

Article

Microfinance Institutions as Drivers of Environmental Sustainability in Artisanal Gold Mining: Evidence from Zimbabwe

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Abstract

This study examines the role of microfinance institutions (MFIs) in promoting environmental sustainability in Zimbabwe's artisanal gold mining (AGM) sector, a context characterised by significant ecological degradation and weak regulatory enforcement. While previous studies have focused on MFIs' role in financial inclusion, their potential to promote environmental sustainability in the informal AGM sector remains underexplored in sub-Saharan Africa. Using an interpretivist qualitative case study design, the study draws on in-depth interviews with MFI personnel operating in AGM regions. The findings of this study suggest that MFIs have the potential to influence environmental sustainability through mechanisms such as conditional lending, financial incentives, and environmental awareness programs within AGM sectors in which they operate. The effectiveness of MFIs in advancing environmental sustainability, however, is constrained by weak regulatory frameworks, limited resources, and the sector's informal nature. The study contributes to the emerging literature on green microfinance by providing context-specific insights into how financial institutions function as intermediaries of environmental governance. Practically, the findings highlight the need for policy frameworks that integrate environmental considerations into microfinance operations and strengthen institutional coordination among stakeholders.

Keywords: microfinance institutions; environmental sustainability; artisanal gold mining; green microfinance; sustainable development; Zimbabwe

1. Introduction

Although the gold mining sector remains a major driver of economic growth and a poverty eradicator, it continues to contribute to global environmental degradation, leaving the greatest footprint in Zimbabwe [1]. Artisanal gold mining (AGM) has increased significantly in Zimbabwe due to the country's economic challenges, including high unemployment and poverty rates, as well as rising global gold prices [2,3]. The unregulated and informal nature of the AGM sector has contributed to significant environmental degradation, including deforestation, soil erosion, and the use of hazardous chemicals that contaminate water sources and endanger the lives of both animals and humans [4]. It has been argued that environmental degradation is an obstacle to ecological sustainability and livelihoods in general, thereby compromising the ability of future generations to meet their needs [5]. The conflict between economic necessity and ecological deterioration prompts essential questions about the role financial institutions can play in promoting



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environmental sustainability and encouraging the AGM sector to adopt ethical mining practices. This implies that understanding MFIs' role and capacity to influence sustainable mining practices within the AGM sector is crucial for harmonising economic resilience with environmental sustainability.

Due to environmental challenges created by the AGM sector, there has been growing interest in exploring the role the financial sector, particularly MFIs, could play in advancing sustainability [3,6,7]. MFIs have historically focused on poverty eradication by making financial services accessible to marginalised individuals and groups through loans [8]. In response to the global call to advance the green ideology, the MFI sector has rebranded to incorporate environmental and social objectives within its mission statements [6,9]. "Green microfinance" has therefore emerged as an interesting and captivating concept that underscores the sustainability and eco-friendly financial services of the MFIs [9,10].

Over the years, MFIs have grown and developed beyond their traditional roles, considering the environmental bottom line and embracing environmental sustainability [11]. Due to this growth and their ability to serve many previously marginalised communities and individuals, MFIs have, of late, been recognised as an essential vehicle for dual objectives: poverty eradication and environmental sustainability [12,13]. In this regard, MFIs have emerged as a vehicle for economic growth and financial inclusion because they provide financial services to institutions and individuals that the formal financial sector considers high risk [14,15]. As a strategy to augment revenue streams, MFIs have tended to create their own market segments by serving marginalised communities and adopting creative strategies, such as providing underwriting and advisory services and improving their visibility through technological innovations [14].

Based on their role, MFIs are thus defined as providers of financial services to previously marginalised informal and low-income sectors of the economy [16]. Researchers have observed that MFIs reach more people than the formal banking sector [13], making them critical agents in the economy. Due to their ability to access many people, they have been forced to rebrand and adopt a dual objective of poverty reduction and environmental sustainability [17]. The global call for sustainable development has placed environmental goals at the forefront, and MFIs have responded by developing innovative products such as "green microfinance" that promote environmental sustainability while reducing poverty and financial exclusion [17,18]. The International Finance Corporation (IFC) estimates that around 130 million people are engaged in microfinance, suggesting a potentially significant impact given its extensive coverage and reliance on its services. A study conducted in Bangladesh found that green microfinance offered environmentally responsive products that promoted the conservation of natural resources while simultaneously yielding sufficient returns to investors [19]. Based on the above, it can be deduced that MFIs have the potential to play a key role in enforcing environmental sustainability in the AGM sector. The researchers, through in-depth interviews with key personnel at MFIs, explored the role they could play in promoting environmentally sustainable mining practices in Zimbabwe.

Based on their growth and the number of people they can reach, and by deliberately promoting and financing environmentally friendly practices, Zimbabwe's MFIs have the potential to influence environmentally sustainable mining practices within the AGM sector [20]. Nevertheless, there is limited knowledge regarding the extent to which MFIs have used these tactics and their impact on financial and environmental performance [9,12,21]. Understanding the role that MFIs can play in facilitating sustainable mining practices is essential, as the sector has the potential to boost national economic growth while also protecting the environment [1,22].

The central challenge facing Zimbabwe's AGM sector is balancing economic gains with environmental protection. Despite the AGM sector's contribution to employment and

poverty alleviation, its ecological footprint continues to worsen in developing countries due to unregulated operations and limited access to sustainable financing models [23]. Concurrently, national and global priorities, such as the Sustainable Development Goals (SDGs) and climate adaptation imperatives, demand stronger institutional responses to environmental degradation, creating a tension that underscores the need to reassess how financial intermediaries, particularly microfinance institutions, can promote environmentally responsible mining practices [24].

Despite the recognised economic and social roles of MFIs, their environmental impact within Zimbabwe's AGM sector remains poorly understood. While AGM contributes significantly to rural livelihoods and national gold output, it also causes severe deforestation, mercury contamination, and land degradation [25]. Existing research has primarily focused on the social and financial inclusion roles of MFIs, leaving an essential gap in understanding how their financial products and non-financial services contribute to environmental sustainability in resource-dependent communities such as Zimbabwe [26]. The absence of structured environmental frameworks and regulatory incentives for MFIs further exacerbates environmentally destructive mining practices by the AGM sector [27]. Therefore, this study seeks to address how MFIs can integrate environmental sustainability into their lending and operational frameworks to promote sustainable AGM in Zimbabwe. The study argues that addressing this issue is essential in the current context of Zimbabwe's resource-driven economy and global calls for green finance, making it timely to investigate how MFIs can embed environmental objectives into their operational frameworks to influence environmentally sustainable mining practices.

In Zimbabwe, the AGM sector operates within a multifaceted legal and policy framework anchored in the Mines and Minerals Act [Chapter 21:05] and the Environmental Management Act [Chapter 20:27], which mandate the Environmental Management Agency (EMA) to oversee environmental compliance and enforce rehabilitation standards. Meanwhile, institutions such as the Ministry of Mines and Mining Development, along with the Zimbabwe Miners Federation (ZMF), are responsible for regulating the sector and formalising miners. The AGM subsector accounts for more than 60% of the country's annual gold output and directly employs over 500,000 people [28].

The aim of this study is to explore how MFIs can contribute to environmental sustainability within the AGM of Zimbabwe and identify mechanisms to align financial services with ecological protection and sustainable development goals. The study contributes to sustainable development literature by investigating and analysing the experiences and practices of MFIs in the AGM sector.

