



## The sustainability of small-scale mining in Zimbabwe: A case of Danangwe District youth in mining co-operative, Chegutu

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### Abstract

Co-operatives are viewed as remedy to social economic injustices, a panacea to poverty at household level and as dependable social safety nets for the mass populations of developing countries. Despite their usefulness and value, their existence is short-lived as a result of failures to endorse institutional sustainability. In an effort to understand why co-operative entities fail, the study focused on the sustainability of small-scale mining cooperatives in Zimbabwe basing on Danangwe District Youth in Mining Cooperative, Gadzema, Chegutu as a case study. The research adopted a descriptive research study design using both qualitative and quantitative techniques. Three categories were generated under governance, compliance and benefit sharing as key pillars of institutional sustainability. The study concludes that small scale mining co-operatives are not sustainable but can be deemed circumstantially sustainable as they continue to exist despite the infractions observed relating to institutional sustainability. Over 70% of participants who were cooperative beneficiaries were not satisfied benefit sharing arrangements and governance of the institution. We recommend that implementation of the 8 principles of good governance to avoid the risk of the co-operative collapsing, establishment of compliance frameworks to observe all mining laws and policies and that cooperatives leadership acquires technical knowledge to manage.

**Keywords:** Cooperatives, Governance, Small-scale mining, Sustainability

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### Introduction

The concept of sustainability emerged as a fraction of the Brundtland report of 1987 and continued to the 1992 and 2012 Rio Earth summit in Brazil. Institutional sustainability refers to an organisation enabling continuity through effective policies, governance and compliance, thus characterizing the institution submitting to concerns and interests of the society. The advent of the Millennium Development Goals (MDGs) enabled co-operative entities to resurface as part of the solution towards ending poverty as social safety nets and economic injustices. This primary role of co-operatives is to meet members' needs but, they have been portrayed as instruments for the delivery of the goals set by external agencies, such as non-governmental organisations, political parties, governments, regulatory competent bodies, and not reaching the intended beneficiaries (Allred, 2013)<sup>[1]</sup>. Zimbabwe has been plagued with meteorological droughts, HIV/AIDS pandemic, unemployment, poverty and inflation which resulted in the economic decline within the last two decades (ZIMVAC, 2009)<sup>[9]</sup>. In a bid to revive the economy from the overall decline such as reduction in Gross Domestic Product (GDP) by 50% in 2008; the 5-year Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET) blueprint was established in the year 2013. The blueprint advocated for indigenization and empowerment of the local people by creation of programs such as co-operative mining in Chegutu district which utilised local environmental resources to combat poverty.

The mining legislative framework encompasses various Acts and Statutory Instruments which determine the code of operation and failure to adhere warrants closure even if productive.

The socialist development trajectory in Zimbabwe led to the proliferation of co-operative ventures though their existence was short-lived despite their achievements, thus indicating sustainability problems. The emergence of mining co-operatives such as Danangwe District Youth in Mining Cooperative (DDYMC) requires a thorough enquiry on its sustainability, whether it will have the same fate or otherwise. Therefore, the research seeks to investigate the sustainability of small-scale mining co-operatives focusing on their governance, compliance to regulatory bodies' requirements, equality and equity under socio-economic benefits derived, focusing on DDYMC.

### Study area

Gadzema is a rural area under Chegutu district in Mashonaland West province of Zimbabwe. It is approximately 110 km south-west of Harare on the main Harare-Bulawayo railway line. Gadzema is classified under agro-

ecological zone 2b which has rainfall estimates of about 750 mm- 1000 mm. The establishment of the co-operative marked the advent of gold mining as a dominant economic activity followed by agriculture. The closure of industries, mines compelled the formally employed people to engage in small scale mining. Agriculture was promoted by the land reform exercise which took place in the year 2000 and the current ongoing land distribution under indigenization and empowerment program. Droughts and rainfall shortage motivated the population to move towards gold mining as a way of earning income (ZIMVAC, 2009) [9]. The mining area consists of 33 hectares which the Ministry of Mines and Mining Development demarcated for small scale mining activities. Underground mining is the dominant feature using hand held tools and machinery such as shovels, picks, hammers, chisels, compressors, generators among others. The co-operative owns the whole demarcated mining area and controls the mining activities.

