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CURRICULUM AND INSTRUCTION DEPARTMENT

*Establishing and Managing of a Mining and Exploration Vocational
Training Institute: A Feasibility Study for the Ethiopian Mineral
Development Share Company*

Addis Ababa

BY

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NOVEMBER 2015

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Establishing and Managing of a Mining and Exploration Vocational Training Institute: A Feasibility Study for the Ethiopian Mineral Development Share Company, Addis Ababa

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in
Partial Fulfillment of the Requirements for the Degree of Master of Arts in Management
of Vocational Education

By

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Haile Michael Tamiru

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ABBREVIATIONS AND ACRONYMS

C2D	Catalyst to development
CMS	Certificate in Mining Studies
EMDSC	Ethiopian Minerals Development Share Company
FET	Further Education and Training
FSDM	Feasibility Study Design Method
GTP	Growth and Transformation Plan
IMF	International Monetary Fund
LLPTI	Leather and Leather Products Technology Institute
MEI	Mining and Exploration Institute
OHS	Occupational Health and Safety
TIDI	Textile Industry Development Institute
UNDP	United Nations Development Program
VET	Vocational Education and Training
XRF	X-Ray Fluorescence

ABSTRACT

This research work emanates from the need of Ethiopian Mineral Development Share company in assessing the feasibility of establishing a Technical and Vocational Training and Education Institute that would satisfy its middle and lower skill level manpower demand in the field of Mining, Exploration and Minerals Laboratory Analysis. The study has set the objective of conducting a feasibility study for arriving at a decision of establishing and managing the said institute. The main research question of the research has been set as, *"Is it feasible to establish and manage a Mining and Exploration Vocational Institute in Ethiopian Minerals Development Share Company?"*. To address such a research question, a mixed research method is found to be ideal where both qualitative and quantitative type of information are gathered using interview and survey technique respectively. Interview questions were supplied to Ethiopian Mineral Development Share Company (EMDSC) senior staffs, Federal TVET Agency staff, Ministry of Mines Staff and Leather and Leather Products Technology Institute Director. Both qualitative and quantitative data analysis was made to arrive at a decision of the feasibility outcome. Structured and semi structured interview was employed depending on the group of the interviewee. Rating scale analysis was conducted from a sample of EMDSC core employees. Random sampling method was used to conduct the survey part of the research. The rating scale result was employed to identify skills having priority for an initial set up of the institute to identify possible options scenario of commencement. Based on the information obtained in the process of data analysis, the research had finally arrived at the possibility of establishing and managing the institute and recommends following option I, which is less costly to start implementation. This study had also recommended conducting a detailed feasibility analysis commonly called Bankable Feasibility Study to see the economic and financial viability of the institute establishment based on the inputs of this research work. The study showed in detail, vision and mission of the institute, the program requirements of the different competencies, the ideal organizational structure of the institute, facilities, possible instructor and budget sources to run the institute. According to the study, the institute can be planned to start delivery of training as of 2017 and possibly generate vocational trainees for work by 2018 onwards.

CHAPTER ONE: THE PROBLEM AND ITS SETTING

1.1 Background of the Study

Ethiopian Minerals Development Share Company has long been engaged in mining and exploration business for more than 20 years. Its technical human resource was staffed by professionals who made their studies mostly in Russia and Cuba during previous regimes. As observed from the company's 2014 annual report, this workforce is retiring and leaving the company from time to time due to natural and other factors. The company is thus facing a serious problem of a succession of workforce. In addition to lack of senior professionals, the company is also facing a grave problem of having vocational workforce in the mining and exploration field as there are no vocational and technical training institutes in the field. This study attempts to solve this shortage of having vocational level Mining and Exploration skilled workforce of Ethiopian Mineral Development Share Company (EMDSC) by making a research on the Feasibility of Establishing and Managing a Mining and Exploration Institute at a vocational level. Moreover, this Institute planned to be a public TVET center in the future and solve the problem of getting vocational level workforce of the sector for similar Mining and Exploration private and public companies of the country to enhance the country's effort in developing the Mining and Exploration investment.

Studies made earlier such as Education for Mining Development in Ethiopia by C2D (an NGO engaged in Development works) 2013, have made a need assessment study and have demonstrated the urgent need for establishing a Technical and Vocational Education Center in the mining and exploration vocation as the country does not have such a center while there is a severe shortage of such a workforce in the mining and exploration sector. Based on this, this research goes further to make a detailed study which digs deeper into the research problem of assessing the feasibility of establishing and managing a mining and exploration institute in Ethiopian Minerals Development Share Company. The research has made a survey to see the feasibility of establishing such a Mining and Exploration Institute for EMDSC by identifying short and long term needs of program areas of the mining, exploration and mineralogy careers, policy and legal matters of the institute to be established, management, facility, and budgetary issues of the institute.

Technical and Vocational Education and Training is the backbone of development in any country which encompasses different types of careers where a mining and exploration field is one of the important vocations leading to a continuous and faster development. It is timely and critical to see the possibility of establishing and managing a Mining and Exploration Institute in EMDSC that can produce the vocational level work force that the sector requires in short term and the industry needs in the long term.

The research topic, Feasibility of Establishing and Managing a Technical and Vocational Education and Training center in Ethiopians Mineral Development Share Company, is so important for both EMDSC and other similar companies in the country and has two major components: the component of establishing the institute and the component of managing the institute requiring enacting, accreditation and administering the resources.

The researcher of this topic being an employee of Ethiopian Minerals Development Share Company with a professional skill of technology, has observed the existence of serious lack of vocational level skilled workers for employment as there are no training institutions supplying such type of trainees and has understood the need to conduct analysis of feasibility study to establish such an institute. As EMDSC is the largest and earliest public mining and exploration company having qualified senior staff in exploration, mining, processing and mineralogy, it would be ideal to conduct the possibility of establishing the Mining and Exploration Institute under its jurisdiction as it has the capacity to employ some of its resources to the establishment and running of the institution and also its long standing business managing capacity can be an additional benefit for managing the institute to be established. In an earlier effort of establishing such an institute made by Ministry of Mines and Ministry of Education, EMDSC's professionals were members of a Steering Committee for establishing a TVET center in the Mining and Exploration and Geoscience sector. As surveyed by this research, the challenge from Mining Companies was not very strong as it is currently and so, the effort has not yet been materialized till the date of this research.

