

The 21st Century Gypsum Mining Industry: Assessing the Economic Implications of Gypsum Mining in Tana River County, Kenya

Mohamed Abubakar Godhana¹, Mohamed H. Omar², Isaiah N. Sitati³

¹Student, Department of Mathematics and Natural Sciences, Garissa University, Garissa, Kenya

²³Lecturer, Department of Mathematics and Natural Sciences, Garissa University, Garissa, Kenya

ABSTRACT

The extraction of gypsum minerals had gradually been contributing to the local economy in Kenya, especially in areas where deposits of the minerals had created employment, investment opportunities and markets for local goods and services. However, the evidence on the economic implications of gypsum mining at the level of the local household and the community was limited. The present study evaluated the economic implications of the mining of gypsum minerals in Tana North Sub-County, Tana River County, Kenya, focusing on employment creation, effects on household income and livelihoods, and the effects on local business development. The study was guided by the Sustainable Livelihoods Framework and used a positivist research philosophy and a descriptive research design. The target population included households in Bilbil, Charidende and Dukanotu, together with selected key informants. Using Yamane's formula, a sample of 93 household respondents was selected while eight key informants were purposely selected resulting in a total sample size of 101 participants. Questionnaires and key informant interviews were used to gather data. Data analysis involved the use of descriptive statistics, including percentages, mean, and standard deviation, correlation analysis and regression analysis. Out of the 93 questionnaires that were distributed, 88 were returned representing 94.6% response rate. The results revealed that gypsum mining had a statistically significant positive relationship with employment creation ($r = .684$, $p < .001$) explaining 46.8% of the variance in employment creation ($R^2 = .468$). The mining of the mineral had a statistically significant positive relationship with household income and livelihoods ($r = .721$, $p < .001$) explaining 52.0% of the variance in the outcome ($R^2 = .520$). Similarly, it was found that the mineral had a statistically significant positive relationship with local business development ($r = .653$, $p < .001$) explaining 42.6% of the variance ($R^2 = .426$). As a result, the null hypotheses put forward were all rejected. It was concluded that the mining activity had made a significant contribution to the local economy through employment creation, enhancing household income and livelihoods as well as stimulating local business development. The study recommended that local employment opportunities should be fostered, including skill acquisition to support local procurement, to promote and support investments in mining-related enterprises as well as facilitating the conversion of mining-related income into investment for the local households and the community. The study further recommended stronger stakeholder participation and responsible mining practices to enhance the long-term economic benefits of gypsum mining in Tana North Sub-County.

Keywords: Gypsum mining, employment creation, household income, livelihoods, local business development.

1.1 Introduction

Natural resources remain a significant pillar of economic development, particularly in rural areas as mining activities offer employment, sources of household income and markets for local goods and services. However, the economic contribution of mining to host communities is determined to a large extent by the extent to which mining activities create local employment, stimulate enterprises and improve livelihoods. Evidence from mining communities demonstrates that the benefits of extraction extend beyond direct employment to supporting industries and local businesses through increased demand for goods and services (Muhirwa, 2023; Kilumelume, 2022). Gypsum is an important industrial mineral used in construction and manufacturing, including the production of plaster and plasterboard. Its extraction therefore has potential to generate employment and stimulate related economic activities. Industrial minerals are vital components of Kenya's economy and have been increasingly recognized as contributors to local employment and industrial development (State Department for Mining, 2025). The economic significance of gypsum is particularly relevant in semi-arid counties where households are highly dependent on natural-resource-based activities for their livelihoods. Evidence from neighbouring Garissa County indicates that gypsum mining has created employment, generated income and supported local market activities. However, the benefits have been constrained by informal and insecure employment, weak labour protection, limited local ownership and uneven distribution of mining benefits (Oyuma, 2026). Tana River County also possesses gypsum resources and has increasingly benefited from gypsum-related revenue. Nevertheless, it remains true that the available evidence has largely focused on the mineral's general economic significance and county-level revenue, with limited empirical evidence on how gypsum mining affects households and businesses specifically in Tana North Sub-County. This study therefore assessed the economic implications of gypsum mining in Tana North, focusing on employment creation, household income and livelihoods, and local business development.

