structured into six sections, Section 1 introduces the relevance of our study, Section 2 includes the review of the literature about trust focusing on geothermal energy technologies, Section 3 enunciates the methodology of our study and analysis methods, Section 4 includes the results of our study, Section 5 covers the discussion of our study and Section 6 comprises the conclusion.

2. Literature review

This section presents the theoretical background on the social acceptance of renewable energy, with a particular focus on geothermal energy. It concludes by highlighting the literature gap, thereby introducing the issue of trust as a critical area to explore.

2.1. Social acceptance of renewable energy theory

The Social Acceptance of renewable energy technologies was theorized by Wüstenhagen et al [8], it helps understanding social issues encountered by the deployment of renewable energy technologies such as wind energy. They proposed a tridimensional model comprising socio-political acceptance, market acceptance and community acceptance.

The socio-political acceptance refers to the acceptance of renewable energy technologies by policy makers and institutions. The market acceptance refers to the adoption and diffusion of renewable energy technologies among consumers, businesses and investors. And, community acceptance refers to the factors influencing acceptance by the community comprising participative justice, distributive justice and trust.

Social acceptance issues, commonly referred to as the "Not In My Backyard" (NIMBY) effect, illustrates how local communities may oppose renewable energy projects due to perceived negative impacts on landscape, health, or property values; even when they generally support the transition to cleaner energy sources [15, 16].

In addition, other acronyms have emerged such as BANANA ("Build Absolutely Nothing Anywhere Near Anything"), NIABY ("Not In Anyone's Backyard") or LULU ("Locally Unwanted Land Used") [17]. However, all these terms tend to stigmatize local communities by portraying them as obstructive, selfish or irrational actors in the development process, and overlooking possible legitimate concerns of communities [16, 18]. Moreover, these labels can exacerbate distrust between communities and developers by neglecting community concerns about renewable energy projects. Thus, it is fundamental to understand factors influencing trust in renewable energy projects, especially geothermal energy projects.

2.2. Literature review about Trust in Geothermal Energy Projects

Trust is an important component of community acceptance, which is one of the three pillars of the social acceptance theory. Trust is a multifaced issue influencing how communities perceive and react to a new project.

More specifically, trust refers to the confidence communities place in both the information provided by developers and the developers' underlying intentions [8]. It also encompasses technical competence, transparency, inclusiveness, and the alignment of projects with local interests; factors that are especially critical in complex and risk-prone technologies like geothermal energy [19]. By fostering trust, developers and institutions can build stronger relationships with communities and increase the likelihood of project acceptance. According to the literature, several types of trust can be distinguished, including trust in technology, in corporations and institutions, and in procedures.

2.2.1. Technology trust

A lack of knowledge about renewable energies can generate biased misconceptions or beliefs. Żywiołek et al. [20] demonstrated the proportional relationship between trust and the level of knowledge of renewable energies. Knowledge or Awareness about renewable energy is thus important, helping to understand their use and their negative and positive impacts. Moreover, trust issues can influence the public engagement of communities. Pellizzone et al. [22,23] conducted a study in Italy and unveiled the lack of knowledge that results in uncertainties and a lack of trust in the decision-making processes of geothermal energy projects in Italy. Moreover, a study in Argentina conducted by Grims [24] that showed that universities were considered the most trusted source of information by communities Indeed, geothermal energy projects are complex and need to be explained to non-expert communities and adopt a comprehensible communication strategy accordingly. These issues unveil the critical role of technological trust in influencing the social acceptance of new technologies such as geothermal energy [21].

