
Original Article

Exploring the Social, Economic, and Environmental Challenges in Mining-Dependent Communities: A Classical Grounded Theory Study of RoshPinah, Namibia

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Abstract: The research sought to determine the socio-economic and environmental impacts of mining 'on communities, using Rosh Pinah as a study area. This examines the consequences of economic reliance on mining, on the environment, and common practices and policies towards communities in the pursuit of measures of sustainable development.

This study adopted a qualitative research approach and interviewed 14 of the 15 participants from different professions; administrators, environmental specialists, health-care personnel, teachers, human resource personnel, exploration geologists, finance managers, and self-recruited plus un-recruited participants. Interviews conducted in the study were analyzed using thematic analysis to extract necessary themes while focus group discussions supplemented information on the community's experiences and issues.

The study identified four key themes: 1) Self-sustainability creativities with Community participation, 2) Transition of Communities: collaborative approaches 3) Building capacity of collaborations: and 4) Youth and Community participation. It indicated a strong community reliance on mining and hence suffer the implications of economic dependence such as poverty and substance abuse. Some of the problems raised included environmental concerns such as dust and lead pollution where the participants complained of poor dust control measures. It was also established that economic dependency had effects on economic growth locally, employment, and investment. The study also identified win-lose mentality and poor executive decision-making as factors that hinder sustainable development in the long run.

The study calls for diversification to decrease the dependency of communities in mining to avoid various risks as showcased in the study regarding Mopane. It is imperative to mention that dust control measures together with enhancement of environmental controls are instrumental in containing health hazards. The study insists on the community development process as a long-term process involving increased cooperation with related stakeholders, development and support of local entrepreneurs, and visioning for economic stability and sustainability.

This paper is valuable for the analysis of the relationships between economic dependency and the environmental health of the population as well as for enhancing the understanding of the problems of mining-dependent communities. They bring novel perspectives on how sustainable development can be developed and implemented in complex contexts, which is useful knowledge for policymakers, industries, and community leaders who wish to respond to the complex issues that arise from mining-dependent regions.

Keywords: Social, Economic, and Environmental Challenges; Mining-Dependent; Communities; Classical Grounded Theory.

1. Introduction

To answer the question posed in this manuscript, it is pertinent to position the study within the body of existing literature, which identifies its strengths and contributions to theoretical and practical applications. Sustainable Development has made tremendous progress over the last several decades but there continues to be much discussion over how long-term it is optimal to be sustainable both in terms of continued business profitability and sustainable as a system. This has led to many research to try and address these disputes; however the issue still has no clear solution, showing that the topic is not only complex but also dynamic. On one side, mining generates tangible economic benefits, yet these are achieved at the expense of environmental depletion and social unrest Horoshkova et al., (2020). Another considerable concern is the dependence on unstable global markets for certain products, thus causing fluctuations in local economies Ranängen et al., (2017). There are still controversies regarding the choice between short-term economic growth, and the development of various industries, coupled with environmental policies in the country Ediriweera & Weiwiora, (2021). A review of the literature shows several seminal works that have informed current knowledge. For instance, Ranängen et al. (2017) offered theoretical knowledge on the subject of easily fluctuating mining economies that create tremendous risk for economically susceptible communities, primarily due to the cyclical booms and bust patterns prevalent in this industry Horoshkova et al. (2020) further established a link between mining and environmental degradation by presenting that the short term gains in mining often result in negative environmental effects in the future. This study then pointed to the importance of the adoption of appropriate measures towards sustained mining that considers the economic benefits to be derived from the venture, with due regard to the consequences it would have on the environment. In another work, Jegourel (2020) analyzed the issues related to mining communities' reliance on external markets and, therefore, fluctuations in the economy. The study offered an understanding of how consistent volatility in the global prices of commodities affects the stability of local economies and the relevance of local economy diversification. Ediriweera & Weiwiora (2021) on global drivers of commodity prices and consequences for mining. They conducted their research focusing on how political and economic factors determine the scale of mining operations and consequently impact the living standards of mining communities. All these studies add in emphasizing the role of Sustainable Development in Mining-Dependent Communities, but they reveal shortcomings that this study tries to fill. Notably, the prior studies have been more drawn to Mitigating the Adverse Impacts of Mining through Sustainable Practices; nevertheless, there is a conspicuous research gap regarding the long-term social effects and post-mining sustainable community advancement, which is highly applicable to today's business practices.