1.2 Statement of the Problem

Mining and quarrying contributed to only 0.7% of Kenya's Gross Domestic Product (GDP) in the year 2024, despite the country's significant production of industrial minerals such as gypsum (Crangle, 2025). This raises a question of whether the benefits of extracting these minerals are adequate to support the local economy through employment, household income and business enterprise. The main issue raised by this question is primarily focused on gypsum because its economic benefits extend beyond the mining industry to other areas such as transportation, processing, construction material supply, and other related activities. Evidence from Kenya shows that the exploitation of gypsum has had potential livelihood benefits, although its impact on household economies is not easily identifiable. In Garissa, employment in the mining industry was informal and insecure, while limited value addition and local links resulted in fewer benefits to the local community (Oyuma, 2026). This implies that mineral exploitation creates benefits, although not necessarily in the local economy.

The issue is particularly important in Tana River County, where gypsum extraction has become a significant source of county revenue. County financial records show that fees from gypsum extraction generated KSh 73.3 million in the 2024/2025 financial year (Tana River County Government, 2025). However, county revenue from mining does not indicate whether the prosperity generated is being felt in local households and businesses located in the mining areas. The county's own-source revenue grew from KSh 59.17 million in 2022/2023 to KSh 97 million in 2023/2024, while the county remained highly dependent on national transfers (Kenya National Bureau of Statistics, 2024). The growing

economic importance of gypsum, therefore, presents an opportunity for local economic diversification, but the extent to which the opportunity translates into employment, household income and local enterprise development, remains uncertain. Most importantly, evidence specifically addressing the economic implications of gypsum mining in Tana North Sub-County is lacking. Existing evidence has documented the revenue potential of gypsum at county level and examined employment effects in neighbouring Garissa County, but has not sufficiently established whether gypsum mining in Tana North creates sustainable employment, improves household income and livelihoods, and stimulates local business development. This evidence and contextual gap formed the basis for the present study, which assessed the economic implications of gypsum mining in Tana North Sub-County, Tana River County.

1.3 Purpose of the Study

The objective of this study was to evaluate the economic benefits of the exploitation of gypsum in Tana North Sub-County, Tana River County, Kenya, in terms of employment opportunities, household income and livelihood and the local business created.

1.4 Specific Objectives

The study was guided by the following objectives:

1. To assess the influence of gypsum mining on employment creation in Tana North Sub-County, Tana River County, Kenya.
2. To examine the influence of gypsum mining on household income and livelihoods in Tana North Sub-County, Tana River County, Kenya.
3. To determine the influence of gypsum mining on local business development in Tana North Sub-County, Tana River County, Kenya.

1.6 Significance of the Study

The study provides information on the economic implications of the gypsum mining to the communities in Tana North Sub-County. At a national level, the findings will contribute to the development of mining policies and regulations that promote community participation, formal employment, skills training and value addition in the gypsum mining sector. At a county level, the findings will inform strategies to leverage on mineral resources for employment generation and community development. The findings also contribute to the knowledge base on the local communities, miners, investors and businesses in the study area since it identifies economic opportunities that are available in the exploitation of gypsum mining such as employment, local procurement, transportation, trading and other mining related activities. The study will also help in promoting local participation and facilitate linkages between the mining activities and the local businesses. Lastly, the study contributes to the existing knowledge on gypsum mining, rural livelihoods and local economic development in Kenya and provides a basis for further research in the Tana River County and other mineral prospects counties.

2.0 Theoretical Underpinning

2.1 Sustainable Livelihoods Framework

The study adopted Sustainable Livelihoods Framework (SLF) because it offered an analytical perspective of examining the livelihood issues arising from economic activities such as mining. In the context of the Tana North Sub-County, gypsum mining could contribute to livelihoods through the provision of employment opportunities, household income, and stimulation of other economic activities in the locality. Households that benefit from employment in the mining fields directly get income to support their livelihood needs. The income from mining provides an avenue for diversifying households'

livelihood activities through purchasing other goods and services. Households that provide goods and services to the miners spend their income on other necessities of life. The framework also acknowledges that mining activities can have a negative effect on the people's livelihood. Mining may be a source of financial and physical assets enhancement through employment and income, but its benefits may be limited by the nature of employment, unequal access to opportunities, institutional arrangements and the distribution of benefits. Hilson and Hu (2022) demonstrate that mining income can support household and community economic activities, while Delgado Jiménez et al. (2024) show that institutional arrangements influence access to mining opportunities and the sustainability of mining-based livelihoods. The SLF was relevant to the three economic dimensions examined in this study. Employment creation represented access to livelihood opportunities; household income and livelihoods reflected the capacity of households to convert mining opportunities into improved economic welfare; and local business development represented the wider economic effects generated through demand for goods and services. Its relevance to Kenya is further supported by Opiyo, Opinde, and Letema (2023), who applied the framework in assessing rural livelihood sustainability.