Established in 1995, Ethiopian Minerals Development Share Company is a Public Enterprise engaged in exploration and mining of different minerals found in the country. It has also a dual mission of rendering consultancy service of minerals exploration, drilling and laboratory analysis. The company, before being formed as a share company, had a mission of operating on Gold Mining business. After the Gold mining activity was privatized, EMDSC

focused mainly on Tantalum mining which is also a highly precious metal and it has been operating in this business since then. Thus, for the last nineteen years, the Share Company's main export product has been Tantalum Concentrate produced at its mining site in Kentich, GujiZone ,Oromiya Regional State where 200 ton per year of tantalum concentrate on average is produced and exported to the international market generating at least 15 Million United States Dollar annually as seen from the company's annual sells report. The company's second GTP shows that, an expansion project is being conducted to increase the tantalum annual production capacity to 400 tons per annum. The Strategic Plan of the second GTP als shows that, a prospective study to develop Copper and new Gold mining sites and other industrial minerals is also being conducted.

Currently, Ethiopian Mineral Development Share Company is making a paradigm shift where it has launched a Tantalum Value Add Project to process the tantalum concentrate from its mine and produce value added products to be exported to the global market that can generate an increased foreign currency. For this, the company has conducted an in -house scope study on the viability of processing the concentrate by installing a processing plant to be installed near the mining area and has found the study to be technically feasible and economically viable.

As explained above, although the company has a long standing mining and exploration staff, it is faced with a succession workforce problem. For getting vocational level skilled manpower and to overcome the lack of such manpower deficiency, the company has been making an effort to develop a succession plan of which one method is to focus on an effort for establishing a TVET center to avail the necessary manpower. It is at this high time that this research has come to a reality and hopefully would be beneficial to the company in particular and to all other mining and exploration companies in general.

Any project demanding the establishment of a vocational education institute will require an analysis of," its purpose, the detail description of the process and an indication of its outcomes and how this project will be conceptualized, enacted and evaluated (Billett, 2011 p. 35).

This approach is used to conduct the feasibility study to establish the Mining and Exploration Institute (MEI) where a recommendation has been made to delineate the mission and vision,

determination of type of competencies (program areas) required by EMDSC that can satisfy itself and other mining companies and steps of enacting (legal and policy issues) and institutionalizing (management and Organization) that will pave the way of looking the feasibility of establishing the vocational institute. The outcome of the study will be to produce information to decision making bodies so that they can make a go or no go decision for establishing the institute based on questioned, surveyed, analyzed and synthesized data in the process of establishing and managing the Mineral and Exploration Institute.

As a study made by Catalyst to Development, a NON Government Organization involved in development work shows, the mining industry (large and small scale miners and traditional manual miners) is an important sector for the country, providing employment opportunities for many people. Mining also plays an important role in the development of other services, manufacturing, and up and downstream industries with strong potential for local and regional economic development and the establishment of a local vocational class. The use of modern technology and proficient management practices require a highly qualified staff. However, there is a shortage of such professionals and well-trained workers in the mining and exploration industries of the country as explained in their study. The lack of skilled workforce hampers the sector's economic development and companies therefore cannot exploit their full potential.

As Ministry of Mines (2015) depicts, Ethiopia's fast growing mining and exploration investment is characterized as,

"dramatically growing with major involvement of the private sector. The investment policy of Ethiopia is generally established under the principle and practices of a free market driven economy. The country has enacted a very competitive legal and fiscal regime that attracted many local and foreign mining companies to involve in the mineral operations starting from exploration to mining activities. The investment in the mining sector is growing from time to time and accordingly revenue generation from this sector is also increasing. The wealth that is generated from the mineral and petroleum resources is becoming a blessing for further development of the country. Many foreign and some local companies have been granted reconnaissance, exploration and mining licenses for gold and base metals, cement

and ceramic raw materials, potash, diatomite, other industrial and construction materials".

In the above quotation, Ethiopian Ministry of Mines has shown that the mining investment is expanding in the country but to my opinion it has short failed to show the immediate need for having vocational training institutions to support this accelerating business. The citation also shows the different types of minerals exploited and stages of licensing as reconnaissance, exploration and mining, which lead to the identification of the different types of specific training or program areas that the institute would address.

Information obtained from Ministry of Mines Public Relations' office shows that, Ministry of Mines is vested in with following powers and duties:-

- i. Promote the development of mining
- ii. Ensure the proper collection, maintenance and accessibility to users of appropriate data on different minerals found in the entire country
- iii. Encourage mining investment through facilitating exploration and mining operations
- iv. Regulate in cooperation with the concerned organs, the market for precious and ornamental minerals produced at the level of traditional and small – scale mining operations
- v. Organize, as may be necessary, *research and training centers* that may assist the enhancement of the development of mining
- vi. Issue licenses to private investors engaged in exploration and mining operations, and ensure that they conduct mining operations and meet financial obligations in accordance with their concession agreements (Ministry of Mines, 2015).

As noted in the above vested powers and responsibility statements, the Ministry has a mission of organizing training institute that will assist the enhancement of the development of the mining sector which is also the main research objective of this thesis and for this to happen, the Ministry has established a research and development core process unit accountable to the Minister.

Although such an objective is set by the Ministry, the process of establishing mining and exploration educational and training institutes has not yet been materialized. As shown above, the rapid expansion of mining activities would eventually necessitate the

establishment and expansion of mining and exploration vocational training centers throughout the country. The country has long developed higher level or tertiary level geological education courses in Addis Ababa University and recently Unity and Michew Universities are incorporating mining engineering courses in their curricula but the lack of vocational level training institutions still exists. The graduates coming from universities and higher institutions are not only few but are also at a higher level of knowledge, which could not fill the gap of vocational workers equipped with a practical knowledge on the mining, geology and exploration trades including relevant minerals laboratory analysis skills.