Despite the growing body of literature on the association between MFIs and sustainable development, significant gaps remain to be addressed. Most studies have focused on the social and financial inclusion roles of MFIs, with limited research on their environmental sustainability, particularly in resource-dependent sectors such as the AGM sector.

Most previous studies on green microfinance have been conducted in Asia and Latin America, with very little undertaken in sub-Saharan Africa [9,10]. There is also a lack of understanding of how MFIs operationalise environmental governance mechanisms in informal AGM sectors subject to weak regulatory frameworks [29,30]. This study addresses these gaps by providing empirical findings from Zimbabwe, a resource-dependent emerging economy, on how MFIs engage with environmental sustainability in the AGM sector. This study contributes to emerging debates on the role of financial institutions in advancing environmental governance in resource-dependent emerging economies.

This study contributes to the emerging literature on green microfinance in the following ways: Firstly, from a theoretical lens, it extends the stakeholder theory by demonstrating how MFIs function as intermediaries in environmental governance within informal

extractive sectors. Secondly, the study contributes to the scant empirical literature on environmentally oriented microfinance practices in resource-dependent emerging economies, particularly within the AGM sector. Thirdly, in practical terms, the findings of this study offer policymakers, MFIs, and development stakeholders insights into integrating environmental sustainability considerations into microfinance operations and regulatory frameworks in resource-constrained contexts.

The remainder of this paper is structured as follows. Section 2 reviews relevant literature and presents the theoretical foundation underpinning the study. Section 3 outlines the research methodology, including data collection and analysis procedures. Section 4 presents and discusses the findings, while Section 5 concludes the study and outlines implications for policy and future research. Based on the identified research gap, this study addresses the following research questions:

Research Questions

1. How do MFI personnel perceive the influence of environmentally oriented financing strategies on sustainability practices within Zimbabwe's AGM sector?
2. What mechanisms and institutional practices do MFIs utilise to promote and monitor compliance with environmental sustainability standards in the Zimbabwean AGM sector?
3. What organisational frameworks and structural innovations can strengthen the role of MFIs in supporting environmental sustainability in AGM while ensuring their own financial sustainability?

Answers to these questions helped explain the role of MFIs in promoting environmental sustainability within Zimbabwe's AGM sector.

2. Literature Review

This section of the study reviews existing literature on AGM, environmental impacts and the evolving role of MFIs in promoting environmental sustainability initiatives.

2.1. Artisanal Gold Mining (AGM)

The economic challenges Zimbabwe faces have led to high unemployment, leaving people with no option but to venture into mining [31]. Due to high levels of unemployment in developing economies, AGM has grown to unprecedented levels, driven by firming gold prices that have made the sector attractive, thereby posing an environmental threat, as most artisanal miners remain unregistered [32]. In developing economies, poverty is a common issue, and many people have been attracted to AGM as the easiest route to eradication and for survival [33]. Zimbabwe has, of late, experienced droughts, which have decreased agricultural yields in areas practising AGM, making gold mining a more appealing source of income and a methodology of poverty alleviation [32,34]. AGM, if not controlled, has significant environmental impacts, motivating this study to explore the role MFIs can play in promoting environmentally sustainable mining practices in the AGM sector. The number of people directly employed and those who depend on the AGM is estimated to exceed 100 million [35], making it crucial to human survival and economic development.

2.2. Adverse Environmental Impacts of AGM

AGM has been widely condemned for its significant environmental footprint, including deforestation, water contamination, and soil erosion. The environmental impacts of AGM are well-documented and pose serious risks to ecological sustainability and community livelihoods [36], underscoring the need to explore the role MFIs can play in shaping environmental sustainability within the sector.

Even though the environmental impacts are well documented, little attention has been given to the role MFIs could play in shaping environmental sustainability within the AGM sector [37,38]. MFIs have the potential to influence borrower behaviour through lending conditions, incentives, and capacity-building initiatives [39], thereby motivating this study.

Research has identified deforestation, water pollution from mercury and cyanide use, and land degradation as critical challenges brought by AGM, which not only undermine biodiversity but also undermine the long-term sustainability of local communities. Despite growing awareness of these challenges, environmentally harmful practices by the AGM sector persist, largely due to weak regulatory enforcement, limited access to sustainable financing, and the sector's informal nature. The following section presents management theories:

2.3. Theoretical Framework

This study is grounded in the stakeholder theory, which posits that organisations operate within a network of relationships involving multiple stakeholders whose interests and expectations influence organisational behaviour [40]. Stakeholders may include regulators, investors, customers, communities, employees, and other groups affected by organisational activities. The stakeholder theory argues that organisations are more likely to achieve legitimacy and long-term sustainability when they respond to stakeholders' concerns and expectations rather than focusing solely on profit maximisation [41].

Most theories in management position profit maximisation as the primary objective of an enterprise and present the satisfaction of shareholders as the central reason for their existence [40], while noting that satisfying other stakeholders' interests could adversely affect a firm's earnings power [42]. Recent studies have demonstrated that organisations tend to achieve their intended objectives more effectively when they prioritise the interests of all stakeholders [41,43,44], thereby raising awareness and motivating many to engage with environmental sustainability. It has been observed that organisations that focus on satisfying the interests of their various stakeholders tend to create a positive image among community members, which, in the long term, is viewed as key to organisational success [45], which aspect we position as key for long-term organisational success and being granted a social licence to operate with.

Environmental sustainability is a new development underpinning green microfinance within the MFI sector [46], which has been observed not only to improve an organisation's reputation but also to act as a shield against negative market responses and to secure the firm's stock [47], thereby positioning this as a vehicle to sustaining an organisation during a crisis. Researchers have identified an association and linkage between the environmental sustainability of an enterprise and its financial performance, and have advocated that those enterprises that tend to focus on satisfying all stakeholders like focusing on environmental sustainability have been able to maintain their market share, reported higher profits when compared to non-social responsive ones, and have tended to have a stable stock price for long periods of times [48,49]. This implies that MFIs stand to benefit from adopting environmental sustainability initiatives, which are likely to improve their reputation and image, as well as their financial performance. Despite evidence of a positive association between environmental sustainability and the financial performance of enterprises, it must be noted that not all investors may embrace environmental sustainability initiatives of their own will, as they perceive them as expenses and view the funds allocated to them as costs [50,51].

In the context of MFIs, stakeholder pressures increasingly extend beyond financial performance to include environmental and social responsibility. Regulators may require compliance with environmental standards, investors may demand sustainability-oriented

lending practices, and communities affected by AGM may expect greater environmental accountability. Ultimately, MFIs may integrate environmental considerations into their operations to maintain legitimacy, strengthen stakeholder relationships, and enhance institutional sustainability.

Grounded in the stakeholder theory, this study conceptualises environmental sustainability in the AGM sector as shaped by the interaction between stakeholder pressures and MFI responses. External stakeholder expectations shape MFIs' adoption of environmental mechanisms, including conditional lending, environmental screening, sustainability training, and borrower monitoring. These mechanisms may subsequently influence environmental practices within mining communities. However, the effectiveness of these interventions is moderated by contextual challenges, including weak regulation, limited institutional capacity, and the informal nature of the AGM sector. The following section discusses regulations and microfinance institutions.

