FACTORS AFFECTING ARTISANAL AND SMALL SCALE GOLD SUPPLY: THE CASE OF ETHIOPIA

A Thesis submitted to Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Executive Master of Business Administration (EMBA)

BY

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STATEMENT OF DECLARATION

I, Abebe Senbete declare that this study entitled "Factors Affecting Gold Supply: The Case of Ethiopia" is my own original work. I have carried out this research independently with the guidance and support of the research advisor. This study has not been submitted to this or any other institution of higher learning for any degree/diploma. It is done in partial fulfillment of the requirements for Executive Master of Business Administration (EMBA) degree.

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Certificate

This is to certify that this thesis, prepared by Abebe Senbete, entitled "Factors Affecting Gold Supply: The Case of Ethiopia" submitted in partial fulfillment of the requirements for the award of Executive Master of Business Administration (EMBA) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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***Abstract**: Artisanal and Small-Scale gold mining is largely linked to poverty-driven activity and a source of foreign exchange and government revenue. In Ethiopia, the sector employed a large number of people supporting approximately 1.2 million while the average share of the sector to GDP and total export during the last 15 years was limited to 0.4% and 8% respectively. Ethiopia has had no its fair share of benefits the artisanal and Small-Scale gold mining brings by way of direct revenue generation and foreign exchange creation. The country has been losing, potentially, millions of dollars through smuggling of gold every year. Supply of gold to the formal market was significantly declined. Therefore, the objective of the study was to analyze the effects of factors affecting artisanal and small scale gold supply and forward possible solutions that can improve the contribution of the sector. Notable factors (problems) are linked with global gold price fluctuation, expansion of local and cross boarder smuggling, administrative problems reflected in the gold supply chain as well as impediments related to policies and taxes including environmental dilapidation in gold mining sits in Ethiopia. In general, the performance of the sector was significantly deteriorated due to the combined effects of these deterring factors.*

A combination of quantitative and qualitative methods was used to analyze the study variables. The target population consisted of 934 artisanal gold miners, dealer, and cooperatives registered and operating in four regions in Ethiopia specifically, Oromiya, Tigray, Benishangul, SNNPR and Gmbella. Random sampling technique was applied to select 100 gold suppliers, senior managers and experts in the field. Out of 100 questionnaires 88 were completed and returned by respondents. Homogenous sampling technique was applied as the target groups are equally well aware of the ASG mining sector. Secondary data was collected from study report, publications, research outputs, proclamations and policy documents related to artisanal and small scale mining. The effects of the factors were examined by using 15 years panel data collected on foreign exchange earned from artisanal and small-scale gold mining sector. Secondary data were analyzed by using multiple linear regression model for one dependent variable (gold supply) and five independent variables. The empirical result shows international *gold price fluctuation, local gold price, incentive to gold suppliers have positive and significant relationship with the performance of the sector while contraband trade and lower gold purchase threshold policy have negative relationship. Based on the result of the study, it is recommended that contraband trade should be controlled, appropriate gold product recording, tracking and monitoring be in placed, formalization of artisanal gold miners, technical and financial support for artisanal gold miners and attention should be given for environmental protection.*

Keywords: Artisanal and small Scale Mining, Livelihood, *Environmental sustainability,*
Gold purchase centers

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List of Acronyms

AM	Artisanal Mining
ASM	Artisanal and Small-scale Mining
AGM	Artisanal gold mining
ASGM	Artisanal and Small-scale Gold Mining
BGR	Benishangul- Gumuz Region
EGS	Ethiopian Geological Surveys
EITI	Extractive Industries Transparency Initiative
GDP	Gross Domestic Product
LSGM	Large Scale Gold Mining
LDCs	less Developed Countries
MMPNG	Ministry of Mines Petroleum and Natural Gas
NBE	National Bank of Ethiopia
SNNPR	Southern Nations, Nationalities, and Peoples Region

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CHAPTER ONE

INTRODUCTION

The first chapter of the study discusses brief background information and concepts of gold mining in general and ASGM in particular. It highlights the introductory issues pertaining to ASGM, challenges and the relative contribution of the sector to the national economy. Similarly, it also discusses the problem statement, objective of the research, hypotheses of the study, research questions, significance, scope and limitation of the study.

1.1 Background of the Study

Mining is the extraction of non-renewable resources from the earth which includes highly valuable minerals diamond, gold, silver, petroleum, natural gas, etc. While agriculture was the first, mining has been the second of humankind's earliest economic activity, ranked together with agriculture as the primary or basic industry which has significantly contributed to human being since early civilization (Nikhilesh Rodiwal, 2015). Little has changed in the importance of mining industry including gold since the beginning of civilization as the sector's contribution is still substantial particularly in terms of employment creation, revenue generation and contribution to export values though the significance of the sector varies from country to country (Haward L.Hartman and Jan M.Mutmansky, 2002).

Globally, 10 to 20 million miners and their families directly depend on gold production and also additional income is derived from local inter-related businesses and approximately 10% of the global gold production is derived from ASG mining sector which at current market price has an estimated value of about US$14 billion (Fabian Stahär and Philip Schütte, 2016). This has demonstrated that sustainable ASG mining could make a significant contribution to the reduction of poverty in many developing countries.

ASG mining has been an important source of export earning for several countries. The contribution takes the largest share in many developing nation though it was not as expected in some others due to the inherent problems and challenges observed in the sector.

ASGM can contribute to economic and social development particularly at the local level where revenues are re-invested so that ASG mining can have a domino effect on the local economy. Thomas Hentschel, Felix Hruschka and Michael Priester (2003) point out that ASG mining can generate significant local purchasing power and lead to more demand for locally produced goods and services such as food, tools, equipment, housing, and infrastructure. Moreover, Beatrice Labonne (2002) emphasized that in the grass root level, gold mining also serve as an engine for small business growth and agricultural expansion, complementing national micro-small and medium-size enterprise projects. It is known that ASGM communities engage in income-generating activities such as the selling of goods and services and other products enable them to sustain their livelihood.

Governments are becoming increasingly aware of the sector's importance as a means of generator of government revenue and a source of capital to start micro business in rural areas. In realization of this importance and to increase the benefit of this economically vital commodity, countries have implemented auspicious policies and developmental programs that can promote the sector.

However, despite significant contribution of ASG mining to the national economy, the sector has stacked with several anomalies and challenges caused environmental degradation, social and health problems considered as curse in some literatures (Martha Amoako, 2014). Thomas Hentschel, Felix Hruschka and Michael Priester, (2003), have emphasized that mining can be extremely environmentally damaging and often has serious health and safety consequences for workers and surrounding communities. The critical challenge for those working in and with the ASM sector is to mitigate the negative consequences and enhance the positive benefits in order to transform ASM into an activity which reduces poverty by supporting integrated sustainable development of the impacted communities.

However, globally, in recent years, a number of governments have formally recognized the sector and attempted to provide or facilitate enabling environments that can minimize the risks associated with ASG gold mining. These demonstrate that if managed properly, sustainable ASG mining makes substantial contribution to many developing countries including Ethiopia.

Like any developing nation, gold has been Ethiopia's most important natural resource which is found in different parts of the country.

The three main regions of greenstone belts are Southern, Western and Northern gold producing areas in Ethiopia and further stated that mining is widely dispersed activity that covers many part of the country while Adola Belt is the largest gold location in the country (Ethiopian Geological Survey, 2015).

In connection to this, the study made by Ministry of Mines (2012) indicates that the placer gold deposit (gold deposit formed by gravity separation from rock during sedimentary processes) has been mined traditionally by the artisanal miners for several thousand years back to biblical times while majority of artisanal mining is derived from alluvial gold sources which are originally from erosion effects from hard rock gold ore bodies.

Currently, three Government organizations namely the MMPNG, the EGS and NBE are jointly responsible to administer the gold supply chains having distinctive role and responsibilities as as indicated in the policy and procedure manual (National Bank of Ethiopia, 2014). According to this Procedure Manual, the MMPNG is responsible to organize cooperatives, provide technical, material and overall awareness creation in cooperation with the regional governments and the EGS undertakes quality management (karat verification) of gold purchased by assigning professionals (chemists) at each purchase centers while the role of NBE is confined to marketing i.e., purchasing gold from artisanal miners, traders, cooperatives and exports the gold abroad. As NBE has no branches in region, special arrangements was made with CBE and this time seven CBE branches are engaged in gold purchase activities in different regions across the country (Artisnal Gold Purchase Agency Agreement document, 2013).

Like any other countries, mining activity can be done by small-scale miners/artisanal or at industrial level production. The country has practiced extensive artisanal mining for several centuries while significant large scale mining is almost absent. Currently, Midroc is the only company producing gold on large scale. ASG mining activities are as important as large scale mining activities, particularly in terms of people employed in the sector.

In the Ethiopian context, the role of artisanal mining outstrips the contribution of large scale mining particularly in terms of employment creation.

ASG mining is a source of basic income for those engaged on a regular basis and in some cases a complementary income for seasonal miners either principally engaged in agriculture or any other business (Beyene Tadesse, 2016).

The ASG mining operations are generating income for the unemployed youths and subsidizing the livelihood of poor farmers and in some cases it is observed that income generated in the sector by some miners enable them to engage in anther investment areas.

According to Beyene Tadesse (2016) the total population involved in ASGM (legal and illegal) is numerous estimated around 1.24 million which shows the significance of the sector in terms of employment creation in Ethiopia.

Moreover, ASG mining is considered as strategic sector that can support the country's economic development endeavors by way of revenue generation and contribution to export values. In this context, artisanal gold mining has received a greater attention in Ethiopia in the last two decades followed the new government policies where miners are encouraged to operate legally. However, even though expectation was so high, the country earned around USD 1.5 billion from the sector from 2009/10 to 2017/18 relatively low achievement in comparison to other countries(Table 2). In this regard, though the benefit is visible, the ASG mining was not able to contribute as expected to the national economy because of various problems and challenges exhibited in the sector.

It is observed during field visit that ASG miners are mostly unskilled and have no appreciation for the natural environment. ASG miners lack the required financial and technical capacities to mitigate negative impacts, or the appropriate enticements to do so in Ethiopia (Beyene Tadesse, 2016). Challenges linked with price fluctuation, illicit trade, administrative problems and related hindering factors were widely observed which are coupled together and negatively affected the performance of the sector. Thus, ASG mining contribution to export earnings and revenue generation to the government has been constantly declined.

Therefore, the paper tried to assess the above factors; the gaps observed in the institutional arrangement, bottlenecks in gold supply chain and suggest appropriate recommendation that can benefit the country as well as artisanal gold miners engaged in the business.

1.2 Statement of the Problem

Gold mining in many countries have become necessary in view of contribution in terms of poverty alleviation and also perceived as a catalyst for economic development of a nation. However, Divine Odame Appiah and Juliet Nana Buaben (2012) have emphasized that mining is one of the controversial industries all over the world, particularly in Sub-Saharan African countries including Ethiopia.

The Second Growth and Transformation Plan (GTP) provides the intention and ambition of the government to generate adequate revenue and foreign currency from the sector in such a way to support the national economy (World Bank Report, 2014). However, it was not easily possible because of internal and external problems and challenges observed in the sector (Beyene Tadesse, 2016).

The problem is that despite huge potential in ASG mining sector, the country has benefited much less than expected when compared with other countries with similar level of development both in terms of revenue generation and foreign exchange earnings. ASG mining by its nature is challenging to make it legal. It is highly exposed to illegal gold trade in all regions where gold resource is mined resulted in gold supply decline in recent years in Ethiopia. Moreover, challenges such as price drops in the international market, sector's administration problems, and limitations observed in gold product site-market monitoring and tracking, skill and technology limitations as well as tax administration restraints are potential factors hindering government revenue and gold supply to the formal market.

The sector can only contribute if these problems can be resolved or minimized so as to achieve the desired objectives set by the Government which can be addressed by enforcing policies, regulations and in placing proper sector management, follow-up and monitoring system. Thus, the main intention of this research paper is thoroughly assess and identify the factors affecting ASG supply and recommend possible solution to the identified problems.

1.3 Research Questions

Research questions are discussed in this section. The main question of the study is how issues (problems) in the artisanal mining sector are addressed? From this main question a number of guiding questions are identified. The identified specific research questions are the following:

Q1. Did the artisanal gold sector contribute to the national economy as expected?

Q2.What have been the factors that can significantly contributed for artisanal gold supply decline in recent years?

Q3. Are there any negative relationships between ASG mining and environment in Ethiopia?

Q4. Are there miss alignments or policy gaps in the institutional arrangement that can be bottleneck for the success of ASGM sector?

1.4 Objective of the Study

The general objective of the study is to examine the problems and challenges existing in artisanal and small scale gold supply to the formal market and forward remedial solution that can improve the sector's contribution to the national economy. Under this general objective, the study analyzes the impact of hindering factors affecting the performance of ASG mining sector, specifically gold price fluctuation, impacts of contraband trade, problems linked with taxation, incentives, marketing, institutional, administrative and policy issues as well as environmental problems emanated from ASG mining in Ethiopia. Gold supply in this context refers to gold produced by artisanal and small scale miners formally and delivered to the National Bank of Ethiopia.

1.5 Hypotheses of the Study

The following hypotheses have been developed for the study:

H0: Gold price decrease has no significant negative relationship with artisnal and small-scale gold supply to the formal market (NBE).

Ha: Gold price decrease has a significant negative relationship with with artisnal and small-scale gold supply to the formal market (NBE).

H0: Contraband gold trade has not created significant impact on artisanal and small-scale gold supply to the formal market in Ethiopia.

Ha: Contraband gold trade has created a significant impact on artisanal and small-scale gold supply to the formal market in Ethiopia.

H0: Lowering the gold purchase threshold has a significant positive relationship with artisanal gold supply flow to the formal market.

Ha: Lowering the gold purchase threshold has no significant positive relationship with artisanal gold supply flow to the formal market.

H0: The existing incentive offered to ASG suppliers (being less) has not created significant negative impact on the performance of the sector;

Ha: The existing incentive offered to ASG suppliers (being less) have created significant negative impact on the performance of the sector;

1.6 Significance of the Study

The contribution of ASG mining to the national economy is expected to be substantial. The benefit from the sector is reflected in terms of job creation where a large number of people are currently engaged and secure their livelihood (both direct and indirect) and contribution to a locality economy. Though, it is not as expected, ASG mining sector generates foreign exchange for the country. It is also a means of mitigating rural-urban migration. Despite several challenges in the sector, the country has earned foreign currency denominated in birr 37,442.19 million from gold purchased by NBE and delivered abroad from 2002/3-2016/17) which can be considered as partial illustration of the benefit of the sector (Appendix1).

Moreover, income created in the sector can be invested in the other sectors and hence ASG mining supports investment expansion opportunities. The income created in the sector can be invested in the other sectors and hence ASG mining supports investment expansion opportunities.

The research identified problems and challenges severely affected the performance of the sector and recommend possible solution which makes the study more commendable. Moreover, the research can help policy makers to formulate policies and procedures. The government could use the study findings and come up with clear criteria enable it promot the sector. Management of ASGM in different level may find the study useful in making decisions that can promote artisanal and small scale gold mining sector in Ethiopia. This study can be used for researchers and academic community for further studies on artisanal gold mining issue. The study recommendations could improve the contribution of the sector to the national economy. These all benefits indicate the significance of the research paper.

1.7 Scope of the Study

The study focused on major factors affecting the gold supply to the formal market covering five major gold purchase centers comprising 906 gold suppliers out of seven with 934 registered artisanal gold miners and dealers. These gold purchase centers are located in Oromiya Regional States in Shekiso City, SNNPR in Mizan Teferi and Dimma Cities, Benishangul Regional State in Asossa and Shire Endasilassie in Tigray Regional State (Table 1). The main source of information for the study such as gold resources and activities related to ASG mining are gathered from MMPNG while information related to gold marketing are gathered from NBE. This includes time series data on volume of gold purchased and amount of foreign currency earned as well as information related to the number of ASG mining license holders and other relevant information, facts and figures. Periodicals and different research papers were also used as a source of information. Furthermore, the study has included primary data by distributing questionnaires to members of cooperatives, association, gold miners and officials/experts engaged in artisanal gold activities.

1.8 Limitation of the Study

AG gold miners by their very nature are characterized by very high mobility. The collection of quantitative data was a critical challenge during the fieldwork, emanating from lack of data records, and partly due to sensitivity of the information as implied by accountability for royalties and taxes. Complete data from government institutions in charge of collecting government revenue is not available.

Income earned by the artisanal miners, cooperatives and development groups from the sale of gold could not be easily accessible, though they are legal entities operating as artisan miners. Thus, government revenue from ASGM has not been included to the study which has limited the study.

1.9 Organization of the Study

The study is organized in to five chapters. The first chapter explains what the study is about and gives a brief introduction/background, the problem statement, and the objectives, hypotheses of the study, research question, significance, scope and limitations of the study. Chapter two provides definition of ASG mining, highlights pertinent theoretical and empirical reviews of the literature and conceptual framework relevant to the study. The third chapter provides description about the

methodology and the variables used in the study and the fourth chapter presents the results and discussions of the study conducted based on data and information collected from secondary and primary sources. The results of the descriptive statistics, correlation analysis, regression analysis and major findings of the research paper in a manner that relates to the topic have also been discussed in the fourth chapter. Summary results, conclusion and recommendations are given in chapter five of the study.

CHAPTER TWO

REVIEW OF RELATED LITRATURE

This chapter discusses the theoretical and empirical literatures regarding ASGM and issues related to the subject matter of the study. In these perspective concepts, principles, theoretical framework and issues specific to the sector were discussed. Several empirical results have been reviewed and compared with various countries case studies and the summarized literature results were presented in the following sections and sub-sections.

2.1 Theoretical Review

2.1.1 Definition of Artisanal and Small-Scale Gold Mining

The definition of ASM including ASGM varies from country to country. In some countries distinction is made between 'artisanal mining' that is purely manual and on a very small scale, and 'small-scale mining' that has some mechanization and is on a larger scale (Thomas Hentschel, Felix Hruschka, and Michael Priester, 2003). In other countries, variables like investment costs, mine output, labour productivity, size of concessions, amount of resources, annual sales and level of technology are used to define AS mining (Lovitz, 2006:5), In the Ethiopian context, according to Mining Operation Proclamation (2010) artisanal mining defined as a mining operation carried out by individuals or cooperatives which is mostly of manual nature and that does not involve the engagement of employed workers and same proclamation article 35 defined that small scale mining is any mining operation of which the annual run-off mine ore does not exceed 100,000m3 for placer operation and 75,000 tons for primary deposit mining. This research, however defines AS mining together as an activity that covers artisanal and small scale gold miners, formal and informal miners who use rudimentary approaches and processes to extract mineral resources.

2.1.2 Concepts and Significance of Artisanal and Small-Scale Gold Mining

2.1.2.1 Livelihood Concept

ASM including artisanal gold mining is largely poverty-driven activity which is typically practiced in the poorest and most remote rural areas largely itinerant, poorly educated populace men and women with few employment alternatives (Beatrice Labonne (2002) and one of the most important

livelihood activities employing millions of people in several countries. This has been emphasized by Thomas Hentschel, Felix Hruschka and Michael Priester (2003) that ASM is critical sources of livelihood where 80-100 million people across developing world depend on this sector. Out of these, globally 10 to 20 million miners and their families directly depend on gold production, and additional income is derived from local inter- related businesses (Fabian Stähr and Philip Schütte, 2016). Moreover, Okoh, G. and Hilson, G.M (2011) have point out the strong ties between subsistence agriculture and ASGM arguing that such mining represents an important means of income diversification for many farmers, making it important to simultaneously address both agriculture and mining issues while improving people's lives. Estimate of specific experience in LDCs also indicates that the contribution of the sector in terms of employment creation is substantial.

2.1.2.2 Export Diversification Concept

Mineral exports can be an alternative for increasing export values of agrarian, low and middle income countries and in the past two decades its contribution to total export in average had increased from 30 to 60 percent (ICMM, 2012). Gold export has been rapidly increased and a major share of total exports in these countries. In Ghana ASGM contributes about one third (34%) of the national gold production in 2012 serving as a major component of the economy almost 1.5 million ounces of gold (Mark L. Wilson, Elisha Renne, Carla Roncoli, Peter Agyei-Baffour, and Emmanuel Yamoah Tenkorang, 2015). Similarly, in Rwanda ASGM sector contributes around 19% to export earnings (Emmanuel MUSHIMIYIMANA, 2016). According to Mohamed Suliman Ibrahim (2015) in Sudan the share of ASG exports relative to the total gold export of the country was accounted for about 85% which makes on average 33% of total national exports for the period 2012-2014. In Ethiopia, 15 years average share of artisanal gold export relative to the total export value of the country was around 8.8% while the maximum was 14.1 % of the total export in the year 2012/13 (Appendix1)

2.1.2.3 Revenue Generation Concept

A key part of transforming minerals and metals into socio-economic development involves using the revenues generated from the sector for public spending and investment The ASG mining can serve as a foundation for stimulating the development of complementary sustainable, revenue-generating activities for rural community. Many countries are able to achieve this objective while the rest, mostly LDCs are fail to perform as expected due to structural and other inherent problems prevailing in the sector. A number of factors influence the size of the contribution that

ASGM makes to government revenues in any given year, including the commodity price, smuggling, administrative limitations and other bottlenecks. It is still the case that, there is no standardized data base available to help assess the size of the ASG mining sector's revenue (tax & royalty) contributions for most of the countries and hence the actual contribution is not covered by this study for reference which is left for future research.