2.2.2. Corporate and Institutional Trust

In addition, Kalkbrenner and Roosen [25] emphasized the importance of trust in the willingness of

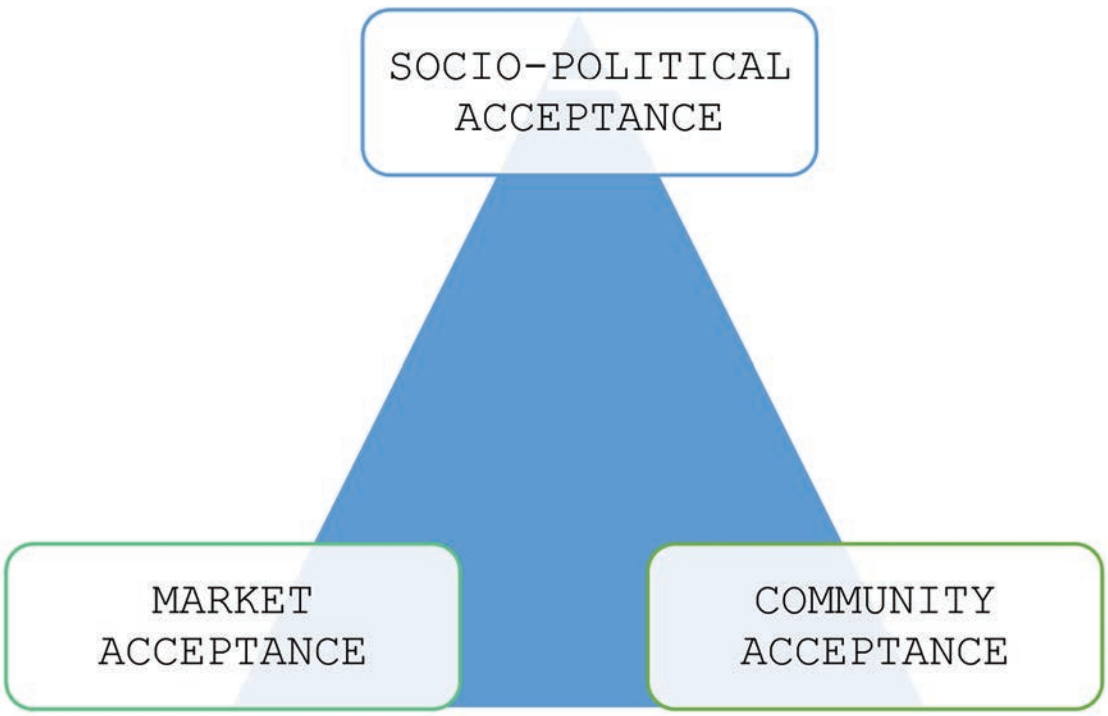

Figure 1: Social Acceptance Triangle, Wüstenhagen et al [8].

communities to participate in energy projects. Lienhoop [26] found that communities tend to trust local regional entities more than external developers. In addition, trust issues toward geothermal developers and governmental institutions can be linked to the perception of corruption [24], political collusion, corporate interests, and experiences of risks from previous projects. In Indonesia, according to Anggreta et al. [27], partnering with local communities by avoiding legal channels and the proactiveness of local government to address concerns can help gain the trust of communities. These issues highlight the importance of trust in corporations and institutions for the acceptance of geothermal energy projects.

2.2.3. Procedural Trust

In addition, trust can also be related to the transparency of public and private institutions but also to the risk related to geothermal development. Pellizzone et al. [23] emphasized the distrust of communities in politics while giving more credibility to university researchers. Moreover, trust in the developer can be influenced by the perception of mismanagement of risks, as explained by Trutnevyte and Wiemer [28], where communities in Switzerland distrusted the ability of the operator to manage induced seismicity. Thus, it is important to implement transparent and participatory processes to foster procedural trust.

2.3. Literature gaps

There is a research gap in understanding trust issues related to geothermal energy projects, particularly in defining and shaping the main categories of trust, such as corporate trust, institutional trust, procedural trust, and technological trust. The authors state that there is a gap in exploring links between trust, and distributive and procedural justices. That is not generally the case, but it might be in relation to geothermal energy.

3. Methodology

This section presents the methodological approach of the paper, detailing the data collection process, as well as the qualitative and quantitative methods employed.