2.4. Regulations and Microfinance Institutions

Given their potential to reach many people, many governments have enacted regulations to control the operations of MFIs and use them as vehicles to promote environmental sustainability [52,53]. Due to growing global pressures on firms, many MFIs have been urged to adopt environmentally sustainable practices to protect the environment for current and future generations [54]. As a strategy to commit to social responsibility initiatives (CSR), MFIs have been urged to engage in environmental sustainability, which will serve as a pillar of good corporate citizenship, and to integrate greening into their products and services [6,54,55]. In this regard, researchers have shown that MFIs that invest in environmental sustainability would gain in the long term compared to those that do not [55,56].

2.5. Green Microfinance and Environmental Sustainability

Green microfinance has emerged as a crucial evolution within the microfinance sector, reflecting a shift from MFIs' purely financial inclusion objectives toward the integration of environmental sustainability initiatives [57]. Green microfinance refers to the provision of financial services that incorporate environmental sustainability, promote eco-friendly practices, support environmental risk assessment, and engage in sustainability-oriented lending [58]. Research has positioned MFIs as capable of playing a dual role by working to eradicate poverty whilst promoting environmental sustainability, especially in resource-dependent emerging economies [59]. It has been argued that green microfinance initiatives can transform the environment by promoting the adoption of renewable energy, environmental sustainability, sustainable agricultural practices, and broader sustainable enterprise development [60]. However, the extent to which MFIs have successfully incorporated environmental sustainability initiatives into their products remains inconsistent and context-specific [61].

Despite the growing importance of MFIs, several hindrances have prevented the sector from fulfilling this role. Much of the research on the role of MFIs in promoting sustainable development has been centred on Asia and Latin America, with limited research conducted in sub-Saharan Africa [9,10]. In addition, previous research has largely focused on agriculture and energy, with minimal attention given to extractive industries such as AGM [62]. There is also a limited understanding of how MFIs operationalise environmental governance mechanisms, especially given the informality of the AGM sector and the weak Zimbabwean regulatory framework [63,64].

These gaps motivated context-specific empirical research to explore the role MFIs can play in influencing environmental sustainability in resource-dependent and high-risk areas such as AGM. This study addresses this gap, which is critical to advancing both theoretical

and policy debates on the role of MFIs in promoting sustainable development initiatives in resource-dependent emerging economies.

Figure 1 below presents the conceptual framework developed from the stakeholder theory and the empirical findings of this study. The framework illustrates how stakeholder pressures influence MFIs' adoption of environmental response mechanisms, thereby shaping borrowers' environmental behaviour and sustainability outcomes within the AGM sector. In addition, the framework recognises that these relationships are moderated by contextual constraints, including weak regulation, informality, resource limitations, and tensions between profitability and sustainability.

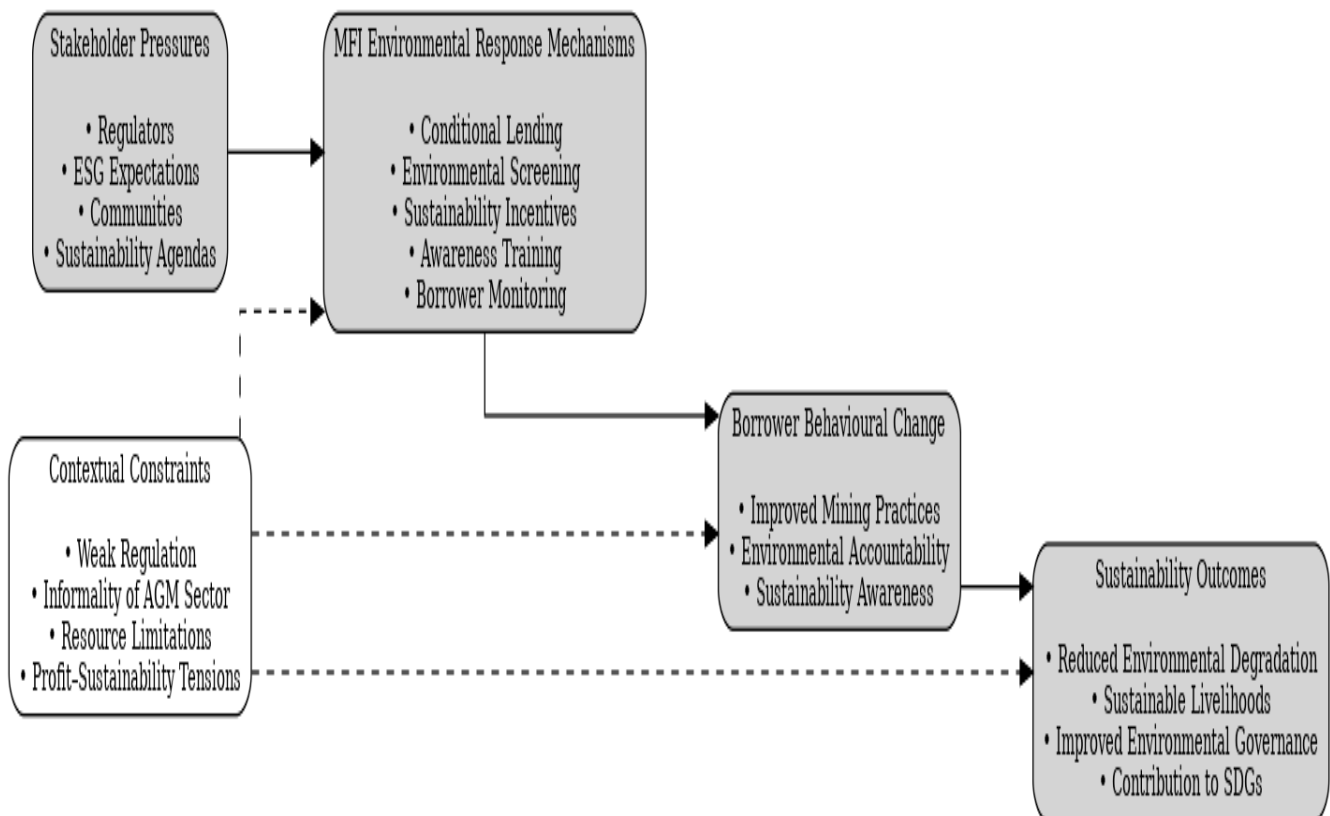


Figure 1. Stakeholder-Driven Green Microfinance Framework for Environmental Sustainability in AGM.

Building on the identified gaps in the literature, the following section outlines the methodological approach adopted to explore the role of MFIs in promoting environmental sustainability within Zimbabwe's AGM sector.

3. Materials and Methods

This study adopted an interpretivist qualitative case study design to explore how MFIs engage with environmental sustainability within Zimbabwe's AGM sector. A qualitative case study approach was considered appropriate because the study sought to investigate a contemporary phenomenon in its real-life context and to generate in-depth insights into institutional practices, stakeholder interactions, and sustainability challenges in the AGM sector [65]. The study focused specifically on MFIs operating in selected AGM regions in Zimbabwe, thereby enabling the researchers to examine environmental governance practices within a bounded context. The study was further guided by an interpretivist philosophical orientation, considered well-suited to understanding participants' experiences, perceptions, and institutional practices in their natural contexts. An inductive

research approach was adopted to allow themes and patterns to emerge from participants' narratives rather than imposing predetermined theoretical assumptions [66].