2.1.2.4 Artisanal and Small-Scale Gold Mining Relationship with Environment

There is direct relationship between ASGM and environment. ASM operations with no environmental impact have not yet been seen. Land degradation, soil erosion and deforestation are common and significant threat to natural environment caused by ASGM. The three stages of mineral development exploration, mining and processing have caused different types of environmental damages, which include ecological disturbance, destruction of natural flora and fauna, pollution of air, land and water, instability of soil and rock masses, landscape degradation and radiation hazards (Divine Odame Appiah and Juliet Nana Buaben (2012) which leads to food insecurity. Gold panners as argued by Dreschler B. (2001) move an average of eight million tons of material for panning per year, and this ends up in the streams and dams as silt which indicates that the risk accumulation process as a result of ASGM practices is enormous. Gold mining in most cases resulted in the pollution of water quality. The impact of mineral pollution on an ecosystem may be severe and may result in the total elimination of animal life from the receiving waters. According to Dreschler, B (2001) artisanal small scale gold mining is associated with mushrooming of unplanned squatter camps located close to water courses with poor or no sanitary facilities.

ASG mining is commonly characterized by social and health problems. ASGM does not only result in rampant deforestation, but also social ills associated with alcohol abuse, prostitution, and land use conflicts, child labour abuse and diseases. Notable health challenges in all artisanal gold mining areas are connected with the use of cyanide or mercury to separate gold from rocks and sediments which poses key environmental and health problems. United Nations Envirnoment Programme (UNEP) Chemicals Branch, (2011) argued that mercury and cyanided use and its external cost impacts on human health and environment have significant implications for societal welfare at local, national and global levels and found out one of the major environmental hazardous activities connected with ASG mining. Lack of safety equipment or unsafe working practices suggest the accidents posed by ASGM should be significantly more likely than in large-scale mining and for self-employed ASG miners while the use of safety

equipment depends almost exclusively on their own conscience (Thomas Hentschel, Felix Hruschka and Michael Priester, 2003). In general despite substantial contribution of ASMG to the national economy, the sector entails several environmental and human threats to the community which need to be managed though vivacious and effective laws and regulations.

2.1.3 Factors Affecting Artisanal and Small-Scale Gold Supply to the Formal Market

ASGM is troubled with a lot of institutional and socio-economic contradictions characterized by multiple endogenous and exogenous deterring factors causing performance deterioration. Major factors affecting the ASG mining are explained as follows: follow.

2.1.3.1 Price Fluctuation

The common perception among the mining community and stakeholders contemplates that gold price decrease negatively affects gold flow to the formal market. This presumption implies that as price of gold decreases, artisanal miners are not motivated to produce gold which could be one of the reasons for gold supply dwindling. In China, for example, the author of the MMSD country study on China cites that, the number of gold mines halved from an estimated 80 to 40, due to a reduction in gold prices (A J Gunson and Yue Jian (2001). In Burkino Faso, recorded gold production decreased from 1,499 kg in 1990 to 513 kg in 2000 which is attributed to a decrease in the official price paid for an increase in smuggling, as higher prices being paid in neighboring countries (Sabine Luning, 2008).

Contrary to the above presumption, some literature emphasized that this is not generally the case. A falling in gold price may slow the growth in artisanal mining but rarely leads to the kind of reductions and contractions that are symptomatic of the formal large scale mining and gold exploration businesses (Artisanal gold Council, 2018). The argument behind livelihood presumes that for those already engaged in ASM activities, price fluctuations are unlikely to affect the decision to mine but will impact on the time spent on the activity and the number of family members involved. For the majority of artisanal miners there is simply no other job that pays anywhere near as much gold production and argued that price fluctuation does not affect supply. However, empirical findings indicate that price is key variable affecting ASG supply in recent years. Both arguments are empirically measured in section four of the research paper.

2.1.3.2 Informal Trade

Gold mining in general and artisanal gold sector in particular are characterized by multiple criminal practices. According to FATF and APG (2015) there are two broad characteristics of

gold and the gold market which make it enticing to illicit groups, the first is the nature and size of the market itself which is highly reliant on cash as the method of exchange and the second is the anonymity generated from the properties of gold which make tracking its origins very difficult makes gold highly attractive to smugglers. Various literatures describes that significant portion of annual gold production in LDCs has been locally traded in informal market and also smuggled abroad through different hidden & illegal channels. According to Fabian Stähr and Philip Schütte (2016), Ecuador estimates its annual production to be approximately 15 to 20 tons of gold and the illegal mining is calculated between 6 and 8 tons of gold every year. In the same token, Sudan experience has shown us that between 2010 and 2014, more than $4.5 billion worth of artisanal gold were smuggled from Sudan to the United Arab Emirates (Mohamed Suliman Ibrahim, 2015)). Similarly, the DRC government estimates that 20 to 30 tons of gold are extracted by Congolese artisanal miners each year, but only about 650 pounds are officially exported while the remaining portion is traded in the contraband market in foreign countries (Kira Zalan, 2017). In his research paper, Beyene Tadesse (2016) has estimated that Ethiopia lost around 9 tons of gold due to the wide spread contraband trade across the country and currently artisanal gold traded in the formal market is trifling.

2.1.3.3 Administrative Problems

Countries in most cases have not been successful in controlling or regulating or even banning activities running in the supply chain in ASG mining perspectives. In most countries including Ethiopia, gold output flows from mining place–marketing niche is not controlled or monitored and thus gold produced by artisanal miners easily keeps it way to the informal market or in most cases untraceable(Beyene Tadesse, 2016; Mohamed Suliman Ibrahim, 2015). The coordination, commitment and engagement of institutions in charge of administering the gold supply chain is so loose and hence due to the system problem or lack of engagement, the nation's valuable resource easily corrupted and smuggled while it is possible to establish appropriate product recording-tracking and monitoring system. Most countries have attractive mining laws, nevertheless, the ability to reinforce the laws and regulation by authorities is trifling and hence gold resources cannot be managed to contribute to the benefit of nations as expected.

2.1.3.4 Artisanal Gold Mining Taxation

ASG sector has contributed to *socio*-economic development both locally and in terms of export values. The governments are expected to encourage and promote the sector in such a way to

increase its contribution to the countrys' development endeavor. With this understanding, in some countries governments mitigate taxes burden from artisanal gold mining for example, no government tax except 10% community charges in Sudan (Mohamed Suliman Ibrahim, 2015). In some others, the tax rates and royalties are small. The effect of tax on ASG mining has multidimensional effects as gold product is highly subtle to this variable. It is common that ASG miners tended to transfer their product and trade in tax free or low tax market across boarder seeking better incentives. Moreover, whenever there is high tax, miners are commonly preferred to trade in the informal market in such a way to escape high taxes.

2.1.3.5 Incentive Payments

The objective is to promote the efficacy of ASG sector and encourage gold miners to improve their output and supply to the formal market. Literatures have shown that countries have implemented one or more incentive schemes in such a way to motivate ASG miners. Zimbabwe has been losing, potentially, millions of dollars through smuggling of gold as small miners sought better prices outside the country and later on the Governor incentivize 5% for small scale miners who deliver their gold to the formal market and eventually the share of small miners increased from 40 percent to about 50 percent.(Janet Shoko, (2014).

Sudan pays 5% without business tax except 10% royalty and more over the central bank left 50% to commercial business to incentivize local commercial operators in the country (Mohamed Suliman Ibrahim, 2015). Ethiopia pays 5% premium on international gold prices and also implemented payments based on 30 days pick price for gold supplied to the Bank in a month time (National Bank of Ethiopia, 2014 and 2017). In general, though it is always difficult to predict the effect of the polices on ASG mining and sustainability in terms of outcome, governments have continued to motivate gold suppliers to ensure their national benefit expected from the sector by implementing different strategies and incentive packages.

2.1.4 Theories on Artisanal and Small-Scale Gold Mining

In an attempt to explain the benefits and challenges, two main frames of theories have been presented which are sustainable livelihoods framework and institutional resource regime.

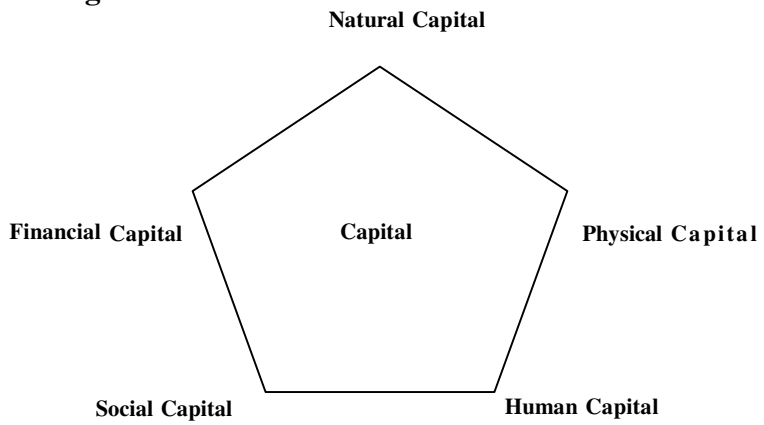
2.1.4.1 Sustainable Livelihood Theory

Sustainable livelihood is a concept that tries to combine poverty reduction, development, environment and empowerment together to reflect the implication of artisanal and small scale mining on the community. It is a means of making a living, the activities and entitlements by

which people can sustain their live. A livelihood system integrates both the opportunities and assets available to a group of people for achieving their goals and aspirations as well as interactions with and exposure to a range of beneficial or harmful ecological, social, economic and political perturbations that may help or hinder groups' capacities to make a living (Olanike F. Deji, 2012). A livelihood is sustainable if it can cope with, recover from and adapt to stresses and shocks, maintain and enhance its capabilities and assets, and enhance opportunities for the next generation (Lasse Krantz (2001).

Sustainability implies the ability to cope with and recover from shocks and stresses, economic efficiency, or the use of minimal inputs to generate a given amount of outputs, ecological integrity, ensuring that livelihood activities do not irreversibly degrade natural resources within a given ecosystem; and, social equity- the promotion of livelihood opportunities for one group should not foreclose options for other groups (Kibert, Charles.J, (2002). Therefore, livelihood is a concept encompasses essentially all aspects of resource required for daily life of human being cited as a component of capital. Generally, these aspects of resources are organized into five distinct categories of physical, natural, social, human, and financial capital as depicted in the following diagram.

Figure 1: Asset Pentagon



Source: Tool kit for implementing Artisanal and Small-Scale Mining Base line Surveys in Africa (2005:9)

Financial capital: represents (sources of) "cash money and other valuables that are used as stock". It includes issues such as employment, savings, income, and access to credit.

Natural capital: refers to "natural resources, such as forest, flora and fauna, sources of fresh water, and mineral resources". It includes both public goods and assets that people use for production such as arable land and fruit trees.

Human capital: includes the "skills, knowledge and ability to work and good health that enable people to pursue different livelihood strategies and achieve their livelihood objectives." It includes education, access to information, good health, and social security.

Social capital: refers to"connections among individuals; social networks and cover organizational and institutional structures, conflicts, migratory networks, formal and informal "

Physical capital: comprises mainly "physical infrastructure such as roads, railways, markets, clinics, schools and physical assets in mines such as equipment and machinery".

2.1.4.2 Resource Curse Theory

According to the resource curse theory, countries with immense natural resources, such as gold, diamond and oil tend to register lower economic development and social advancement. Paradoxically, despite the prospects of wealth and opportunity that accompany the discovery and extraction of oil, minerals and other natural resources, such endowments all too often impede rather further balanced and sustainable development (Ricardo Restrepo Echavarría; Carlos Vazquez; Karen Garzón Sherdek 2016). The greed'and'grievance' argument remained another way by which the resource curse concept can be occurred or explained. The concept describes how greedy behavior has fueled civil wars linked to natural resources. Civil wars stem from the greedy behavior of a rebel group in organizing an insurgency against the government to control and have access to natural resources (Jose Antonio Mingolarra, Carmen Arocena, and Rosa Martin Sabaris, 2012). This applies in the case of the long-standing armed conflict in the Democratic Republic of Congo (DRC). DRC is endowed with substantial mineral wealth. Natural resources like gold, diamonds, and copper have been the backbone of the economy of DRC (Kira Zalan, 2017). The reality has been that these natural resources have motivated civil war between armed group and the government in the DRC. The main reasons for the conflict in the DRC have become access to key mineral resources: diamonds, gold copper, and cobalt and control trade.

What the 'greed' and 'grievance' argument offers for the case of Ethiopia, though the country was not suffered any civil conflict that is sparked by natural resources, what has happening was that the benefits that have been supposed to accrue to the majority people were highly competed for by the few smuggling groups. Wide spread smuggling was a reflection of greed behavior. In general, the resource curse hypothesis is central to explain why ASGM has not contributed to prosperity in promoting exports, revenue generation to the Government, insecurity and poverty reduction of the mining communities in Ethiopia.

In conclusion, the literatures provide the background to understand how the study will situate analysis of ASG mining and the implications of the sector on export, income generation, employment creation and related issues. The livelihood hypothesis provides understanding to the fact that there are favorable grounds that can improve peoples living particularly in economically distant areas of the country and explains the negative impact of the sector on natural environment. Despite the blessing, the sector is also considered as a curse by some people because of the risks and threats involved in the ASG supply chain, exploration, production and marketing. The perspective brings to the fore the usefulness of the resource curse in understanding why abundant natural resources have not translated into improved economic conditions and livelihoods. In Ethiopia, gold resources supposed to be exploited by the nation has been smuggled and used by few individuals and in some cases a source of conflicts. Resource Curse theory provides better discussion on factors affecting artisanal and small scale gold mining in Ethiopia which is the subject matter of the study. This explains that despite ample gold resources in Ethiopia, why the contribution of the sector was dwindling and why the benefits of these resources have not converted in to the nation's benefits is much more associated to the concept of Resource Curse theory approach. Due to these reasons, the concept of both theories are taken conceptualize the study framework.

2.2 Empirical Review

2.2.1 Artisanal and Small-Scale Gold Mining in Ethiopia

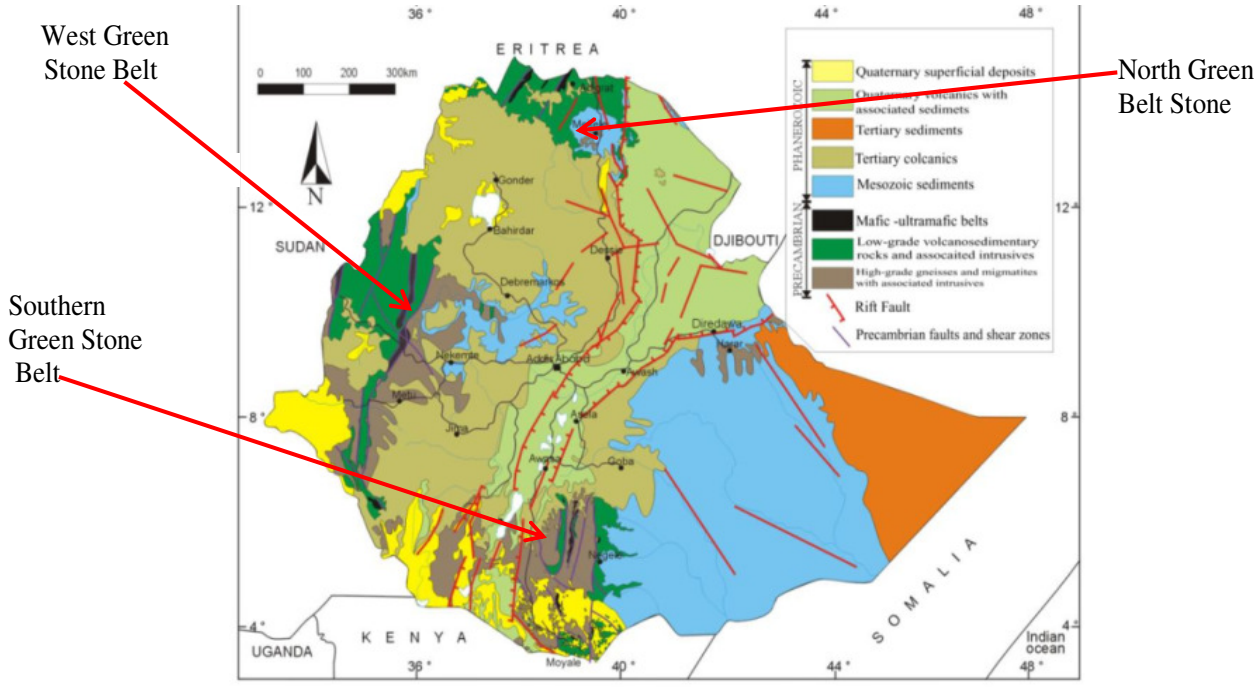
The placer gold deposits in Ethiopia have been mined mainly by the artisanal miners for several thousand years and the basic mineral and rocks production and processing throughout the older civilianization of the country has been undertake from pre-Axumite kingdom to present time (Ministry of Mines, 2012). Ethiopia has abundant mineral resources including gold mineral which needs further exploration and extraction (Ethiopian Geological Survey, 2015).

2.2.1.1 Potential Gold Deposit Areas

More than sixty shear-zone hosting gold occurrences have been identified in the three main regions of greenstone belts in Ethiopia: Southern (including Adola, Ageremariam and Moyale areas), Western (including the Akobo area), Northern Tigray region (Ethiopian Geological Survey, 2015).

Artisanal mining is widely dispersed in different regions in Ethiopia, however, in most cases, concentrated more in south west, and north western part of the country.

Figure 2: Placer gold Deposits in Ethiopia



Source: Ministry of Mines, October 2012

The potentials deposits and AMG mining activities are mainly confined and located within the greenstone belts as portrayed in the geographical map of Ethiopia indicated above.

2.2.1.2 Artisanal Mining Operation

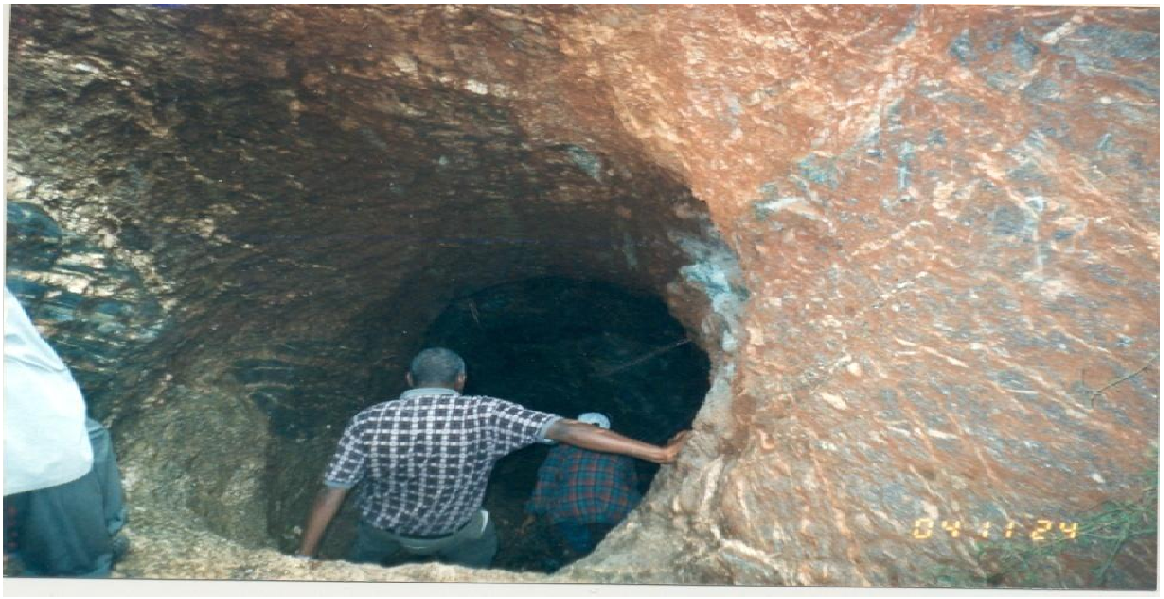
Artisanal mining operations include traditional techniques of resource localization, reconnaissance and extraction, processing and marketing as a value chain approach. For several years in Ethiopia, the ASG mining extracted gold from both surface as a placer deposits and underground (sub-surface) mining while, both surface and underground operations can be taking place by the miners on the same reserve depending on the availability of the gold resources (Ethiopian Geological Survey, 2015).

Open surface mining is mainly for placer deposits which contain stream sediment panning and strip mining. The process is done by removing surface vegetation, if necessary layers of top soil in order to reach ore deposits close to the earth's surface. Placer deposit is nearly exhausted everywhere particularly in Tigray, though there is still some potential in BGR, Bureau of SNNPR and Shakiso of Oromiya (Beyene Tadesse, 2016).

Open-pit mining- today, surface mining in the country seems exhausted everywhere, and hence extracting rocks deep in the earth becomes increasingly important though it is difficult tasks for artisanal miners. This type of mining consists of open pit-shallow depth and open-

pit deep hole, which involves discovery of gold ore from an open pit in the ground (Ministry of Mines, 2012). Unlike women, men are mainly engaged in open-pit mining even tend to mine more in deep holes and unsupported underground tunnel drilling and removing rock with hand tools and carrying the ore to the surface in sacks and in alluvial gold case, artisanal miners dig pit to reach the payable gravel (gold bearing layer in alluvial deposits) which goes as deep as 5-10 meters in some localities and goes deeper to 20-40 meters in some areas (Beyene Tadesse, 2016). The following diagram shows the artisanal miner on the process of gold mining in the southern part of Ethiopia.

Figure 3: Gold Open-Pit Mining in Ethiopia



Source: Ministry of Mines, 2015

The picture highlights how difficult open-pit mining operations which can be successful under hard-hitting efforts mostly by men. We learnt from field visit that the participation of women tends to decrease as the mining goes deeper and deeper while that of men increases as shown in the picture. In Ethiopia, as per information obtained from the community, the participation of women in artisanal mining is quickly diminishing, due to the increasing scarcity of placer minerals, remoteness of the mining locations from residential areas, harsh climate, and the inherent tiring and risky working condition of mining and for similar reason, the participation of children and the elderly is negligible except that it is estimated to be 5% in BGR, 6% in SNNPR, 9% in Tigray and 10% in Oromia (Beyene Tadesse, 2016).