1.2 Statement of the Problem

According to TVET Strategy of Ethiopia (2008), the country has been in the state of rapid and continuous development since it sets the Growth and Transformation Plan of 2010 where it has scored a double digit percentage growth as conformed by World Bank and other monetary organization such as IMF. On its GTP strategy the government has indicated its intention of making this economy a knowledge based one by reinforcing Higher Education Institutes and revitalizing Technical and Vocational Education and Training Centers by building and expanding additional Universities throughout the country and facilitating the expansion of public and private TVET colleges and polytechnics.

The mining sector is one of the pillars of the national economy and as it is fast developing, it requires a corresponding skilled vocational level manpower. Previous studies such as a study made by Catalyst to Development has showed that a wider gap on manpower demand especially at vocational level exists as the country has not at all any vocational education and training center in the mining and exploration by the time the study was conducted in 2013.

The findings of C2D showed only the nonexistence of a mining vocational institute while there is a need of such skilled workers which implies that an initial need assessment has already been conducted. As the need still exists as observed in EMDSC, the researcher will move one step forward and will endeavor to conduct an in-depth feasibility study on the possibility of establishing a Mining and Exploration Institute by identifying program areas required by EMDSC, identifying facility conditions in the establishment process, and

identifying management and legal considerations to be considered in the process of establishing the vocational institute.

The fact that there are no vocational education and training institutes hampers the development of the mining and exploration industry. In order to overcome this critical problem, it is now high time to conduct a research for providing an answer for the main research problem, ***"Is it feasible to establish a Mining and Exploration Vocational Institute in Ethiopian Mineral Development Share Company?"***, which requires a detailed feasibility study. The problem is thus clear that the mining and exploration sector is demanding vocational level workers urgently but there are no local vocational training and education centers to supply such a vocationally skilled workforce. This thesis has tried to address this burning issue by making an in-depth feasibility study for arriving at a possible decision of establishing and managing a mining and exploration institute.

1.3 Objective of the Study

The main objective of the research is to conduct a feasibility study for arriving at a decision of establishing and managing a Mining and Exploration Vocational and Training Institute in the Ethiopian Minerals Development Share Company to fulfill its vocational level manpower demand.

To meet this objective the following specific objectives have been addressed:

- i. To assess the existence of demand of vocational level skills in EMDSC.
- ii. To determine the type of careers (program areas) required by EMDSC.
- iii. To propose a possible organization structure of the institute.
- iv. To indicate possible human resource composition of the institute's training and managing staff.
- v. To identify the legal issues in establishing the institute.
- vi. To indicate procedures to be followed for accreditation of the institute.
- vii. To indicate possible funding source of the institute.

1.4 Research Questions

The main research question of this study is stated as follows. *Is it feasible to establish and manage a Mining and Exploration Vocational Institute in Ethiopian Minerals Development Share Company?*

In order to answer this main research problem, the study will try to address the following detailed research questions:

- i. Is there a real demand of vocational level workers and does EMDSC faces shortage of such workers?
- ii. What will be the type of careers (program areas) required by EMDSC which could also be useful to other Ethiopian mining and exploration private and public companies in the long run?
- iii. What will be a possible organizational structure and managing human resource composition?
- iv. What shall be the legal issues in establishing the institute?
- v. How is accreditation to be processed?
- vi. How shall the institute be funded?

1.5 Significance of the study

The researcher being an employee of Ethiopian Minerals Development Share Company and working on mining and exploration projects has come to understand the lack of vocational level workers in EMDSC. This study is currently to be conducted as a partial fulfillment of a Master's Degree, with a research topic approved by Addis Ababa University College of Education, Department of Curriculum and Teacher Professional Development Studies. The result of the study would allow EMDSC to arrive at an informed decision for establishing a vocational institute that can be a continuous vocational level work force source to meet its business objective.

It is important to show some theoretical background that such a study can base on,

“Technical and vocational education is normally furnished within education systems, while training aimed at development of skills and capabilities directly related to work situations is often imparted by specialized governmental and public institutions

(apprenticeship services, ministries other than education, etc.) or by the enterprises themselves." (UNESCO, 1991 p. 3).

From UNESCO'S 1991 study, it can be seen that most technical and vocational education programs are integrated with ministries and some specialized institutions showing the possibility to establish the Mining and Exploration Institute in Ethiopian Minerals Development Share Company.

Furthermore the significance of having such a technical and vocational education establishment can be enhanced...

"By increasing social demand and the ever-growing technological component of human activities. In the past few decades productive activities have evolved significantly, mainly because of automation of operations, robotization, computerized control, development of new materials, more efficient usage of energy, and innovative organization patterns of production. This evolution entails a general shift from manual skills towards automated and advanced technical knowledge, and the advent of new fields of competence at all levels. In all, significant changes in the occupational profile take place continuously, coupled to expansion of technology-based activities" (UNESCO, 1991 p.6).

Such a study is thus very important and timely as it is an applied research as opposed to basic research and its outcome will help Ethiopian Minerals Development Share Company and policy makers to identify conditions for establishing a Mining and Exploration Vocational Institute. As this research is a continuation of need assessment research work on the necessity of establishing mining and exploration vocational centers made by previous researchers, the report of this study has tried to show the detailed requirements for establishing such an institute that can lead to the final establishment study of the vocational center.

1.6 Delimitation of the Study

Delimitations are choices made by the researcher, which should be mentioned that describe the boundaries of the study under consideration. It explains things that the research does not consider and why it has chosen not to do so. Also it shows the population being studied or

being rejected with reasons and also shows methodological procedures the research will use or will not use and why so (Schmitz, 2012).