3.0 Empirical Literature Review

3.1 Gypsum Mining and Employment Creation

Empirical evidence generally indicates that mining can create direct and indirect employment opportunities in rural communities. According to Dagare, Gambo, and Abare (2024), the study conducted on the mining of gypsum in Yobe State, Nigeria, revealed that the activity created economic opportunities and employment for the locals. Similarly, in Ghana, evidence shows artisanal and small-scale mining creates employment and income, although the opportunities are undetermined as they depend on formalisation, labour-intensity, and organisation of mining activities. Mining can create employment opportunities as a competitor to agriculture due to the perceived income opportunities, with the money from minerals enabling people to purchase goods and services (Mabe, Dauda, & Owusu-Sekyere, 2023). Other studies indicate that mining generates employment opportunities directly in mineral extraction and indirectly in transport, trading, and services. Afriyie et al. (2023) reveal that informal mining created employment and income for households in mineral-rich communities, while Mancini and Sala (2022) indicate that the mining activities created diverse employment opportunities, but the conditions were dissimilar in different communities. Moreover, the study by Mancini and Sala (2022) expounds that the reliance on extractive activities made some locals vulnerable to the absence of sustained employment. From the available evidence, it suffices to say that mining creates employment opportunities directly and indirectly. However, the opportunities are dependent on the type of mineral, scale, and level of formalization. Although this evidence, important gaps remain. Much of the literature focuses on gold and artisanal or small-scale mining rather than gypsum. Limited gypsum-specific evidence is largely from Nigeria, leaving a geographical gap in Kenya. Thus, there was a need to establish whether or not mining gypsum would create employment opportunities for residents of Tana North Sub-County.

3.2 Gypsum Mining, Household Income and Livelihoods

Mining can influence households' welfare by generating additional incomes and reshaping livelihood strategies. According to Yamarak and Parton (2021), who evaluated the poverty and livelihood outcomes using data from 609 households in Papua New Guinea, such an outcome is not always positive as there were observed differences between mining-affected and non-mining communities. Nonetheless,

the presence of mining activities is not necessarily beneficial for welfare, as Tiamgne, Kalaba, and Nyirenda (2021) demonstrated that being in close proximity to mining "hotspots" might make a household more vulnerable to a range of negative livelihood outcomes. Similar evidence was provided by studies in Ghana, Tanzania, Mali, and other countries, which showed that mining can have both positive and negative effects on local economies. While being able to provide additional income to support livelihoods, mining activities can also replace some of the existing economic opportunities. For instance, according to Musoma, Khamis, and Badurdeen (2023), extractive industries in Tanzania were associated with higher proportions of transport and food-vending activities and lower proportions of some traditional livelihood activities. Finally, a study by Adranyi, Stringer, and Altink (2023) showed that there were different livelihood outcomes for households engaged in artisanal mining, while Gueye, Gubert, and Roubaud (2024) found that mining activities in Mali generated positive local economic spillovers that improved many household's economic welfare. In general, the literature suggests that mining has the potential to enhance household income and livelihood diversification, but the extent and direction of this impact will depend on household characteristics, proximity to mining, local economic linkages, and the ability of households to diversify their livelihoods in order to take advantage of opportunities derived from mining activity. Nevertheless, most of the existing literature deals with gold, copper or gas extraction, and is concerned with countries other than Kenya. There is little information about the livelihood implications of gypsum mining for rural Kenyan communities, particularly Tana North Sub-County.

3.3 Gypsum Mining and Local Business Development

Mining activities may generate economic benefits to local businesses through the demand for products and services from the extractive firms, their employees, and the surrounding households. These businesses could range from food vendors and retail shops to transport services, hotels, and equipment suppliers. According to Weldegiorgis, Dietsche, and Franks (2021), local procurement and linkages through supply chains could extend the benefits of mining activities to the host economy, as local firms require appropriate financing, skills, infrastructure, and institutional support to actively participate in the extractive activities. Similarly, Weldegiorgis et al. (2022) found that businesses, infrastructure, and knowledge capabilities were critical factors that determined transformative mining linkages, whereas Kilumelume et al. (2022) found that variations in mining activities influenced related local service industries. Provenzano and Bull (2021), using minerals as evidence from Africa, also concluded that mining activity was associated with positive local economic development, although the effect was conditional upon institutional proximity. Thus, the reviewed literature demonstrates that mining can create conditions for local business development through procurement, supply chains, demand, and other economic linkages. However, the focus of most of the previous research was on large-scale mining activities or the overall impact of minerals on the local economy, not specifically on gypsum mining in Kenya's rural communities. Moreover, the impact of mineral mining on local business development was rarely assessed in the reviewed articles. Most researchers analyzed economic linkages at a regional or national level, neglecting local business development indicators such as local business creation, their growth, local markets, and access to products. This study aimed to fill this gap by assessing local business development in Tana North Sub-County.