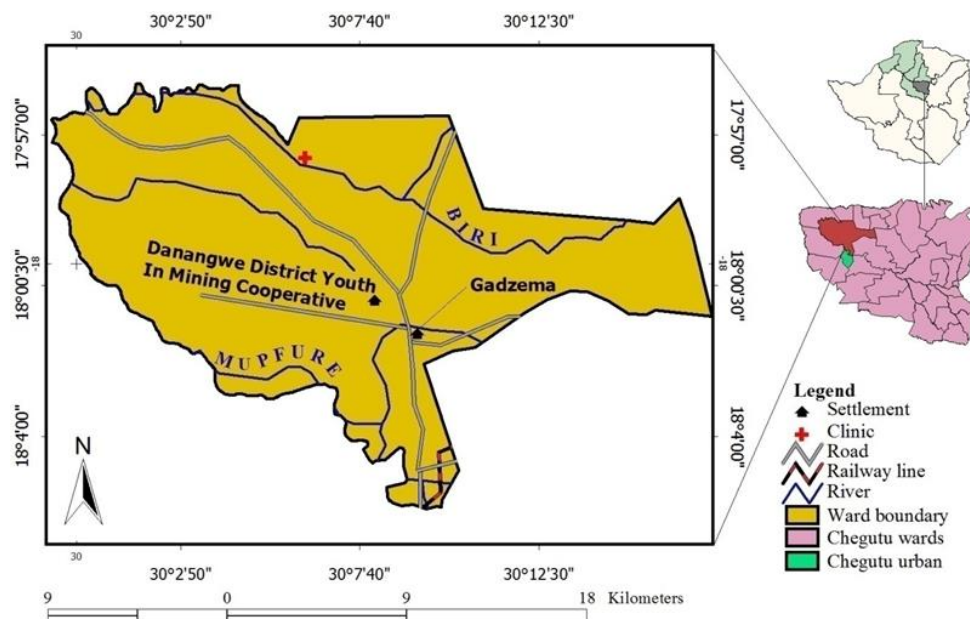


Fig 1: Map showing the location of the study area DDYMC, Gadzema, Chegutu

### Research Materials and Methods

#### Research design

The researcher adopted a descriptive study design based on case study approach as it permitted the use of both qualitative and quantitative research enabling gathering of data without any alteration of daily occurrence of events within the study environment participants (Burns and Grove, 2003) [3]. The qualitative data package was crucial to the research because, it allowed efficient processing of interpersonal experiences, motives behind human behaviours, personal values, thoughts and perceptions (Kothari, 2004) [5]. Quantitative data was presented in numerical, experimental and categorical form consisting of graphs, statistical relationship analysis from data gather from questionnaires.

#### Target population, sample size, determination and representation

Representative figure heads were selected as key respondents because of their roles and responsibility in their fields within Chegutu district. The research selected 5 participants for interviewing on purposive sampling. The interview participants consisted of 1 Environmental Management Agency (EMA)

officer, 1 Rural District Council officer, 2 district field operators from Ministry of Small to Medium Enterprises and 1 DDYMC co-ordinator. The researcher selected 81 individuals from 100 of the co-operative's group leaders at 5% precision and 95% confidence level were  $p=.5$  using sample size determination tables. The group members of the groups led by the 100 leaders were also perceived as part of the target population to be sampled.

#### Data collection

The researcher collected primary data through first-hand investigation and secondary data from year 2011 to observe trends. The researcher employed four data collection techniques which were interviews, questionnaires survey, observations as primary data and journals, eBooks, environmental reports and environmental outlooks as secondary data. The data collection tools utilised were structured interview guides, questionnaires, observation guide, media and literature.

#### Data cleaning

Interviews took point as high priority data as it was collected

from key respondents and had less volume of data compared to the other techniques. Their tools made creation of headings or codes for analysis less complicated to establish.

### Data coding and entry

The researcher implemented coding of data from questionnaires, interviews and observations. Subsequent to coding process, data from questionnaires was input in SPSS package for computing analysis (descriptive statistics) and Microsoft Excel (generation of charts). The information generated consisted of three major codes that are governance, compliance and benefit sharing issues. A narrative approach was used to analyse data from interviews and observations. The information was presented using charts and tables for visual appreciation. Furthermore, the generated information from questionnaires which was analysed using descriptive statistics was used to aid created codes from interviews and observation. Determination of relationships was done through explanatory factor statistical analysis approach as the quantitative package of the research. The researcher extracted components with a correlation value of above 0.5 to prove the research hypothesis and reliability for component analysis following explanatory factor analysis.