Panning-different methods are employed to extract gold depending on the area where the miners are deployed which could be using concentration methods or gravity concentration

method. Before concentration begins, miners crash the ore or milled to liberate gold particles from rock and to decrease grain size. An appropriate grain size can be achieved using screens or sieves using water to separate heavy gold from other lighter particles within a medium sized pan. Miners use water or chemicals to separate gold from other elements. The miner moves the pan in a series of motions designed to eject lighter sediments. The density of gold keeps it on the bottom of the pan as lighter material is ejected along with water. After a series of successful iterations have been completed, gold will be exposed on the bottom of the pan for the miner to recover.

2.2.1.3 Artisanal and Small- Scale Gold Mining Legal and Policy Frameworks

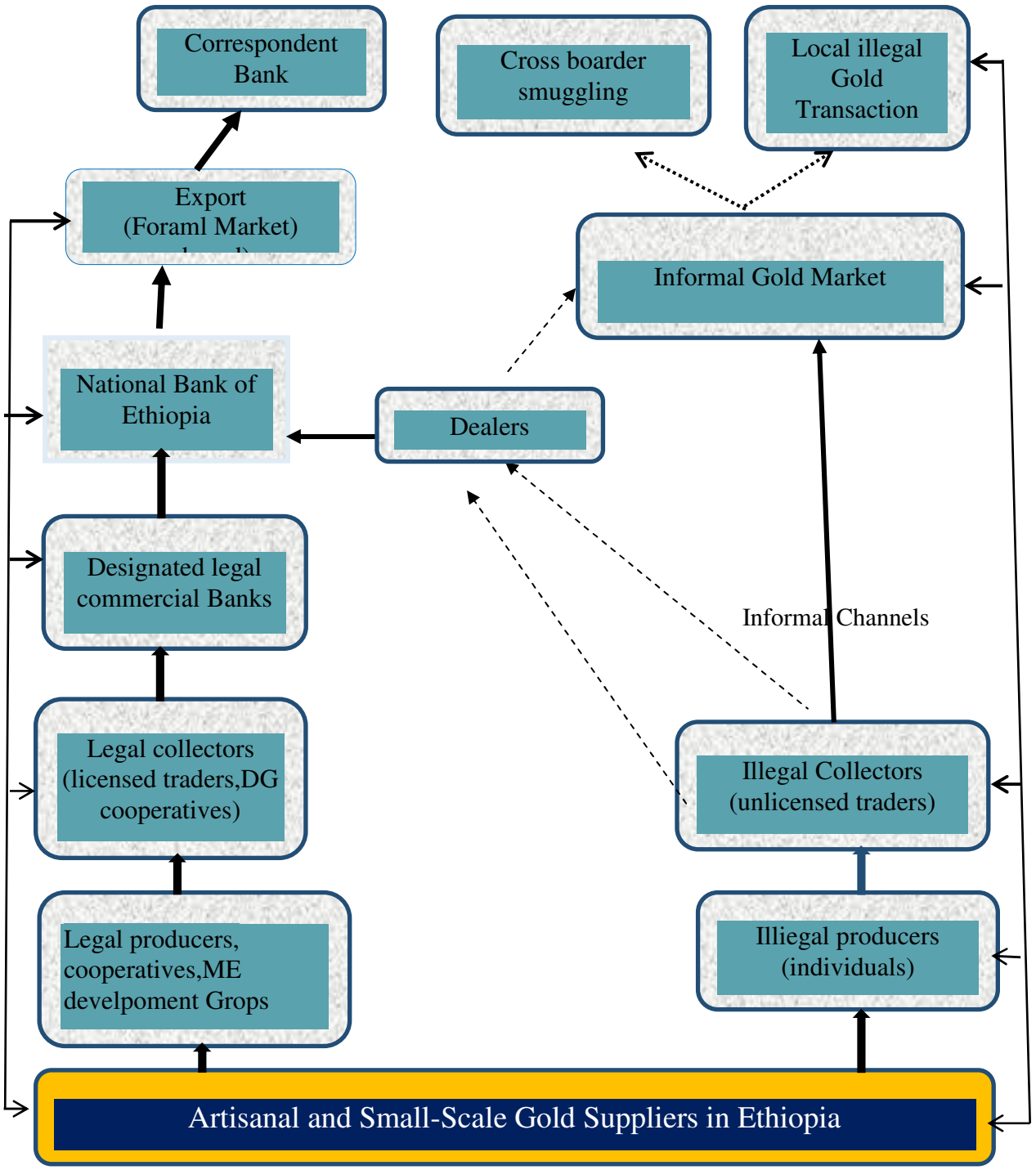
The government has endorsed series of proclamations to address the mineral operations in the country, including artisanal gold mining and transactions of gold mineral. Based on the decree, licenses are issued both by the Federal Government and Regional Governments either to extract gold or act as brokers. The Mining Operations Proclamation (678/2010) made a clear legal and operational ground about ASG mining in terms of definition and requirements. According to the current law, mining and trading of artisanal and small scale gold is allowed to the Ethiopians only. Legal Artisanal miners are those organized as a formal Mining Development Group (composed of three or more persons) or as a Mining Cooperatives. The Mining law underlined that miners should necessarily be organized as cooperatives.The current system has a serious deficiency as both licensed and unlicensed artisan miners practice in a traditional manner with no limit in time and boundary, i.e., the vast majority of miners and mineral traders are operating informally and also some of the important provisions such as environmental laws and regulation, tax and royalty laws are not enacted according to the law.

2.2.1.4 Artisanal and Small Scale Gold Marketing in Ethiopia

Marketing channel- Similar to production, marketing of ASG mining in Ethiopia does also exhibit both formal and informal channels. The gold mineral that are collected by legal buyers at production site as indicated in left hand side column of figure 5 are channeled to the NBE for export. The other market involves illegal gold trading which takes the largest share of artisanal gold transactions in all mining sites across the country.

The flowing figure highlights the current marketing channels of ASG gold mining in Ethiopia.

Figure 4: Market Channels for Artisanal and Small-Scale Gold Mining in Ethiopia



Source: Researcher's own design from field study, 2018

Formal Channel-the current policy regarding ASG mining suggests that all dealers and artisanal miners should sell the gold they produced to the NBE which has marked by thick line of the left side of the figure while the right side highlights the informal (contraband) gold trade path.

Gold supplied to the formal market involve tasks undertaken by the NBE at the top and commercial bank branches designated to purchase gold from licensed traders, ASG miners, and cooperatives,. Though there is no transparency in the system, gold supplied to NBE through official channel is formally treaded by miner/ legal traders. However, there is no system that can ensure gold produced by gold miners at each mining site is entirely delivered to the Bank and hence there is a gap or no mechanism as such that can forbid license holders from participating in illegal transaction.

The Bank has no adequate branches in regions and hence agency arrangement was made with CBE to purchase gold through its branches where gold resources are available. Currently, gold transactions are formally undertaken by seven purchase centers (CBE branches) established and act as an agent of the NBE. Authorized gold purchase centers are the following.

Table1: List of Gold Purchase Centers in Regions

No	Gold purchase Centers	Regions	Number of Miners/brokers
1	Hawassa branch	SNNPR	4
2	Shekiso branch	Oromyia	141
3	Mizan Teferi branch	SNNPR	49
4	Dimma branch	SNNPR	72
5	Gambella branch	Gambella	24
6	Assossa branch	Benishangule	112
7	Shire branch	Tigray	532
	Total		934

Source: National Bank of Ethiopia

Once in three months time, the branches deliver gold they purchase to the NBE-Central Gold Purchase Coordinating Office in Addis Ababa for further verification and export. The Bank is responsible to verify the gold purchased by branches at the head office level and ultimately pack and deliver abroad where finally refined and deposited to the country's Foreign Reserve Account. It is found out that the process of checking and quality verification is lengthy and hectic that needs to be improved to maintain efficiency and in cost saving way. In the formal market, the price of gold is largely governed by the international market price with defined quality standards (14-24 karats) and 5% premium (top up) on the international gold price. Moreover, the NBE also provides 30 days price selection opportunity as an incentive package to artisanal

miners/traders who supply gold to the Bank formally. Despite the challenges in the supply chain, the value of gold supplied to the formal market and exported abroad in nine years period is indicated in Table 2 below.

Table 2: Volume of Gold Purchased and Foreign Exchange Earned (2009/10-2017/18)

Year	Gold supplied (in Grams)		Total	Foreign currency Earned (US$ in 1000s)		Total
	ASM	MIDROC		ASGM	MIDROC	
2009/10	2,745.	3,963.62	6,7093	10,930	91,910	102,840
2010/11	6,643.	4,463.23	11,106.	100,000	139,990	239,990
2011/12	5,682.	3,119.17	8,802.1	295,400	123,850	419,250
2012/13	8,281.	4,142.27	12,423.	430,600	173,730	604,330
2013/14	7,616.	4,582.27	12,198.	305,300	154,820	460,120
2014/15	3,503.	4,580.75	8,083.8	133,630	147,160	280,790
2015/16	4,048.	5,221.96	9,270.9	176,500	162,100	338,600
2016/17	1,588.	3,277.05	4,865.0	89,700	108,900	198,600
2017/18	215.3	3,363.42	3578.72	8,400	107,410	115,810
Total	40,109	33,566	76,823	1,550,460	1,209,870,	2,760,330

Source: National Bank of Ethiopia

The data showed us that the total contribution of gold mineral sector from the year 2009/10 to 2017/18 has been 2.76 billion US$. In relative terms the share of industrial gold mining is less than the artisanal gold mining sector indicating the relative importance of ASG mining sector.

Informal Channel-Gold mining by informal channels is illegally traded by local market retailers, illegal collectors and illegal producers (individuals). Open market for gold exists in all regions where ASG mining activities illegally traded. Illegal collectors and illegal producers can sell their products to the informal market or directly to the dealers. As there is no product monitoring mechanism, dealers can also sell gold collected from the legal market (NBE) to the contraband market as implicated in figure 5. The ASG is mostly traded in the local contraband market and in some cases exported across boundaries by traders. According to Beyene Tadesse (2016), the volume of transaction in the formal (legal) channel is estimated around 39% of the total gold produced in the year 2014. However, this research finds out that 80%-90% of the gold was traded in the informal market in last two years period.

2.2.1.5 Contribution of Artisanal and Small-Scale Gold Mining to the National Economy

The ASG mining sector offers a livelihood choice for many people in the fragile rural economies. The artisanal mining significantly contributes to employment estimated at 1.26 million people and supports the livelihood of over 7.5 million populations in Ethiopia out of these the total population involved in ASGM (legal and illegal) was about 1.24 million (Beyene Tadesse, 2016). The World Bank Group (2014) reported that the contribution of the mining sector in total was 10% of total foreign exchange earnings, and about 2/3 came from artisan & small scale mining particularly form gold export. Gold was expected to contribute the bigger share of export earnings though the performance is not as anticipated by the government. The data in Table 2 shows that the total contribution of gold mineral sector from the year 2009/10 to 2017/18 has been US$ 2.76 billion while share of ASGM was US$ 1.55 billion.

In accordance with the Mining Operations Proclamation (678/2010) artisanal miners are obliged to pay royalties to the government. The regional governments attempted to collect royalties through their respective offices of customs and revenue at zonal or woreda level. Royalties payments widely vary across regions, ranging from 8% in Oromyiya and 6% in Amhara to as low as 3% in Tigray and 5% in SNNPR (Beyene Tadesse, 2016). Royalty was collected only when the producers report their annual income from the mining. Regional governments were not adequately collected the royalties and taxes. According to Beyne Tadesse (2016) in 2014/15, SNNPR collected over 13 million birr and Oromyia about 8 million birr while the remaining regions were much weaker in the collection of royalties and further founds out that in Ormyiya only 36% of potential royalties was collected in 2014. In all regions, taxes and royalties collection is characterized by several deficiencies and limitations. It was not easy to collect data hence the researcher is not able to indicate the exact contribution of ASG mining sector to revenue generation which is left for future investigation.

2.2.1.6 Key Factors Affecting Artisanal and Small-Scale Gold Supply

Artisanal and Small-Scale Gold Price

The issue is whether international gold price fluctuation has an impact on ASG mining and equally influences gold supplies to the Bank. Studies has shown that people are not unanimously consider price decrease has an impact on the supply of gold, rather perceive the impact of price differently. Some agreed that price decrease has a huge impact on industrial gold production, while ASG production is not affected by price fluctuation for the fact that miners are survivals

who have no better income generating job thus, continue to supply better even in worst conditions of price decrease. Understanding the notion of both perceptions, the research has tried to show the impact of gold price decrease on gold supply in Ethiopia for the period 2004/5-2016/17. Despite aggressive policy actions and continuous efforts both by the government and the stakeholders to improve the performance of the sector, the hope and expectations is nearly without success especially in the recent years when gold export value declined to the lowest level than ever. The highest contribution in terms of volume was registered 8.3 tons in the year 2012/13 while average yearly sector contribution from 2004/5-2016/17 was 3.3 tones (Compiled from appindex1). From empirical observation, the impact of price is more visible that the gold supply decreased follow-suite to price drops and one of the reasons for gold supply drips in Ethiopia.

Illegal Gold Trade Practice

The diversion of gold produced by ASG miners/suppliers to illegal market has been one of the reasons for gold supply decline. Due to the challenges of governing this sporadic form of mining, there is significant scope to harvest gold ore from ASGM operations illegality in all gold mining areas in Ethiopia. Gold that is illegally mined often channeled to smugglers either locally or across the boundary. Sophisticated smuggling individuals or groups are engaged to transport the illegally mined gold ore across borders. The volume of gold flow to the formal market declined to 0.215 tons in 2017/18 from 8.282 tons in the year 2012/13. The best guess taken from the study conducted on the sector shows that smuggling is a basic reason for such erratic decline. According to the study conducted by Beyene Tadesse,(2016) gold produced legally and illegal in the year 2014 was estimated about 18,000 kg . To get second best approximation of illegal gold transaction, the study has taken the estimated number of population involved in the artisanal gold mining and calculated the volume of gold traded through illegal trade. According to the study, the volume of transaction in the formal (legal) channel is estimated at 39% of the total production while the remaining balance (61%) goes through the informal market showing the threat of smuggling on the national economy. The problem was also emphasized by Ines Schjolberg Marques (2016) that about 60% of ASG mining is traded through informal market in Ethiopia.

This implies that several factors can contribute for such drastic decline; nevertheless, mainly the major contributing factor is contraband trade in Ethiopia.

Lower Level Purchase Threshold Policy

The rationale behind the implementation of the lower gold purchase threshold policy was to include economically weak gold miners and collect small gold bars which could ultimately

improves gold supply to the formal market. Historically, the NBE used to purchase gold with a lower limit of 1kg, 250 grams, 150 grams and eventually reduced to 50 grams (limit set in different times) from suppliers in a view to improve gold supply to the formal market (National Bank of Ethiopia, 2014, 2016 and 2017). The researcher has come across an argument that as the Bank put caps on small gold bars purchase, miners producing gold bars below the threshold traded their product in the informal market claiming that the lower purchase limit policy of the Bank become one of the reasons for gold supply decrease. Considering this comment, the bank has decreased the limit from 1kg/transection to 250 gram, latter on to 150 grams and ultimately 50 grams. Currently quantity of gold below 50 gram is not purchased. In this regard, though the policy was relaxed down to 50 gram/transaction, these changes has not impact on the volume of gold supplied to the Bank, rather opposite trend was observed particularly in recent years.

Artisanal and Small Scale Gold Mining Taxation

The Ethiopia law requires mining license holders to pay royalty based on the scale price of the commercial transactions of the minerals produced and traded. The rate of payment ranges from 8% while some regions set the rate below this magnitude. Holders of large scale or small scale mining license have to pays tax at 25% (Federal Republic of Ethiopa, (Income Tax proclamation, 2016). The ASG mining tax system has series of deficiencies. Tax authorities fail to properly record incomes of the artisanal miners and collect taxes and royalties. It also happens that even the actual taxes paid by the legal traders are not clearly known as they lack clarity. The legal traders and miners are also not transparent to disclose their true incomes. The existing institutional set up (tax authorities in region) has no capacity to enact the tax law and collect government revenue from such vast stratum of the community. Currently, tax/royalty obligation is not complied as per the proclamation by traders and cooperatives. Morover, tax authorities were not able to collect tax on time. Du to this reason, there was serious disagreement between the tax authorities and gold suppliers. Some of traders gave up gold mining and shift their occupation in one way or another affected the gold supply to the formal market. It was not possible to collect previous year's data from regions due to the "sensitivity" or unavailability of information. Due to this reason, assessment on income (tax and royalty) is not covered by this study.

Incentives Offered to Artisanal and Small Scale Gold Suppliers

Governments offer incentives to encourage gold miners enable them intensively engage in gold mining and deliver their product directly to official market (NBE), so as to get the fair and transparent prices as well as technical assistance in return for legal sales. The incentive package

include additional 5% payment above daily international gold price rate by including in the daily prices applicable on each gold transaction traded in the official market. Besides, artisanal miners are allowed to select the highest price out of 30 days consecutive gold price fix and apply on gold supplied to the Bank all through the month. Moreover, the Bank has created market access to gold miners/suppliers in gold resource nearby areas in a way that can improve service efficiency and cost reduction. Following price decrease in 2015/16 and subsequent losses of gold export value, the Bank has left 30 days premium price offer and remain only with 5% price markup incentive. This coupled with other deterring factors seems to contribute for staidly supply drops (Appendix1). Though, the 30 days premium price incentive reinstated in November 2017, the impact on gold supply to the formal market is found minimal implying that the existing incentive package is not as such effective to motivate gold miners/suppliers to supply their output to the formal market. Moreover, artisanal miners are financially and educationally marginalized, it deemed necessary to organize material and technical support including training that can encourage the miners. These facilities are so vital that can support the gold miners efficiency.

Relationship of Artisanal and Small Scale Gold Mining with Environment

Relationship between ASGM and environment- Study has shown us that there is strong relationship between artisanal mining and environment in Ethiopia. Land degradation, soil erosion, water contamination and other environmental impacts are critical problem observed in all gold mining sites in all regions. It is common to observe abandoned artisanal mining sites (pits for mining) and left without rehabilitating similar to the following site diagram.

Figure 5: Environmental Degradation Activities in Southern Ethiopia

Source: Ministry of Mines, October 2012

In all series of Proclamations, it is clearly indicated that artisanal miners are required to "fill pits and plant trees" and forbids the use of "mercury" or similar materials, moreover, the procedure of licensing any artisanal mining group should pass through a brief environmental assessment by the office of the Environmental Protection Agency at zonal or woreda level. However, the situation in regions does not seem to consider the provisions in proclamations or any regulation issued by the government related to environment, thus the damage to the environment is significant in all regions. In BGR, it was observed excessive tree felling occurred especially in the mining villages of the region, the trees and the soil were left on the ground and no effort was made to fill the holes with soil (Ministry of Mines, 2012). In most cases, the pits remain open and the sites have never been replanted/ rehabilitated in all gold mining areas as shown in the following photogra

Figure 6: Abandoned Land in Benishangul and Oromiya, Shekiso Area

Source: Ministry of Mines, October 2012

The conservation of forests is also a great concern as many artisanal mining operations take place in and around forests that are home to vast amounts of biodiversity. ASG miners often cut down trees to clear space for their mining and collect other forest resources for food as a way to supplement their income in all regions. Moreover, harmful chemicals such as mercury and cyanide are also used in most ASG mining areas during the amalgamation process to collect small gold particles from sediment which has caused health problem.

Use of child labor impact- Gold miners who are involved in the sector have the age of 7 to 16 (Beyene Tadesse, 2016). Those children gold miners are not only part of the gold miners which organized in groups or individually but also they participate there as family members or migrated there with their family. As in the case of most other countries, in Ethiopia children who are involved in mining sector fulltime are either early drop outs from school or don't have any educational background. The following photograph more highlights the facts on the ASG mining practice in Ethiopia.

Figure 7: Instances of Child Labour Abuse

Source: Ministry of Mines, October 2012

Reports of the MoEM, ASGM in Hademdemi has adversely affected the children's opportunity to get education since they are highly involved as full time workers. In addition to this, getting educational opportunity in the area is very limited since majority of the teachers are also highly involved in the sector. Children gold miners' most of leave school to get money to support their family and cover their daily life expenses. In addition children are vulnerable to number of health risks.

Social impact of AGSM- Some of the ASM-related challenges highlighted included high mobility of miners, HIV/AIDS, health and safety issues with regard to the occupational health risks of working in the mines without proper training and equipment, and the alteration of the social fabric of the community. They don't have safety materials. Many people have been buried in the earth due to collapsed pits, tunnels and workings. These openings are normally dug using primitive methods and are usual weakly supported by wood.

2.2.2 Artisanal and Small-Scale Gold Mining in Sudan

The gold mining sector in Sudan is predominantly artisanal in nature. The study conducted by Mohamed Suliman Ibrahim (2015) shows that artisanal gold sector constitutes 85-90% of the total gold extracted and estimates of the number of artisanal miners working directly in gold mining and from 250,000 to over one million poverty-driven miners emerging from an army of uneducated, unemployed, under-privileged men and women from both the periphery and the center. According to this study, gold exports make an average of 33% of total national exports for the period 2012-2014.

In Sudan, there is no business tax on artisanal gold mining, however localities imposes annual 10% tax on the proceeds of gold sales as a royalty payments. Moreover, as a benefits package, the Central Bank declared a new gold purchase policy in 2017 which has reduced its share of the market to 50% leaving the other half to commercial entities and these entities can also export 50% of the gold they extracted by themselves and deliver the rest 50% to the central Bank(Mohamed Suliman Ibrahim, 2015). According to this study, it is impossible to regulate the industry partially controlled by militia, gold brokers and speculators who are highly politically influential. It is estimated that Musa Hilal and his armed followers make $54 million a year from their control of the gold mines.