This research bases itself on Ethiopian Minerals Development Share Company (EMDSC) need and aspiration. It has not entered in surveying other mining companies as the survey made on EMDSC can also be useful to similar companies since mining and exploration companies require identical vocations. Local and previously made studies are referenced in the literature review as these are more contextual to the country's situation and also some developed countries' experience has been reviewed and considered to learn from their experience in the process of managing and establishing mineral vocational education institutes.

The placement of the institute is to be in Ethiopian Minerals Development Share Company as it is the largest public mining and exploration company in the country having Gold, Tantalum, Kaolin, Dolomite, Quartz and Diatomite mining experience which makes it ideal for establishing and managing the anticipated institute.

Although Earth Moving machines operators are important in the mining and exploration field such programs can be covered by other vocational training schools and colleges such as vocational training centers providing automotive and driving programs and thus this study has not considered the analysis of such skills.

1.7 Limitation of the Study

Limitations are influences that cannot be controlled by the researcher. These are the shortcomings and conditions that place restrictions on the methodology and conclusions (Schmitz, 2012).

The nature of the main research problem being a descriptive educational research requires a mixed method of enquiry and the study has to employ both qualitative and quantitative methods and due to an inherent characteristics of qualitative analysis, the findings made on questions and interviews may not depict the exact or real condition of the research problem leading to some percentage of uncertainty on the results. Thus, the sample size considered, bias of respondents and researcher, time and budget constraints and inherent sampling

errors of the survey might be the limitations of this study that can bear some uncertainty on the conclusion and findings of the study.

1.8 Operational Definition of Terms

Institute means a vocational level training center with a certificate of competency award.

Vocational Training is providing education and training in a specific skill towards gaining or creating job.

Feasibility Study is making a research or study for assessing the possibility of realizing or not realizing the establishment of a vocational institute.

Accreditation means the granting of a certificate of competence by Federal TVET Agency, to an institution providing technical and vocational education and training evidencing its fulfillment of the basic and additional requirements relating to the specified training standard to enhance the capacity of EMDSC.

Accrediting Authority means the Federal TVET Agency in respect of the issuance of pre-accreditation licenses and accreditation certificates.

Training means any technical and vocational education and training provided through EMI leading to a certification or diploma.

Public Training institution means a training institution as EMI of this study established with the funds of and operated under the guidance and control of the Government.

License means a pre-accreditation license or an accreditation certificate issued pursuant to Proclamation No.391/2004.

Occupational Standards means duties and tasks determined to be performed by employees.

1.9 Organization of the Study

The organization of a study shows in what sequence the study and its findings are presented so that the readers or beneficiaries of the study can go through the study step by step. The first part of the study shows the abstract which will be a short presentation directed to a more

general audience and to those who may not want to read the details of the research work due to lack of time or interest.

The next section of the research is Chapter One which deals with the background and statement of the problem, rationale, limitation, delimitation, objectives and the research question. The purpose of this section is to prepare the reader to understand the structure of following chapters of the research work.

Next comes Chapter Two which refers to the review of related literature section. A standard model found in the literature called Feasibility Design Study Model (FDSM), is presented to be used as a framework of reference for conducting the research. Also, from the researcher's own perspective, a suitable model of study is developed and literature reviews related to each section of the model are referenced.

Chapter Three shows the data collection methods and analysis with a strategy of the research work. It shows also the type of questionnaires and interviews and also the organization to be surveyed in order to find a solution to the research problem. This section also shows in detail how the sampling is made, the sample size considered and the data analysis technique followed. Also organization of data by tables, Bar Charts, coding techniques, frequency and determination of measures of central tendency as mean, is proposed in order to come to a better analysis of each variable to better answer the research question.

Next comes Chapter Four where data analysis is extensively made on surveyed and interviewed data. Finally comes Chapter Five where the research has drawn a concluding remark readdressing the research topic and coming to the research findings. A call to next development of the research work is included in the conclusion as the work of this particular research would not be exhaustive in the process of establishment and management of the Mining and Exploration Institute.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

This research is an educational feasibility study to assess the possibility of establishing a vocational training institute that can serve the needs of EMDSC and other similar companies by establishing a vocational level Mining and Exploration Vocational Training Institute. To conduct the study a framework of making a typical feasibility study is required which guides the researcher in developing the study. This literature review section provides the theoretical background as a guide to develop the feasibility study.

2.1 Feasibility Study

Three main commonalities in defining feasibility studies could be stated as: Feasibility studies are performed before commencing with an endeavor; Feasibility studies are designed to answer the 'Go/No Go' question (whether or not to proceed with an endeavor); and Feasibility studies provide insight in the probable success or failure of a prospective endeavor (Claase, 2012).

Feasibility studies are a widely dispersed research tools. The aim of any feasibility study is to examine and/or evaluate the possible future success or failure of prospective endeavors Palvia and Palvia as cited by Claase, 2012. An endeavor is any future project or organization that is studied for its prospective feasibility.

From my own experience working on different feasibility projects, feasibility studies have different stages where the first one is the prefeasibility analysis which demonstrates the general practicality and the endeavor being economical. Mostly this stage of feasibility study is termed as a scoping study. Then comes a more detailed feasibility study showing the detail material, financial and managerial requirements of the project with profitability indicators. Banks can use this study for lending money as it shows the details of the profitability which sets its name, ' Bankable Feasibility Study (BFS). This research work is thus assumed to address the first part of the feasibility study with the main research question. "Is it feasible to establish and manage a vocational institute for Ethiopian Minerals Development Share Company?"

The current research focuses on the feasibility of establishing a Mining and Exploration Institute relevant to Ethiopian Minerals Development Share Company, a public business organization engaged in the exploration and development of minerals found in the

country. Thus literatures related to the design and development of feasibility studies especially to the feasibility of educational studies are important tools to be employed in this research.

Among many different models of feasibility design, the Feasibility Study Design Method (FSDM) developed through a Grounded Theory approach by Marcella Claase in her research work for a Master's thesis at the University of Twente in Netherlands is used as a framework of feasibility study for this research as this researcher finds it clear, easily understandable and suitable to the research in question.