4.0 Conceptual Framework

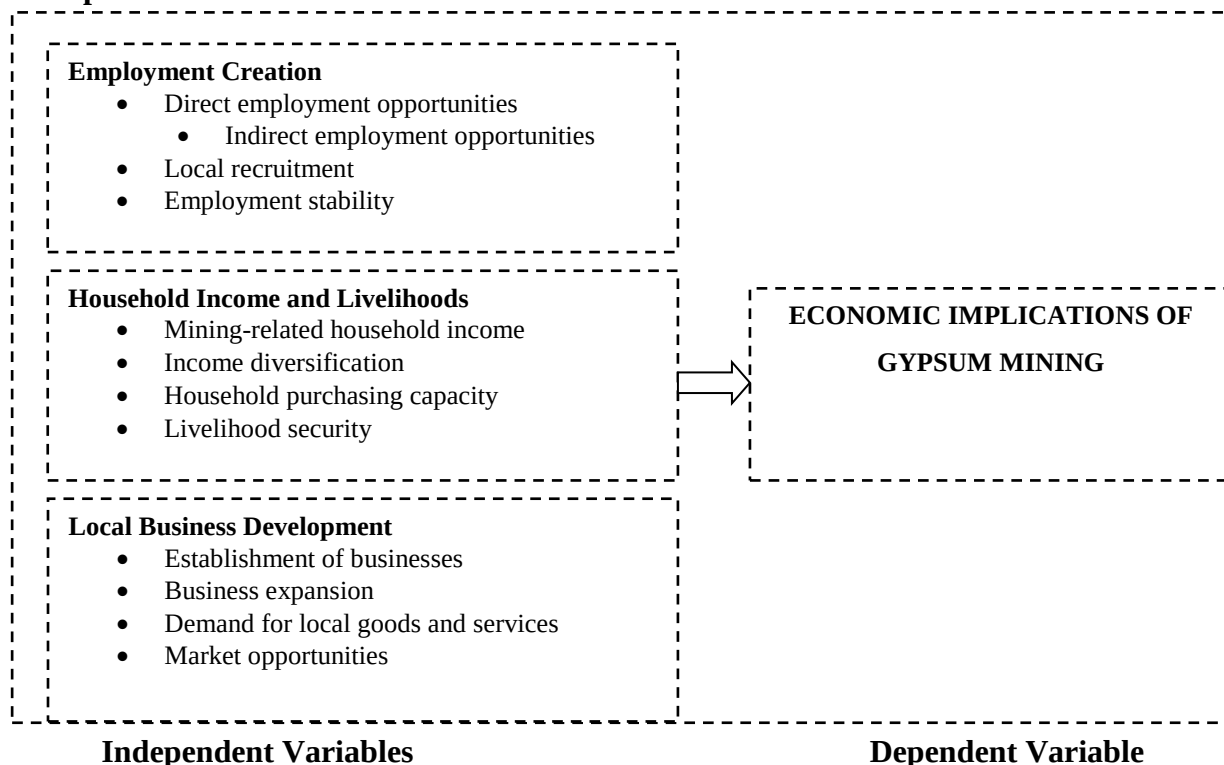


Table 1: Conceptual Framework

5.0 Research Methodology

The study adopted a positivist research philosophy which was suitable for the study since the variables under study were measured quantitatively and hypotheses were tested using statistical procedures. The positivist research philosophy emphasizes on objective measurement and statistical analysis of relationships between study variables (Maksimovic & Evtimov, 2023). A descriptive research design was adopted to describe the economic implications of gypsum mining and establish relationships between gypsum mining and employment creation, household income and livelihoods, and local business development. The descriptive research design was efficient to examine the characteristics, patterns, and distribution of the variables under study (McCombes, 2022). Correlation and regression analyses were performed in order to establish relationships between the study variables.

The research was performed among Tana River County, where gypsum mining constitutes an important economic activity for the population. The target population included the households and individuals that could be directly or indirectly affected by the economic activity, such as workers, families and businesses. The study focused on three of the most affected mining localities, Bilbil, Charidende and Dukanotu. According to Kenya Population and Housing Census (2019), the three localities sum up to a total number of 1,328 households of population: 331 in Bilbil, 794 in Charidende and 203 in Dukanotu. The sample size for the households was determined using the following formula: $n = N / [1 + N(e)^2]$. Using the 1,328 of households as a population with 10% margin of error, a sample size of 93 households was extracted, which proportionally produced 25 respondents from Bilbil, 60 from Charidende and 16 from Dukanotu. In addition, the study employed eight key informants who were purposively selected on the basis of their work, comprising three Chiefs, three Community-Based Group representatives, one

Environment Officer and one Ward Administrator. The intended sample size therefore comprised 101 participants.