This literature highlighted that the sector is a source of conflict that militia in Jebel Amir is in control of the gold producing areas and as a result has access to substantial amounts of money while relatives of high ranking public officials often own companies that do business with the government and provide government officials with kickbacks in exchange for government contracts (Elfadil Elsharief Elhashmi, 2015). It is estimated that every week between 50 and 100 kilograms of extracted gold are sent to Khartoum for black market sale and export. (Jörg Gertel, Richard Rottenburg and Sandra chlkins, 2014) The study shows 75% of gold gets smuggled while smuggling is being enabled by the inconsistency of policies regulating the sector, monetary policies, corruption and militia control of the gold producing area of Jebel Amir and between 2010 and 2014, more than $4.5 billion worth of gold was smuggled from Sudan to the United Arab Emirates, according to the report of the U.N. panel of experts (Mohamed Suliman Ibrahim, 2015). It is conflict gold which is internationally subject to trade sanctions.

In Sudan there is no health, safety and environmental concerns related to the use of mercury and cyanide during the processes of milling, sluicing, amalgamation and burning, mercury pollutes the air, soil, water sources and other socio-economic and human rights issues include child labor is

widely observed (Mohamed Suliman Ibrahim, 2015). According to Mohamed Suliman (2015) the existing legal and regulatory frameworks have enforced socio-economic disparities, and encouraged smuggling and impunity meanwhile widespread corruption has encouraged environmental pollution, and threats to the health and safety of both miners and individuals in the vicinity of gold sites. In general, although the artisanal sector provides unemployed and uneducated agro- pastoralists with temporary relief and also contributes to the export earnings and revenue generation, it has proved to be environmentally destructive and to widen the gap between the people as well as imposes a serious threat to peace, security and human rights. The health, safety, social and environmental impacts of release of mercury and cyanide as a byproduct of mining and processing gold are serious challenges in Sudan.

2.2.3 Artisanal and Small-Scale Gold Mining in Ghana

In Ghana, important gold-producing country, gold accounted for 43% of the country's national exports in 2012 while ASGM accounted for 10.5% though much of this activity is considered "informal", "unregistered" and proximately 70% of mining operations in Ghana are illegal and not registered under the provisions of the Small-Scale Gold Mining Act of 1999 (GRAHAM-Sustaninability Institute, 2015). The sector employed 0.5–1 million people as of 2010 in Ghana (GRAHAM-Sustainability Institute, 2015). This group of miners lacked enough capital and their operations were labour intensive with low rates of recover. They also suffered from poor access to markets and support services, and had to depend on middlemen who facilitate the transfer of their gold to the market.

Ghana has adopted marketing strategy. The strategy was adopted by Precious Minerals and Marketing Corporation (PMMC). Prior to regularization of the small-scale mining sector, gold was being sold to middlemen who in turn smuggled it out of the country in search of foreign exchange. PMMC discourages illegal trading trend and offer attractive prices that would lure miners away from the middlemen. Based on this, a minimum guaranteed price was announced weekly and it remained an assured price even if the world price for gold would fall. Prices for 18-24 karat gold were calculated on this basis and announced accordingly. In addition, pre-financing selected licensed buying agents, procurement and supply of basic tools like weighing scales, shovels, pick axles to legal gold minors and annual award to honor the best small-scale miner in terms of quality and value of minerals sold were incentives used to encourage legal business and discourage illegal minors. In terms of environmental conservation, informal gold mining is critical problem facing the country for a longer period of time. Though, it is difficult to determine the precise contribution of

ASGM to deforestation, loss of forest cover is visible in Ghana and ASGM's contribution to other ecological issues such as legacy contamination and climate change are as of yet poorly understood (Graham Sustainability Institute, 2015). Thea case is often made that mercury amalgamation is the preferred practice in the sector because it is a reliable and portable means for concentrating and extracting gold from low-grade ores.

A lot of lives have been lost through illegal mining in Ghana. Many people have been buried in the earth due to collapsed pits, tunnels and workings. Mobile and resident sex workers are common practice in mining areas in Ghana as a result HIV/AIDS and other contagious disease is a significant problem. Moreover, it is common knowledge among many residents of the various mining towns that an addictive drug sub-culture is growing in these areas.

2.2.4 Lesson Learned

The study identified some performance indicators that can be taken as a lesson from the countries exprience. All countries troubled by illegal gold trade practice and other hindering factors. The experience of Ghana and Sudan indicates that the ASG sector contribution in terms of revenue generation, GDP and export earnings is much higher that the Ethiopia experience which implies the administrative capability of both countries, relatively better than Ethiopia. Ethiopia needs to enhance institutional capabilities to manage the ASG mining sector.

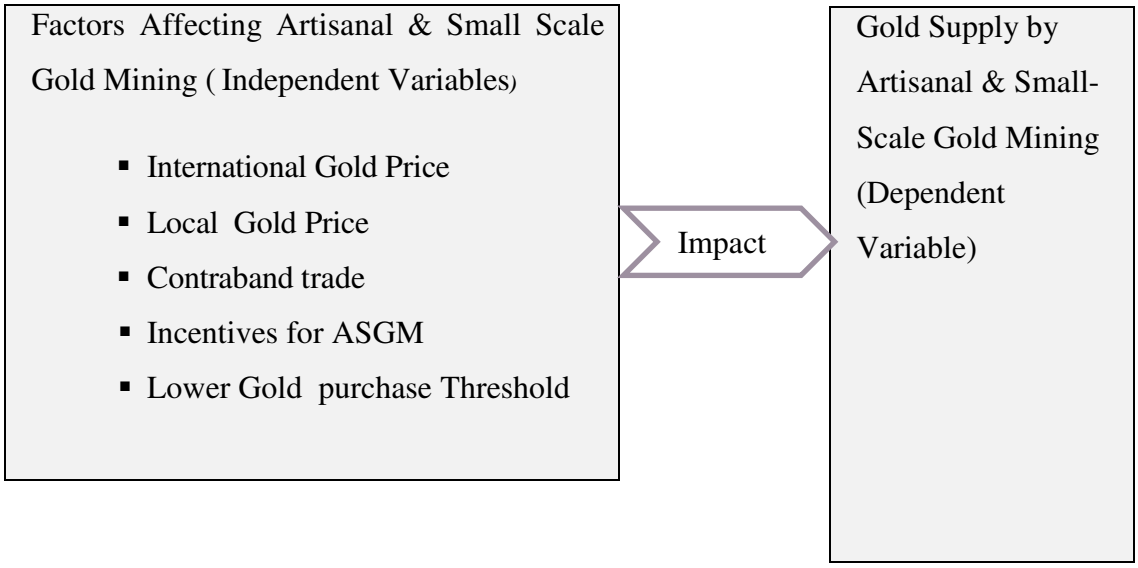
The Ghanaian experience provides special arrangement i.e prefinancing facilities for selected buying agents that can support gold suppliers supply their gold to the legal market. Ghana discourages illegal trading trend as strategy by offering attractive prices that could lure miners away from the middlemen. Minimum guaranteed price was announced weekly and it remained an assured price even if the world price for gold would fall. This strategy helps to safeguard the gold traders from possible losses emanated from gold price fluctuations & also providing basic tools to gold suppliers and annual award to honor the best suppliers are lesson to be considered. In the case of Sudan, gold miners are required to pay only 10% royalty to localities on the proceeds of gold sales. No business tax. However, in Ethiopia, gold suppliers pay 25% tax on proceeds of gold sales which can discourage the gold suppliers. Being high tax levied on gold suppliers in Ethiopia, definitely encourage suppliers to smuggle gold and sale in countries where taxes are less which could be one of the reasons for gold supply decrease in recent years. Ethiopia can share these experiences and enhance gold supply to the formal market.

2.3 Conceptual Framework

The detailed investigation and collection of necessary information from literature, theories, a variety of participants along the value chain was done to characterize the factors affecting gold supply and the degree of their impact. Gold mining is exposed to internal and external factors most cited are price fluctuation, illicit trade, limits on gold purchase, administrative problems including lack of technical support, tax issues and others similar elements. ASG mining impacts on environment have also provided to understand the vulnerabilities emanated from ASG mining on the community. These factors provide positive or negative relationship with the ultimate performance of the ASG mining sector.

The following simple model is developed to indicate the impact of the aforementioned factors on ASG mining sector its contribution in terms gold supply to the formal market (NBE) considering the livelihood and resource curse theories.

Figure 8: Conceptual Framework on Factors Affecting ASG Gold Supply



Source: Researcher's own design, 2018.

Considering the livelihood and factors affecting the artisanal gold sector performance, the study is conceptualized with a clear relationship between dependent (gold Supply) and influencing or independent variables (factors affecting the performance). All factors are assessed and presented in the study as illustrated in the above simple diagrammatic framework.

CHAPTER THREE

RESEARCH METHODOLOGY

In this section, the research planned to discuss in details about the data, measurement and the methodology used in analyzing the factors affecting ASG mining. It includes data collection method, coverage, sample design, and methods of data analysis. The study was planned to use different types of research designs which would be the base for collecting and analyzing the data in relation to the ASG mining performance.

3.1. Research Design

Examining the factors affecting the ASG mining in Ethiopia is the primary objective of this study. To achieve this objective, descriptive type of research design with a mixed approach, qualitative and quantitative method of data analysis has been employed to assess the factors affecting gold supply flow to the formal gold purchase centers using survey by direct collection of information through questionnaires about the subject matter of the study along with observations and empirical evidences collected from secondary sources such as published literatures or data so as to support the trend analysis of ASG sector performance.

The explanatory type of research design helped to focuses on explaining the aspects of the study in a detailed manner identify and evaluate the causal relationships between the different variables under consideration. In this study, the explanatory research design has also employed to examine the relationship of the stated variables. It is believed that mixed methods research provides better (stronger) inferences. Therefore, by using a mixed approach it is able to capitalize the strength of quantitative and qualitative approach and remove any biases that exist in any single research method.

3.2. Sampling Design

Cohen, L., Manion, L. & Morrison, K. (2000) defined a sample as a portion of the entire population to be studied and generalize findings. The study population consisted of 934 artisanal gold miners, dealers and cooperatives registered and operating in four regions and five gold purchase centers in Ethiopia specifically 532 in Shire Endasillase, Tigrie regional state, 141 from shekiso in

Oromiya, 112 from Assossa gold purchase branch in Benishangul, 49 from Mizan Teferi and 72 from Dimma purchase centers both in SNNPR, 24 from gambella purchase center and 4 from Awassa purchase center.The study also included senior managers from MMPNG, NBE and EGS and experts in field. These groups of people were targeted because of there in depth knowledge and diverse experience in artisanal and small scale mining related issues as pertained on the ground and their capacity to provide information relevant to the research objective..

In general 70 artisanal gold miners, dealers and cooperatives, 10 senior managers and 20 experts in artisanal and small scale gold mining were purposively selected making for a total sample size of 100 out of which 88 of them were responded. The target groups are equally well aware of the ASG mining field and hence homogenous sampling was applied. The gold dealers and miners may not understand and fill the questionnaires in English. Due to this reason, the questionnaires were prepared in Amharic and distributed to them which were eventually translated to English to facilitate the research writing.

3.3 Sample Size Determination

There are several approaches to determine the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables, and applying formulas to calculate a sample size. For most of household based studies, formulas are used to determine the sample size of target groups/households. For populations that are large, Cochran (1963:75) developed an equation that can yield a representative sample for proportions. The calculation is based on the pilot, 95% of the desired confidence level which is 1.96 and different desired level of precision to determine the sample size calculation. Based on Cochran equation sample size of the study is calculated for $\pm$10% level of precision which comes to be $((1.96)^2\,(.05)(.05))/[\![0.10]\!]^2 = 96$ n $= 96/(1 + ((96 - 1))/1023) = 89$

3.4. Source of Ddata and Collection Methods

The data for this study were collected from both primary and secondary sources. The primary data were collected through questionnaires and interviews. The questionnaires were required to collect data for this study to get information on various factors such as gold sector contribution to the national economy, gold price problems, the status of illicit gold trade, administrative problems and issues related to environment and other relevant information.

The secondary data has been collected from the NBE's archive which includes, among others, study report, publications and research outputs. In addition, secondary data was also collected from MMPNG, regional relevant offices, non-governmental offices and research outputs of organizations in the same area and other developing countries experience. The secondary data covered various data on the number of ASG mining participants, export value creation, international and local gold prices, FX premium rates etc. The study also reviewed proclamations and policies related to artisanal mining.

After the primary and secondary data gathering procedures completed, the data was analyzed and presented in a way to produce important information that can answer the basic questions, ensure objectives of the study and also show future implications of the study. The responses of informants/respondents are presented and analyzed both quantitatively and qualitatively through tables, figures, percentages and statements.

3.5. Description of Variables and Measurements

In this study, the variables have been selected based on empirical observations related to ASG mining and the sector's performance i.e, its contribution to the national economy. Moreover, in accordance with some written literatures and empirical studies, the independent and dependent variables of the study have been identified in order to investigate the impact of various factors influencing artisanal mining sector in Ethiopia.

3.5.1. Dependent Variables

The dependent variable considered in this study is variable used to measure the ASG mining performance and it is defined as follows:

Gold supply (ASGSS): measures the overall contribution of ASG mining sector in terms of export value creation. It gives an idea how the sector is managed to generate revenue and foreign currency earnings.

3.5.2. Independent Variables

The independent variables which are considered for this study are factors affecting ASG supply such as price of gold in the international market (PGIM), price of gold in the local market (PGILM), gold smuggling as represented by proxy variable Fx premium (GSMUG), gold purchase lower limits (GOPLL) and incentive on artisanal gold mining (GOICTVE). The definition and measurements of the variables are given in 3.5.3 below.

3.5.3. Specification of Empirical Research Model

The research used both the descriptive statistics and a multiple regression model based analysis to test whether there is correlation between artisanal gold supply to the formal market and independent variables that can be tested using correlation and regression model. Other variables such as government technical support, limitation related to gold product monitoring and tracking, problems related to sector management, institutional arrangement and administration were analyzed using the results obtained from time series data, observations and descriptive statistics as obtained from respondents' opinion.

The general algebraic equation considered for the sector performance as a dependent variable is given by the **ASGSS** based on the gold supply time series data for the period between 2002/3–2016/17. To estimate the impact of different factors on the performance of the artisanal gold sector, the following general empirical research model is developed:

$Y_{it} = \beta^0 + \Sigma\beta_K X_{it} + \varepsilon it$

Were:

Yit represents the value of dependent variable (ASGSS)

βo is the intercept

β_K represents the coefficients of the X variable

Xit represents the explanatory variables (PGIM, PGILM, GOPLL, GSMUG, and GOICTVE) and εit is the error term.

The above general empirical research model is changed in to the study variables to find out the impact of different factors affecting the performance of artisanal gold mining sector as indicated below:

Log (ASGSS) $= \beta o + \beta_1 \log (PGIM) + \beta_2 \log (PGILM) + \beta_3 \log (GOPLL) + \beta_4 \log GSMUG) +$ B5 log (GOICTVE) + εit

Where;

ASGSS=Artisanal and small - scale gold supply

PGIM= International gold price

PGILM=Local gold price

GOPLL=Lower gold purchase limit

GSMUG=Contraband Trade

GOICTVE= Incentive for artisanal and small -scale gold traders/miners

3.6. Data Analysis

Kothari 2004, point out that data analysis has involved various stages, this include editing, coding and tabulation of the collected data. The analysis process applies both qualitative and quantitative techniques of data presentation. It also uses tables, figures and percentages. As indicated in the above model, a multiple regression analysis between the dependent and the collective effect of independent variables has been found to be appropriate to analyze the time series data as well as data collected from survey. The survey response has also been analyzed to measure correlations and report descriptive statistics, coefficient of multiple correlations, and regressions. F test and t-test have also been used to determine the significant of multiple correlations at 5% level of significance. In order to simplify the analysis process, SPSS- version-20 and EVIEWS version-8 soft wares have been used in the study.

3.7. Description of Variables and Measurement

In this study, the variables have been selected based on alternative theories and previous empirical studies related to factors that are affecting ASG mining and performance of the sector as measured by gold supply. In accordance with the theory and empirical studies, the independent and dependent variables of the study have been identified in order to investigate the impact of the impeding factors on the artisanal gold mining performance in Ethiopia.

3.8. Methods of Data Analysis

In this study, to analyze the collected data, both descriptive, correlation and multiple panel linear regression data analysis method were employed. The descriptive statistics was used to quantitatively describe the important features of the variables. The correlation analysis was used to identify the relationship between the independent and dependent variables using Pearson correlation analysis.

The correlation analysis shows only the degree of association between variables and does not permit the researcher to make causal inferences regarding the relationship between variables (Marczyketal, David DeMatteo and David Festinger, 2005). Accordingly, multiple panel linear regression analysis was used to test the hypothesis and to explain the relationship between artisanal and small scale gold supplies as a dependent or performance measure variable and factors influencing the performance of ASG mining. Geoffrey Marczyk,

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter has three sections and presents the descriptive statistics, correlation analysis and multiple panel linear regression analysis of the study variables. The first section deals with the descriptive statistics and summarizes the main features of the study variables using graphs, tables and percentage. For this part of the study, the researcher has used the information gathered in the form of secondary data as well as facts collected through questionnaires from stakeholders to analyses the impact of factors affecting gold supply chain. The second section also deals with the correlation analysis and shows the degree of association between the study variables. The third section of this chapter analyzes regression result reports of the OLS estimation output of the multiple regression model. The candidate variables analyzed include the dependent variable (ASGSS) and independent variables indicated in the following section.

4.1 Descriptive Statistics

4.1.1. Descriptive Statistics for the Dependent Variables

In order to measure the performance of sector, one dependent variable, artisanal gold supply to the official market (ASGSS) has been used in this study. ASG mining is exposed to several endogenous and exogenous factors which are hindering the performance of the sector. As clearly indicated in the earlier chapters, artisanal gold supply to the official market for this study measures the overall performance of artisanal gold sector and it gives an idea how efficient the sector has been managed.

4.1.2. Descriptive Statistics for the Explanatory Variables

This section of the paper analyses the factors affecting the artisanal gold sector's contribution to the national economy. In this study, five independent or explanatory variables have been used. The candidate variables analyzed include the dependent variable (ASGSS) and independent variables which are price of gold in international market (PGIM), Price of gold in local market (PGILM), gold purchase limits (GOPLL), incentive to gold suppliers (GOICTVE) and gold

smuggling (GOSMUG) as represented by proxy variable, foreign exchange premium while other factors in the study were examined using descriptive statistics and correlation analysis results.. Both primary and secondary data is used to analyze these hindering factors which are negatively or positively affect the performance of the sector.

4.1.3 Artisanal and Small-Scale gold Sector Contribution to the National Economy

The researcher has taken time series data to show the degree of ASG mining sector's contribution in terms of foreign exchange earnings, share of the sector to total export and contribution to GDP from the year 2002/3-2017/18. In absolute terms, the time series data analysis shows that the country has exported artisanal and small scale gold worth of birr 37,442.19 millions in the last 15 years time. In similar period, the country has exported a cumulative value of goods worth of Birr 425,967.34 million, out of which the share of ASG mining has accounted for about 8.8% of the total exports(.(Appendix1)

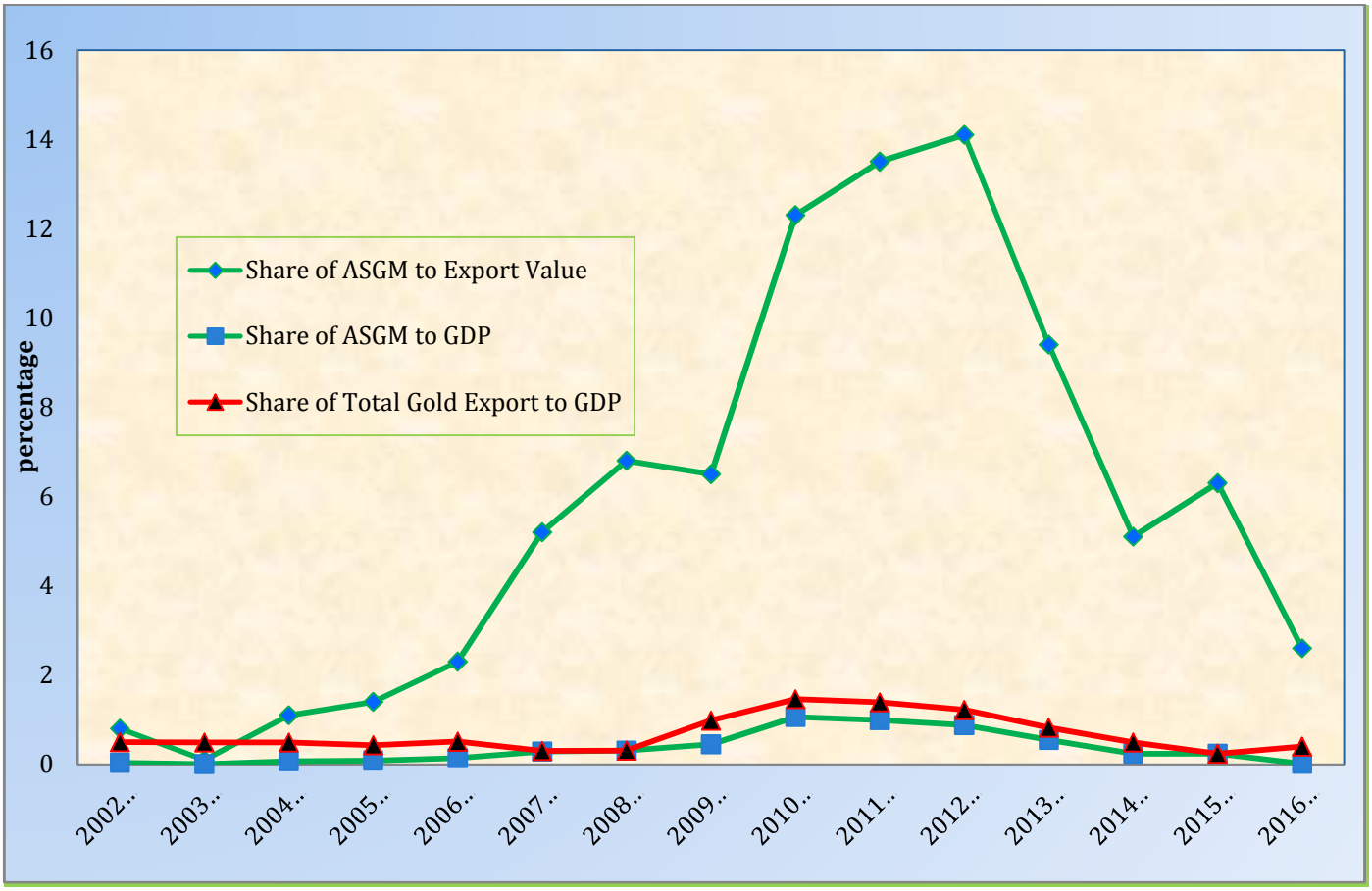
The ASG mining sector contribution to the cumulative GDP figure for the period under the study is about 0.4% while the share of total gold export (artisanal & industrial) to GDP is nearly 0.65% indicating that the role of ASG mining outstrips industrial gold mining in Ethiopia. The secondary data analysis result highlights the wavering trends of ASG mining contribution to the national economy showing unpredictable and erratic nature as the sector is exposed to tremendous deterring factors. ASG mining contribution to export sector had been aggressively increased up to 2012/13 and constantly declined then after due to several problems exhibited in the sector. The production of gold from artisanal and small-scale mines should have been a major contributor of foreign- exchange earnings and a source of income to the Governement.