3.1. Data collection

Environmental and Social Impact Assessment are realized before the implementation of infrastructure development projects like geothermal energy projects. These projects can be classified depending on the stage of geothermal energy development. Indeed, geothermal energy development can be classified in several stages as stated in the figure below:

Seven Environmental and Social Impact Assessments (ESIA) reports were collected online from reputable sources (Developers, consultants or international finance organization's websites). Selected reports included one

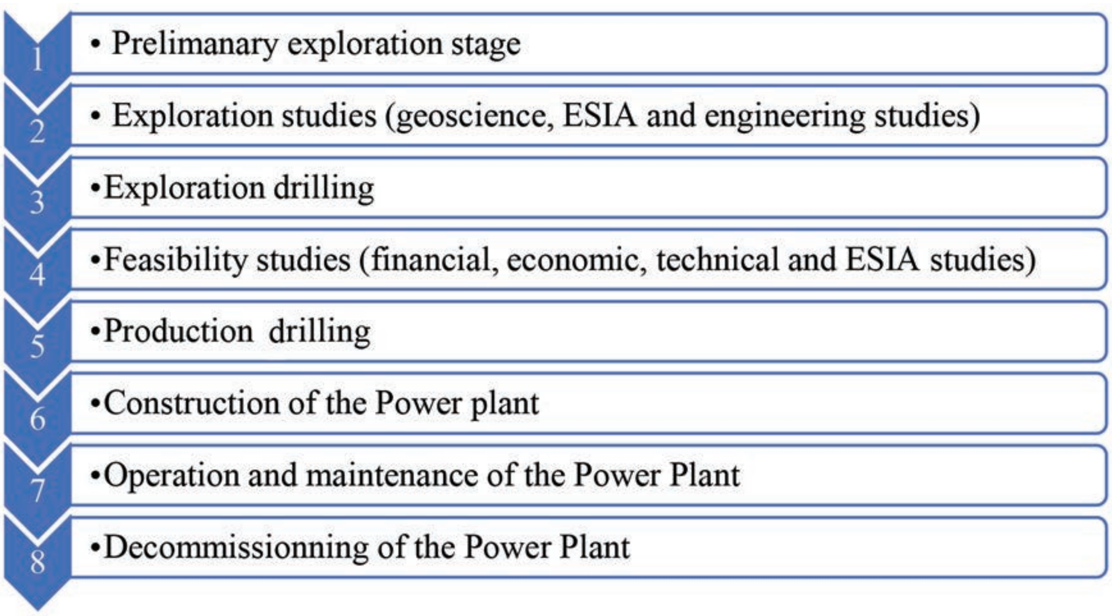

Figure 2: Geothermal development stages, adapted from [29].

project in Djibouti [30], two projects in Ethiopia [31, 32], and four projects in Kenya [33-36]. These three countries were selected based on the number of ongoing geothermal projects and their political commitment to developing this energy source. As a result, few geothermal energy projects have been developed in the region, which explains why fewer reports were collected. In addition, several criteria were applied to select the ESIA reports, including:

- ❖ Year: ESIA reports from 2008 onward were collected to gain a better understanding of current issues. The year 2008 was also targeted to ensure a sufficient number of ESIA reports, taking into account the specificities of geothermal energy development in East Africa.
- ❖ Geographical scope: Djibouti, Ethiopia, and Kenya.
- ❖ Source: Reports were gathered from reputable sources such as project developers, international financial institutions, and national environmental authorities' websites.

3.2. Qualitative analysis method

Public participation materials included in the ESIA reports were collected, and 680 concerns from communities were reported and analyzed in an Excel file. A qualitative analysis was then conducted, using a combination of manual thematic review and keyword searches, following the approach of Miles and Huberman [37]. Each concern was individually screened to confirm its relevance to trust-related issues, ensuring that potentially significant entries were not missed due to keyword limitations. This process led to the identification of 150 concerns specifically linked to trust.

The analysis employed both deductive and inductive coding strategies to maximize analytical depth and systematic analysis [38]. Firstly, deductive coding was used to classify concerns into four main categories of trust: corporate trust, institutional trust, procedural trust, and technological trust. Secondly, inductive coding was applied to identify specific issues of community concerns, and 15 codes were generated. Finaly, the last step of coding is intended to highlight the link between trust issues and established concepts of community acceptance such as Distributive Justice and Procedural Justice.