The study employed a structured questionnaire to gather quantitative data from selected household respondents and key-informant interviews to generate complementary information. The questionnaire comprised items assessing gypsum mining, employment creation, household income and livelihoods, and local business development. Several items were integrated to evaluate each construct. The questionnaire underwent pilot testing to detect unclear questions, unsuitable response options, and other weaknesses prior to the main data collection exercise (Crick, Lamey, & Meyer, 2023). Validity was established by ensuring that the items corresponded to the study objectives, conceptual framework, operational definitions and relevant literature. Both content and face validity were taken into account while expert evaluation and pre-testing were utilized to ascertain whether the items adequately reflected the intended constructs (Crick, Lamey, & Meyer, 2023). Reliability was evaluated by using Cronbach's alpha to assess the internal consistency of the items used in the questionnaire to measure the study constructs. A coefficient of 0.7 or higher was considered acceptable by the studies of Knekta, Runyon, and Eddy (2021), Boateng, Neilands, Frongillo, Melgar-Quinonez, and Young (2018), and Maksimovic and Evtimov (2023). The quantitative data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics included frequencies and percentages, means and standard deviations. The Pearson correlation analysis determined the direction and magnitude of the association between gypsum mining and each indicator while simple linear regression analyzed how much each of the indicators was predicted by the mining activity. Statistical significance was assessed at the 5% level ($p < 0.05$). The regression model is specified as:

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

Where Y represents each economic outcome, X represents gypsum mining, β_0 is the constant, β_1 is the regression coefficient and ε is the error term. Separate regression models were estimated for employment creation, household income and livelihoods, and local business development. Before interpreting the regression results, diagnostic tests were conducted to assess relevant model assumptions, including multicollinearity and normality. Variance Inflation Factor statistics were examined for multicollinearity, while distributional diagnostics were used to assess the data. The study obtained permission from the relevant authorities and adhered to ethical principles throughout the research process. Participation was voluntary and based on informed consent. Respondents were informed about the purpose of the study and their right to withdraw at any time. Confidentiality and anonymity were maintained, and information collected was used solely for academic purposes.

6.0 Results, Findings and Discussion

6.1 Response Rate

A total of 93 questionnaires were distributed among the sampled households in Bilbil, Charidende and Dukanotu, and out of these, 88 questionnaires were completed and returned representing a 94.6% response rate. In addition, all eight key informants targeted also participated in the interviews. This is a good response rate adequate for analyzing the study results and interpreting the research findings.

6.2 Overall Economic Implications of Gypsum Mining

The study determined the economic implications of the gypsum mining using such parameters as employment creation, impact on the household income and livelihoods and local business development. The results of the study revealed that the economic implications were generally favourable. Employment

creation had the highest mean score, that is, 3.96 (SD = 0.74). The impact on the household income and livelihoods reported a mean score of 3.88 (SD = 0.79), while local business development recorded a mean of 3.71 (SD = 0.83). Overall, a mean score of 3.85 (SD = 0.79) suggests that respondents generally agree that the mining activities have a positive economic implication.

6.3 Gypsum Mining and Employment Creation

The first research objective sought to determine the effect of gypsum mining on employment creation. Interviewees responded that gypsum mining creates direct employment with a mean of 4.08 (SD = 0.81), indirect employment due to transport and related services with a mean of 4.02 (SD = 0.76), and provides employment opportunities for local residents with a mean of 3.94 (SD = 0.82). Alternative employment opportunities and improved economic security recorded means of 3.91 (SD = 0.79) and 3.86 (SD = 0.87), respectively. The overall mean of 3.96 (SD = 0.81) was a positive indication of perceptions of mining-related employment opportunities. A Pearson correlation analysis revealed a strong positive relationship between gypsum mining and employment creation ($r = .684$, $p < .001$, $SD = 0.790$). Regression analysis further revealed that gypsum mining explained 46.8% of the variation in employment creation ($R^2 = .468$; adjusted $R^2 = .462$). The regression model was statistically significant, $F(1, 86) = 84.31$, $p < .001$. The regression coefficient was also statistically significant ($B = .681$, $SE = .074$, $\beta = .684$, $SD = 0.791$, $p < .001$). Thus, the initial hypothesis that gypsum mining has no significant influence on employment creation was rejected. The result suggests that gypsum mining offers direct and indirect employment provisions in the study area. Nevertheless, employment creation should not be evaluated solely on the number of jobs generated. Quality, stability, safety, and sustainability are also significant factors to consider. Evidence from gypsum mining in Garissa indicates that although the sector creates employment and local economic opportunities, some jobs remain informal and insecure with limited social protection and uneven distribution of benefits (Oyuma, Miao, Roeland, Game, & Lieuw-Kie Song, 2026). Thus, the findings suggest that strengthening the quality of mining-related employment could increase its contribution to sustainable local livelihoods.