The FSDM intends to clarify the process of feasibility study development for both researchers as well as practitioners. The method consists of six stages; determine the prerequisites, identify target audience's information needs, specify the properties of the endeavor, determine the requirements for feasibility study reporting, search for relevant information and finally present feasibility study results (Claase, 2012).

The FSDM can be used as a roadmap, making the process of performing a feasibility study more structured and thereby potentially optimizing its outcome. By using , such a method, I could make the research transparent , save time and make sure that all necessary topics are addressed and not forgotten.

By documenting every stage in detail and translating this into the presentation of the feasibility study, the entire process becomes transparent for all parties involved.

2.2 Feasibility Studies as a Form within Knowledge Management

The knowledge management field focuses on ways to create, identify, distribute, represent, and enable adoption of knowledge by Nonaka as cited by Claase (2012). To understand the concept of knowledge, it is important to identify the distinction between data, information and knowledge. According to Suministrado as cited by Claase (2012), data are trivial and meaningless outputs from any effort. Outputs transform into information when relevance or a goal is given to the data. Only when information is being used for decision making of any kind, it becomes knowledge (Suministrado, 2010). Feasibility studies are intended to provide knowledge. Based on this knowledge, the eventual go/no go decision is made. The FSDM demonstrates how to systematically transform an idea for a prospective endeavor, through the stages of data collecting and

information identifying into knowledge on which a feasibility decision about the potential success or failure of the prospective endeavor can be based. These properties of the feasibility design process fit seamlessly in the knowledge management field.

In 1991, Nonaka as cited by Claase (2012) already stressed the strategic importance of decision making on the subject of developing, supporting or proceeding with an endeavor within the field of knowledge management. Within this field, feasibility studies are regarded a necessity in several methodologies Staab as cited by Claase(2012).

2.3 Stakeholder roles of feasibility study development

Within the development process of feasibility studies two stakeholder roles are identified, the commissioner and the researcher. It is to be noted that in this research the commissioner refers to EMDSC management and the researcher is represented by this particular researcher conducting the research.

2.4 The Feasibility Study Design Method (FSDM)

According to Claase (2012), the six-stage approach method for designing feasibility studies is presented as follows:

First Stage: Determine the prerequisites of the feasibility study

Before commencing with the process of developing the feasibility study, a number of questions must first be answered; ‘*What is the research topic of which we want to test the feasibility?*’, ‘*why is the feasibility study being conducted?*’ and ‘*for whom is the feasibility study designed?*’

These questions form the prerequisites for the feasibility study. Without this knowledge it is not possible to design an efficacious feasibility study Mortimer and Vancas as cited by Claase (2012). It is to be noted that the current research is to respond to the shortage of vocational level skilled manpower demand of Ethiopian Minerals Development Share Company (EMDSC) as there is no any vocational institute that can address this issue by making a research on the Feasibility of Establishing a Mining and Exploration Vocational Institute for EMDSC.

Specify endeavor

When engaging in the process of designing any feasibility study, it is vital to start the process with defining the endeavor in question Mortimer as cited by Claase (2012). It is essential to set a scope of the endeavor and its stakeholders in order to provide clarity on the main topic of the feasibility study. Vague and/or overly broad or narrow limits to the scope, will affect the results of the feasibility study in a negative manner.

Identify goal of feasibility study

Next to the specifications of the future endeavor, the goal of the feasibility study itself should be identified. Identifying the goal of the feasibility study is important as each goal requires an appropriate and logical approach to the feasibility study reporting. Research directions aid the researcher in evaluating and prioritizing the pieces of information of the feasibility study report. They greatly enhance the possibility of the feasibility study being satisfactory Bowen as cited by Claase (2012).

Second Stage: Identify the target audience information needs

In order to design an appropriate feasibility study, the information needs of the audience, with respect to feasibility studies, must first be identified. Brockman as cited by Claase (2012) states that a feasibility study is merely successful when it achieves the information needs envisioned by the target audience.

For own audience, emphasis is placed on collecting information about implementing and working with the envisioned endeavor which is this research's case as the researcher is an employee of EMDSC with full knowledge of internal needs. .

Managers have similar information needs as users. Managers would like information on (in order of importance) operational factors, meeting requirements, impact on organization, economic factors, stakeholder factors, management support, technical factors, security concerns and legal concerns. The next stage in developing the feasibility study is to specify the quality measures of the prospective endeavor.

Third Stage: Specify the quality measures of the prospective endeavor

The quality measure 'acceptability' measures the extent to which the future endeavor is positively regarded by all parties involved Bowen as cited by Claase (2012). 'Demand' on the other hand, measures the need for the endeavor within the respective fields. If a

sufficient market demand for the endeavor cannot be obtained, the endeavor will not be feasible. The measure 'Implementation' is about the extent to which the endeavor can be realized in an unstable environment Ries as cited by Claase (2012). 'Practicality' refers to the quality measure indicating whether or not the endeavor can be realized, to what extent and the factors this depends on. Whereas, 'Adaptability' measures the ability of the endeavor to function in a different or changing environment. 'Integration' focuses on the extent to which an endeavor can be integrated into some other (new) endeavor and/or environment Bowen as cited by Claase (2012).

The quality measure 'Expandability' assesses the degree to which the proposed endeavor is feasible for a bigger or different group of users .

'Generalizability' is a measure to examine the degree to which an endeavor can be generalized to a different setting.

Obviously here as elsewhere, one size does not fit all. It can occur that none or more than one quality measure is desired. As explained before, the FSDM allows for flexibility in the choices the researcher has to make. For this research work the quality measures of acceptability, demand, practicality and expandability are important measures to be considered.

After ensuring the prerequisites for the feasibility study, identifying the information needs of the target audience and determining the quality measures of the prospective endeavor it is time to analyze and determine the actual requirements for feasibility study reporting.