In comparison to other countries, the sector's contribution in in terms of foreign exchange earnings, revenue generation and its contribution to GDP is found below expectation due to several hindering factors. The follwing Table highlights the trend observed in ASG production from 2002/03-2016/17.

Partial

Fulfillment

Table 3: Contribution of ASG and Small-Scale Gold Mining to GDP and Export Earnings (2002/3-2016/17)



Source: National Bank of Ethiopia. (Data from appendix 1)

.The share of total gold production to GDP and ASG sector contribution to GDP demonstrated similar trend with uneven pattern and less contribution. Stakeholders were also requested to rank the contribution of ASG sector to the national economy. Out of 88 respondents, 34.1% perceived the contribution of the sector to employment creation is very high while 51.1% and 14.8% believed high and medium respectively (Table 6).

In terms of export earning, 3.4% of the respondents believed the contribution of the sector is very high, 31.8% medium, 47.8% and 17% low and very low respectively. Similarly, in terms of revenue generation, 2.3% of the respondents understood the contribution is very high, 11.4% and 4.5% high and medium respectively while 52.3% and 29.5% believed low and very low contribution respectively. In general, the analysis result concludes that the contribution of ASG mining in terms of employment creation is high while the sector's contribution to export earnings

and government income is fairly low.

4.1.4 Price Fluctuation Impact Analysis

The issue is whether international gold price fluctuation has an impact or equally influences gold supplies by ASG miners and suppliers. Production and export of gold started rising from US$ 10.93 million in the year 2009/10 to 8 tons (US$ 430.6 million) in 2012/113 showing tremendous performance of the sector in three years period and constantly decreased and reached 0.2153 ton in the year 2017/18 (Table2). The achievements were not sustained, thus foreign exchange earned in consecutive years has continuously declined and end up to US$ 8.4 million in the year ended June 2017/18 (Table 2).

Analysis of time series data reflects linear relationship between gold price and gold supply. During the initial years, both gold price and supply declined and started increasing in the subsequent two years 2005/6-2008/9, again dropped together in the year 2008/9 in the same direction. Then after, the ASGM export value has sharply increased up to the year 2012/13 and constantly declined then after. The impact of fluctuation is more visible that when price increased from 2009/10 -2012/13, the volume of gold supply also increased following the same trend. Similarly, gold supply follow-suit to the sharp price drops starting from 2012/13 to the year 2017/18 though duly stable in the year 2014/15. The relationship between international gold price and gold supply is strong. Furthermore, opinion was collected from gold miners and stakeholder through questionnaires as well as interviews and compared with the result obtained from secondary data analyses results to understand the clear implication of the relationship between gold supply (to the formal market) and price fluctuation. Out of 88 respondents 50.1% of them strongly believe that gold price has an impact and 37% of them do not agree while 12.9% have responded no opinion. From the secondary data analysis result and respondents opinion, it is possible to comprehend that the trend of gold supply and price is much more correlated. The sharp fall of gold supply was occurred when international gold price started falling and vice versa.

4.2.5 Analysis of Contraband Trade Impacts

Gold mining by informal channels are illegally traded by local market retailers, illegal collectors (unlicensed traders) and illegal producers (individuals). Open market for gold exists in all regions where artisanal mining activities illegally traded. Illegal collectors and illegal producers can sell their products to the informal market or directly to the dealers (middle men). According to Beyene

Tadesse (2016), the volume of gold traded in the informal market was estimated about 61% and this research finds out that 80%-90% of the gold was traded in the informal market in last two years period.

As there is no gold product monitoring mechanism, dealers and miners can sell gold either to the legal market (NBE) or to the contraband market (Figure 4). The highest ASG purchased in history was 8.281 tons in 2012/13 while lower transactions were 1.588 and 0.215.3 tons respectively in the year 2016/17 and 2017/18 indicating 80.8% and 97.4% drops respectively. However, if we go back and calculate five years consecutive variations taking 8.281 tons as the highest representative gold supply figure, the gold supply drops during the 5 years (2013/14-2017/18) in average estimation is 59.1% indicating that this magnitude of gold supposed to be supplied to the Bank has been traded in the contraband market. This finding is nearly matched with the estimate made by Boyne Tadesse (2016) when he presented that the volume of gold marketed through formal (legal) channel is estimated at only 39% of the total production while remaining 61% traded through informal channel though the latter years drops (2017 & 2018) are alarmingly high.

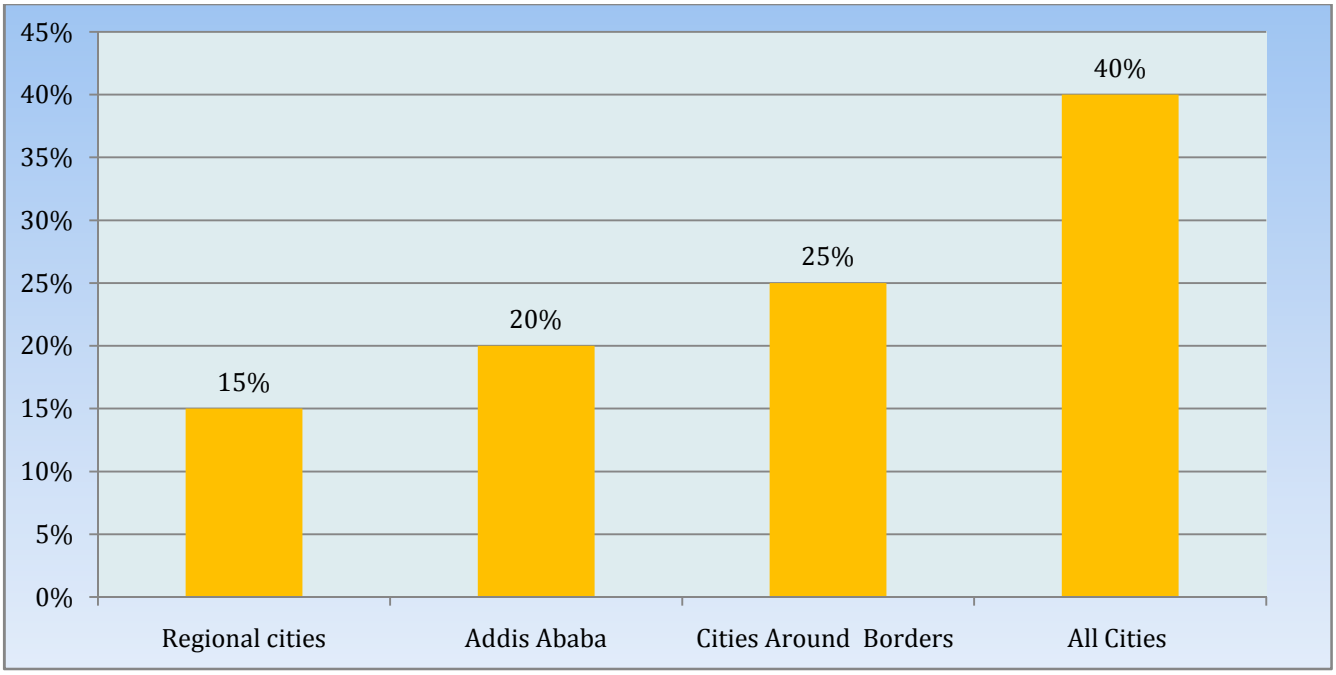
To validate the result obtained from the secondary data analysis, stakeholders were also requested to share there opinion whether they believe contraband trade could be one of the reasons for gold supply drops in recent years. Out of 88 respondents, 83.4% of them have strongly believed that due to the wide spread of illicit trade in all gold mining areas, major part of the gold produced by ASG miners are directly channeled to the informal market in different forms of smuggling, 11.5% were agreed that contraband trade has no impact while 5.1 % of them no opinion. Moreover, the researcher has also conducted interviews with officials from the MMPNG, NBE, and experts on the area asking them to reflect their opinion whether contraband trade has negative impact on artisanal gold flow to the formal market.

All the interviewed officials and experts reflected their view that contraband trade became a free riding problem where illegal miners including legal license holders have also boundlessly engaged in and strongly believe one of the basic reasons for artisanal gold supply decrease.

The study also considered the route of contraband trade in Ethiopia. Gold that is illegally mined often channeled to smugglers either locally or across boundaries. Sophisticated smuggling individuals or groups are engaged to transport the illegally mined gold ore across borders. Respondents were also requested to share their feeling regarding the potential local contraband trade, places (areas) across the country and in foreign countries.

In general,, though other problems can contribute for the decline of formal gold trade, contraband becomes a chronic problem affecting the performance of artisanal gold sector in Ethiopia. The opinion collected is highlighted in following Table

Table 4: Areas of Potential Contraband Trade Market



Source: author's NPSS, 2018

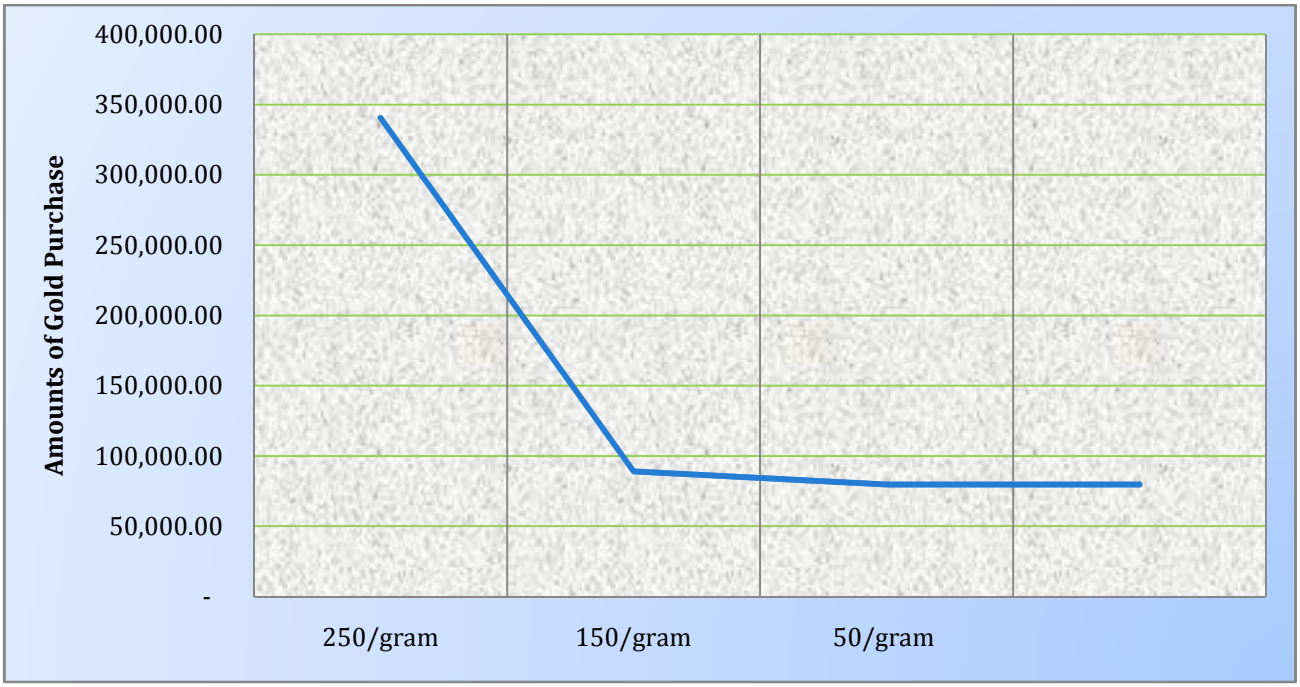
Out of 88 respondents, 20% of them strongly believe that gold produced by artisanal miners is illegally traded in Addis Ababa, merkato area, 15% in big cities in regions, 25% cities around bounders and 40% of them strongly believe that major part of gold produced by artisanal gold miners is illegally traded in all areas as indicated in the figure. Moreover, respondents have also requested the reason why it is not possible to control illicit gold trade in Ethiopia. Out of 88 respondents, 23.63% of them believed that customs police mechanism in placed to control illicit gold trade is so week while 30.04% reflected that gold is so easily smuggled which makes monitoring and controlling difficult. Again, 46.33% believes gold is smuggled due to the prevalent rent seeking in all gold production area in the country.

4.2.6 Lower Purchase Threshold Impact Analysis

The argument related to lower gold purchase threshold was analyzed to understand the extent of its impact and whether gold supply was dropped because of lower treshold policy. Gold supply data before and after the implementation of series of different purchase threshold policies and

respondents opinion was taken and analyzed to indicate the implication of purchase limit policy which is portrayed in the following Table.

Table 5**: Gold Purchase Lower Threshold Policy Impact Implication**



Source: author's own design based on the data from the National Bank of Ethiopia, 2018

The average six months gold purchase was 340,429 grams six months before the lower limit 250/ gram policy was repealed in 2016 and reduced to 89,038 grams (73.84%) one year after the implementation of the new policy 150/grams and further declined to 79,758 grams (76.57%) after the purchase limit was down sized to 50/grams in November 2017. From the secondary data analysis, the result shows negative relationship between the policy and gold supply that the more the threshold is relaxed down, the less the gold supply to the Bank as indicated in the above graph.

While this indication is true from secondary data analysis result, miners, suppliers and other stakeholders were also requested to reflect their opinion whether gold purchase threshold being 50 gram (while it could be lower than this limit) has an impact or one of the reasons for gold supply decrease. In this regard, out of 88 respondents, (60.23 %) are strongly believe that decreasing the purchase limit has no impact or a reason for gold supply increase while (26.14%) perceived the higher limit has an impact or a reason for the decline of gold supply and (13.63%) responded no idea.

4.2.7 Impacts of Taxation on Artisanal and Small Scale Gold Mining

The research provides that though the gold suppliers are required to pay taxes and royalty, this obligation is not fully complied in all ASG prodcing areas. Artisanal traders and cooperatives do not pay taxes according to the law. During the field visit, it was realized that taxes on gold traders has not been collected on time for so many years and ultimately the government has requested them to pay the taxes including the arrears at one time which has created severe grievance and disagreement between the tax authorities and traders and in some cases termination of the gold business by traders. From the field observation, it was noted that gold miners and traders prefer to trade gold in the informal market to scape taxes and avoid excessive time taken to discharge their commitment. The research identified that due to tax administration problem, many active gold traders have shifted to other business implying that the institutional failure emanated from revenue authorities' side is found one of the problems causing gold supply decrease.

Beside these limitations, ASG traders are not comfortable with the tax rate levied on ASG business. Respondents have requested to forward their opinion whether the royalty and taxes levied on ASG miners/traders is reasonable to encourage the gold miners/traders and one of the reasons for gold supply decrease. Out of 88 respondents, 56.8% of them strongly believed that the tax levied is not reasonable and one of the reasons for gold supply drops while 24% of them said medium and 19.2% together believe the royalty and tax system can encourage the miners and traders. The government is expected to encourage and promote the gold mining sector in such a way to increase its contribution to the country's development endeavor. The researcher was not able to fully assess the magnitude of revenue earned in the form of taxes and royalties, as it was not possible to get data from the revenue authorities in regions and hence suggested for future studies.

4.2.8 Implication of Incentive Policies

The impacts of incentives are analyzed to measure the degree or to what extent it has contributed for the constant decline of gold supply. From interview made with officials and experts in the field, it was noted that the difference between the official gold purchase price and gold price-black market is more than Birr 200/gram. The premium payment on gold black market is much higher than the incentive package offered by the Bank and hence gold miners/ traders prefer to trade their gold in the informal market. The official incentives, 5% top-up on international gold price and the

opportunity offered to select the highest price from monthly price fix cannot compensate the gold black-market premium.

The study shows that the incentive policies were very effective particularly in the early years of implementation and eventually faded away and became ineffective to motivate the gold suppliers. From countries experiences, the study provides understanding that though these policies were effective at the outset, the impact remained unsustainable due to the problems and challenges in the sector. This implies the need for alternative policy dimension that can improve the performance of the sector. Moreover, miners/suppliers and stakeholders were requested to reflect their opinion whether the existing incentives motivates gold suppliers. Out of 88 respondents, 65% of them perceived the incentives are inadequate while 35% have said adequate. In general from the opinion given by respondents, it is possible to deduce that the existing incentives (inadequate) have some contribution for gold supply drops.

4.2.9 Impacts of Administrative and Institutional Weakness

The weakness can be measured by the level of coordination among stakeholders and loose policy implementation. The research has thoroughly assessed the coordination of these institutions to what extent they discharge their duties and responsibilities stipulated in the sector's policy documents as regards to ASG mining sector.

Though, the MMPNG takes the key mandate to establish a system that can support gold product data management monitoring and tracking at the mining place, such system is not exist in all mining areas. Land use problems, lack of technical support and inadequate training that can support the gold miners to improve gold production is found out to be coordination problem observed among the MMPNG and regional state mining bureaus. More importantly, increasing trend of illegal gold transactions which is now in every corner of the country is a reflection of reckless or lack of coordination among stakeholders engaged in artisanal gold mining sector management which has depleted the sector's performance particularly weakness of the customs police offices in all regions and MMPNG as this mandate is expected to be implemented by these institutions. Moreover, while it was possible to formalize illegal miners, still large numbers of the gold mining communities are engaged in informal gold production in all regions where gold is sourced and channeled to the informal market. Even though, it is not entirely possible to avoid informal gold transactions, the existence of massive and damaging gold smuggling in all artisanal gold sites in the country is found out to be the reflection of coordination loophole among the

institutions responsible to administer the sector.

This analysis was also validated by stakeholders' opinion. Out of 88 respondents, 56.2% of them have believed that the coordination among stakeholders is poor while 24% said medium and 19.2% together believes good and very good coordination. In general from the study result (both from the secondary and primary data result), the observation justifies that lack of coordination is found one of the bottleneck or impeding factor for gold supply dwindling.

4.2.10 Analysis of Gold Product Tracking and Monitoring System Limitations

Gold supply chain management requires rigorous and systematic design of product process management right from production site to product marketing place. In the absence of such system, gold produced by ASG miners can obviously channeled to the informal market which could be one of the major reasons for misusing this scare resources and one of the major factors for the sharp decline of gold supply to the formal market.

The country is not able develop a system that can ensure traceability of the gold produced by ASG miners. Most important is, ASG mining sector authorities should develop and implement product tracking and channeling system i.e., from mining place -to-marketing place where gold is officially traded. No official recording, tracking and monitoring system is instituted on the production site that can ensures gold produced are all channeled to the legal market. This suggests that in the absence of gold product management system (data recording, tracking and monitoring), the possibility of smuggling is very obvious. If we expect the artisanal gold sector has to contribute, the gold miners should properly record the gold they produce every day at the production site and deliver to the formal market (NBE) according to the records.

Stakeholders

The stakeholders were also requested to share their opinion with regards to the informal gold transactions. Out of 88 respondents 67.58% of them believed that there is no official recording, tracking and monitoring system is instituted while 21.6% said the system is in placed and 10.82% said no idea. It is clear that the impact of illicit trade in gold transactions is determined by the strength or weakness of supply chain management. In general the study result (both from the secondary and primary data analysis) justifies that gold product data management is found one of the impeding factors causing gold supply dwindling.

4.2.11 Artisanal and Small Scale Gold Mining Policy Limitations

It is observed that, the current legal system has serious deficiencies both in terms of declaration and application that makes the law ineffective. Both licensed and unlicensed artisanal gold miners in all gold sourcing sites operate in a traditional and backward manner. Vast majority of miners and mineral traders are operating informally with no limit in time and boundary. This has exposed the sector to extensive and persistent gold smuggling which can be cited as one of the reasons for gold supply drops in recent years.

The Mining Operation Proclamations No. 678/2010 and the preceding proclamations underlined that miners should necessarily be organized as cooperatives. On the other hand, the amended Proclamation No 816/2013 totally deletes the relevance of cooperatives in mining; instead, it encourages special Small-Scale or Small- Scale Mining. Moreover, the new regulation (816/2013) limits the relevance of miners' cooperative as an entity and the period of validity of artisan mining licenses from a possible nine years (with renewals) to a maximum of two years. The researcher has observed during field visit that it is practically impossible to create seed money in two years period. One year could be an exercise period and the second year could be the time that the miner's well engage in the business even without recovering profit let alone generating profit required for the next step which is one of the big policy gap observed.