This manuscript intends to bridge this gap by documenting and analyzing a range of complex issues that affect mining-dependent communities emphasizing on the social, economic and environmental effects as well as Sustainable Community Development. The research is not only aimed at increasing the amount of knowledge in the field but also at constantly contributing useful findings to a business environment. In this respect, this study aims to provide a fresh approach to the issue of mine reliance, which will encompass both the theoretical and the practical angles.

2. Problem statement

However, there are major environmental, social, and economic implications when a mine closes down in a community where such income source is very essential. While mining is vital in the global economy and people's lives, it has adverse effects on traditional cultures, social relations, equality, and health since it has negative impacts on the environment (Horoshkova et al., 2020). Often, economic gains are achieved with the dependency on mining, fluctuations in the market, and have few permanent positive impacts on the inhabitants of the areas, which host the mines (Ranängen et al., 2017). The negative impacts of mining include the exhaustion of land, water pollution, and loss of both plant and animal species add to the weakening of communities (Ediriweera & Weiwiora, 2021). When a mine was closed, more people would be out of work, unemployment rates in the location would rise, and local enterprises and facilities such as Schools and hospitals would suffer significant losses among other effects (Jegourel, 2020). Apart from environmental issues, correlations like higher stress and mental disorders plus the potential rise of crime rates would undoubtedly emerge too (Horoshkova et al., 2020). To make this shift, which can otherwise be described as a transition from an oil-dependent economy to another economic activity, it would have been pertinent to diversify and undergo the process of professional training (Ranängen et al., 2017). Therefore, it is not unlikely that the cultural identity and cohesiveness of the group shall change. As such, to resolve these interrelated issues and to implement suitable measures, it is essential to carry out considerable research activities that rely on evidence (Ediriweera & Weiwiora, 2021).

3. Materials and Methods

Research Design

The research methodology in this study was qualitative, and it used the Classic Grounded Theory procedure together with a case study research design. These methodologies were chosen to have a rigorous understanding of the multifaceted change of Rosh Pinah, Namibia from a mining-oriented town to a sustainable and self-sufficient city. Cognitive Given the task of establishing theories that were based

on data, Classic Grounded Theory was selected because of the effective identification of influential sustainability factors when the town changed (Tie et al., 2019). The case study technique gave a profound analysis of Rosh Pinah by focusing on the details that were very important in examining the social, economic, and ecological impacts on a community (Kolb, 2012).

Participant Selection and Sampling

In this context, the study used a purposeful sampling technique to identify 15 sample participants who could provide a wealth of information on the transformation of Rosh Pinah. These people were selected based on the roles that they play or the knowledge they have about the transformation of the town from being a mining-dependent area to being sustainability-focused. Local stakeholders included former miners, businesspeople, environmental consultants, and other inhabitants of the region focused on diversifying their economy. Hence, a type of purposive sampling known as purposeful sampling was used to get data from people knowledgeable about the processes in question, thereby ensuring the variation of perceptions and experiences (Taherdoost, 2021).

Data Collection

The data collection process consisted of three main methods: intercept surveys, document review, and memo writing.

Interviews: In all, face-to-face interviews were completed with the 14 selected participants. These were purposive interviews that took the format of a semi-structured interview since the questions posed were meant to generate qualitative and comprehensive information about the experiences and attitudes of participants through the process of transition in the town. The interviews were done in English, or the local languages preferred by the participants of the study. This approach made it possible to document the social and economic effects of mining, together with community initiatives towards economic diversification (Giles et al., 2016).

Document Analysis: Interviews were also supplemented with carefully selected and analyzed documents to provide more information where necessary. Such sources included reports by local non-governmental organizations, parliamentary papers, and forums on the Internet concerning the development of Rosh Pinah. Further information was gathered in the interviews and document analysis conducted to complement the presented research and to obtain a deeper understanding of the outlined process of the town's evolution (McMullin, 2021).

Memo Writing: Throughout the data collection and analysis process, notes were taken in the form of memos to jot down new ideas, thoughts, and possible themes on the subject. Memo writing was useful in the grounded theory approach since it enabled constant analysis and theory formation. In addition, memos were written by the researcher to record ideas and thoughts regarding the collected data to enhance the development of codes and categories in the process (Birks et al., 2008).