Fourth Stage: Determine requirements for feasibility study reporting

The researcher should prioritize the information reported in the feasibility study to adequately meet the needs of the target audience and/or the commissioner. The central question at this stage is 'What topics of information should be addressed in the feasibility study?' In the model of FSDM, seven prime topics of information within feasibility study reporting are identified: (1) The stakeholders, (2) Overview of the prospective endeavor, (3) Field specific factors, (4) Operational factors, (5) Financial factors, (6) Legal concerns and (7) Testing Ries as cited by Claase (2012). In order to create an effective feasibility study these topics should at least be covered. The extent to which the topics should be covered depends on the target audience and their information needs, the goal of the

feasibility study, the quality measures of the prospective endeavor and of course the wishes of the commissioner. Improper or missing information will have a negative effect on the reliability of the results and conclusions of the feasibility study.. This will influence the outcome of the go/no go decision

Fifth Stage: Search for relevant information

When searching for information the researcher can uncover unexpected, but highly relevant topics, other than the ones he/she has pre-defined in the above stages. This is why the search for information has an iterative nature. The researcher is supposed to continually go back and forth, when new topics emerge. This may even lead to revisiting the earlier stages 1, 2, 3 and 4 to devise an even more feasible endeavor Evans as cited by Claase (2012).

Sixth Stage: Present feasibility study results

In stage six the researcher engages in the process of analyzing, structuring and representing the information obtained in the stages 1, 2, 3,4 and 5. The researcher should continue to make an iterative process until either the prospective endeavor seems feasible or the prospective endeavor seems not feasible, despite all the alterations the researcher has made within the boundaries set by the commissioner. Based on this knowledge the commissioner will make the go/no go decision on the prospective endeavor.

About the presentation of the feasibility study Haramis as cited by Claase (2012) states that the introduction of a feasibility report must consist of the endeavor title and scope, the endeavor development team members, the reason the endeavor is founded, a brief summary and a determination of the boundaries set by the commissioner.

Study Model

A model is a mental representation of something to be prepared or produced on a paper usually called blue print. To make studies focused on an organized direction and to indicate the approach used to realize the objective of the study, I have developed one of such models as shown in figure 1. This model is designed to guide and make an organized study on the possibility of establishing and managing a Mining and Exploration

Institute for Ethiopian Minerals Development Share Company but can also be used as a feasibility study model for future research works.



Figure 1 Vocational Institute Managing & Establishing Model (Own Work)

From the model it can be seen that there are five analysis spots each having their own attributes leading to the realization of the central idea, EMDSC's Mining and Exploration Institute. Moreover the different process are interrelated to one another as each spot has an effect on the other to accomplish the major objective of the thesis, establishing and managing the Mining and Exploration Vocational and Training Institute for EMDSC. A proper survey, analysis and synthesis of the four outer circle activities: Identification of Target Customers, Program Areas, Legal and Policy Issues and Internal Management Issues would contribute a decision making tool for the realization of the central idea of the model, the Feasibility of Establishing and Managing a Mining and Exploration Vocational and Training Institute for Ethiopian Minerals Development Share Company. Properly fulfilling the tasks that each outer circle spot requires will meet all the objectives set in

section 1.3, which leads to the success of the study as a whole. Comparing the FSDM frame work with this model ,one sees the similarity of both approaches with the exception of the detailed approach and the inclusion of reporting template of an endeavor provided by FSDM of Mercella Claese..

2.5 Complexity of VET systems

Although VET is used to describe a type of education and training, what constitutes VET and how it is delivered varies across countries (Grubb, 2006) . Among the issues which are treated differently by countries are: definitions and status of VET, the balance between academic and practical content of VET programs, where VET is provided - in an institution such as EMDSC, the type of training delivered or needed and the flexibility of programs to meet market need. Grubb(2006) points out that it is common to distinguish VET in terms of initial preparation and training for the labor market, upgrade training for employed individuals and retraining for those moving to different departments. From the above theoretical approach this feasibility study will only consider initial preparation and training to become Mining and Exploration vocational workers.

The boundaries between the ‘education’ component of VET and the ‘training’ component are often imprecise. In many places ‘training’ refers to short-term job training programs to retrain or upgrade skills, and ‘education’ is seen as a longer duration exercise with broader implications for knowledge as well as skills. The boundary between education and training is becoming blurred further as VET may well include some ‘education’ component so even those training in auto-repair work and dealing with complex equipment have some broader reading and information skills to enable them to cope with the technology.

Some countries’ experiences show that there may be facilities totally dedicated to VET while in others, there may be some spaces in buildings used for other purposes which may be used for VET. A question may be to what extent are VET dedicated buildings sufficiently flexible to meet changing demand for courses, what kinds of spaces do they have? For example, the extent of generic spaces such as classrooms which can be used to teach anything as compared to ‘specialist’ teaching space. Grubb(2006) also raised the issue that VET teaching takes place in a variety of settings from specialized workshops to classrooms. The extent to which VET training is “hands-on” varies as it is interpreted differently between trainers.

2.6 Institution Building - Planning and designing VET facilities

Training institutions' buildings and facilities serve a variety of purposes for students and the surrounding community, most importantly to develop knowledge and skills of learners. Yet, the impact of the physical environment on learning outcomes has been insufficiently explained and examined. However, some researchers have made connections. For example Lipman (2005) has found that curriculum and facility design are related, and the findings demonstrate that the physical learning environment has an influence on students' social and scholastic behavior. A research that has been conducted which examines the links between school infrastructure and student performance is at best unquantifiable observation (Marmot, 2006). Even less research is focused on space issues in vocational education and training (VET) facilities and skill attainment.

The educational infrastructure for VET programs also serves a more specific purpose in that it prepares students to enter the world of work with a set of specific technical skills. While the issues of facility planning for technical schools are not markedly different from those in other academic facilities, there are other challenges with regards to the maintenance and improvement of specialized equipment that is needed for instruction (Cutshall as cited by Lippman, 2005). Spaces for VET have distinct requirements for constructing the infrastructure, which include equipment, room size and providing resources for a range of activities, in addition to providing conventional classrooms for academic instruction. Spatial and equipment needs vary depending on the country job market demands, curriculum requisites and programs, funding and organization.