The main objective of deductive coding was to highlight the link between trust issues and established theoretical concepts, while the main objective of inductive coding was to uncover new insights directly from the data, providing a deeper understanding of trust-related concern

3.3. Quantitative analysis methods

Dummy variables of all codes resulting from the three-step coding were obtained for issues using SPSS version 24 software. A correlation between respective issues and trust categories was performed. Subsequently, dummy variables were generated for Procedural justice (concern related to procedural justice code = 1, concern not related = 0) and Distributive justice (concern related to distributive justice code = 1, concern not related = 0) and were correlated to dummy variables related to trust (Corporate trust, Institutional trust, Procedural trust, and Technology trust).

Table 1: Codes used in the QCA.

First Step Coding – Deductive coding of Trust categories	**Second Step coding – Inductive coding of trust issues**	**Third Step – Deductive coding of other community acceptance pillars**
- Corporate trust - Institutional trust - Procedural trust - Technology trust	- Community health - Compensation - Corporate support - Employment - Environmental pollution - Infrastructure risks - Land ownership - Resettlement - Socio-economic loss	Distributive Justice trust issues
	- Equal fairness - Public engagement - Right to grievance - Right to information	Procedural Justice trust issues
	- Project timeline - Security issues	Other

The standard deviation, the mean and variation were reported for transparency and completeness.

Subsequently, a Chi square test of independence was employed to understand the relationship between trust categories, distributive justice and participative justice issues.

3. Results of Qualitative content analysis

This section includes the results of the qualitative content analysis.

3.1. Corporate trust

Corporate trust issues were mostly related to unmet corporate support commitment (sum = 36), unmet employment promises (sum = 14) and infrastructure related risks linked to corporate activities (sum = 2). These issues reflect an erosion of trust between communities and developers, especially when corporate social responsibility promises are not implemented and do not meet community expectations. As illustrated by one respondent, "*The company is our friend but has failed our promise*" (R5), community had initially trusted the company but then deteriorated over time due to perceived unrealized promises leading to distrust. This erosion is particularly important for employment issues, where local communities expected job opportunities to materialize as part of the project's benefits. The quote, "*Previously, the community was promised employment especially for the youth. This has not been forthcoming, now in its fourth year…*" (R7), highlights the sense of disillusionment and the perceived neglect of an informal social contract or agreement between developers and communities.

In addition, infrastructure-related risks, such as inadequate road construction leading to flooding, and further strained corporate trust. As one community member noted, "*There is a problem [with] flood at Golba Aluto Kebele because of the road structure…*" (R2), indicating a failure of the company to prevent or mitigate negative impacts of projects.

3.2. Institutional trust

The analysis of institutional trust concerns revealed that community distrust was primarily directed toward the role of government institutions in land governance (Sum=2) and security issues (Sum=2). One of the most important themes is the legacy of forced resettlement without compensation, which undermines public trust in the government's handling of land acquisition. As one respondent described, "*The village of Rikongo...was settled in 1983/84 and they were later moved by the government without compensation to date. The community therefore felt that there would be displacement from their land...*" (R7). This concern reflects not only a lack of trust in past forced resettlement but also a fear that history will repeat itself under the current geothermal project which exacerbates community distrust.

Security-related concerns further underscore the perceived neglect by governmental institutions. Respondents described a lack of basic infrastructure such as electricity and the resulting vulnerability to crime: "*When there's no power, thieves attack the households at night*" (R8). Moreover, the community called on the government to play a more active role in safeguarding the project and its neighboring community: "*Recommended that the project should ensure that adequate security is provided by concerned government security bodies...*" (R3). These comments highlight a deficit in institutional responsiveness and presence, which can exacerbate fears and resistance to project implementation.

In addition, the low number of institutional trust concerns compared to others. Trust categories may reflect a broader normalization of institutional inefficacy, where communities no longer expect the state to act in their interest, or a reluctance to criticize government authorities directly

3.3. Procedural trust

Procedural trust refers to the level of confidence communities place in the fairness, transparency, and inclusiveness of the decision-making processes. Concerns related to procedural trust were mostly related to employment procedures (Sum=18), fairness and equal treatment (Sum=7), and resettlement procedures (Sum=6).