### Ethical issues

Research ethics were considered to enable the research to be conducted in a non-offensive and discriminating way.

### Results and Analysis

#### Demographic characteristics of respondents

Questionnaires were administered to 100% (81 people) in which the percentage of respondents was 64% males and 34% females. This can be attributed to the theory of George Murdock of biology and practicality which states that division of labour is based on the physical makeup of sexes. The 21-25 years age group constituted the highest population percentage followed by 26-30 years age group, 16-20 years age group and lastly the 32+ age group. The mining co-operative initiative aimed at benefiting the youth thus having more youth population and owing to the risk as well as labour intensive strenuous activities.

The level of education attained by individuals in the mining co-operative was categorised as 12% primary, 49.9% secondary (ordinary level), 9.9% secondary (advanced level), 6.2% tertiary and 25.7% other. This distribution was influenced by unemployment, financial problems, venturing into entrepreneurship especially to the tertiary education holder as most of them are sponsors or investors of individual mining groups, the need to earn a living after death of legal guardian, failure to proceed with education due to various reasons. The high percentage frequencies on the household size ranks of 0-5 people and 6-10 was mainly a prominent feature in the age groups 16-20 years and 21-25 years up to the 26-30 years which denotes early marriages, extended families, young adults headed households and cultural practices such as polygamy. Time of membership of 3-4 years denoted that most members joined the co-operative prior to ZIMASSET support.

#### Organisational structure of the mining cooperative

The co-operative is established under the chairman as the senior leader with the vice chair, with an appointed manager, the co-operative committee, established departments; finance, advisory, administration, human resources management and

safety department. The co-operative operates under two unique fronts which are the co-operative's own mining activities as a mining entity and general public mining operations. The general public front entails issuing of a mining plot an individual to practice mining under the co-operative and when the individual is in production 10% of unprocessed mineral ore is repatriated as tribute to the co-operative. The average output of unprocessed mineral ore of the co-operative is estimated to be at about 300 tonnes per day as highlighted during interviews.

#### Decision making process within the mining co-operative.

Decision making within the mining co-operative is characterised by voting upon meetings and co-operative committee-based decision based on public participation but being endorsed by the co-operative chairman. 96.3% of the co-operative population was fully aware of the organisational structure and 3.7% was not aware of the organisational structure. 38.3% was satisfied with decision making and 61.7% was not. The researcher noted that, public participation was not fully implemented as there is a significant portion of the population who do not attend the weekly meetings. This translates to poor implementation of the governance principles namely transparency, equitable and inclusive public participation.

The 42% portion of the co-operative members who acknowledged all the parameters as visible and inclusive of their participation had considerably strong relationships with the actors in power. The survey showed that the leadership violated the co-operative act statute of the 3-year term in office. The Small to Medium Enterprise (SMEs) officers acknowledged interference by political matters therefore making compliance towards the Cooperative Act difficult to monitor. The issue of co-operative dividends is not fully endorsed as much of the population is not fully aware of the legal statutes encompassing the matter. This subsequently hinders compliance and benefit sharing thus threatening continuity of the institution.

#### Organisational compliance of the mining co-operative

21% of the respondents adheres to legal requirements due to fear of prosecution. 40.7% were indicated benefits accrued from compliance as their only motivator to comply and 38.3% adheres to legal requirements because benefits accrued from compliance and fear of prosecution. This relates to the law compliance theory under instrumental perspective which entails the 2 observed scenarios. 12.3% are fully aware of the legal instruments in question, 22.2% not aware of the legal requirements and 65.4% are aware of the three legal instruments. The most common legal instrument was the EM Act because EMA carried out environmental blitz programs. Our findings showed that group members are responsible for securing their mining equipment at the co-operative offices on credit or purchase to external sources. This entails securing of mercury, explosives, personal protective equipment, drills and compressors. These present major safety, health and environmental risks which can manifest into injuries and fatalities. In gold trading, 22.2% the members sold their gold to the official buyer called Fidelity. 1.2% of the co-operative members sold gold at informal markets termed black markets. 76.5% sold to both fidelity and other channels. This was because none official gold buyers have a high purchase price than fidelity the official buyer which makes the miners ration the produced gold

between formal and informal markets. Regulatory authorities indicated that preliminary requirements such as the environmental impact assessment process (EIA) had not been done and quarterly reports were not being submitted by the mining co-operative. The authorities flagged deforestation done for timber used in underground mining support. Deforestation leads to deterioration of biodiversity. Furthermore, the enforcing agents asserted that they are obscured from enforcing compliance because of the political support backing the organisation. There are inter-agency relationships that encourage enforcement of legislation. For example, there was a tussle between EMA and Zimbabwe National Water Authority (ZINWA) towards management of water-based activities such as effluent. This cultures hostility as institutions compete for jurisdiction.