Data Management and Analysis

The data collected were properly analyzed using the grounded theory research approach as outlined below.

Coding Process: The development of the codes started with the process of open coding, whereby the data collected were first split and given labels that described them. Axial coding was conducted next, which involved regrouping the initial codes based on their connections. Last, in the analytical stage, selective coding was utilized to synthesize and clarify the core categories that formed the theoretical propositions of the study's central themes that were derived from the analysis of the data (Tie et al., 2019). The coding that was done was made easier by the use of MS Excel software, which allowed for proper grouping and analysis of the data (Kolb, 2012).

Constant Comparison: More specifically, the constant comparison method was applied throughout the analysis of collected data. This entailed constantly comparing new data against the existing codes and categories to further develop the emerging theory. The use of the comparison method was essential in ensuring that the findings were rooted within the data and particularly in the experiences of the participants (Giles et al., 2016).

Theoretical Saturation: Data analysis stopped when a point of theoretical saturation was achieved where no new themes appeared and the existing categories were well developed. This made the study

exhaustive, thus guaranteeing that the researcher got adequate theoretical saturation to create a grounded theory (Davoudi et al., 2017).

Ethical Considerations

The principles of ethical research were closely adhered to throughout the research process to minimize the risks of influence on the study and the participants.

Confidentiality: The identities of all the participants and any information about them that could be identified were concealed. Identifying information was removed from data and interview transcripts were safeguarded to maintain participant confidentiality. This was important to build and continue the trust between the researcher and the participants to freely present their experiences (Foley et al., 2021).

Informed Consent: Informed consent was obtained from each participant before the study; all participants were made aware of the aim and the method of the study and the rights of patients to withdraw at any time. Regarding ethical considerations, it was ensured that informed consent was sought from each study participant before data collection (Muswazi & Nhamo, 2013).

Transparency and Accountability: The research process was done with full disclosure, and if there was any conflict of interest that arose, it was pointed out. If any organization or individual was paid or otherwise contracted to help with data collection and management, this was reported in the study for disclosure and to keep records (Foley et al., 2021).

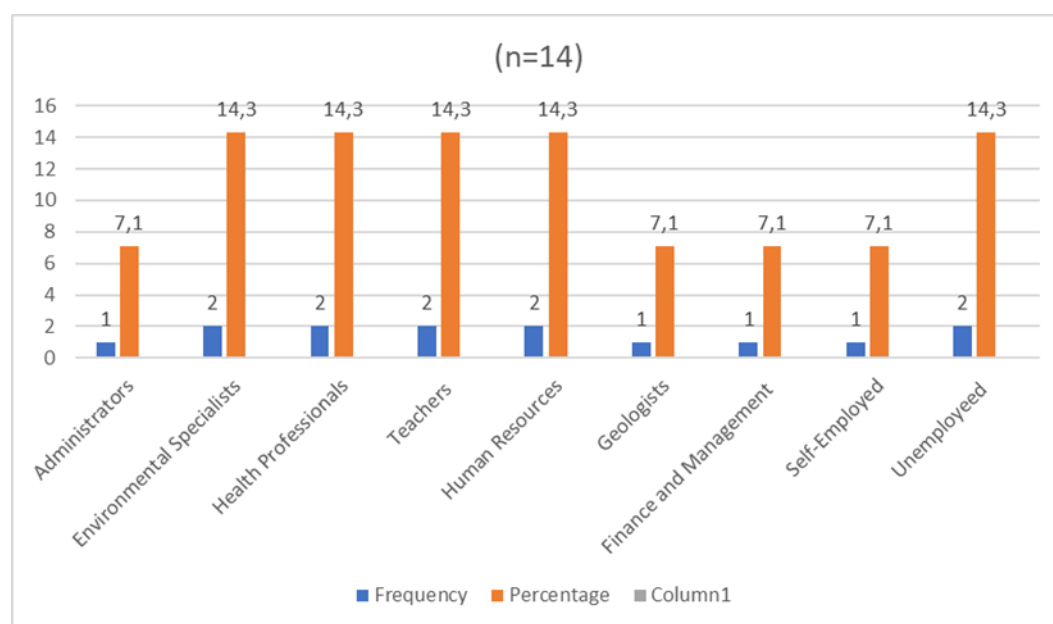
Justification for Methodological Choices