These results reflect a lack of transparency in how job opportunities were allocated to local communities. One respondent noted: "*The company requested us names, qualifications among other things to get employment but up to date we haven't heard from them*" (R5). This suggests that while communities were initially engaged or consulted, the process lacked transparency, leaving communities feeling excluded or abused. This disconnects between community expectations and corporate actions undermines community trust, as it shows a failure in employment procedures transparency, communication and fairness.

The feeling of isolation in the decision-making process can also lead to the feeling of unfairness between communities. One respondent emphasized: "*If we are minority, we still deserve equal rights*" (R5). This highlights a perception of unfairness or inequity in how benefits or opportunities are distributed, particularly among marginalized communities within the affected population. Indeed, in several rural areas where communities are divided into clans or tribes it is important to avoid.

In addition, resettlement-related procedural issues highlighted concerns about how displacement was being managed and whether affected individuals were being adequately informed or involved. The lack of procedural clarity or responsiveness in resettlement planning can severely erode community trust, especially in contexts of past forced relocation or unmet promises.

3.4. Technology trust

Technology trust issues reflected concerns about the environmental, health, and socio-economic impacts of geothermal technologies. These concerns were mainly related to environmental pollution (n = 28), community health (n = 8), socio-economic loss (n = 7), and resettlement or restricted access to resources (n = 6).

Many respondents attributed visible environmental degradation to geothermal emissions, especially the loss of vegetation and declining soil fertility. One respondent noted: "*Our grass is no longer green. We think it's because of geothermal gasses*" (R5). Similarly, another added: "*Steam released from the wells is affecting vegetation growth especially grass since it rains in the area but the land cover remains fallow*" (R5). These comments revealed how geothermal technologies or related facilities are perceived by communities.

Communities also expressed concern about restricted access to traditional natural resources, such as grazing land, firewood, and construction materials. One community member explained: "*Geothermal development has restricted access to the caldera thus depriving the community [of] benefits such as grazing grounds, firewood and poles for fencing*" (R5). This indicates how infrastructure-related land use changes can result in a sense of displacement and exclusion, even in the absence of formal resettlement.

In addition, several respondents raised health and property damage concerns, particularly around emissions and water quality. "*The emissions from the stations mix with rainwater forming sulphury acid which corrodes their roofs*" (R8), said one, linking geothermal powerplant emissions to structural damage. Another noted: "*Bad odor from the Caldera is affecting breathing especially at night*" (R6), while others associated geothermal activity with crop disease: "*Disease affecting maize crop in the area is caused by geothermal steam from the Caldera*" (R6). These statements illustrate how technology-related fears extend beyond the

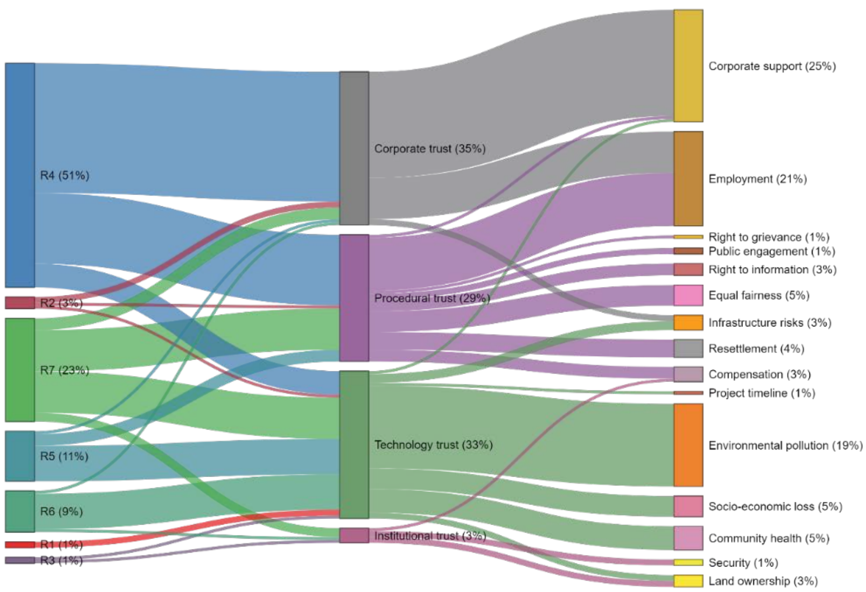

Figure 3: Result of Qualitative Content Analysis.

environment to personal health and food security, amplifying mistrust.