The choice of a qualitative case study design was further informed by the exploratory nature of the research questions, which sought to understand how MFI personnel perceive and operationalise environmentally oriented financing practices within Zimbabwe's AGM sector. In this case study research, investigating 'how' questions about complex institutional and social phenomena was particularly appropriate, given the highly relevant contextual conditions [67]. Given the informal and institutionally constrained nature of Zimbabwe's AGM sector, a case study design provided an appropriate methodological framework for examining these dynamics in depth.

The study was conducted in four major AGM regions of Zimbabwe, namely Gwanda, Shurugwi, Masvingo, and Kwekwe, which were purposively selected due to their concentration of microfinance operations and artisanal mining activities. These areas are the primary sites where MFIs interact with small-scale miners, providing a suitable context for examining environmental practices in the sector. Within the qualitative case study framework, semi-structured in-depth interviews were employed as the primary data collection method to generate rich, context-specific insights from MFI personnel operating in AGM regions. A total of ten (10) participants were purposively selected from people working within MFIs in AGM districts.

Purposive sampling was adopted to ensure the inclusion of participants with direct experience in environmental risk management, credit appraisal, and sustainability-related activities, which allowed the researchers to gather in-depth perspectives from information-rich participants familiar with both microfinance operations and the environmental implications of AGM [68]. Qualitatively, the views of key personnel at MFIs were sought to assess their efforts to promote environmentally friendly gold mining practices in Zimbabwe.

This study focused on MFI personnel rather than AGMs, as the primary objective was to examine how MFIs promote environmental sustainability in mining regions, given their role as intermediaries that influence mining practices through lending conditions and advisory services. The insights from MFIs were considered key to understanding how financial institutions can act as vehicles of change in shaping environmental behaviour within the AGM sector.

Even though this study was conducted across four mining areas, which included Shurugwi, Gwanda, Masvingo, and Kwekwe, the participant group was relatively homogeneous and consisted of personnel from MFIs with similar institutional roles and responsibilities, which reduced the variability of responses and enabled thematic saturation to be achieved with a small sample size.

The inclusion of multiple geographic locations was intended to enhance contextual richness rather than to achieve statistical representation [67]. Given that MFIs operate under similar regulatory and institutional frameworks across these regions, participants shared comparable experiences and perspectives, facilitating early saturation of themes.

Although the sample size of 10 participants may appear limited, it is consistent with qualitative research standards that prioritise a detailed understanding of the subject matter over breadth [69]. The purposive selection of knowledgeable participants and the achievement of data saturation ensured the sample was sufficient to generate meaningful and credible insights [70,71].

Participants in this study were recruited using purposive and criterion-based sampling to ensure that only those with experience in the subject matter were included. Initial contact with participants was made through professional networks and referrals within the selected AGM regions. Potential participants were contacted via email and telephone, and those meeting the inclusion criteria of being involved in credit appraisal, sustainability

initiatives, and risk management were invited to participate in this study. This approach ensured that the study included those with a detailed understanding of the subject matter, enabling researchers to extract rich insights into the association between microfinance and sustainable development.

The in-depth interviews for this study were conducted in December 2025 and January 2026 using the attached interview guide (Appendix A). The interviews were conducted face-to-face and by telephone, depending on the participant's availability and location, and lasted 45 to 60 min each. With participants' permission, interviews were audio-recorded and later transcribed verbatim, with field notes taken during the interviews to capture non-verbal cues and contextual observations, thereby enriching the data.

Although the study was guided by three core research questions, the interview guide included broader, more flexible questions to encourage participants to provide detailed reflections on environmental sustainability, institutional practices, financing mechanisms, and operational challenges within the AGM sector [72,73]. This approach was consistent with interpretivist qualitative research, which uses in-depth interviews to generate rich, context-specific insights rather than narrowly predefined responses. During the analysis, interview responses were systematically coded and grouped into themes aligned with the three overarching research questions, thereby ensuring conceptual coherence between the data collection instrument and the analytical framework. Appendix A further illustrates how the interview questions contributed to the exploration of the study's core research questions.

The data collection process continued until thematic saturation was achieved, which is the point at which no new insights emerged from successive interviews [69]. Thematic saturation in this study was reached after we conducted interview number eight (8), with two (2) additional interviews conducted to confirm existing patterns rather than generate new data. The sample size of ten aligns with a qualitative research design, which emphasises in-depth examination rather than sample size [74,75].

Although participants were drawn from four geographically distinct mining regions, no major region-specific variations emerged regarding the study's core themes. Participants generally reported similar institutional experiences and sustainability challenges across regions, largely due to the shared regulatory environment and operational characteristics of Zimbabwe's AGM sector. Minor contextual differences were observed regarding resource availability and local enforcement practices; however, these variations did not substantially alter the broader thematic patterns identified in the study.

The data for this study were analysed using thematic analysis, following the six-step procedure proposed by [76]. Our first step in thematic analysis was to read the transcripts repeatedly to familiarise ourselves with the data. This was followed by manually generating the initial codes, which involved identifying meaningful text units relevant to the research objectives. In the next step, we grouped codes into broader categories, resulting in preliminary themes (Table 1). In the fourth step, researchers reviewed and refined themes to ensure internal consistency and distinctiveness, then named them to reflect their conceptual meaning within the study. The final step involved reporting the themes, with aspects supported by direct quotes from participants. The researchers felt this systematic approach enhanced the analytical transparency and rigour of the study. To enhance analytical reliability and minimise interpretive bias, the coding process and theme development were independently reviewed by the co-author. Emerging codes and thematic interpretations were discussed collaboratively to ensure consistency and coherence in the analysis. Furthermore, an audit trail documenting coding decisions, theme refinement, and analytical reflections was maintained throughout the study to strengthen dependability and confirmability.

Table 1. Illustration of Coding and Theme Development Process.

Raw Participant Extract	Initial Code	Category	Final Theme
“We encourage miners to adopt environmentally responsible practices before approving loans.”	Environmental lending conditions	Sustainability-oriented financing	Financial and Non-Financial Mechanisms for Sustainability
“There is limited monitoring because enforcement agencies lack resources.”	Weak institutional enforcement	Regulatory constraints	Institutional and Operational Constraints
“Investors increasingly expect us to support sustainable practices.”	Stakeholder pressure	External sustainability expectations	Institutional Drivers of MFI Environmental Engagement
“Some miners resist environmental conditions because they increase operational costs.”	Resistance to sustainability measures	Profitability–sustainability tensions	Financial Survival versus Environmental Responsibility

To ensure the methodological rigour required in a qualitative study, trustworthiness criteria, which include credibility, dependability, and transferability, were applied in this study. The credibility of this study was enhanced by continually returning to participants after transcription to check whether the transcription matched the discussion that would have taken place, with participants reviewing the transcriptions and confirming that they continued to align with the interviews. To ensure the study’s reliability, researchers had to maintain a detailed audit trail documenting all decisions and analytical steps. To reduce researchers’ bias, confirmability was achieved through independent examination of coding judgments and reflexive journaling, and transferability of the study findings was supported by a detailed description of the research context, participants, and processes used, thereby enabling readers to assess the applicability of the findings to similar contexts.