Moreover, the Mining Operation Proclamations No. 678/2010 and the preceding proclamations allows brokers (dealers) to actively involve in gold trade by collecting from small miners and deliver to the Bank. This opportunity is limited by the amended proclamation 816/2013 that artisanal cooperatives should be dissolved once their license expires; to be transformed either into Small-Scale Mining or totally be shifted from the mining activity to any other business which made the most experienced groups of traders out of business. As a result, these groups of traders have shifted themselves to illegal gold trade financers and this time most smugglings are either done by themselves or under their full coverage implying the policy gap of the sector.

The law emanated from the definition of artisanal gold mining limits the use of technology and hence artisanal gold miners were obliged to use traditional and rudimentary hand tolls and manual operations. The policy does not promote technology and hence miners produce

gold under difficult and laborious working condition that does not promote efficacy and effectiveness in the sector. Due to this reason, the volume of gold produced per miner a day is very limited and in some cases even without any production.

In some instances authorities are lacking the courage and commitment to strictly enact the proclamation. The authorities failed to prohibit illegal practitioners from mining work thus, a number of unlicensed gold operators have engaged in all gold mining sites in Ethiopia. Similarly, even though, the law defines the need for royalty and tax pavements; gold miners/traders do not fully pay royalty and tax for the government. While the law strongly insist gold producers/traders to supply the gold to the Bank, majority of the miners/traders are trading the gold in the informal market by negating the provisions in the proclamation implying that the authorities are unable to enact the rules and regulations issued to manage the sector which leads to non-compliance from the miners/traders side.

In general, from the secondary data result and field observation, the research found out that currently, the aforementioned are the policy gaps observed in ASG mining sector in Ethiopia. This has been substantiated by interview result that all 10 interviewee officials and experts have unanimously agreed that the listed limitations are basic policy drawbacks observed in the sector coupled together and affected gold supply.

4.2.12 Technical Support Limitations

The government lacks institutional capacity and support of artisanal miners. Gold miners are financially and educationally marginalized. No adequate effort was made to improve the gold miner' skill, raise their awareness and induce behavioral change in their saving culture and the essence of environmental protection (Beyene Tadesse, 2016), Institutions at the grass root level also do not have a good awareness and understanding about the proclamations (678/2010 and 816/2013) while gold miners also have little information on their rights, responsibilities and obligations in the mining process i.e., payment of royalties, rehabilitation etc. (Beyene Tadesse, 2016).

Lack of skill, technology and shortage of finance is another problem. Another common problem which is always raised by miners is lack of information on site identification and availability of mineral deposits which made mining just a random operation in most cases. The mining sites are generally located in remote and harsh environment. Poor infrastructure, shortage of potable water, school and health facilities within a reasonable distance is common. Non-availability of technical

and financial support is a problem. Stakeholders were also requested to rate the importance of technical support. About 23.9% and 45.5% of respondents rated its importance as very high and high respectively whilst 22.7% and 7.9% of the respondents perceived low and very low compare to other factors

4.2.13 1mpacts of Artisanal Gold Mining on Environment and Community Health

The study result has shown that there is strong relationship between ASG mining and environment. The impact of artisanal gold mining on environment as indicated in the literature review part of the study is substantiated by field observation and information obtained from stakeholders. This relationship can be explained positively as a contribution and also negatively as a threat to the natural environment. Land degradation, soil erosion, water pollution are identified a common challenges of artisanal gold mining in all gold mining sites across the country.

Respondents were requested to reflect their opinion whether artisanal gold mining has an impact or a cause for environment degradation and a case for social and health problem on ASG mining community in Ethiopia. Out of 88 respondents, 68.6% of them strongly believe that ASG mining entails huge damage on environment in the form of soil erosion, water pollution, destruction of natural vegetation (forests) and a cause for expansion of drought and weather changes.

The study has identified that most of the artisanal gold miners, if not all, are using hazardous chemicals such as cyanide and mercury to amalgamate and separation of gold from sediments and ore which has entailed basic problem of health in gold mining sites in Ethiopia. In addition to this, as there is no basic safety and protection materials are used, gold miners are subject to different risks that put them to lose their life. From field observation, social and health problems are identified a common challenges emanated from artisanal and small scale gold mining activities almost in all areas.

Respondents were also requested to reflect their opinion whether artisanal miners are using toxic and hazardous chemicals to separate gold from sediments and out of 88 respondents 20% of them said gold miners use mercury and 30% cyanide chemical while 50% said traditional methods including borax chemical. Even if the review in percentage seems to be small, the results demonstrates clear indication that harmful chemicals are used in Ethiopia to separate gold from soil particles which is one of the problems emanated from ASG mining in the country. The respondents have also indicated that people have died because of these chemicals and to this effect

53.5% of the respondents have identified incidents of death in different ASG sourcing areas. In addition to this, the use of child labour is common in all gold mining sites in areas were ASG mining is undertaken. Out of 88 respondents, 56% of them reflected that children from 6-12 years have engaged in gold mining and 26 or 38.2% reflected that 13-18 years aged people are engaged in gold production. This indicates that as a family occupation, children below 12 years are also involved in gold mining which is unacceptable according to the United Nations conventions.

Tantamount to this, the questionnaires result shows that ASG mining entails health and social problems on the community and due to the nature of artisanal mining sector, various diseases are easily transmitted. The numbers of victims in all mining areas are high. In this regard, respondents were requested to share their opinion. Out of 86 respondents, 32.9% of them said the spread of contagious diseases is very high and 32.8% believed high while 34.3% of the respondents said medium.

In general the result derived from the questionnaires and field observation highlights that the health problems emanated from ASG mining in all areas where gold mining exercised in Ethiopia are prevalent. In addition, artisanal miners have physically impaired and died in the open pet while extracting gold indicating health problem connected to artisanal mining operations.

4.2.14. Ranking of Factors Affecting Artisanal and Small-Scale Gold Mining

The factors analyzed have combined effect on the performance of ASG mining sector (gold supply). The degree or impact (effect) is rated to indicate which factor has the highest role for ASG mining sector performance dwindling based on stakeholders' opinion as indicated in Table 5 below.

Table 6:- Respondents Ranked Rsults on Factors Affecting Artisanal & Small-Scale Gold Supply.

Factors attributes	Ranking scale					Factors impact ranks
	Very high	High	Medium	Low	Very Low	
Contraband trade expansion impact`	72(81.8%)	13(14.8%)	3(3.4%)	0	0	Very high
Absence of gold product recording, tracking & monitoring	54(61.4%)	22(25%)	9(10.2%)	2(2.3%)	1(1.1%)	Very high
Government institutions Coordination gaps	30(34.1%)	30(34.1%)	12(13.6%)	14(15.9%)	2(2.3%)	Very high
Price fluctuation impact	25(28.4%)	26(29.5)	18(20.5%)	15(17.0%)	4(4.6%)	High
Lack of technical and finacial support	21(23.9%)	40(45.5%)	20(22.7%)	7(7.9%)	0	High
Tax burden levied on gold suppliers	24(27.3)	31(35.2%)	24(27.3%)	9(10.2%)	0	High
Inadequate Incentive Schemes	5(5.7%)	25(28.5%)	37(42%)	6(6.8%)	15(17%)	Medium
Impact related to purchase limit	0	0	12(13.6%))	16(18.2%)	60(68.2%)	Low impact
II. Contribution						
ASGM Contribution-employment	30(34.1%)	45(51.1%)	13(14.8%)	0	0	Very high
ASGM Contribution- export earning	3(3.4%)	0	28(31.8%)	42(47.8)	15(17%)	Low
ASGM contribution-revenue generation	2(2.3%)	10(11.4)	4(4.5%)	46(52.3%)	26(29.5%)	Low

Source: Author's SPSS Output, 2018

The respondents were asked to rate the listed challenges facing ASG mining supply chain. It is evident from the results in Table 6 that contraband trade appeared a major challenge facing the supply chain that 81.8 %(n=72) of the respondents rated contraband trade has very high impact,

14.8%(n=13) rated it is high whilst 3.4%(n=3) considered it is fairly high implying that among the hindering factors contraband trade takes the lion share for gold supply dwindling.

Next to contraband trade, absence of gold product recording, tracking & monitoring as one of the hindering factor was also found to be a great challenge affecting the artisanal gold mining supply chain. Out of 88 respondents, 61.4 %(n=54) of them perceived that the impact due to the absence of gold product recording, tracking & monitoring is very high whereas 25%(n=22) rated high, 10.2%(n=9) medium impact and 3 respondents (3.4%) believed low and very low impact.

Challenges related to loose coordination among government institutions is the third impact about 34.1%(n=30) of the respondents very high whilst 34.1%(n=30) of the respondents rated high and 13.6% (n=12) perceived medium, 15.9% (n= 14) and 2(2.3%) low and very low respectively indicating that the impact emanated from sector management problem was the major challenge affecting the performance of the sector.

Price impacts ranked about 28.4 %(n=25) very high, 29.5 %(n=26) high and 18(20.5%) medium respectively while the remaining score is low and very low. As regards to tax impact is concerned, the results, 27.3%(n=24) and 35.2%(n=31) of respondents rated this factor as very high and high impact respectively whilst 27.3%(n=24) considered it medium and the rest 10.2%(n=9) perceived as low impact. Non availability of technical and financial support is another challenge. It can be seen from the results that about 23.9%(n=21) and 45.5%(n=40) of respondents rated this factor very high and high respectively whilst 22.7%(n=20) and 7.9% (n=7) of the respondents perceived low and very low respectively. Impacts of inadequate incentive schemes on ASG mining performance due to ASGM is rated as a medium challenge by respondents whilst respondents impact ranking due to lower purchase limit fall in low and very low categories (Table 6).

On the other hand, the contribution of ASG mining to employment creation ranked 34.1% (n=30) very high, 51.1% (n=45) high, 14.8% (n=13) medium. In terms of foreign exchange earnings, 3.4% (n=3) very high, 31.8% (n=28) medium, 47.8% (n=42) & 17% (n=15) low and very low respectively. Similarly the result given to revenue generation 2.3% (n=2) very high, 11% (n=10) high, 4.5 (n=1) medium 52.3% (n=46) and 29.5% (n=26) low and very low ranks respectively.

4.3. Correlation Analysis

This section of the study deals with the correlation analysis of the study variables. The purpose of undertaking correlation analysis is to check whether there is multicollinearity problem in the model and to indicate whether the variables move together or not in the same direction and the correlation coefficient indicates the strength of a linear relationship between two variables. The correlation coefficient varies from -1 to +1 where -1 shows a perfect negative correlation, and +1 indicates perfect positive correlation. If the correlation is 0, the movements of the variables are said to have no correlation.

4.3.1. Correlation Analysis of ASGSS and Factors Affecting Gold Supply.

Table 5 bellow presents the correlation analysis of independent variable i.e., international gold price (PGIM), local gold price (PGILM), illicit trade (GSMUG), lower limit set on gold purchase (GOPLL) with the dependent variable (ASGSS).

Table 7: Correlation Analysis of Dependent and Independent Variables

FACTORS	ASGSS	GOPLL	PGIM	PGILM	GSMUG
ASGSS	1.000000				
GOPLL	-0.269208	1.000000			
PGIM	0.836208	-0.696967	1.000000		
PGILM	0.790312	-0.711495	0.790312	1.000000	
`GSMUG	-0.000639	-0.878776	-0.2699208	-0.487066	1.000000

Source: Author's Eviews Output, 2018

The correlation matrix Table shows the linear relationships between dependent variable and independent variables as well as among most independent variables used in the study. The

international gold price in line with literatures has strong positive correlation 0.84 with ASGSS indicating the fact that gold price increase plays a vital role to scale up the performance of the sector and vice versa. Similarly, the trend of local gold price is positively correlated with gold supply 0.79 reflecting same implication.

On the other hand, lower gold purchase limit has a strong negative correlation with the dependent variable and all independent variables. As indicated in the Table, percentage correlation point is -0.27% with the dependent variable, -0.70 with international price, -0.71 with local gold price, and -0.88 with contraband trade indicating that the more the purchase limit is downsized, the less the gold supply is recorded during the study period while the expectation is on the other way round. This shows that the policy action taken to motivate miners by reducing the purchase limit has no positive impact on the gold supply. Tantamount to this, the purchase limit variable relationship with international gold price & local gold price and contraband trade is negatively correlated implying that whatever action is taken on purchase threshold (limit), it has no positive. Illegal gold transaction obviously affects the official gold trade (Gold supply) flow to the formal market and thus, the relationship between the contraband trade and supply is negatively correlated in line with literature. This implies that the more the gold trade in the contraband market, the less will be the supply to the formal market which is empirically observed and found out one of the basic reasons for poor performance of the artisanal and small-scale gold mining sector in the country.

4.4. Regression Results and Discussion

This section of the study presents the regression results of the effects of factors affecting artisanal gold mining performance as measured by the amount of ASGSS flow to the formal market. The researcher has taken to analyses the impact of nine factors on artisanal gold supply which are thoroughly discussed using the information received from time series data, out of these factors international gold price fluctuation, local gold price, lower gold purchase threshold, incentive for gold suppliers, dummy variable foreign exchange premium as proxy to contraband trade data (gold black-market rate) and dummy variable on international gold price that shows price break (second level down word trend) are candidate variables considered in the regression analysis.

To enhance the quality of the econometric estimates, model diagnosis and robustness checks are made followed by presentation of regression results on the effects of factors that can affect the performance of the sector using trend data on dependent and independent variables. The regression analysis enables the researcher to empirically test the proposed hypothesis and to

achieve the research objective.

Due to the attractive statistical properties that made it one of the most powerful and popular methods of regression analysis (Gujarati, 2004), the method of least squares, OLS, estimation method was used in multiple regression model by conducting the appropriate diagnosis tests.

4.4.1 Model Diagnosis

Heteroskedasticity

It is assumed that the error terms are homoscedastic i.e., it assumed that the error terms have a constant variance otherwise they are said to be heteroskedastic. Validation of the null hypothesis that the error terms are homoscedastic is required because the presence of heteroskedasticity makes the standard errors wrong and consequently any inferences made could be misleading. To ensure that this assumption is no longer violated, the most popular method, the white test has to be made. Brooks(2008) recommended that not to reject the null hypothesis, the p-value of the F-and $\chi 2$('LM') versions of the test statistics and the p-value of the Scaled Explained SS must be higher than 0.05. The detail of this test is provided in the appendix at the end of the paper.

Table 8: Heteroskedasticity Test: Breusch-Pagan-Godfrey for Sample Factors affecting gold supply

F-statistic	0.507726	Prob. F(4,11)	0.7314
Obs*R squared	2.493647	Prob. Chi Square(4)	0.6458
Scaled explained SS	0.924062	Prob. Chi Square(4)	0.9211

Source: Author's Eviews output, 2018

In table 8 above, Eviews presents three different types of tests for heteroskedasticity indicating that both the F- and $\chi 2$ ('LM') versions of the test statistic give the same conclusion that there is no evidence for the presence of heteroskedasticity, since the p- values are higher than 0.05. The third version of the test statistic, 'Scaled explained SS', as the name suggests is based on a normalized version of the explained sum of squares and also suggests that there is no evidence of heteroskedasticity as its p-value is reasonably higher than 0.05 and not significant.

Autocorrelation

A test of this assumption is required to validate the null hypothesis that the covariance between the errors terms over time is zero. It is assumed that the distribution errors are un correlated with one another and that the errors are linearly independent of one another. If the errors are not uncorrelated with one another, it would be stated that they are auto correlated' or they are 'serially correlated (Brook, 2008). Accordingly, this study utilized the Durbin and Watson test recommended by Brook (2008). The Durbin-Watson test statistics value in the main regression for the models is 2.343764 critical values have been used with 16 observations and 4 explanatory variables. According to the theory, it is better if we get Durbin-Watson statistics close to 2 for non serial correlation, nearer 0 for existence of positive correlation and closed 4 for negative correlation in the model. The study result 2.343764 is close to 2 and hence there is no evidence for the presence of autocorrelation.

Durbin-Watson is a test for first orders autocorrelation and it tests only a relationship between an error and its immediate previous value. Therefore, in addition to Durbin-Watson test it was found desirable to conduct a Breusch-Godfrey Serial Correlation LM test to examine a joint test for autocorrelation that will allow examination of the relationship between error term and several of its lagged values at the same time. Thus, Breusch-Godfrey test was also conducted for the model and found no problem of autocorrelation as indicated in the table below.

Table 9: Breusch-Godfrey Serial Correlation LM Test for ASGSS

F-statistic	0.309677	Prob. F(2,9)	0.7412
Obs*R-squared	1.030180	Prob. Chi-Square(2)	0.5974

Source: Author's Eviews output, 2018

Normality Test

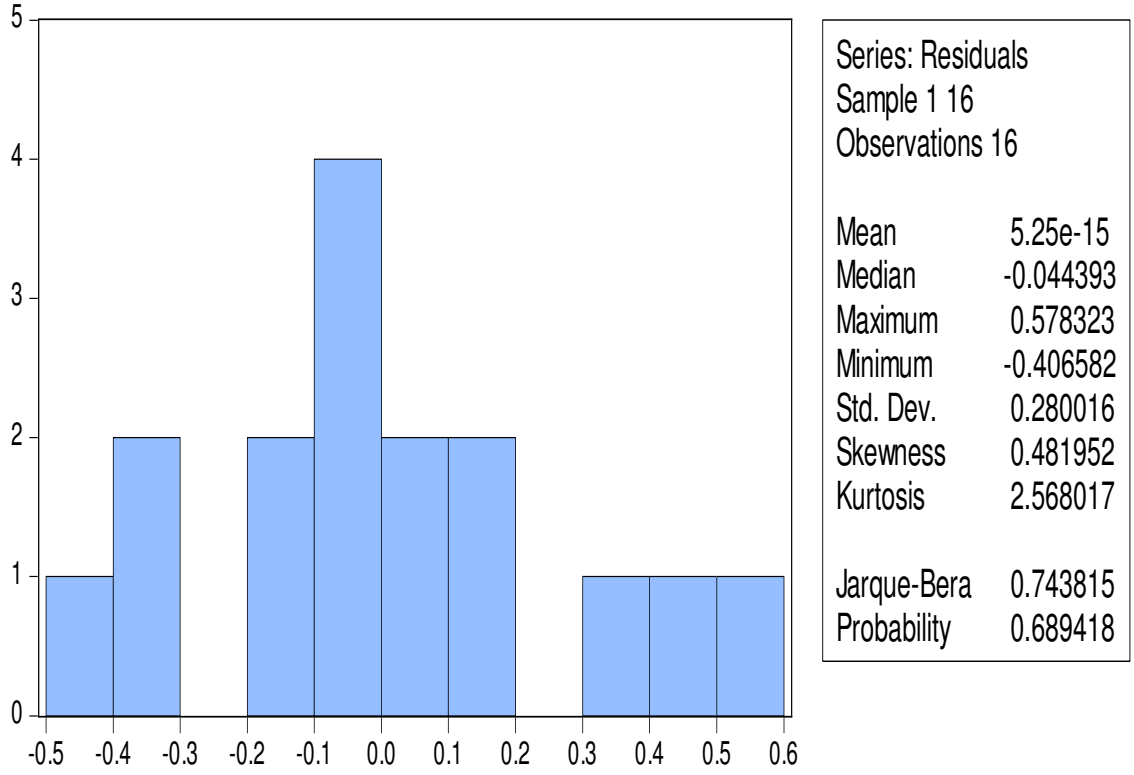
The normality assumption requires the disturbances to be normally distributed. According to Brooks (2008), if the residuals are normally distributed, the Jarque-Bera statistic would not be significant and the disturbances are said to be normally distributed.The study establishes a null hypothesis for residual normality and an alternate hypothesis for non-normal distribution error and

testing the normality assumption required that not to reject the null hypothesis of normality at the 5% level, the p-value should be bigger than 0.05.

As indicated in Figure 13 below, distribution of the gold supply panel observation is symmetric about its mean and the Jarque-Bera statistic has a P-value of 0.69 implying that the p-value for the Jarque-Bera test for the model is greater than 0.05 that indicate the errors are normally distributed.

Based on the statistical result, the study failed to reject the hypothesis of normality at the 5% significance level.

Figure 9: Normality Test for ASGSS



Source: Author's Eviews output, 2018

Accordingly, from the normality figures indicated above, it is possible to conclude that there is no normality problem on the data used for this study.

4.4.2 Regression Results and Description of Gold Supply (ASGSS)

The result has been discussed at two levels by including all candidate variables and excluding categorical variable which is not significant to explain the dependent variable (ASGSS) when measured with P-value t statistics. The regression result of the candidate variables are shown in

the flowing Table.