6.4 Gypsum Mining and Household Income and Livelihoods

The second objective sought to establish the influence of gypsum mining on household income and livelihoods. The overall mean score was 3.88 (SD = 0.792), signifying that respondents perceived mining activities as having a positive effect on household economic wellbeing. Individual indicators recorded a mean score of 3.94, 3.89, 3.86, 3.82 and 3.89 respectively indicating that respondents agreed that mining had a positive effect on all the livelihood indicators evaluated. The extent to which gypsum mining influenced household income and livelihoods was strong and positive ($r = .721$, $p < .001$). Regression analysis revealed that $R = .721$ and $R^2 = .520$ while the adjusted R^2 was .514. Thus, 52.0% of the variance in the household income and livelihoods was explained by gypsum mining activities. The model was significant $F(1, 86) = 106.71$, $p < .001$. The regression coefficient was significant ($B = .714$, $SE = .069$, $\beta = .721$, $SD = 0.793$, $p < .001$). Therefore, the second null hypothesis was rejected. In comparing the three economic indicators evaluated it was evident that household income and livelihood indicators recorded the highest statistical relationship with gypsum mining activities. This implies that the economic benefits of mining go beyond providing employment to influencing household income and livelihoods. The results are consistent with Sustainable Livelihoods Framework as they show that provision of economic opportunities enhances livelihood resources and strategies. However, this study raises the issue of whether the benefits accrued from mining would be sustainable given the need for households to diversify their sources of income and not rely solely on one activity.

6.5 Gypsum Mining and Local Business Development

The third objective sought to examine the impact of gypsum mining on local business development. Overall mean was 3.71 (SD = 0.794__), an indication that the respondents agreed that mining has a positive effect on local business development. The respective indicators recorded mean scores of 3.79, 3.68, 3.65, 3.76 and 3.67. Pearson correlation analysis revealed a positive relationship between gypsum mining and local business development ($r = .653$, $p < .001$). Regression analysis indicated that gypsum mining explains 42.6% of the variance in local business development ($R^2 = .426$; adjusted $R^2 = .419$). The model was statistically significant, $F(1, 86) = 73.42$, $p < .001$. The regression coefficient was also statistically significant ($B = .648$, $SE = .076$, $\beta = .653$, $SD = 0.795$ __, $p < .001$). Therefore, the third null hypothesis was rejected. The result suggests that mining promotes demand for goods and services thereby creating opportunities for local traders, transporters and other service providers. However, the extent to which businesses benefit will depend on their ability to participate in the supply chains for the mining activities. Financing, entrepreneurial competencies, access to infrastructure and procurement opportunities present potential factors that may determine whether the money spent on mining will be recycled back in the local economy or go to other businesses not found in the study area.

6.6 Summary of Hypothesis Testing

The three hypotheses were rejected since gypsum mining showed statistically significant positive associations with all three economic indicators. Income and livelihoods had the strongest association with gypsum mining ($\beta = .721$, $p < .001$), followed by the creation of employment ($\beta = .684$, $p < .001$) and local business development ($\beta = .653$, $p < .001$).

Hypothesis	β	p-value	Decision
H01: Gypsum mining has no significant influence on employment creation	.684	< .001	Rejected
H02: Gypsum mining has no significant influence on household income and livelihoods	.721	< .001	Rejected
H03: Gypsum mining has no significant influence on local business development	.653	< .001	Rejected

Overall, the results support that gypsum mining is associated with significant economic opportunities for Tana North Sub-County. The element that benefited the most from the mining activities was household income and livelihood, followed by employment and local business development. The study results conform to the Sustainable Livelihoods Framework because mining creates livelihood opportunities as it provides employment, income, and promotes local business development. However, the study also reveals the need to formulate policies that promote employment security, encourage local enterprise participation, and ensure equitable distribution of mining benefits.