Ethical Considerations and Data Integrity

Personnel from MFIs in areas where AGM activities are primarily practised, including Gwanda, Shurugwi, Kwekwe, and Masvingo, were approached for in-depth interviews. Each participant received a participant information document detailing the study’s aims and the interviewees’ rights. Before participating in the survey, interviewees were required to sign an informed consent form and assured that their comments would be kept confidential. Appendix A presents the interview questions. Ethical clearance for this research was approved by the Walter Sisulu University Senate Research Ethics Committee (FREC). The approval number is 07/03/10/2025/PG, and the approval date is 10 February 2025, prior to data collection. Participants were fully informed of the study’s purpose, assured of confidentiality, and granted the right to withdraw at any point. To ensure data integrity, pseudonyms were used in transcripts and reporting, and interview recordings were securely stored in password-protected files accessible only to the researchers. The researcher believed that the chosen participants had sufficient experience and were better positioned to provide insight into the industry’s role in promoting environmentally sustainable mining practices in Zimbabwe’s AGM sector.

Relying on MFIs as the sole stakeholder group may introduce perspective bias; however, in this study, this was intentional, as it explored the role of MFIs in promoting environmental sustainability within the AGM sector. Future research should adopt a multi-stakeholder approach, incorporating perspectives from artisanal miners, regulators, and community members to provide a more holistic understanding of the subject.

Given the qualitative nature of the study, the analysis focuses on participants' perceptions and interpretations of financial sustainability rather than objective financial performance metrics. The study identified both convergent and divergent participant perspectives. While some themes emerged consistently across multiple interviews, others reflected context-specific or individual institutional experiences. In interpretivist qualitative research, the value of findings is not determined solely by numerical consensus but by the depth, relevance, and contextual richness of the insights generated. Ultimately, themes supported by fewer participants were retained where they provided meaningful analytical insight into institutional practices and sustainability challenges within the AGM sector.

Table 2 presents the profiles of participants, including their roles, experience, and regional distribution, providing context for assessing the data's credibility and relevance. The following section contains the results and discussion:

Table 2. Participants' Profile.

Participant	Role	Experience (Years)	Age	Region
P1	Credit Manager	10	42	Gwanda
P2	Risk Officer	8	38	Kwekwe
P3	Branch Manager	12	45	Masvingo
P4	Loan Officer	6	34	Shurugwi
P5	Sustainability Officer	9	40	Gwanda
P6	Operations Manager	11	44	Kwekwe
P7	Credit Analyst	7	36	Masvingo
P8	Compliance Officer	13	47	Shurugwi
P9	Field Officer	5	32	Gwanda
P10	Regional Manager	15	50	Kwekwe

4. Results and Discussion

The analysis of interview data yielded several important themes for the study, including the environmental impacts of AGM, the role of MFIs, institutional challenges, and collaborative mechanisms for sustainable development. Table 3 summarises the key themes and sub-themes derived from the analysis and is discussed in detail below. Some themes emerged strongly among participants, while others reflected divergent or context-specific perspectives, consistent with interpretivist qualitative research. While several themes reflected broad convergence among participants, others represented more context-specific institutional experiences and were therefore interpreted with caution within the study's broader analytical framework. Themes supported by fewer participants were retained where they provided meaningful insight into emerging sustainability tensions and institutional dynamics within the AGM sector. These themes are presented below with supporting evidence from participant responses. This section presents the findings derived from the thematic analysis of interview data and discusses them in relation to existing literature. A total of 10 in-depth interviews, coded P1, P2, . . . , and P10, were conducted and transcribed by a transcriber who signed a confidential agreement as part of ethical clearance approval. The findings of this study should be interpreted as exploratory context-specific insights derived from participants' experiences in selected MFI settings, rather than as universally representative conclusions about the entire AGM sector in Zimbabwe.

Table 3. Summary of Themes, Sub-themes, and Supporting Evidence.

Theme	Sub-Theme	Description	Supporting Evidence
Environmental Degradation	Deforestation	Clearing of vegetation for mining	“Gold mining destroys ecosystems. . .” (P2)
Environmental Degradation	Water Pollution	Use of mercury and cyanide	“Chemicals contaminate water bodies. . .” (P3)
Environmental Degradation	Soil Degradation	Loss of fertile land	“Land becomes unsuitable for agriculture. . .” (P4)
Institutional drivers of MFIs	Financial Support	Provision of loans and insurance	“MFIs provide capital for mining operations. . .” (P5)
Institutional drivers of MFIs	Environmental Incentives	Rewards for sustainable practices	“We reward environmentally responsible clients. . .” (P5)
Institutional Constraints	Weak Regulation	Poor monitoring by the authorities	“No proper supervision. . . corruption exists. . .” (P6)
Institutional Constraints	Resource Limitations	Limited funding for enforcement	“Government lacks resources. . .” (P6)
Collaboration	Stakeholder Engagement	Need for joint action	“Government, MFIs and miners must collaborate. . .” (P3)
Sustainability Tension	Profit vs Environment	Environmental costs seen as a burden	“These costs reduce profits. . .” (P3)

4.1. THEME 1: Environmental Degradation Associated with AGM

Most participants (P1, P2, P4, P6, P7, P9, P10) consistently highlighted the severe environmental consequences of AGM, particularly deforestation, water pollution, and soil degradation. Participants noted that removing large areas of vegetation is often necessary to access gold-rich areas, ultimately causing biodiversity loss by displacing or eradicating plant and animal species that rely on forest environments. Participants in this study argued that clearing trees disrupts habitats and jeopardises the biological balance, resulting in long-term damage to the land. To emphasise this view, one participant remarked:

“AGM activities are destructive by nature since they can destroy entire ecosystems, and if they are not checked, they can contaminate water bodies through the chemicals they use.” (P2)

This aspect of the finding aligns well with the views of [77–80], who contend that mining causes deforestation and harms habitat.

Most participants in the study (P2, P3, P6, P7, P8, P10) identified water pollution as a serious concern caused by gold mining activities. Participants described how toxic chemicals in gold production, such as mercury and cyanide, damage nearby rivers and streams. Despite an international ban on mercury use, the study found that Zimbabwe’s AGM sector continued to use mercury in gold processing, with the metal ultimately entering water bodies. These pollutants, which are frequently leached or spilt, have devastating consequences for aquatic life and the overall water ecosystem. Fish populations, for example, have lower reproduction rates, and polluted water poses significant health hazards to the local inhabitants who rely on these water supplies for drinking and agriculture. These findings concur with the view of [81–83], who noted that gold mining activities tend to produce hazardous chemicals that enter water bodies, poisoning them and posing a risk to both animals and humans.

Several participants (P1, P2, P4, P6, P7, P9, P10) in the study highlighted the substantial soil deterioration caused by mining activity. Participants noted that the excavation procedure not only depletes the land's topsoil but also renders it unsuitable for agriculture. In addition, the loss of fertile land, along with chemical contamination, jeopardises food security for local communities, many of whom rely on farming. Participants in the study were concerned about diminished soil fertility and the challenges of restoring mined areas to plant-friendly conditions, which aligns with the views of [84–86] who found that gold mining causes considerable soil damage, as excavating and removing topsoil makes the ground barren and unsuitable for agriculture, thereby affecting long-term food security.

Additionally, dust and pollutants from gold mining operations were identified as significant contributors to air pollution. Some participants in the study reported that blasting and mineral processing produce fine particulate matter that degrades air quality. Toxic gases, such as sulfur dioxide, are released, exacerbating health concerns and contributing to environmental hazards like acid rain. This aspect of the finding is consistent with [87–89], which found that gold mining activities have generally been recognised as contributing to air pollution by producing dust and releasing pollutants, thereby affecting air quality and adversely affecting human health.