Table 10: Regression Results for Determinants of ASGSS

Dependent Variable: LOG(Gold Supply)

Method: Least Squares

Date: 03/29/18 Time: 14:23

Sample: 1 16

Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.08661	3.548127	-5.097509	0.0005
LOG(PGIM)	3.528855	0.462847	7.624238	0.0000
FX Premium(GSMUG)	- 0.045857	0.032548	-1.408905	0.1892
Incetive Dummy	0.734308	0.408592	1.797166	0.1025
Intern. Price Dummy (PGILM)	1.137395	0.445631	2.552322	0.0287
Gold Purchase lower Limit (GPURLM)	0.333950	0.314026	1.063446	0.3126

R-squared	0.979730	Mean dependent var	6.803346
Adjusted R-squared	0.969594	S.D. dependent var	1.864174
S.E. of regression	0.325060	Akaike info criterion	0.870383
Sum squared resid	1.056641	Schwarz criterion	1.160104
Log likelihood	-0.963067	Hannan-Quinn criter.	0.885219
F-statistic	96.66585	Durbin-Watson stat	2.694888
Prob(F-statistic)	0.000000		

Source: Author's Eviews output, 2018

As can be seen from Table 10, all variables except international prices are not statistically significant which requires ASGSS to be remodeled against other explanatory variables. As a result, the minimum purchase threshold limit variable is excluded, as it has no impact on gold supply and remodeled the gold supply with other explanatory variables as indicated in the following Table

Table 11: Remodeled Regression Results for Determinants of ASGSS

Dependent Variable: LOG(ASGSS)-Gold supply

Method: Least Squares

Date: 03/27/18 Time: 10:58

Sample: 1 16

Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-15.18765	2.284622	-6.647775	0.0000
FX_Premium	-0.074547	0.018316	-4.069984	0.0019
LOG(Inter_Price)	3.224584	0.365977	8.810896	0.0000
Incetive_Dummy	0.858369	0.393908	2.179110	0.0519
Inter_Price_Dummy	1.258205	0.433465	2.902669	0.0144

R-squared	0.977437	Mean dependent var	6.803346
Adjusted R-squared	0.969232	S.D. dependent var	1.864174
S.E.of regression	0.326989	Akaike info criterion	0.852525
Sum squared resid	1.176138	Schwarz criterion	1.093959
Log likelihood	-1.820198	F-statistic	119.1317
Durbin-Watson stat	2.343764	Prob(F-statistic)	0.000000

Source: Author's Eviews output, 2018

In general based on the remodeled regression analysis, the study found out that the estimated result of multiple regression analysis is at a high level. This is evidenced by the fact that the R-squared is 97 percent and the Adjusted R-squared value is 96 percent for ASGSS. The values of the Adjusted R-squared for model revealed the existence of good relationships between dependent and independent variables, where all independent variables can explain collectively about 96 percent of the performance of ASGM sector as measured by ASGSS, while the remaining 4 percent of the change in performance regression model is explained by other factors which are not included in the regression line. Both the R-squared and the Adjusted R-squared values of the model in this study is found to be higher implying that it has more explanatory power.

Moreover for panel data, R-Squared greater than 20% is still large enough for reliable conclusions (Cameron, A. C. and Trivedi, P.K. (2009). Generally, the R2 results indicate the overall Goodness-of-fit of the models used in this study. The overall reliability and validity of the model was also further enhanced by the fact that the Prob (F-statistic) values being zero for the models, which indicates strong statistical significance. Thus the null hypothesis of the overall test of significance that all coefficients are equal to zero was rejected as the p-value was sufficiently low.

International Gold Price Fluctuation

International gold price (PGIM) explains the variations of the artisanal mining sector gold supply represented by ASGSS with a coefficient of 3.22 percent. The P-statistics is taken to analyze whether the coefficient is significant or not. If P-value is below 0.05 then, coefficient is significant at 5 percent level or below meaning that the estimated coefficient has very strong impact on the dependent variable. In this case it is statistically significant at zero level P-value statistics of significance and the result indicates that high level gold price has a significant positive influence on the performance of artisanal and small scale gold sector. On the other hand the higher the gold price in international market, the higher would be the performance and the decrease in price negatively affects the ASG gold mining sector accordingly. This is justified by the fact that the fluctuation of gold price plays a vital role in determining the contribution of the sector to the national economy in terms of foreign exchange earnings and others. The study has tried to test the impact of gold price decrease and consequently the null hypothesis stating that gold price decrease has no significant and negative relationship with gold supply to the formal market is regected and the alternative hypothesis is accepted.

Contraband Trade

The issue of illicit gold trade has received increasing attention in literature and policy makers as a result it became the focus area of this study, being one of the basic factors affecting the performance of the ASGM mining sector. Contraband trade cannot be directly measured due to lack of data on smuggling. Because of this, proxy measurement was required to stand for this variable. For this reason, time series data on foreign exchange (FX) premium (Appendix2) has been taken as a proxy variable to analyze the impact of illicit gold trade as the gold black market is much more related to foreign exchange black- market rate.

The study found out that contraband trade as represented by proxy variable has negative coefficient (-0.074547) showing a negative relationship with performance of the sector as measured by ASGSS. This implies that when large volume of gold is traded in the informal market which is true in the case of Ethiopia, gold supply to the official market shrank to the lower level. The coefficient is significant at 0.19 percent (p, value) level implying that since the contraband trade is found statistically significant as the performance of the sector is measured by ASGSS, it affects the sector negatively. Therefore, the null hypothesis stating that contraband gold trade has not created significant impact on gold supply to the formal market is rejected and opposite or the alternative hypothesis is accepted.

Lower Limit on Gold Purchase

Lower limit on gold purchase set by NBE has a negative correlation-0.269208 indicating inverse relationship with performance of artisanal gold mining as measured by ASGSS and other explanatory variables (Tabl6). The objective was to involve economically weak and fragile part of the artisanal gold mining community by reducing the purchase limit from 250 grams to 50 gram and create marketing access thereby increasing gold supply flow to the formal market. However, though artisanal gold miners allowed delivering gold as much as these small quantities, in reality the policy intervention has no motivating effect and hence the outcome shows down word trend in gold supply. The lower limit threshold on gold purchase would not play a significant role in increasing the performance of artisanal gold mining as measured by ASGSS. The negative result is not in line with the hypothesis stating that lowering the gold purchase threshold has a significant and positive relationship with the performance of artisanal gold supply flow to the formal market. Consequently the study does reject the null hypothesis. This is justified by the fact that artisanal gold miners have supplied small gold bars which is not significantly contribute for supply of gold to the formal market and the assumption and arguments previously hold is falsified by the study.

Implication of Dummy Variables

Incentive dummy-The incentive dummy variable is found to be 0.858369 which is significant at 5% significant level indicating a unit increase in incentive package will improve the gold supply by 0.85869. In general this implies that ASG mining incentive offered by the government has a significant positive impact in the context of Ethiopia's ASG mining sector.

International price dummy-This variable is taken as a candidate variable to analyze the effect of

international gold price after price 8 pick break (1) to represent shock or erratic decline of price and the positive increase levels (0) and run regression to know the direction and significance of the variable. The international price dummy coefficient is -1.258205 which implies that the variable has significant negative impact on gold flow to the formal market right away when gold price started declining.

4.5 Findings of the Study

- The artisanal and small-scale mining sector has significantly contributed to employment and supports the livelihood of many people in Ethiopia. However, the study found out that though the sector's contribution to employment is high, its contribution to export value creation, revenue generation and GDP was found minimal in comparison to other LDCs.
- The result of the study does not support the argument that price decrease has no effect on gold supply. The prices trend implication obtained from time series data, descriptive statistics and regression analysis shows positive correlation between gold supply and price decrease and found out one of the hindering factors for gold supply dwindling.
- The study found out that the volume of artisanal and small-scale gold traded through formal (legal) channel was reduced nearly by more than 90% in recent years mostly because of wide spread illegal gold trade both in domestic market and across boundaries indicating that contraband trade has severely (negatively) affected the contribution of the sector to the national economy.
- The study identified that the policy action taken to motivate miners by reducing the lower purchase limit has contributed for constatnt decline of gold supply. The result obtained from time series data and analysis of customers' opinion as obtained through questionnaires and regression result confirmed that lowering gold purchase limit has a strong positive correlation (down word tendency) with gold supply to the formal market.
- The research identifies that the policy action implemented by the Bank to motivate gold traders/miners by applying 5% top-up on international gold price and application of the highest 30 days gold price offer on gold supplies to the Bank is found ineffective and the result implying or suggesting alternative incentive policy action.
- Site-Marketing gold product control and monitoring is found a key problem identified and one of the basic reasons for gold supply decrease. Gold product data recording and tracking system

is not in place at each production site and due to this deficiency the possibility of smuggling is found rampant in all regions which has severely affected legal gold supply.

- The research finding provides that, specifically, except on and off meetings and workshops; no adequate technical and financial support, awareness creation mechanisms that can encourage or motivate gold suppliers/miners is in placed. Absences of these facilities are found one of the reasons limiting the sector's contribution (gold supply).
- The research finds that royalty including taxes supposed to be paid according to the law has not been uniformly and timely collected by each region. Some of them collect taxes and royalty while others do not comply with the proclamation. Due to tax administration problem, many active gold traders have shifted to other business implying that the institutional failure emanated from revenue authorities' side is found one of the reasons for gold supply decrease.
- The study identifies that ASG mining in Ethiopia is one of the primary causes of environmental degradation which include soil erosion, water pollution, depletion of the ecosystem and also entails social and health problems like prostitution, child labour as well as insecurity due to lake of safety materials in the operation site.
- The study identified that some of gold suppliers are using hazardous chemicals like mercury and cyanide in amalgamation and separation of gold from sediments and ores which has entailed environmental, health, social and saftey risks on the community.
- The revised Minerals and Mining Act, 868/15, limits the relevance of miners' cooperative as an entity and the period of validity of artisan mining licenses from a possible nine years to a maximum of two years. The study identified that as the land holding right is very short, miners were not able to generate the required seed money enable them to shift to the next stage and this limitation made many miners to participate in the informal gold trade after the expiry of their licenses. The research finding implies there are wide gaps in the legal framework and loose enforcement of regulations related to ASG mining and thus calls for law revisions and improved enforcement.
- The study found out that coordination among stakeholders is so loose and incapable of administering the sector as expected. The MMPNG supposed to coordinate regional government, customs polices, gold dealers and miners in such a way to combat contraband trade was not performed as expected.

- The gold produced by purchase centers in region is transported to the Central Gold Purchase/Sales Coordination office in Addis Ababa and re-weighted and verified to ensure the correctness of the gold purchased by purchase centers. The study found out that the process taken to verify the quality and weight of the gold takes longer time and found inefficient that needs to be improved.

4.6 Discussion

The research made by Beyene Tadesse (2016) supports the study finding that gold mining is the backbone of the livelihood and the major source of income for artisanal and small-scale miners in the study areas. However, the study findings i.e., 8.8 % contribution to total export value and 0.4% contribution to GDP shows inadequate performance relative to other countries experience. Poor ASG mining sector management, coordination, commitment and engagement of institutions in charge of administering the gold supply chain as implicated in the study finding shows one of the reasons for poor performance of the sector.

The study finding shows price decrease has negative impact on gold supply to the formal market. This has been supported by Artisanal Gold Council (2018) literature that over the past year the drop in the price of gold would lead to less artisanal mining activity as it has for the industrial gold mining sector. This is also consistent with the empirical studies. The gold supply has been extremely decreased from 8,281 gram in the year 2012/13 to 215 gram in the year 2017/18 following the gold price decrease during the period which shows a tight link between gold supply and prices. The result of multiple regression model also indicates that the decrease in gold price has a significant negative impact on gold supply to the formal market (NBE) and vice versa.

The research findings shows that contraband trade became a chronic problem affecting the performance of artisanal gold sector and one of the basic reasons for gold supply decline in recent years in Ethiopia. The literature by Tadesse Beyene (2016) supports the research finding that gold supply has been dropped by 61% in the year 2014 due to wide spread contraband trade in all ASG sourcing areas. Moreover, this research identified that 80%-90% of ASG gold was traded in the informal market in the year 2016/17 and 2017/18. Though some other factors had the share for ASG gold supply drops in recent years, contraband trade as implicated by the research findings was the major contributing factor in Ethiopia. Respondents assessments support the finding that 81.8 %(n=72) of them rated contraband trade as a critical problem taking the lion share for gold supply dwindling ranked as a main challenge facing the gold supply chain management in

Ethiopia. The multiple regression model negative coefficient (-0.074547) supports the finding that contraband trade has a significant negative relationship with performance of the sector implies that as big volume of gold was traded in the informal market, supply to the official market was shrank to the lower level which is also consistent with the literatures (Mohamed Suliman Ibrahim, 2015).

The study finding provides that the policy action taken to motivate miners by reducing the gold purchase threshold as lower as 50 gram per transaction has no impact on the volume of gold supply to the formal market. The results from empirical study and customers opinions obtained through questionnaires are in line with the research finding. The negative regression coefficient (-0.269208) implies inverse relationship between lower gold purchase threshold policy (decreasing the gold price limit) and the performance of artisanal and small-scale gold mining sector as measured by ASGSS suggesting that this policy intervention has negatively contributed to the performance of the sector which should be repealed and replaced with higher threshold so that ASG mining can be handled by those skilled and financially capable cooperatives and miners.

The research finding shows that site-marketing gold product control and monitoring is a key problem and one of the basic reasons for gold supply decline. The study made by Ines Schjolberg Marques (2016) has substantiated this finding that due to the absence of gold product data recording and tracking system at each production site, the possibility of smuggling is found rampant in gold souring areas which has severely affected legal gold supply. Furthermore, the finding stating that ,in Ethiopia, gold output flows from mining place–marketing niche is not controlled or monitored and thus the gold produced by artisanal miners easily keeps it way to the informal market or in most cases untraceable which is consistent with the study conducted by Beyene Tadesse, 2016).

Most countries have attractive mining laws, nevertheless, the ability to reinforce the laws and regulation by authorities is trifling and hence gold resources can not be managed to contribute to the benefit of nations as expected. In Ethiopia, the research finding shows that there appeared lack of government monitoring and oversight in particular with regards to artisanal gold miners (licensed and unlicensed areas), gaps in the legal framework and loose enforcement of regulations related to ASG mining which is consistent the study made by Ines Schjolberg Marques (2016) emphasizing the deficiencies in the existing laws related to the sector suggesting legal revisions and improved enforcement.

The research finding implies that due to administrative problems, taxes, in some case royalties supposed to be paid according to the law has not been uniformly collected by each region which is consistent with the study made by Beyene Tadesse (2016). The majority of ASM activities (production and marketing) is informal. The research study result of Ines Schjolberg Marques (2016) supports the finding that to avoid taxes and royalties gold suppliers/miners prefer to trade in informal market which indicates the tax system by its self encourages licensed small-scale miners to shift to informal and in some cases illegal activities.

The research finds that due to tax administration problems, many active gold traders have shifted to other business implying that the institutional failure emanated from revenue authorities' side is found one of the reasons for gold supply decrease.

The study finding provides that no adequate technical and financial support, awareness creation mechanisms that can encourage or motivate gold suppliers/miners. The study conducted by Tadesse (2016) supports the research finding that gold miners are financially and educationally marginalized while gold miners also have little information on their rights, responsibilities and obligations in the mining process, environmental and issues related to land use.

The result of the study revealed that ASG mining in Ethiopia is one of the primary cases of environmental degradation which include soil erosion, water pollution, and depletion of the ecosystem and also entails social and health problems like prostitution, child labour as well as insecurity due to lake of safety materials in the operation site which is consistent with the literature review (Beyene Tadess, 2016, Ministry of Mines, 2012). The research finding shows that some of gold suppliers are using hazardous chemicals like mercury and cyanides in amalgamation and separation of gold from sediments and ores which has entailed environmental, health, social and safety risks on the community. The result is consistent with the empirical study conducted on the ASG mining in Ethiopia.

This study is expected to have different implications for the government, for the artisanal miners and for the public. For the government it would have a great contribution in its effort to establish a sound framework that can promote the sector and eventually improve the sector's contribution to the national economy. This can lay a ground for ASGM to maintain sustainable livelihood and income generation for the government and a permanent basis for export value creation. For ASGM community, it creates awareness on best sector administration practices and relationships of stakeholder with regards to their duties and performance. Moreover, the study

can help policy makers to formulate policies and come up with clear criteria enable it promot the sector. Management of ASGM in different level may find the study valuable in making proper decisions. This study can be used to conduct further studies on artisanal gold mining issue.

Limitations and constraints of the study have prompted suggestions for further research. The study has gone some distance to examine factors affecting artisanal gold mining and the performance of the sector in limited context. However, further research could be done and explore the details. Since this study also focused only on limited factors, it would be beneficial to extend the study and have a clearer understanding of factors affecting the sector, mainly in the perspective of the sector. This study could also be used as a starting point and could be possible to study and come up with a better insight and inference by applying several extensions to policies issues, environmental concerns, administrative and the nature of the sector, taking also evidences from other countries experience.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The general objective of the study is to examine the problems and challenges that can affect artisanal and small scale gold supply to the formal market and forward possible solutions that can resolve the problems. The ASG mining sector has significantly contributed to employment creation in Ethiopia. However, the contribution of the sector in terms of revenue generation and foreign exchange earnings was not as expected due to several problems and challenges.

Price fluctuation, contraband trade, lack of support, problems related to ASG miners taxation, absence of gold product monitoring and tracking and loose coordination among stakeholders were factors affecting the ASG mining sector. The study tried to analyze the effects of these factors based on the information gathered from different sources and five gold purchase branches located in four regions.

There is strong relationship between artisanal mining and environment in Ethiopia. ASG mining has created extensive environmental degradation, water pollution and causes of health and social problems in gold sourcing area. This relationship can be explained positively as a contribution to wellbeing of the society and also negatively as a threat to the natural environment. Hazardous chemicals such as mercury and cyanide are also used in artisanal and small-scale gold mining in some mining sites in Ethiopia.

The rationale behind the implementation of the lower gold purchase threshold policy to include economically weak gold miners is not effective. Though the policy was relaxed down to 50 gram/transaction, these changes has no impact on the volume of gold supplied to the Bank, rather opposite trend was observed particularly in recent years. The incentive policies of the Bank were very effective in the early years of implementation and eventually became ineffective to motivate the gold suppliers which needs alternative policy dimension that can improve the performance of the sector.

The secondary data was obtained basically from NBE, MMPNG while supplementary data was also collected from local and international periodicals, internets and interpreted the data using

percentage variations, figures and tables. The primary data has been collected from the target groups i.e., cooperatives, ASG miners, officials and experts in the field using questionnaires in a view to deepen the result of study. The research made use of time series data in analyzing and interpreting the relationship between dependent and explanatory variables based on ASG mining export value data set covering 15 years period from 2002/3 to 2016/17. The conclusion of the study is determined using the analysis of both the primary and secondary data and interpret the results. Based on the results of the study, possible recommendations were given.

The Pearson Correlation and regression analysis was also used to find out if there is a relationship between the variables to be measured also to find out whether the relationship is significant or not. The dependent variable used was artisanal and small-scale gold supply (ASGSS) and factors affecting ASG supply as independent variables used in the regression model as hindering factors were international gold price, local gold price, contrabands trade, lower level gold threshold, incentive package so far implemented with regards to artisanal and small scale gold traders/miners.

5.2 Conclusion

Based on the descriptive statistics of the study, the performance of the ASG mining sector in terms of employment creation is significant and supports the livelihood of several million populations in Ethiopia. In terms of foreign exchange earnings and GDP in comparison to other LCDs, the contribution of the sector is not significant.

The study result concludes that the fluctuation of gold price plays a vital role in determining the contribution of the sector to the national economy in terms of foreign exchange earnings and others. The decrease in gold price has a significant negative impact on gold supply to the formal market (NBE) and vice versa which calls for better mechanisms that can limit the impact of gold price decrease on ASG mining business.

Large volume of gold is traded in the local contraband market and in some cases exported across boundaries by traders, tourists and foreign passengers. Absence of Site-Marketing gold product control and monitoring is found one of the basic reasons for gold supply decline. In the absence of such system, gold produced by artisanal miners can be obviously channeled to the informal market. The current ASGM sector has a serious deficiency that vast majority of miners and mineral traders are operating informally thus; it is not possible to ensure traceability of the gold produced by artisanal gold miners.

The trend of gold supply and price is much more correlated indicating that a sharp fall of gold supply was occurred when international gold price started falling and vice versa. ASG miners are technically and financially marginalized indicating that there is no sustainable financial and technical support as well as training facilities that can enhance the contribution of the gold miners.

The country has tax laws though the capacity to enact seems very low. Royalty rates are different across the regions. Tax is not collected on time and data management is not well structured. Due to these problems, the contribution of ASG mining sector in terms of revenue generation to the government remained minimal.

The study concludes that ASG mining is primary cases of environmental degradation; health problems due to the use of hazardous chemicals which has entailed social problems like prostitution and child labour including insecurity due to lake of safety materials in operation. Hazardous chemicals (mercury and cyanide) and social threats including soil erosion, water pollution and depletion of the ecosystem is common problem. As in the case of most other countries, in Ethiopia, child labour is common in all ASG mining areas and children who are involved in mining sector fulltime are either early drop outs from school or they are without any educational background.

The coordination, commitment and engagement of institutions in charge of administering the gold supply chain is so loose and hence due to the system problem the ability to reinforce the laws and regulation by authorities is insignificant and hence gold resources can not be managed in such a way to contribute to the benefit of nations as expected.

The correlation analysis of the study revealed that international gold price, local gold price, incentive offered to gold suppliers are positively correlated with the dependent variable indicating that any positive change occurred to these variables will scale up the performance of the sector and vice versa. Contraband trade is negatively correlated with the dependent variable and lower gold purchase threshold policy variable is also negatively correlated with the dependent and other independent variables indicating that whatever action is taken on the gold purchase lower limit policy, it has negative impact on gold supply.

According to the regression result of the study, from the explanatory variables international gold price is found to be significant regressors of performance of ASG mining sector as measured by ASGSS. The study proved that gold supply is positively correlated with price fluctuation when price increased, flow of gold to the formal market increased and vice versa. The study found a negative relationship between contraband trade as represented by proxy variable (FX premium) and performance of the ASG mining sector as measured by gold supply flow to the formal market implying that the impact of contraband trade is found statistically significant as the performance is measured by gold supply indicating that it affects the performance of the sector negatively.

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Lower limit on gold purchase set by NBE has a negative relationship with performance of ASG gold mining as measured by ASGSS, it is not statistically significant indicating that the lower limit threshold on gold purchase would not play a role in increasing the performance of artisanal gold mining as measured by ASGSS.