7.0 Conclusions and Recommendations

7.1 Conclusions

The study concluded that there are significant positive economic implications of gypsum mining to the community in Tana North Sub-County through increased employment opportunities, provision of an income and livelihood source and stimulation of local business development. The study results revealed significant positive correlations between the gypsum mining activity and all the three dependent variables.

Household income and livelihoods had the greatest relationship with gypsum mining. This suggests that the mining activities were a major source of support towards the local residents' livelihoods and household businesses. Employment generation also had a positive relationship with gypsum mining. This indicates that the activities supported the local employment opportunities. Similarly, local business development also had a significant positive relationship with the activities. However, the long term benefits of the activities were reliant on the quality of the employment generated and the extent to which the local businesses and inhabitants benefitted from the investment. Therefore, the study recommended that the economic significance of the gypsum mining should complement other factors that contribute towards sustainable livelihoods.

7.2 Recommendations

The first key recommendation for consideration is the need for enhanced local employment opportunities. This may be achieved by targeting local residents from Bilbil, Charidende and Dukanotu during recruitment. The local residents should be trained in mining operations, machines operation, transport handling, safety measures and mineral processing among others. This would enhance the level and quality of employment being generated by the mining activities.

The second recommendation relates to the need to support local livelihoods through transformation of the household income derived from the mining activities. The county government and development partners could consider collaborating with the mining companies to support the local community to save, grow and invest some of the income derived from the mining activities. This support would enhance diversified household income sources and reduce overreliance on the mining activities.

The local business development would also be key in enhancing the local economic development of the area around the mining sites. The local businesses should be prioritized in the provision of services and goods to the mining companies to enhance their competitiveness and potential for growth. This will require sensitization efforts by the county government and local business development associations in support of the local businesses to meet the required standards, sustainability and compliance requirements to participate in tenders invited by the mining companies. Such approaches would enhance the value addition potential of the local businesses and consequently the local economy around the mining sites.

Finally, it would be important for future interventions related to gypsum mining to focus on sustainability of the environmental and social aspects of the local communities. Emphasis should be placed on community ownership of some aspects of the mining activities, including benefit-sharing mechanisms to complement the community development needs. Such approaches would enhance long-term benefits of the local economy and livelihoods from gypsum mining.

References

1. Adranyi, E., Stringer, L. C., & Altink, H. (2023). The impacts of artisanal and small-scale gold mining on rural livelihood trajectories: Insights from Ghana. *The Extractive Industries and Society*, 14, 101273. <https://doi.org/10.1016/j.exis.2023.101273>
2. Afriyie, K., Abass, K., Frempong, F., Arthur, B., & Gyasi, R. M. (2023). The dynamics and livelihood implications of illegal mining in Ghana: A critical assessment. *Geographical Research*, 61(1), 32–43. <https://doi.org/10.1111/1745-5871.12573>