Trust issues were mostly related to “Corporate trust” (sum = 52, percentage = 34.67%), “Technology trust” (sum = 50, percentage = 33.33%), “Procedural trust” (sum = 43, percentage = 28.67%) and less to “Institutional trust” (sum = 5, percentage = 3.33%). Issues were mostly related to “Corporate support” (25.33%), “Employment” (21.33 %), and “Environmental pollution” (18.67%). Issues were barely related to “Project timeline,” “Right to grievances,” and “Public engagement”, as shown in the Figure 3.

4. Results of Quantitative data analysis

4.1. Descriptive statistics

Dummy variables of all codes were obtained in order to quantitively analyse the results of the qualitative content analysis. Descriptive statistics were used to analyse frequencies, trends and variability of codes. Among the four main dimensions of trust, corporate trust issues registered the highest mean score (M = 0.35, SD = 0.478, Variance = 0.228), followed by technology trust (M = 0.33, SD = 0.473, Variance = 0.224), procedural trust (M = 0.29, SD = 0.454, Variance = 0.206), and institutional trust (M = 0.03, SD = 0.180, Variance = 0.032).

In addition, corporate support was the most frequently cited concern (M = 0.25, SD = 0.436, Variance = 0.190), followed by employment opportunities (M = 0.21, SD = 0.411, Variance = 0.169), and environmental pollution (M = 0.19, SD = 0.391, Variance = 0.153). Other moderately mentioned factors included community health and equal fairness, both with mean values of 0.05 but differing slightly in their variability.

Concerns such as compensation, infrastructure risks, and socioeconomic loss had similar low frequencies (M = 0.03–0.05), while issues like land ownership, right to information, public engagement, security, and project timelines were rarely mentioned (M = 0.01–0.03). These lower mean values are also associated with smaller standard deviations and variances, indicating less variability in responses.

4.2. Pearson correlation analysis

The Pearson correlation analysis between code and topics showed a strong correlation between Corporate trust and corporate support (r = 0.735), moderate correlations were found between Technology trust and environmental pollution (r = 0.678), between Institutional trust and security issues (r = 0.626), between Institutional trust and land ownership (r = 0.430), between Procedural trust and equal fairness (r = 0.349), between Procedural trust and employment (r = 0.318) and between Technology trust and socio-economic loss (r = 0.313).

4.3. Chi-square analysis

Furthermore, Chi square analysis was performed to highlight the relationship between different aspects of trust, distributive justice, and procedural justice. We have found strong association between procedural justice and procedural trust ($p < 0.001$), and between distributive justice and procedural trust ($p < 0.001$) and between distributive justice and corporate trust (p = 0.001), between procedural justice and corporate trust (p = 0.004), and between procedural justice and technology trust (p = 0.005). Weak associations were found between distributive justice and technology trust (p = 0.011) and between procedural justice and institutional trust (p = 0.466).

5. Discussion

The acquisition of trust from local communities is important for the successful implementation and acceptance of geothermal energy projects [22]. Indeed, our results showed that trust issues were mostly related to “Corporate trust” (34.67%), “Technology trust” (33.33%), “Procedural trust” (28.67%). We also found that issues were mostly related to corporate support, employment, and environmental pollution.

According to the reading of stakeholders’ concerns, communities had trust issues about unrealized promises in terms of employment and other socioeconomic support through corporate social responsibility projects, and about the process of getting these benefits and the mitigation of environmental impacts. This statement is confirmed by the association between distributive justice and corporate trust (p = 0.001) and the correlation between corporate trust and corporate support (r = 0.735). Moreover, unrealized promises highlighted in stakeholders’ concerns demonstrate the willingness of developers to gain support during the initial stages of projects but also unveil flaws in public participation activities and transparency. In addition, the lack of transparency and miscommunication about the adverse effects of geothermal energy can lead to misconceptions

Table 2: Results of Correlation analysis.