5.3 Recommendations

The focus of this study was to examine the factors affecting the performance of ASG mining in Ethiopia and recommend possible solutions that can mitigate or avoid those factors affecting the gold supply. Based on the result of the study, the following recommendations have been given.

- In comparison to other LCDs countries, the contribution of ASG mining sector is insignificant both in terms of GDP, foreign exchange earnings and contribution to revenue generation. The reasons emanated from weak and inefficient sector management practices, lack of commitment and loose policy implementation. Therefore, the government should implement rules and regulations already issued to run the sector and enhance institutional capabilities that can guide ASG mining sector so that it can contribute to the national economy as expected.
- The study finding reflects that gold price has an impact on gold supply. It was confirmed that the volume of ASG gold flow to the formal market in situations of price decrease was found trifling. Therefore, it is recommended that the government should implement strategy to manage the erratic fall of international gold price by announcing minimum guaranteed price every week which can fully compensate the miners/suppliers in situation when the ASG miners are in a loose or crises due to price decrease (assured price even if the world price for gold would fall).

- The study found out that the volume of artisanal gold marketed through formal (legal) channel has been severely reduced due to illegal gold trade both in domestic market and cross boundaries smuggling. Contraband trade has significant and negative relationship with the performance of the sector. The following are recommended to reduce the impact of contraband trade:
  - In Ethiopia, formalization is at the lower stages as result there is no system that can ensure traceability of gold produced by ASG miners. Most activities of ASGM are not legal. Therefore, it is recommended to formalize illegal gold miners to ensure that all its activities are made legal and properly regulated to reduce the risk of contraband trade.
  - Customs police control and checking practice is found very loose, hence the government should enhance control and monitoring capabilities by in placing effective and workable checking system that can monitor or detect gold smuggling misdeed in all gold production sites.
  - Contraband control should not be an issue to the Federal Government only. Therefore, it is recommended to consider regions as contraband combating cluster and implement appropriate policy action which gives opportunity to the community to combat illegal gold trade and also share benefits from gold resource.
- The policy action taken to include small miners by reducing the purchase limit has no impact on the gold supply to the formal market and hence it is recommended to repeal this law and replace with higher threshold so that ASG mining can be handled by those skilled and financially capable cooperatives and miners.
- The 5% top-up on international gold price and application of the highest 30 days gold price fix found gradually ineffective and fall to encourage gold traders/miners. It is clear that shortage of foreign exchange is burning issue this time in Ethiopia. As one of strategic policy intervention, the government needs to increase the incentive package which will motivate gold suppliers to increase gold flow to the formal market and reverse the persistent gold supply decline in recent years. Thus, to avoid outflow of gold to neighboring countries, the best strategy should be to fix better price or at least the price paid by these countries. Therefore the recommendation is to incentivize gold supplier by establishing performance

focused pricing system based on volume of gold supplied to the Bank by fixing high premium up to 20% for big volume category and lesser rate for small supply category.

- Site-marketing gold product control and monitoring is found a key problem identified and one of the basic reasons for gold supply decline. There is no gold product recording, tracking and monitoring system in all sites under the study and recommended to implement Site – Market gold product recording, tracking and monitoring system in all mining sites. .
- ASG miners are technically and financially marginalized and hence it is imperative to organize material, technical support and credit facilities, policy improvement that can encourage them to produce more gold and supply to the Bank. Therefore, the government should organize sustainable financial and technical support as well as training facilities to enhance the contribution of the gold miners to the national economy.
- Royalty including taxes supposed to be paid according to the law has not been uniformly collected by each region implying that the tax law is found ineffective. The research finds out that gold miners/suppliers avoids taxes/royalties by trading gold in the informal market which was one of the reasons for contraband expansion. Therefore, the recommendation is to implement uniform royalty rates all through the gold mining regions and avoid business taxes so that gold suppliers can be motivated to supply their output to the formal market.
- The study finds out that ASG mining is primary causes of environmental degradation which has also entailed health problem due to the use of hazardous chemicals and also caused social problems like prostitution and child labour abuse including insecurity due to lake of safety materials in mining place. To avoid the wide range of environmental damages, it is recommended to enact the law and protect the environment from damage, social threats including soil erosion, water pollution and depletion of the ecosystem.
- The study identified that some of the gold suppliers are using hazardous chemicals like mercury and cyanide in amalgamation and separation of gold from ores and sediments. These chemicals are very dangerous for human health and environment. Therefore, the government should promptly implement the key elements of the Minamata Convention on Mercury, including introducing mercury-free gold processing techniques.
- Limiting the validity period of artisanal mining licenses to a maximum of two years (Minerals and Mining Act, 868/15) was tumbled to bring the required result and found a

grave policy gap affecting the gold supply flow to the formal market. Thus, the government should revise the proclamation and include the required provision that can allow the participation of potentially active groups in supplying the gold to the Bank.

- The MMPNG should coordinate regional governments; customs police, gold miners as well as others and implement workable system that can drastically minimize gold trade in contraband market, provide technical and material supports to the gold suppliers and in place system that can improve efficiency.
- The study found out that the process taken to verify the quality and weight of the gold takes longer time and found inefficient that needs to be improved. It is recommended revising the process and in place working system that can support quality verification and weight checking at the branch level by discontinuing double checking without compromising the security of the gold purchased.

6. Suggestions for Future Research

Limitations and constraints of the study have prompted suggestions for further research. The study has gone some distance to examine factors affecting artisanal gold mining and the performance of the sector in limited context. However, further research could be done and explore the details. It would be beneficial to extend the study and have a clearer understanding of factors affecting the sector mainly in the perspective of the sector. This study could also be used as a starting point and could be possible to study and come up with a better insight and inference by applying several extensions to this study such as further increasing the study of artisanal miners, policies, administrative and the nature of the sector taking also evidence from other countries experience.

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Appendices

Appendix 1: Magnitude of gold supply and its contribution to GDP and Export Eranings *(Birr in millions)*

Period	ASGM Export Value(1)		Total goods Export Value (3)	GDP Current Market Price (4)	Share of ASGM to Export Value	Share of ASGM to GDP	Share of Total Gold Export to GDP
	Value	%	Value				
2002/3	32.11	0.09	4,137.21	72,702.7	0.8	0.04	0.50
2003/4	5.00	0.01	5,178.47	85,800.0	0.1	0.01	0.49
2004/5	77.84	0.21	7,331.26	105,415.0	1.1	0.07	0.49
2005/6	120.50	0.32	8,685.38	130,333.7	1.4	0.09	0.43
2006/7	243.72	0.65	10,457.62	170,280.4	2.3	0.14	0.51
2007/8	715.12	1.91	13,643.97	245,836.3	5.2	0.29	0.30
2008/9	1,034.50	2.76	15,217.75	332,060.1	6.8	0.31	0.31
2009/10	1,697.95	4.53	26,115.31	379,134.8	6.5	0.45	0.98
2010/11	5,460.30	14.58	44,525.57	515,078.5	12.3	1.06	1.46
2011/12	7363.83	19.67	54,494.77	747,326.5	13.5	0.99	1.39
2012/13	7659.35	20.46	54,350.35	866,921.1	14.1	0.88	1.22
2013/14	5854.38	15.64	62,243.00	1,060,825.4	9.4	0.55	0.82
2014/15	3067.55	8.19	59,860.38	1,297,961.4	5.1	0.24	0.49
2015/16	3,749.01	10.01	59,726.30	1,541,277.0	6.3	0.24	0.24
2016/17	1,682.2	0.96	63,685.74	1,806,656.0	2.6	0.02	0.40
`Total	37,442.19	100.00	425,967.34	9,357,608.9	8.8	0.4	0.65

Source: National Bank of Ethiopia

Appendix 2: Data on Foreign Exchange Black Market Premium

Period	Rates in Birr per USD				Parallel Market Average	Premium
	End Period Rates			Average Weighted Rate		
	Weighted Rate	Highest	Lowest			
1992/93	5.1000	6.5600	5.0000	5.0091	7.6000	51.7239
1994/95	6.3200	6.4500	6.2500	6.2505	7.2955	16.7192
1995/96	6.3500	6.5500	6.3200	6.3178	7.6394	20.9191
1996/97	6.8000	7.1600	5.9900	6.5007	7.1612	10.1609
1997/98	7.0600	7.2100	7.0000	6.8817	7.0835	2.9319
1998/99	8.1210	7.9610	8.1510	7.5111	7.6900	2.3817
1999/00	8.2220	8.2250	8.2220	8.1426	8.3094	2.0484
2000/01	8.5663	8.5663	8.5651	8.5425	8.6850	1.6681
2001/02	8.5663	8.5663	8.5651	8.5425	8.6850	1.6681
2001/02	8.5663	8.5663	8.5651	8.5425	8.6850	1.6684
2002/03	8.6001	8.6001	8.5663	8.5809	8.7091	1.4940
2003/04	8.6368	8.6368	8.6003	8.6197	8.6751	0.6423
2004/05	8.6663	8.6663	8.6371	8.6518	8.7110	0.6848
2005/06	8.6949	8.6949	8.6687	8.6810	9.0258	3.9719
2006/07	9.0296	9.0296	8.7019	8.7943	8.9570	1.8493
2007/08	9.6100	9.6100	9.0382	9.2441	9.5569	3.3835
2008/09	11.3009	11.3009	9.6929	10.4205	11.8102	13.3362
2009/10	13.5321	13.5321	12.4721	12.8909	13.6806	6.1263
2010/11	16.9081	16.9081	13.5822	16.1178	16.5292	2.5520

2011/12	17.7305	17.7309	16.9667	17.2536	17.9883	4.2585
2012/13	18.6426	18.6459	17.8378	18.1947	19.3333	6.26
2013.14	19.5771	19.5775	19.5766	19.0748	19.8666	4.2
2014/15	20.5659	20.5664	20.5653	20.0956	22.2932	10.9
2015/16	21.8004	21.8008	21.7999	21.1059	23.6035	11.8
2016/17	23.1081	23.1085	23.1076	22.4137	26.1872	16.8
2017/18	27.2621	27.2625	27.2616	26.1082	31.8146	21.9

Source: National Bank of Ethiopia

Appendix 3: Heteroskedasticity Test: White for ASGSS Model

F-statistic	0.507726	Prob. F(4,11)	0.7314
Obs*R squared	2.493647	Prob. Chi-Square(4)	0.6458
Scaled explained SS	0.924062	Prob. Chi-Square(4)	0.9211

Dependent Variable: LOG(GOLD_SUPPLY)
Method: Least Squares
Date: 03/29/18 Time: 14:23
Sample: 1 16
Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.08661	3.548127	-5.097509	0.0005
LOG(Internl __Price)	3.528855	0.462847	7.624238	0.0000
FX_Premium	-0.045857	0.032548	-1.408905	0.1892
Incentive Dummy	0.734308	0.408592	1.797166	0.1025
Internl-_Price Dummy	1.137395	0.445631	2.552322	0.0287
	0.333950	0.314026	1.063446	0.3126

R-squared	0.979730	Mean dependent var	6.803346
Adjusted R-squared	0.969594	S.D. dependent var	1.864174
S.E. of regression	0.325060	Akaike info criterion	0.870383
Sum squared resid	1.056641	Schwarz criterion	1.160104
Log likelihood	-0.963067	Hannan-Quinn criter.	0.885219
F-statistic	96.66585	Durbin-Watson stat	2.694888
Prob(F-statistic)	0.000000		

Source: Author's E-views output, 2018

Appendix 4: Regression Results for Determinants of ASGSS

Regression Results for Determinants of ASGSS

Dependent Variable: LOG(Gold Supply)

Method: Least Squares

Date: 03/29/18 Time: 14:23

Sample: 1 16

Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.08661	3.548127	-5.097509	0.0005
LOG(PGIM)	3.528855	0.462847	7.624238	0.0000
FX Premium(GSMUG)	- 0.045857	0.032548	-1.408905	0.1892
Incetive Dummy	0.734308	0.408592	1.797166	0.1025
Intern. Price Dummy (PGILM)	1.137395	0.445631	2.552322	0.0287
Gold Purchase lower Limit (GPURLM)	0.333950	0.314026	1.063446	0.3126

R-squared	0.979730	Mean dependent var	6.803346
Adjusted R-squared	0.969594	S.D. dependent var	1.864174
S.E. of regression	0.325060	Akaike info criterion	0.870383
Sum squared resid	1.056641	Schwarz criterion	1.160104
Log likelihood	-0.963067	Hannan-Quinn criter.	0.885219
F-statistic	96.66585	Durbin-Watson stat	2.694888
Prob(F-statistic)	0.000000		

C	-18.08661
LOG(Internl __Price)	3.528855
FX_Premium	-0.045857
Incentive Dummy	0.734308
Internl-_Price Dummy	1.137395
C	-18.08661
LOG(Internl __Price)	3.528855
FX_Premium	-0.045857
Incentive Dummy	0.734308
Internl-_Price Dummy	1.137395

Appendix 5: Remodeled Regression Results for Determinants of ASGSS

Dependent Variable: LOG(ASGSS)-Gold supply

Method: Least Squares

Date: 03/27/18 Time: 10:58

Sample: 1 16

Included observations: 16

Variable	Coefficien	Std. Error	t-Statistic	Prob.
C	-15.18765	2.284622	-6.647775	0.0000
LOG(PGIM)	-0.074547	0.018316	-4.069984	0.0019
FX-Premium (GSMUG)	3.224584	0.365977	8.810896	0.0000
Incentive Dummy	0.858369	0.393908	2.179110	0.0519
Inter. Price Dummy (PGILM)	1.258205	0.433465	2.902669	0.0144

R-squared	0.977437	Mean dependent var	.803346
Adjusted R-squared	0.969232	S.D. dependent var	.864174
S.E.of regression	0.326989	Akaike info criterion	.852525
Sum squared resid	1.176138	Schwarz criterion	.093959
Log likelihood	-1.820198	F-statistic	19.1317
Durbin-Watson stat	2.343764	Prob(F-statistic)	000000

Source: Author's Eviews Output,

Appendix6: The study Questionnaires in English

Note for the respondents: Dear respondents, the purpose of this questionnaire is to conduct a study on factors affecting gold supply in Ethiopia as a partial fulfillment of the requirement for the Executive Master of Business Administration (EMBA). Your response is supposed to have a paramount contribution for the success of the study, thus I would like request you to fill each questionnaire. I would also like to assure you that the information provided will be used only for academic purposes and thus will be treated with maximum confidentiality. Please, forward to me your genuine and faire opinion by circling the letter reflecting your feeling.

Part I: General information

1.1 Gender: 1.Women 2. Male

1.2 Age: 1) 15-25 2) 26-35 3) 3 6-45 4) 46-55 5) 56-65 6) above 65

1.3 Education level: 1) Writing and reading 2) Elementary 3) Diploma 4) First Degree 5) Masters Degre

Part II: Questionnaires required for analyzing factors that can significantly affecting the performance of artisanal and small scale gold supply.

1. Do you think international gold price decrease was one of the reasons for declining gold supply?
   a) Yes b) No c) No idea

2. Do you the existing gold purchase threshold, being 50 grams (while it could be below 50 grams) has an impact or a reason for gold supply decrease?
   a) Yes b) No c) No idea

3. Do you believe contraband trade has significant impact & one of the reasons for gold supply decrease in recent years?
   a) Yes b) No c) No idea

4. If you believe gold is traded illegally, which market/s are/is potential contraband market?
   a) Local illicit purchases b) Neighboring countries c) Other foreign countries d) all

5. If you believe gold is traded illegally in local market, which market/s is/are the potential market in Ethiopia?
   a) Addis Ababa, Markato b) Big cities in regions c) Cites adjacent to boundaries
   d) directly for local smithereens and lapidaries e) Please indicate if any others _____

6. If you believe gold is smuggled abroad, which market is the potential outlet?

a) Through boundaries b) through airports by passengers c) Smuggled with exportable goods d) All e) Please indicate if any others exist_____

7. In your opinion, why do artisanal gold suppliers prefer to sell their gold in contraband market?

a) Neighboring countries offer better price b) Local illegal market offers better price c) Gold marketing system in the formal market (Bank) is not convenient for gold suppliers d) Pleas indicate if others _____

8. In your opinion, why was not possible to avoid illicit gold trade in general?

a) Customs and police controlling mechanisms are so weak b) Transmitting gold is easy for smugglers c) existence of rent seeking d) Please indicate if any others _____

9. In your opinion, do you believe tax levied on gold suppliers is appropriate and reasonable?

a) Yes, I believe b) No I don't believe c) I have no idea

10. If you believe the tax paid is high and one of the reasons for gold supply decline, what could be the problem/s?

a) Tax tariff is high or the magnitude is not known b) As the data on gold supply is not properly recorded, taxes are paid arbitrarily or estimation c) As taxes are not collected on time, gold suppliers moved to other activities in fear of tax arrears d) The tax system does not encourage gold suppliers e) Please indicate others, if any_____

11. Do you think proper system is in placed to record gold produced by artisanal miners at the production site enabling them to deliver the gold to the formal (Bank) market without missing its legal channel?

a) Yes b) No c) No information

12. Do you think the existing incentive package is not able to motivate gold suppliers and one of the reasons for gold supply dwindling?

a) Yes b) No c) I have no information

13. How do you explain the problems observed around artisanal gold mining sites?

a) Artisanal miners are not supported by technology b) There is no training enable gold miners improve their output c) No safety materials like hand globs, helmets, safety goggles and hence they are exposed to various risks d) all are correct e) gold miners get these facilities

14. Relative to the previous times, do yout think gold reserves in gold resources potential areas declined? a) Gold easily sourced in previous time is gradually declined b) Gold resources are the same as the previous time c) The gold reserves increased than the previous time.

Part III: Questionnaires required for analyzing the relationship between Artisanal/ Small Scale Mining and environment (natural environment, health safety and Child labour)

1. How do you evaluate the impact of artisanal and small scale gold mining on environment?
   a) It is a cause for soil erosion and hence one of the reasons for natural resources degradation b) It has threated trees and forests and a causes for drought c) It is one of the causes for water pollution d) all of the above e) No impact on environment

2. To mitigate the impact on environment is the land previously used for extraction of gold by artisanal gold miners rehabilitated by planting trees?
   a) Yes b) No c) No opinion

3. In areas where gold is mined, is there any practice of timely covering the open pit of already dug up land by artisanal miners or community?
   a) No practice of covering the open pit in general b) There is practice of covering open pit after mining is completed c) I have no opinion

4. Currently which type of chemical is used to produce or separate gold from soil or rock?
   a) Cyanides chemical b) Mercury Chemical c) Zinc d) Traditional (water) e) please indicate if _____

5. Are there any incident that exposed gold miners to health problem in gold production area due to the use of chemicals by artisanal miners in the process of separation of gold from soil)?
   a) Yes, health problem encountered number ___ b) No, health problem is encountered c) I have no idea

6. In areas where gold is produced, is there any incident of death or physical injury on artisanal gold miners in the deep hole dug for gold mining?
   a) Yes number ___ b) No c) No opinion

7. In your opinion, in addition to the adult miners, the age of miners involved in gold exploration and production in terms of age category could be?
   a) Form 6- 12 years age b) From 13-18 years age c) Above 18 years age

8. How do you observe the spread of contagious disease and its threat to artisanal gold miners in areas where gold is sourced? a) Very high b) High c) Medium d) Low

9. How do you evaluate the income generated by artisanal gold minerals from gold mining activities?

a) The income generated is good enough to save and invest in anther economic sector b) The income generated is adequate only for daily consumption c) As income earned by artisanal gold miners is not adequate to cover their daily consumption; miners are supported by income earned from other sector.

10. How do you explain miners currently engaged in gold production?

a) Most of them have no alternative jobs and hence undertake gold mining permanently b) most of them undertake gold mining on a seasonal basis when agricultural gob is not exist

b) Few of them are undertaking gold mining job when agricultural or other jobs are not exist.

Part IV: Questionnaires required analyze policy and institutional arrangement gaps that can be bottleneck for the success of the sector?

1 How do you evaluate the coordination or relationship between different government and none Government institutions in strengthen or supporting artisanal and small scale gold suppliers?

a) Very good b) Good c) Satisfactory d) Poor coordination

2. How do you evaluate gold purchase centers efficiency (marketing aspects) in terms of service delivery?

a) Very good b) It is good c) satisfactory (not much hassling) d) Poor service (too much hassling)

3. Do you think the existing artisanal gold purchase policy (guidelines) needs revision or amendment?

a) Yes b) No c) I have no idea d) If yes, which article/s

_____

Part V: The following questionnaires are required to rank the impact of major factors affecting the ASG gold supply to the formal market. Please reflect your feeling by rating the impact of each factor by making tick mark for 5 for 'very high impact' 4 for 'high impact' 3 for 'medium impact' 2 for 'low impact' and 1 for 'very low impact.

No	How do you rate the factors that can significantly affect the performance of ASGM sector?	Very high	high	Medium	Low	Very Low
		5	4	3	2	1
1	Price decrease impact					
2	Contraband trade expansion impact					
3	Impact related to purchase limit set by the Bank (Below 50 grams not purchased by NBE)					
4	Impact due to absence of proper gold product recording, trucking & monitoring system (weakness of supply chain management)					
5	Impacts linked to inadequate incentive schemes for gold suppliers					
6	Impacts of tax burden levied on gold suppliers					
7	Impacts due to government technical support limitations					
8	Impacts emanated from gold purchase centers efficiency limitations in terms of service delivery					
9	Environmental threats due to artisanal gold mining have contributed for low gold supply to the formal market?					
10	Coordination (relationship) between different government and none government institutions in strengthening ASGM					
II	How do you rate the contribution of artisanal gold mining to the national economy?					
	1 In terms of employment creation					
	2.In terms of export earnings					
	3 In terms of revenue generation					

Thank you very much for taking your time in responding all the questionnaires

Abebe Senbete