Some participants linked the environmental consequences of gold mining to broader concerns about climate change and noted that deforestation and land degradation limit Earth's natural capacity to sequester carbon, thereby worsening global warming. Participants noted that the energy-intensive nature of mining operations, which are often dependent on fossil fuels, is a substantial source of greenhouse gas emissions contributing to climate change. This finding concurs with that of researchers [90–92], who found that gold mining activities have worsened climate change by increasing deforestation and emissions, thereby exacerbating global warming.

Participants in this study emphasised erosion and the destabilisation of geological structures caused by the removal of vegetation and the modification of land surfaces, rendering the area susceptible to landslides and soil erosion, particularly following heavy rainfall. This instability not only degrades the soil but also increases residents' vulnerability to natural disasters. This reflects arguments advanced by [92–94], who found that gold mining causes significant geological changes, making communities more vulnerable to disasters.

Even though participants noted that AGMs are significant to the national economy, as they can be used as a poverty-reduction strategy, provided MFIs and the mining sector are monitored and regulated to achieve the desired objectives. A synthesis of participants' responses demonstrated that there is only one planet, Earth, which must be jealously conserved for the benefit of all stakeholders and future generations. In this regard, participants indicated that environmental stewardship requires monitoring of MFIs, as most of these institutions were primarily concerned with profit maximisation at the expense of environmental sustainability. This finding is consistent with the view that if MFIs are permitted to operate without oversight and funding is allocated to individuals without regard for environmental considerations, the outcome could be a simplistic microcredit approach that fails to foster long-term, sustainable green business development [95]. Furthermore, it has been stated that a lack of control and inefficient compliance programmes expose banking and trust organisations to an increased risk of money laundering and terrorist financing [96].

These findings suggest that environmental sustainability challenges in the AGM sector are deeply embedded in broader institutional and socioeconomic conditions, underscoring the need for context-sensitive environmental governance interventions. From a stakeholder theory perspective, these environmental consequences increase pressure on financial insti-

tutions, regulators, and mining communities to adopt more environmentally accountable practices within the AGM sector.

4.2. THEME 2: Institutional Drivers of MFI Environmental Engagement

Most participants (P1, P2, P5, P6, P7, P9, P10) report that MFIs are increasingly positioning themselves as agents of environmental sustainability, extending their roles beyond traditional financial intermediation. Participants in this study indicated that MFIs are primarily motivated by competitiveness, social duty, and, to some extent, legitimacy stemming from stakeholder pressure, as well as by the inclusion of non-financial services, such as incentives to improve environmental sustainability, intended to enhance their image. In addition, it was also observed that most MFIs are seeking to attract foreign investors who consider the ecological, social, and governance (ESG) aspects of their programs a condition for unlocking foreign funding. Furthermore, it was noted that MFIs act as watchdogs for the country's citizens, as gold mining activities can displace people from their communal lands without adequate compensation and pollute water bodies if left unchecked. To emphasise the reasons and importance of including non-financial services to promote environmental sustainability, P2 and P5 remarked:

"We are now trying to integrate environmental considerations because investors and regulators expect us to demonstrate sustainability commitment." (P5)

"Gold mining activities are inherently destructive, as they can degrade ecosystems and contaminate water bodies through the chemicals used. In addition, we want to build a good image with foreign investors, thus if we show them that we have the environment at heart." (P2)

The above discussion supports prior research by [6], which indicates that under stakeholder pressure, MFIs have begun to consider the environmental bottom line as a basis for legitimacy. As a result, they tend to take a defensive stance, using superficial measures to appear green. This reflects pressure being exerted, where MFIs respond to stakeholder expectations and investor demands for sustainability.

This finding supports the stakeholder theory by demonstrating how MFIs respond to pressures from regulators, investors, and communities to maintain institutional legitimacy in environmentally sensitive sectors.

4.3. THEME 3: Financial and Non-Financial Mechanisms for Sustainability

Most participants (P1, P2, P3, P4, P6, P7, P9, P10) suggested that some MFIs promote environmental practices through financial incentives, training, and conditional lending. A summary of participant responses demonstrated that microfinance provides impoverished individuals with access to productive capital, which, when combined with human capital acquired through education and training, enables them to escape poverty. Participants viewed poverty as a major barrier to social and economic development because it deprives communities of access to education, healthcare, and sustainable livelihood opportunities. Participants further noted that MFIs provide financing and insurance support to AGMs, thereby reducing operational risks associated with mining activities. The argument aligns well with the view that MFIs enable the poor to obtain capital, which they could invest in gold mining and thereby generate income that could be used to build assets and obtain educational levels that would move them out of poverty [97], and that MFIs have become a popular approach to finance in developing countries due to their objective of helping reduce poverty by giving the impoverished new options for business [98]. The study's findings are consistent and suggest that MFIs are increasingly extending their traditional financial intermediation roles toward broader sustainability-oriented governance functions within mining communities.

A synthesis of the participants' responses revealed that MFIs, in addition to their usual duty of providing credit, play an important role in encouraging environmental sustainability because they are more accessible than formal banks. Several respondents (P2, P3, P5, P7, P8, P9, P10) indicated that by providing alternative funds at accommodating rates to small-scale miners, MFIs are helping in structuring their operations towards sustainable development. Several participants emphasised that assistance to small-scale miners was critical for promoting grassroots economic development and supporting environmentally sustainable livelihood practices. Participants also noted that although Zimbabwe possesses abundant mineral resources, the country continues to face environmental, social, and governance challenges associated with extractive activities. The aspect of the finding underscores the argument that due to their ability to reach many people, MFIs have the potential of influencing the environmental sustainability of many AGMs through the inclusion of them in the products they sell to their clients, including AGMs, which in the end has the potential of them achieving a dual responsibility of attaining their financial goals while contributing to sustainable development [9,99].

Several participants (P2, P4, P6, P7, P8, P10) in the study reported that MFIs embedded environmental responsibility in their vision and mission statements, thereby promoting a greener environment as a requirement of the organisation. Participants further observed that employees constitute an important stakeholder group in advancing organisational environmental responsibility. The consensus among participants was that demonstrating commitment to sustainable development within the mission was necessary to impress the regulator and avoid scrutiny and heavy environmental fines.

The preceding explanation aligns with research findings showing that a firm's proactive environmental measures, translated into employee stakeholder integration of ecological performance as a common goal, constituted a critical element in advancing the company's greening agenda [100].

The study found that although many firms openly supported goals and values related to sustainable development in the extractive industry, they showed little commitment to implementing them, as most respondents viewed them as costs that could diminish revenues. The discussion aligns well with the research view that, while many firms publicly endorsed sustainable development goals in their mission and vision statements, this did not translate into progress or commitment to action [101].

This demonstrates the use of coercive institutional mechanisms, as MFIs influence borrower behaviour through conditional lending and financial incentives.

The findings of this study show how MFIs operationalise stakeholder expectations through sustainability-oriented financial and non-financial mechanisms designed to influence borrower environmental behaviour within the AGM sector. This reinforces the stakeholder theory by showing that MFIs' environmental actions are shaped not only by internal financial objectives but also by external expectations from regulators, investors, communities, and development actors.