The particular research approach, which is based on the integration of Classic Grounded Theory and case study research methods, has been chosen because this approach will help to reveal the critical theoretical concepts that underpin the process of Rosh Pinah's transformation. The category of participants selected for the study through purposeful sampling rendered adequate and meaningful data on the development of the town (Taherdoost, 2021). The structured approach to data collection and analysis, supported by the principles of grounded theory methodology, facilitated the development of a coherent, empirically based theory that captured the complexity of the issues and strategies for moving to a state of self-sufficiency in mining-dependent communities (Giles et al., 2016; Tie et al., 2019). The ethical considerations carried out as highlighted across this paper made sure that the research methodology adhered to the highest standards of ethics in conducting research and making sure that the rights of the participants involved in the study were highly respected while at the same time ensuring that the integrity of the findings was well upheld (Foley et al., 2021).

4. Results and Discussion

While conducting the interviews, we were able to conduct interviews with 14 out of the 15 targeted participants, which gives us a high response rate of 93%, which makes the data collected reliable. The respondents spanned all levels of employment and were drawn from different professions.

Figure 1: Participant Demographics (n=14)



These demographics suggest a diverse and inclusive pool of participants that should increase the reliability of the research results.

Key Themes and Observations

The findings reveal how much Rosh Pinah remains tied to mining, which creates various social and economic problems, such as poverty and unemployment, and a highly dangerous environmental problem with dust and the effects of lead. Even with the set guidelines being observed most companies have continued to display environmental irresponsibility in areas like dust control and sanitation. Some of them are low diversification, high levels of unemployment, and practices that militate against local economic development such as offering employment opportunities to strangers unlike locals. Solving these problems requires long-term thinking, planning, and targeted measures on the way of improving economic and community well-being.

- **Social Relations in Mining-Dependent Societies**

Community Dependency on Mining: According to the survey, this depended on mining with 29.4% of the respondents confessing to having a strong reliance on the sector for employment opportunities, social interests, and overall well-being. Of concern, 14% of the respondents detected social concerns in Tutungeni informal settlements such as poverty, unemployment, and substance use. Disregard to health, safety, and security were also rated high with over 57.1% of the respondents mentioning that mining activities presented various health, safety, and/or security challenges.

Therefore, these outcomes signify the necessity for economic diversification and steady development efforts to diversify the dependence of the community on mining operations and related social problems.

Economic Challenges

Economic Dependency:

35.1% of participants pointed to the economic risk attached to the fact that the community was wholly or partly dependent on mining industries.

This makes it vulnerable to economic shocks because of its inability to diversify its economy and provide other employment opportunities apart from mining.

Impact on Local Economy:

26.7% Concerns mentioned by the participants included the lack of economic diversification in Rosh Pinah. High unemployment rate 17.7%, low, average economic growth per year (15.6%) and reliance in foreign markets (11.1%) were other matters of worry.

37.5% of the participants reported concerns regarding the topic of unemployment and bringing workers from other towns and this affects the local businesses and families.

These findings are consistent with other studies of mining-dependent societies, especially stressing the dangers of excessive reliance on mining and the necessity of appropriate economic development policies.

Environmental Conditions

Soil-Lead Contamination and Health Risk: Soil-Lead Contamination and Health Risk: Regarding hazards, the two main issues identified by 18% of the participants were dust and lead risks to children, employees, and the community. Nonetheless, government regulators' performance audits show adequate environmental performance, but the residents continue to experience dust emissions.

Environmental Challenges:

A total of 42.9% of participants reported dust pollution being a problem while 35.7% pointed out cleanliness problems and 21.4% noted health problems. These outcomes suggest a demand for improved measures to address dust issues and advanced environmental management systems to safeguard the health of the population.

Statistical Significance

The statistical significance of these findings was also determined where feasible. For instance, the high percentage of participants associating dust pollution and health risks (42.9% and 21.4%, respectively) indicates that these aspects should be prioritized.

The results of the study presented in this paper depict some major issues affecting mining-dependent communities such as Rosh Pinah. Some of these are economic vulnerability, vulnerability to environmental conditions, and social problems, and these must be addressed by specific strategies to promote the sustainability and wellness of the communities.