This review looks at the issues of planning and designing VET facilities under five headings: learning spaces, technology, maintenance and accommodation, community links and funding schemes. It considers the layout of learning spaces; integration and management of technologies; ensuring satisfactory environmental conditions; the community relationship to the building; and the funding structure. Accompanying each of the five areas are examples of good practices in renovated or newly constructed VET facilities that exemplify the theme. Buildings are often not constructed, budgeted or retained to adapt, however, to remain functional they should change and be redefined (Wolff as cited by Lippman, 2005). Since VET facilities are sizeable financial investments to construct, sustain and refurbish an element of flexibility is necessary to maximize cost-effectiveness and the buildings' educational value (Cave, 2008).

Another important cross-cutting theme is the link between VET and industry as industry is an important source of funding, in particular where the costs of providing, updating and maintaining equipment used in training courses may put excess strain on the funding resources of VET providers. From a broader VET perspective, industry also can provide valuable training resources in terms of knowledge and skills needed to carry out the training.

Thus, in establishing the anticipated mining and exploration institute considerations will be made to investigate the additional building requirement and the possibility of using current facilities as workshops, library and laboratories available in EMDSC.

2.7 Integration of technology for training

The integration of technology is an essential component to augment training programs, yet constant advances make this difficult to fund and preserve. For vocational studies, the exposure to and experience with modern and advanced technologies easily translates into marketable skills when entering the labor force. The inclusion of learning technologies will supplement the students' experience by giving direct access to broad resources, diversify skills and develop one's adaptability and creativity (Andrew, 2011). Technology is divided into two categories and defined as digital (e.g. the Internet, wireless local area network communication, intranet) and mechanical or industry-specific (e.g. drilling machines, exploration equipment, agricultural equipment, automotive repair tools). Both digital and mechanical technologies require that trainees and instructors remain proficient with the latest trends, methods and equipment. Spaces for learning technologies will remain more cost-efficient and better serve user purposes for longer periods if designed flexibly, rather than expressly for technologies with uncertain longevity.

Computer literacy and competency are becoming normative job criteria, and digital technologies need to be incorporated in VET infrastructure design to diversify and maintain skill quality and provisions for information and communication technologies do not demand a large amount of physical space (Temple as cited by Andrew, 2011). The increasing reliance on technology and resulting improvements do require that spaces be flexible in their design to include and allow for new technological methods and devices. To maximize infrastructure utility, appropriations for digital technology need to be organized in a way to maintain and support rapidly changing advancements and learning space needs.

Rapidly changing industry technologies render equipment and machines outdated relatively quickly compared to the expense, which demands that vocational and technical schools adapt just as quickly. The need for hands-on exposure to the latest technologies and equipment raises the possibility of creating partnerships with local companies and businesses, which improves student access to and training with current industry technologies and consequently enhancing educational outcomes.

2.8 Synopsis of the Development of Industrial Vocational Institutes in Ethiopia

Feasibility study of establishing a vocational institute in Ethiopia is not a new phenomenon as the Government has already established different industrial vocational institutes to support the rapid development of the economy. Following are some of the institutes already established, which this thesis work has considered as lesson learned especially in the organizational, legal, policy and budgetary issues in assessing the feasibility of establishing a Mining and Exploration Institute, which is also as vital as the others in transforming the National Economy.

2.8.1 The legal conditions of Textile Development Institute

The Council of Ministers by its regulation No 180/2010 gave directives to establish a textile institute to support the development of textile industry which led to the establishment of Textile Industry Development Institute in the country (Federal Negarit Gazeta, Council of Ministers Regulation No 180/2010).

While the institute has a wider mission of developing the textile industry, its education and training mission is to build technical capacities and enhance the sector's competitiveness on global level by providing the required skillful human resource through appropriate training and fulfilling the following detail objectives:

- i. Conducting technical support in collaboration with Technical and Vocational Institutes in the development of required skills
- ii. Developing curriculum for colleges
- iii. Providing training to TVET school teachers, textile and garment firms, tailors, garment finishing experts on technicians on textile, garment technology, machine maintenance and quality assurance.

It can be seen that the realization of such a textile industry vocational training institute has required the identification of different trades and skills, legal conditions, technical support conditions and short term training provision of the already working employees of the sector. It can also be observed that such an institute requires a decree by Council of Ministers for its establishment.

2.8.2 Food, Beverage and Pharmaceuticals Industry Development Institute and Chemicals and Construction Materials Development Institute

In a similar manner, the government has given directives to establish Food, Beverage and Pharmaceuticals Industry Development Institute and a Chemicals and Construction Materials Development Institute and at the time of this study it is discovered that the two institutes have been established legally and the institutes' management bodies have already been functional and are further developing their respective institutes. It is also noted that the Meat and Dairy Technology Development Institute, now under the Ministry of Agriculture (MoA), will be merged with the Food, Beverage and Pharmaceuticals Industry Development Institute once it becomes operational (Leykun, 2013).

2.8.3 Leather & Leather Products Technology Institute (LLPTI) and Ethiopian Metal Industries Development Institute

The Ethiopian government has already established the Leather and Leather Products Technology Institute (LLPTI), and the Ethiopian Metal Industries Development Institute (EMIDI), to help the development and competitiveness of their respective sectors.

Following the trend of establishment and development of the different public institutes shown above, it can be seen that Ministry of Mines would be the responsible organ to present an official request to the Council of Ministers for establishing the Mining and Exploration Institute to develop the sector. Similar to all industrial institutes, the Mining and Exploration Institute would have a vision of supporting the development of the mining and exploration industry in addition to providing vocational training to skilled and semi-skilled level workers that the sector demands. But this study will not include the details of programs related to giving an engineering support to the mining companies but rather will concentrate on the provision of vocational skill requirements from Level I to V. However, the vision of the Mining and Exploration Institute will in the future include the provision of

providing a technical and engineering support together with a research and development component.