4.4. THEME 4: Institutional and Regulatory Constraints

Despite their potential, MFIs face significant institutional barriers that limit their effectiveness in promoting environmental sustainability. Several participants (P2, P4, P6, P7, P8, P10) reported that, because most AGMs lacked collateral, which was essential for obtaining funding from the mainstream banking sector, they had to rely on MFIs for funding, even though the lending rates were slightly higher. Respondents suggested that the government needed to develop legislation to help AGMs obtain low-cost capital from both the commercial and public sectors. Most of the participants stated that the government can use MFIs to advocate for sustainable development by including them as a

key component of MFI CSR, since the government can provide MFIs with the institutional support they need to promote environmentally sustainable mining practices. Participants in the study suggested that the government should offer incentive programs and tax relief to MFIs that advance sustainable development goals, arguing that this would ensure MFIs promote environmentally sustainable mining practices in Zimbabwe. Additionally, participants advocated that the regulator enact legislation requiring all MFIs to participate in environmentally friendly initiatives.

The aspect of this finding aligns with previous studies, which indicate that financial inclusion can contribute to achieving the 17 Sustainable Development Goals (SDGs), which include eradicating poverty in all its manifestations, reducing hunger, achieving food security, improving nutrition, and promoting sustainable agriculture [1,102], and also that MFIs are essential contributors to informal financial intermediation and consumer convenience.

However, this industry has the potential to harm consumers through exorbitant interest rates and the need for government regulation of MFIs to promote fair commercial agreements between lenders and consumers [103]. This is consistent with the belief that MFIs' role and contribution to the sector should be strengthened and also backed by the government, which is the official buyer of minerals in the country, because this would aid in plugging the holes in the minerals market and ensuring the profitability and survival of the sector, as well as sustainable employment generation [104].

A few participants (P1, P4, P6) argued that training programs for AGMs were relatively scarce. Participants opined that mining was highly destructive to the environment and that progressive efforts and strategies were needed to meet the objective of the UN Sustainable Development Goals by 2030. Participants argued that AGMs, who are most likely to visit MFIs seeking financial assistance, are difficult to control because their operations are poorly organised. It was also argued that the situation was exacerbated by the fact that the Ministry of Mines and the Environmental Management Agency (EMA), an arm of the government mandated to monitor and supervise small-scale mines, was poorly funded. To emphasise the above point, P6 had this to say:

"There is no proper monitoring and supervision of AGMS by the Ministry of Mines and EMA, as these do not have resources. AGMs can go for months without any visits from officials of these organisations. Because of a lack of resources, this has fuelled corruption in that when they come, they are easily bribed, making them turn a blind eye to environmental sustainability issues."

However, implementing sustainability-oriented financial and regulatory interventions within Zimbabwe's AGM sector remains highly complex. Weak institutional enforcement capacity, economic instability, corruption, and limited financial resources may constrain the effectiveness of environmental governance initiatives. In some instances, stricter environmental lending conditions could unintentionally exclude vulnerable artisanal miners from accessing financial support, thereby reinforcing informal and unregulated mining practices. These realities highlight the importance of designing context-sensitive sustainability interventions that balance environmental objectives with socioeconomic survival considerations within resource-constrained settings.

The discussion aligns with the argument that larger MFIs registered as banks tend to do better on environmental policy and environmental risk assessment than smaller MFIs [6]. These constraints highlight the limitations of institutional enforcement in weak regulatory environments.

The findings suggest that environmental governance within Zimbabwe's AGM sector is constrained not only by institutional intentions but also by broader structural challenges, including economic instability, informality, weak enforcement capacity, and limited regulatory support. From a stakeholder theory perspective, these constraints demonstrate that

the effectiveness of MFI sustainability initiatives depends heavily on the strength of the wider institutional environment within which stakeholders interact.

From a stakeholder theory perspective, these constraints reveal that MFI responses to environmental expectations depend on the strength of the wider institutional environment in which stakeholders interact.

4.5. THEME 5: Stakeholder Collaboration and Governance

The findings of this study suggest the importance of multi-stakeholder collaboration in achieving sustainable mining practices. Most participants (P1, P2, P4, P6, P5, P7, P8, P10) reported that achieving sustainable development goals requires coordinated efforts across multiple levels, including social, environmental, and economic challenges. Participants argued that the successful implementation of the SDGs will depend on untangling the complicated relationships between the objectives and their targets. Several participants advocated an integrated approach to sustainability, which entails realising the potential of all its key dimensions simultaneously while managing the tensions, trade-offs, and collaborations among them. To reinforce this issue, one participant remarked:

“In Zimbabwe, the challenges related to sustainable development require a multi-stakeholder approach to manage them. The government, NGOs, AGM and MFIs must work together, and if this is not done soon, it means sustainability will remain theoretical rather than practical.” (P4)

Participants noted that international organisations and institutions, such as the United Nations, individual country governments, non-governmental organisations, and civil society organisations, must play critical roles in resolving the contradictions between sustainability and sustainable development. In addition, the participants indicated that sustainable development has emerged as an essential factor for both business and society, a shift that has imposed a new system of corporate governance that calls for accountability in the use and governance of resources. Given the importance of sustainable development, participants argued that it should be enshrined as a rule of law, as this would promote equality of treatment, enhance the security of persons and property, and facilitate the impartial and peaceful resolution of disputes. Most participants indicated that the extractive industry’s activities are inconsistent with the objectives of sustainable development and that, if we are not compelled to manage the environment, we risk destroying the planet Earth; hence, the need to adopt sustainable development as a guiding principle.

The discussion aligns with research findings that link the rule of law to sustainable development, though the association is not particularly strong [104]. Furthermore, research has shown that mining can be considered sustainable if its earnings are generated and used to advance sustainable objectives at both the local and national levels [105].

Most participants (P1, P3, P5, P6, P7, P10) stated that for collaboration to be effective, stakeholder commitment from the government, miners, and microfinance service providers was required, as these parties must work together to develop a robust system that is both aggressive and viable enough to drive economic development. Participants believed that AGMs should be included in the development of collaborative policies because they have a direct impact on the viability of their operations. All participants believed that the government plays a significant role in establishing an inclusive financial sector that meets miners’ needs, while also intensifying efforts to foster a stable macroeconomic environment, which is crucial for long-term economic development. Several participants suggested that numerous cooperative engagement meetings between the government and gold miners are necessary to find common ground and promote a mutually beneficial working relationship.

The debate aligns with the premise that a cooperative approach to AGM could leverage a state gold-buying program, formalise the sector, and thereby alleviate poverty and promote macroeconomic stability [2].

Most participants (P1, P3, P5, P6, P7, and P10) indicated that most AGMs, though contributing a lot to the development of the Zimbabwean economy, lack financial skills and are unable to recruit professional accountants to do books of accounts for them, which in the end tends to inhibit them from accessing funding from large money lenders. Participants suggested that MFIs could help organise and facilitate financial literacy workshops, ultimately enabling miners to manage their finances more effectively and contribute to sustainable development in the long term. To emphasise the importance of the above point, P3 stated:

“There are things that we do out of ignorance. Artisanal mining is profitable, but most of the time, people see us as poor. I think, as a sector, the government and other interested stakeholders must come in and train us on financial management, which will help us manage what we generate, so that we appreciate the importance of sustainable development goals.”

This is consistent with study findings linking financial literacy to funding structures that support long-term management [87]. This reflects the importance of institutional coordination in achieving sustainability outcomes.

The findings of this study reinforce the stakeholder theory’s emphasis on collaborative engagement among multiple actors to advance environmentally sustainable outcomes in resource-dependent sectors.