3. Atta-Quayson, A. (2022). Local procurement in the mining sector: Is Ghana swimming with the tide? *Journal of the Southern African Institute of Mining and Metallurgy*, 122(2), 59–72. <https://doi.org/10.17159/2411-9717/1586/2022>
4. Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quiñonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research: A primer. *Frontiers in Public Health*, 6, 149. <https://doi.org/10.3389/fpubh.2018.00149>
5. Crick, J. M., Lamey, L., & Meyer, R. (2023). Analyzing survey data in marketing research: A guide for academics and postgraduate students. *Journal of Business Research*.
6. Dagare, A. M., Gambo, Y., & Abare, J. S. (2024). Geochemistry and socioeconomic importance of gypsum in Fune and Fika LGA, Yobe, North Eastern Nigeria. *International Journal of Research and Innovation in Social Science*, 8(3s), 2095–2104. <https://doi.org/10.47772/IJRISS.2024.803152S>
7. Delgado Jiménez, A., Smith, N. M., & Holley, E. A. (2024). Towards sustainable ASM-based livelihoods: The role of institutional arrangements in the formalization of artisanal and small-scale mining. *Resources Policy*, 94, 105129. <https://doi.org/10.1016/j.resourpol.2024.105129>
8. Dikgwatlhe, P., & Mulenga, F. (2023). Perceptions of local communities regarding the impacts of mining on employment and economic activities in South Africa. *Resources Policy*, 80, 103138. <https://doi.org/10.1016/j.resourpol.2022.103138>
9. Fraser, J., Bat-Erdene, Z., Lyons, J., & Kunz, N. (2022). Local procurement, shared value, and sustainable development: A case study from the mining sector in Mongolia. *Business Strategy & Development*, 5(3), 222–231. <https://doi.org/10.1002/bsd2.193>
10. Hilson, G., & Hu, Y. (2022). Changing priorities, shifting narratives: Remapping rural livelihoods in Africa's artisanal and small-scale mining sector. *Journal of Rural Studies*, 92, 93–108. <https://doi.org/10.1016/j.jrurstud.2022.03.010>
11. Huggins, C. D., Siwale-Mulenga, A., & Parmelo, S. (2024). Gender, livelihoods and local development in artisanal and small-scale mining areas: Evidence from gemstone production in Zambia and Tanzania. *The Extractive Industries and Society*, 18, 101461. <https://doi.org/10.1016/j.exis.2024.101461>
12. International Labour Organization. (2026). *Employment impact assessment of the gypsum mining sector in Garissa County, Kenya*. International Labour Organization. <https://doi.org/10.54394/00033243>
13. Kenya National Bureau of Statistics. (2024). *2024 Economic Survey*. Kenya National Bureau of Statistics.
14. Kenya National Bureau of Statistics. (2019). *2019 Kenya Population and Housing Census*. Kenya National Bureau of Statistics.
15. Knekta, E., Runyon, C., & Eddy, S. (2019). One size doesn't fit all: Using factor analysis to gather validity evidence when using surveys in your research. *CBE—Life Sciences Education*, 18(1), rm1. <https://doi.org/10.1187/cbe.18-04-0064>
16. Maponga, O. P., & Musa, C. (2021). Domestication of the role of the mining sector in Southern Africa through local content requirements. *The Extractive Industries and Society*, 8(1), 195–210. <https://doi.org/10.1016/j.exis.2020.06.001>
17. Mabe, F. N., Dauda, A., & Owusu-Sekyere, E. (2023). Artisanal small-scale mining, farm labour attraction and household welfare in Ghana. *Resources Policy*, 86, 104208. <https://doi.org/10.1016/j.resourpol.2023.104208>

18. Maksimovic, M., & Evtimov, I. (2023). [Source used in the methodology discussion on positivism and quantitative research].
19. Musoma, T., Khamis, A., & Badurdeen, F. (2023). [Study on gas extraction, livelihood diversification and local economic activities in Tanzania].
20. Ofosu, G., Torbor, M., & Sarpong, D. (2022). Gender and artisanal and small-scale mining: Exploring women's livelihood and occupational roles in formalised settings. *Journal of Rural Studies*, 96, 121–128. <https://doi.org/10.1016/j.jrurstud.2022.10.013>
21. Opiyo, S. B., Opinde, G., & Letema, S. (2024). A perspective of sustainable livelihood framework in analysis of sustainability of rural community livelihoods: Evidence from Migori River watershed in Kenya. *International Journal of River Basin Management*, 22(4), 627–643. <https://doi.org/10.1080/15715124.2023.2216019>
22. Oyuma, C., Miao, G., Roeland, A., Game, A., & Lieuw-Kie Song, M. (2026). *Employment impact assessment of the gypsum mining sector in Garissa County, Kenya*. International Labour Organization. <https://doi.org/10.54394/00033243>
23. Ramadhani, J., & Maliti, E. (2023). *Implementation of local content regulation: The case study of a foreign-owned mining operation in Tanzania* (WIDER Working Paper 2023/77). United Nations University World Institute for Development Economics Research. <https://doi.org/10.35188/UNU-WIDER/2023/385-7>
24. Shatz, I. (2024). Assumption-checking rather than (just) testing: The importance of visualization and effect size in statistical diagnostics. *Behavior Research Methods*, 56, 826–845. <https://doi.org/10.3758/s13428-023-02072-x>
25. Tannor, A., Kelboro, G., Greve, H., Borgemeister, C., & Tischbein, B. (2022). [Study on climate variability, extractivism and livelihood resilience in Ghana].
26. Tiamgne, X. T., Kalaba, F. K., & Nyirenda, V. R. (2022). Household livelihood vulnerability to mining in Zambia's Solwezi copper mining district. *The Extractive Industries and Society*, 9, 101032. <https://doi.org/10.1016/j.exis.2021.101032>
27. Tana River County Government. (2024). *Tana River County Budget Review and Outlook Paper 2024*. County Government of Tana River.
28. Tana River County Government. (2025). *Tana River County Budget Review and Outlook Paper 2025*. County Government of Tana River.
29. Yamarak, L., & Parton, K. A. (2021). Impacts of mining projects in Papua New Guinea on livelihoods and poverty in indigenous mining communities. *Mineral Economics*, 36(1), 13–27. <https://doi.org/10.1007/s13563-021-00284-1>