Issues Codes		Trust categories			
		Corporate trust	Institutional trust	Procedural trust	Technology trust
Distributive Justice	Community health	–.173*	–0.044	–0.150	.336**
	Compensation	–0.135	.172*	.211**	–0.131
	Corporate support	**.735****	–0.108	–.335**	–.379**
	Employment	0.099	–0.097	**.318****	–.368**
	Environmental pollution	–.349**	–0.089	–.304**	**.678****
	Infrastructure risks	0.021	–0.034	–0.118	0.105
	Land ownership	–0.121	**.430****	–0.105	0.059
	Resettlement	–0.149	–0.038	**.322****	–0.144
	Socio-economic loss	–.161*	–0.041	–0.140	**.313****
Procedural Justice	Equal fairness	–.161*	–0.041	**.349****	–0.156
	Public engagement	–0.085	–0.022	.183*	–0.082
	Right to grievance	–0.060	–0.015	.129	–0.058
	Right to information	–0.121	–0.031	.261**	–0.117
Other	Project timeline	–0.056	–0.015	–0.052	0.116
	Security issues	–0.085	**.626****	–0.074	–0.082

*: Correlation is significant at the 0.05 level

**: Correlation is significant at the 0.01 level

about these impacts by communities seeking information on social media and other platforms making them vulnerable to misinformation and populist speeches [6,39]. Indeed, the lack of transparency about the process of getting socioeconomic benefits in terms of employment or CSR projects and mitigating negative impacts can lead to trust issues between developers and communities [5,40].

According to our results, the perception of adverse negative environmental and socio-economic impacts was the most prominent issue that caused distrust about geothermal energy technologies. This is highlighted by the correlation between technology trust and environmental pollution (r = 0.678) and socio-economic loss (r = 0.313). This result suggests a link between negative environmental and socio-economic impacts and distrust of geothermal energy technologies. Indeed, the link between the perception of adverse effects and distrust of geothermal energy technologies has been widely covered by the literature [6, 13, 14, 41, 42,]. Moreover, the association between procedural trust and procedural justice ($p < 0.001$) shows that communities have a distrust towards the procedures of geothermal energy projects. Precisely, distrust towards procedures was related to employment (r = 0.318), compensation (r = 0.211), and resettlement (r = 0.322) procedures. Indeed, these procedures are usually not well explained to the community, which can feel misrepresented. This feeling of isolation is highlighted by the correlation between procedural trust with equal fairness (r = 0.349), public engagement (r = 0.183), right to information (r = 0.261), and right to grievances (r = 0.129). These results show gaps in public engagement activities, transparency, and fairness. These gaps can result in information asymmetries between communities and developers, miscommunication, and mishandling of expectations that can cause conflict with communities [21,39].

Also, our results showed that institutional, a correlation between institutional trust and land ownership was found (r = 0.440) and security issues (r = 0.630). This highlights the mistrust of communities towards local public institutions about land ownership and preserving the security of communities. Indeed, geothermal energy prospects are usually located in rural areas where rural communities do not necessarily own the land or live on community lands, which makes them vulnerable to possible forced evictions of indigenous communities or other marginalized groups [12]. Moreover, the low number of institutional trust concerns may reflect a broader normalization of institutional inefficacy where communities no longer expect the state to act in their interest or a reluctance to criticize government authorities directly [43].

6. Conclusion

This study offers insights into trust-related issues of geothermal energy projects in East Africa, based on an analysis of community concerns included in the public participation sections of Environmental and Social Impact Assessment (ESIA) reports. The findings reveal that trust issues primarily relate to Corporate trust, Technology trust, and Procedural trust (respectively, 34.67%, 33.33%, 28.67%), particularly in areas such as Corporate support (25.33%), Employment (21.33 %), and Environmental pollution (18.67%). These concerns reflect deeper challenges, including lack of transparency in employment and corporate social responsibility activities, poor communication, perceptions of unfairness in public engagement, and land ownership issues.

The results reaffirm the importance of trust in managing environmental and social risks and fostering meaningful public participation in geothermal energy projects. Importantly, this study deepens our understanding of the factors shaping community trust in such initiatives. It underscores the need for developers to promote fairness, transparency, and inclusivity in employment, resettlement, compensation, and corporate social responsibility efforts, while proactively addressing and communicating potential environmental and social impacts to prevent conflict and build lasting trust with communities.