### Benefits and beneficiaries of small-scale co-operative mining

76.5% of the co-operative members valued employment as their prime benefit as they are full-time legal miners. 18.5% of the respondents valued income because they are partly sponsors within their respective groups and have considerably large shares in profit distribution. 3.7% realised assets accrued from the mining co-operative as they were able to purchase houses, cars and livestock. 1.2% of the respondents valued income, assets and employment as they were mining plot holders and sponsors.

**Table 1:** Benefits derived from the mining co-operative

Identified benefits	% Frequency of respondents
Income	18.5%
Assets (livestock, houses, cars etc)	3.7%
Employment	76.5%
Income, assets and employment	1.2%

### Benefit sharing mechanisms and benefit sharing satisfaction.

Benefit sharing was done through equal distribution among members and according to member contributions during production of mineral ore as well as its processing.

**Table 2:** Benefits sharing criteria

Benefit sharing mechanisms	% Frequency of respondents
Equal benefit sharing	13.6%
Benefit sharing according to member contributions	86.4%

Our results show a scenario whereby mining plot holders leased their plots to separate independent miners such that, when they produce mineral ore or profits, the holders acquired 30%-50% regardless of the plot holders' contributions to the mineral extraction process. Moreover, the plot holder would be included in sharing of the remaining 50%. In the event of low profit, some group members would be left with no or low income. 77.8% of the members were satisfied with the benefit sharing mechanism and 22.2% of the members were not, though no recorded cases of violence were recorded. The sharing process was not being supervised by the co-operative committee and was mutually exclusive to group members.

### Statistical data testing using explanatory factor analysis (communalities, eigen value, rotated component matrix).

Total variance explained using the Eigen value

The findings showed 492 on the measurement of co-operative benefits, meaning benefits acquired from the co-operative accounted 49.2% of the variance in cooperative sustainability in general. The maximum value from the table of communalities is 926 which measures the degree of satisfaction of co-operative members, therefore it can be established that, 92.6% of variation in questionnaire respondents is attributed to satisfaction towards the decision-making process. All the variables are above .3 value extraction signifying that they indeed warrant in variations in data gathered rendering them useful to the research labelling them as principal components.

### Extraction Method: Principal Component Analysis

Out of the 19 questionnaire aspects, 8 factors have Eigen value >1, these were extracted in not only influencing the sustainability of the small-scale mining co-operative but determining the current situation of circumstantial sustainability and probably future sustainability. In their order of significance, there is age of respondents (3.761), gender (2.291), educational background (2.032), household size (1.926), time of membership (1.493), meeting attendance (1,375), familiarity with organisational structure (1.192) and how the decision-making process was being done (1,030). The 8 influencing factors with an Eigen value of greater than 1 accounted for 75.468% of variance. Factors with value of less than 1 were regarded as potential influencing factors as they have significant values in the communalities table

### Extraction Method: Principal Component Analysis Rotation Method: Varimax with Kaiser Normalization

#### a. Rotation converged in 7 iterations

Values of less than .5 were suppressed as the researcher used values with higher positive correlation to make assumptions. Codes to establish relationships were assumed as per research objectives and easy clarification and analysis. Under component 1 the set contained, questions 5 and 4 (under governance issues), question 14 (under compliance) and question 16 (under benefit sharing) with strong positive correlation values of 0.724, 0.717, 0.617 and 0.516 respectively showing that there is a relation between governance, compliance and benefit sharing thus accepting the null hypothesis. Under component 2 the set contained, question 17 under (benefit sharing), question 3 (under governance), question 15 and 14 (under compliance) with positive correlation values of 0.700, 0.680, 0.556 and 0.556 respectively and household size under demographic data with a strong negative correlation. The second component groups benefit sharing, governance and compliance with demographic data though with a negative correlation. This shows that, in assessment of small co-operative mining the three aspects are major determinants of sustainability.