Main Findings

From the research, some key social, economic, and environmental issues related to mining-induced development have been established, including those affecting the Rosh Pinah community in Namibia. In terms of social impact, studies have revealed that economies that shudder under the fluctuations of mining employment worsen social disparities and erode social relations within society. In economic terms, the powerful reliance on mining has restricted the fashion in which there can be diversification thus leading to high levels of dependency that can in turn worsen the effects of external socioeconomic shocks. Environmental wise the study showed a high incidence of health risks and degradation of the environment; aspects like land degradation, water pollution, poor quality air, and so on pose serious challenges to the sustainability of resources, and widen social and health disparities.

Among the implications/impacts of the study, it was observed that depending on a single source of revenue, for instance, mining is harmful to society and the economy. This poses a drawback of limited diversification which limits economic flexibility and makes the communities vulnerable to forces of demand and supply of commodities in the global market. Moreover, the features of environmental pollution caused by mining works negatively affect not only natural and material values but also social tensions and health problems, which will worsen the cohesion of the community. Some of the properties believed to be permanent are also seen to be changing with time under different contexts, hence, time is also taken into consideration when studying them.

This study provides ERs that incorporate social, economic, and environmental aspects of the dependency on mining in communities. Compared to prior research that may investigate these variables separately, this research utilizes all of them in combination, which allows for a more complete picture of the problems that affect such communities. The research also brings new perspectives on the co-associated social and economic effects of mining and on environmental deterioration and subsequently calls for multi-disciplinary solutions.

From the results of this research, this study incorporates previous works that show the dangers of economic reliance on the production sector. However, this research offers further clarification by showing that such dependency is not only on economic results but also the social and environmental fabric of society. Drawing upon the principles and literature of economic dependency theory and environmental justice, this study supports the existing direction of research that questions and encourages regional diversification and greater attention to sustainable development initiatives in regions that are heavily reliant on natural resource exploitation.

Limitations of the Study

However, it is important to note certain limitations of this study that can be worked on in future research endeavors. The majority of the data collected were cross-sectional thus decreasing the possibility of making cause-and-effect relationships between the mining activities and the various social, economic, and environmental impacts recorded. Also, the study was conducted in Rosh Pinah, a mining-dependent community in Namibia, meaning the findings cannot be used to represent other similar communities in different socio-economic and environmental conditions. Secondly, the use of secondary data sources is also characterized by limitations in terms of data validity and completeness.

Implications for Future Research

Therefore, the implications for this study are that subsequent research should endeavor to investigate long-term data to determine the precise correlation between mining activities as well as their social, economic, and environmental consequences. Future research should also employ cross-sectional research designs that compare the effectiveness of such initiatives in different mining-dependent communities to gain insights into context factors that might affect success. Furthermore, there is a critical need for research that would explore and possibly seek to determine the possibility of economic diversification and sustainable development of mining-dependent areas.

5. Conclusions

The conclusions derived from this research accord well with the objectives that were to identify the diverse outcomes of mining to communities. Consequently, the study underscores the significance of policy interventions in the direction of Economic diversification, Environmental sustainability, and Social inclusion among Mineral-dependent economies. However, these conclusions are derived from the data obtained, and further studies should aim at availing for the limitations that have been pointed out.

New Theories

Based on the findings, a new theory can be proposed: The origins of this theory include the following propositions “*Economic diversification and sustainable environmental management in mining-dependent communities will lead to improved social cohesion and reduced vulnerability to external economic shocks.*” These propositions are a good promising for future empirical exploration and qualify as a research portal.

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Competing Interests

The authors have no fear of interest or other ties that can directly influence the contents of this article.

Author Contributions

All authors have contributed to the development of this work and have significantly participated in the conception, design, and writing of this research. Overall supervision and guidance of this project were given by Professor John Volk. Both the design of the research and the analysis were also done with the help of Dr. Mpofu. The study was initiated by the author, Mr. Mutau, and he performed all the research design, data collection, and writing of the manuscript. Dr. Jacob supported the research process by acting as a mentor, while language editing and manuscript refinement were performed by Dr. Max Mlene.

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Data Availability

The data used to arrive at these conclusions of this study can be requested from the author with permission from the researcher, Mr. Mutau.

Disclaimer

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