4.6. THEME 6: Tension Between Profit and Sustainability

A recurring tension emerged between environmental responsibility and financial performance, particularly among AGMs and small-scale miners, as a synthesis of interviewee responses revealed that environmental issues have been, and remain, a major problem for firms. Given that gold mining operations have significant environmental impacts, it was noted that most AGMs, even after securing funding, are reluctant to invest in sustainability initiatives, viewing them as expenses that would erode profits, unlike large gold mining companies. Even though environmental information disclosure (EID) has gained popularity as an alternative strategy for managing business ecological performance, participants noted that, although large gold mining companies use it, most AGMs do not. Participants contended that the focus of gold mining organisations should not be solely on profit but also on environmental responsibility, ethical practices, and a duty to other stakeholders, such as animals, since we share the natural environment. Participants argued that most AGMs complied with the EMA’s requirements only because they lacked resources and because of a weak regulatory framework. To emphasise the importance of being environmentally some participants stated:

“Environmental sustainability enables big mining companies to improve their processes, thereby resulting in improved financial performance over the years. It enables organisations to avoid penalties from environmental regulators, thereby strengthening the brand of the company.” (P3)

“We made a follow-up on AGM, whom we had given funding to, to check the progress of their sustainability initiatives, only to discover they used the money on a totally different project. We don’t have much power to enforce sustainability initiatives unless we get government backing.” (P8)

Participants indicated that, unlike large gold mining companies, AGM viewed environmental sustainability as an additional cost that could erode their profits and, in turn,

adversely affect their financial performance. Several participants in the study indicated that holding AGMs accountable was challenging because most are unregistered and operate illegally in Zimbabwe. One interviewee remarked that:

“Being responsive needs some money to spend on that program. The problem with most AGMs is that they view sustainability initiatives as expenses and, in the end, tend to ignore them. Don’t forget that we are also in business and hence there are times we give credit if the AGM shows capacity to repay and we don’t bother looking at their sustainability issues.” (P5)

The discussion aligns with the findings that environmental performance and firm size had a positive, though not strong, effect on environmental performance [106,107].

The findings reflect participants’ perceptions of financial sustainability rather than measurable financial performance outcomes, which should be interpreted within the context of the study’s qualitative design. This tension illustrates a clash between financial survival and environmental responsibility.

This tension reflects the broader challenge of balancing environmental sustainability objectives with livelihood-survival pressures in resource-constrained mining communities. The tensions identified between financial survival and environmental responsibility further demonstrate the competing stakeholder expectations that confront MFIs and artisanal miners in economically constrained environments. This reflects the stakeholder theory’s proposition that organisations often operate under competing stakeholder expectations, requiring them to balance financial survival, environmental accountability, and broader societal responsibilities. The following section summarises the key findings and discusses their implications for policy and future research.

5. Conclusions

This study explored MFI personnel’s perceptions regarding the potential role of micro-finance institutions in promoting environmentally sustainable practices within Zimbabwe’s AGM sector. The findings should be interpreted within the context of MFI perspectives and do not represent the experiences of all stakeholders within the AGM sector. Nevertheless, focusing specifically on MFIs was intentional, as the study aimed to understand how financial institutions perceive and operationalise environmental sustainability within mining communities. This study provides exploratory insights into the potential role of microfinance institutions (MFIs) in promoting environmental sustainability within Zimbabwe’s artisanal gold mining sector. Although MFIs now provide financial services to small-scale miners, their ecological function remains underdeveloped and requires strategic reinforcement. The results highlight that although several MFIs have implemented green practices, more extensive structural and policy adjustments are needed to increase the effectiveness and sustainability of these programs.

The study provides exploratory empirical insights into the limited literature on green microfinance in sub-Saharan Africa by situating it within Zimbabwe’s resource-dependent economy. The study highlights the emerging shift among MFIs from purely financial objectives to hybrid goals that encompass social and environmental accountability. A key finding is that MFIs in Zimbabwe are informally assuming quasi-regulatory roles by conditioning credit access on environmental compliance and supporting environmental education among AGMs. In addition, significant contributions have been made by identifying institutional and policy gaps that hinder the scaling up of green microfinance, including the lack of environmental screening tools, weak enforcement of the Environmental Management Act, and insufficient integration of financial and environmental governance. These insights extend the discourse on sustainable finance by illustrating how financial intermediaries can function as agents of environmental governance in informal extractive sectors.

It is recommended that the government establish regulations mandating MFIs to integrate environmental risk evaluations into their loan approval procedures. Tax subsidies for green initiatives could incentivise MFIs to adopt more environmentally sound operations. Promote collaborations among MFIs, government organisations, and environmental non-governmental organisations to develop training initiatives for small-scale miners. These training programs should prioritise financial literacy and environmentally friendly mining methods. To ensure compliance and promote sustainable mining practices, MFIs must incorporate environmental performance criteria into their evaluation frameworks. Additionally, it would enhance MFIs' reputational capital, attracting more eco-aware investors. Increase funding for government organisations, such as the Environmental Management Agency, to enable them to oversee gold mining operations more effectively. Furthermore, MFIs should be included in a multi-stakeholder group that monitors environmental compliance to better understand social and ecological challenges and to ensure that financial services meet the full needs of miners and communities.

While this study's findings point to potential pathways for integrating environmental considerations into MFI operations, these recommendations should be interpreted with caution. The study suggests that policymakers could explore mechanisms for aligning financial inclusion with environmental sustainability, particularly through incentives, regulatory frameworks, and stakeholder collaboration. However, further empirical research involving multiple stakeholders is required before broad policy implementation.

The study relied primarily on in-depth interviews with MFI personnel and did not employ methodological triangulation, which may have limited the breadth of perspectives captured. Furthermore, the qualitative and context-specific nature of the study limits the generalizability of the findings beyond the selected AGM regions. Therefore, future research should adopt a multi-stakeholder, mixed-methods approach by incorporating the perspectives of artisanal miners, regulators, and community members to validate and extend these findings. Longitudinal studies would also be valuable in assessing the long-term impact of green microfinance interventions on environmental sustainability outcomes.

Ultimately, this study contributes to the emerging discourse on green microfinance by offering context-specific insights into how MFIs could influence environmental practices in informal mining sectors, while recognising the need for further empirical validation.

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Data Availability Statement: The data supporting the findings of this case study are not publicly available due to privacy and ethical restrictions that protect participant confidentiality. Transcripts and raw interview data may contain identifiable information and are therefore accessible only to

the principal investigator upon reasonable request, provided that appropriate ethical clearance has been obtained.

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Appendix A. Interview Guide

- (1) What are the harmful effects of gold mining on the environment?
- (2) How accurate is it that if your operations are not managed and monitored, you can support environmental terrorism by sponsoring firms that engage in risky mining practices? Explain.
- (3) Why have microfinance institutions included non-financial services, such as incentives and assistance to promote environmental management?
- (4) What role has been played by MFIs in promoting environmentally sustainable mining practices in Zimbabwe?
- (5) How are MFIs assisting the gold mining sector to structure their operations along sustainable development goals?
- (6) How can MFIs and the gold mining sector collaborate and work together to achieve sustainable development goals in the gold mining sector?
- (7) Should sustainable growth be regarded as a rule that all entities must follow? Explain.
- (8) How does an entity's environmental sustainability relate to its financial performance?
- (9) What role is being played by the government in promoting and ensuring that MFIs work towards promoting environmentally sustainable mining practices, green in Zimbabwe?
- (10) Is environmental sustainability embedded or included in your entity's vision and mission statement? How has this helped your organisation promote a greener environment?

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