7. Limitations of the study

A key limitation of this study is the potential language bias, as community concerns expressed in local languages may have been misrepresented or oversimplified when translated into English or French in ESIA reports. This may have led to underreporting of trust-related issues. Additionally, the aggregated analysis may overlook important project-specific contexts. Future research should use quantitative surveys in specific areas to capture more accurate and nuanced community perspectives on trust. Furthermore, the findings reflect the public's trust perceptions at the time of each report's preparation and may not fully represent current dynamics.

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Appendix Table 1: Data source.

Countries	Project site	Description of projects	Date	Development	Code
Djibouti	Assal Fiale	Drilling of 4 geothermal wells	2012	Geothermal drilling	R1
Ethiopia	Aluto-Langano	Drilling of 20 geothermal wells, and a 70 MW power plant,	2013	Integrated development	R2
	Alalobad Tendaho	Drilling of 4 test wells, several production wells, and a 70 MW power plant	2013	Integrated development	R3
Kenya	Menengai West	Drilling of 5 geothermal wells	2019	Geothermal drilling	R4
	Menengai	Construction of one 35 MW geothermal power plant	2019	Powerplant construction phase	R5
	Menangai caldera	Drilling of 3 geothermal test wells	2019	Geothermal drilling	R6
	Olkaria 4	Construction of two 70MW geothermal power plants	2009	Powerplant construction	R7

Appendix Table 2: Detailed results of the inductive coding.

Reports			Trust				Total
			Corporate trust	Institutional trust	Procedural trust	Technology trust	
R1	Codes	Environ. pollution				1	1
		Project timeline				1	1
	Total					2	2
R2	Codes	Environ. pollution	0		0	1	1
		Infrastructure risks	2		0	0	2
		Right to grievance	0		1	0	1
	Total		2		1	1	4
R3	Codes	Land ownership		0		1	1
		Security		1		0	1
	Total			1		1	2
R4	Codes	Community health	0		0	1	1
		Corporate support	34		1	0	35
		Employment	10		15	0	25
		Environmental pollution	0		0	5	5
		Equal fairness	0		4	0	4
		Land ownership	0		0	1	1
		Public engagement	0		1	0	1
		Right to information	0		3	0	3
		Socio-economic loss	0		0	1	1
	Total		44		24	8	76
R5	Codes	Compensation	0		1	0	1
		Corporate support	1		0	0	1
		Employment	0		3	0	3
		Environ. pollution	0		0	7	7
		Infrastructure risks	0		0	2	2
		Socio-economic loss	0		0	3	3
	Total		1		4	12	17

R6	Codes	Community health	0	0		1	1
		Compensation	0	1		0	1
		Employment	1	0		0	1
		Environ. pollution	0	0		11	11
	Total		1	1		12	14
R7	Codes	Community health	0	0	0	6	6
		Compensation	0	0	3	0	3
		Corporate support	1	0	0	1	2
		Employment	3	0	0	0	3
		Environ. pollution	0	0	0	3	3
		Equal fairness	0	0	3	0	3
		Infrastructure risks	0	0	0	1	1
		Land ownership	0	2	0	0	2
		Public engagement	0	0	1	0	1
		Resettlement	0	0	6	0	6
		Right to information	0	0	1	0	1
		Security	0	1	0	0	1
		Socio-economic loss	0	0	0	3	3
	Total		4	3	14	14	35
Total	Codes	Community health	0	0	0	8	8
		Compensation	0	1	4	0	5
		Corporate support	36	0	1	1	38
		Employment	14	0	18	0	32
		Environ. pollution	0	0	0	28	28
		Equal fairness	0	0	7	0	7
		Infrastructure risks	2	0	0	3	5
		Land ownership	0	2	0	2	4
		Project timeline	0	0	0	1	1
		Public engagement	0	0	2	0	2
		Resettlement	0	0	6	0	6
		Right to grievance	0	0	1	0	1
		Right to information	0	0	4	0	4
		Security	0	2	0	0	2
		Socio-economic loss	0	0	0	7	7
	Total		52	5	43	50	150