### Mode of governance applied at DDYMC

The type of governance applied within the mining co-operative can be classified as a combination of hierarchal and competition-based governance. There is individualism within the co-operative, although the representative of the organisation claimed that the process encompasses public consultation. This is supported by the disgruntlements highlighted by the questionnaire survey towards member satisfaction with the decision-making process and implemented decisions.

### Governance principles and sustainability of DDYMC

Consensus orientation not endorsed as issuing of mining plots at individual basis to practice mining increases competition which limits sharing of knowledge and skills. This results in creation of hostile relations within the mining site, making it difficult to implement team spirit and team building. Offsite gold milling makes it difficult to account for the exact figures of processed mineral quantity and its final market destinations thus resulting in gold sales at informal markets therefore promoting corruption.

### Discussion

#### Governance principles applied and co-operative sustainability

The governance system applied at DDYMC co-operative is a combination of hierarchy and competition-based modes of governance. (Boyne, 1992) <sup>[2]</sup> argues that, competitive government structure allows for an experimentation of new public policies/operations without doing harm if they fail. This may be an advantage towards sustainability of the mining co-operative. However, (Salem and Jarrar, 2010) discredits competition-based governance system as it has less potential to harness the power of knowledge integration and sharing. Likewise, it impacts full public participation as it curtails individual based development which hinders effective development of the co-operative. Potential conflict can collapse the co-operative when members realise lack of transparency, accountability, equity and inclusiveness on dividends.

#### Compliance and co-operative sustainability

There is non-compliance within the organisation indicating that the co-operative mine is not yet sustainable. In support of this view, the foundation of the co-operative project which is ZIMASSET, is enshrined under politics. This can result in catastrophic events such as mercury contamination through bio-accumulation, open pits, deforestation, violence and criminal tendencies due to excessive exposure to mercury and high turbidity water levels as observed in the Suriname mining fields in the Amazon (Heemskerk, 2002) <sup>[4]</sup>.

Trading of Gold in accordance to the gold trade act is being breached due favourable pricing on alternative markets as compared to formal buyers thus demonstrating the effect of external influence towards compliance. Individual compliance of co-operative members relates to the law compliance theory as (Ramcilovic-Suominen *et al.*, 2013) <sup>[7]</sup> who asserts that, people obey the law because of the expected costs and benefits of compliant versus non-compliance.

#### Benefit sharing and sustainability of the co-operative

Benefit sharing in the context Zimbabwe of mining co-operative is uniquely done and less documented as the aspect emerged fully after ZIMASSET and it yet to take full shape, but observable traits can be matched to pre-existing benefit sharing typologies. The process is done in secrecy of the members as a pact to avoid theft and robbery in case of a hefty payback which normally occurs in first periods of gold rush situations. Collaborative benefit sharing arrangements exist as there is differential control over access to benefits showing bureaucratically structured flows of benefits; enforcement of agreements is usually difficult and the efficiency in delivery is dependent on the levels of bureaucracy (Nkhata *et al.*, 2012) <sup>[6]</sup>.

### Conclusion

In conclusion, small scale co-operative mining is not sustainable but it can be quantified as circumstantially sustainable. Reason is given to the application of hierarchy and competitive based modes of governance which does not warrants co-operative sustainability. This is so because, the combination of these two modes of governance impacts efficient implementation of all 8 key principles of good governance. Compliance of small-scale mining co-operatives is not up to standard, thus classifying the co-operatives as unsustainable and subjected to the risk of failure. The study showed lack of skills and technical knowhow on the part of the co-operative members towards mining policies and legislation and lack of adequate communication. The collaborative benefit sharing method applied in the distribution of benefits also induce circumstantial sustainability as well and it is argued that, the main implementation weakness is how to curtail the unyielding power of state actors, thus the system tends to result in conflicts as the participating groups are both homogenous and heterogeneous which threatens to crop out conflicts.

### Recommendations

The co-operative administration and senior leadership should urgently adopt governance for sustainability by implementing all 8 principles of good governance to avoid the risk of the co-operative collapsing. The co-operative should come up with a compliance framework which observe all mining laws and policies to warrant its sustainability without failure. This will quantify them as legal miners in the eyes of the law and not to depend on political support. The co-operative's leadership requires the technical knowledge to manage the cooperative. The Ministry of Small to Medium Enterprises should devise a sustainability governance framework to show how governance, compliance and benefit sharing should be carried out. The benefit sharing arrangements should be modified with a public consultation process and implement a supervision framework to ensure equality and equity.

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