Organizational structure of functional institutes such as Leather Products Technology Institute is used as a benchmark of setting up the organization structure of the Mining and Exploration Institute as indicated in the study model of this research that "internal management issues" are one of the parameters to be developed in the feasibility study in addressing the possibility of establishing the institute.

2.9 Previous Study on Mining and Exploration Vocational Education and Training in the country

An exploratory study on the status of Education for Mining Development in the country was conducted in July 2013 by a Canadian Non-Government Organization called Catalyst to Development, which showed that the country lacks local experienced exploration geologists, diamond drill rigs and skilled workers in diamond drilling and laboratory facilities. According to C2D one of the main factors negatively affecting the development of the mining and exploration sector is the lack of skilled workers both in the sub fields of geology and mining. The study further illustrates,

.... Although the mining sector is among the first development priorities of the GTP, the TVET institutions have not started the design and development of a specific training offer for the mining sector. However, the government has a plan to expand the operation of TVET institutions in areas involving mining activities. There are TVET institutions offering training possibilities for occupations that support the mining sector, such as: driver, automotive body repair, metal engineering, plumbing, driller, surveyor, and machine operators. However, these are not designed to specifically meet the need of the mining sector. They are rather meant to meet the needs of the industrial and agricultural sectors that received priority by the government.

The demands and the expectations of the mining sector and the capacity of Ethiopian institutions to fulfill these demands create gaps. This study has identified three gaps that correspond to the current situation (Education for Mining Development in Ethiopia, Background Study, 2013)

Of these is the gap directly related to this thesis research question which is the second gap: addressing the shortage of a vocational local skilled force:” At the technical training level, it must be noted that the TVET institutions do not yet offer programs catering specifically to the technical occupations that are related to the mining sector. Moreover, there is no specific training for the artisanal miners” (*Education for Mining Development in Ethiopia, Background Study, 2013*)

The background study made by C2D showed that there is a gap in mining and exploration vocational skill and there is a need to develop vocational training institutes in the mining sector, which supports the research problem of this study, feasibility study for establishing a Mining and Exploration Institute in Ethiopian Mineral Development Share Company.

2.10 Mining and Exploration Career

Understanding the minerals mining and exploration career would lead to the proper identification of the vocational careers to be developed in the institute. This regards the "Program Area" section of the study model as presented in section 2.2 the study model.

For this, the study has tried the experience of following countries which have a well-grounded experience in the field of minerals exploration, minerals prospecting, resource evaluation and drilling, which are career and program areas requiring curriculum development and teaching resources to be considered for the institute.

2.10.1 Australian experience

As this thesis is addressing a complex issue of establishing a Mining and Exploration Institute it would be wise to see the experience of developed countries which are well known in the mining and exploration sector of which Australia is one of them. It is also a well-known country not only in the development of its mining industry but in the development of the vocational education and training sector too and is an ideal country for benchmarking Vocational Education and Training activities.

The Australian Minerals Industry has a proud tradition of producing the country's brightest, well trained and most sought technical and business professionals. The Industry offers an extensive range of career pathways from the traditional mining

disciplines to the core business professions. Minerals' professionals, supervisors, operators and technicians enjoy great training, attractive remuneration packages and career advancement opportunities (Mining Career.com, 2015).

From this ,it can be learnt that establishing a vocational and training institute, as this thesis endeavors to do so, can be a prelude to a rewarding profession and a path to higher education of the mining and exploration career leading to core professions, skills related to mining, exploration and minerals laboratory analysis.

Demand for Skilled Workforce

In Australia

..... There is a growing demand for skilled, safety-conscious people with initiative and team-working skills across the industry. Other personal attributes required include the ability to work in a team, communicate ideas, and the resourcefulness to deliver results in remote, challenging situations. Pathways into the industry can commence through VET qualifications, university and existing employment in a relevant industry. The Australian Qualification Framework (AQF) has been adopted by the industry (Dixon, 2010 p. 12).

From the above explanation, one can see the competencies required for the vocation.

Australians have engaged their mining industries in the development of the qualification framework which leads to make a similar effort in developing the competencies, program areas accreditation issues of the Mining and Exploration Vocations for this study by engaging local industries.

Australian Industry Occupational Overview for mining career looks as:

- i. Driller, Drillers' Assistant,
- ii. Certificate II in Mining Field/Exploration Operations
- iii. Certificate II in Drilling Operations
- iv. Certificate III in Drilling Operations
- v. Certificate IV in Drilling Operations

There is an adequate number of training providers but there is a question as to the quality of the training and assessment being provided by some of the center. In Australia the

quality of training is paramount and the validity and integrity of the assessment process is critical.

In Western Australia the majority of off-the-job drill training is provided by three organizations: Central Institute of Technology (CIT), the Australian Drilling Industry Training Committee (ADITC) and Drill Skill. CIT is a large public training provider which offers the pre-employment qualification, i.e. the Certificate II in Drilling Operations, via a twenty-week, 22 hours per week training program (Dixon, 2010 p. 17)

It is also observed that pre-employment courses in the mining sector categorized as Certificate I in Resources and Infrastructure Operations and Certificate II in Resources and Infrastructure Work Preparation are pre-requisite for an initial employment in the mining sector. This research has also included Minerals Resource and Infrastructure Work training categorized as Level I (see Fig 2, page 43)

In a similar manner pre-employment courses for the drilling sector are found to Certificate II in Drilling Operations and Certificate II in Mining Field/Exploration Operations.

From Australian experience, we can see that vocational skill levels focus on drilling, exploration and maintenance skills ranging from entry, assistant and operator level where the pre-employment qualification requires a certificate II qualification level which takes about 20 weeks to complete with a minimum of 22 hours per week. It is possible to envisage such articulation for the Mining and Exploration Institute under question.

2.10.2 Canadian Experience

Another highly developed country especially with the development of Mining Industries is Canada. Many careers exist within mining operations such as: blasters, diamond drillers, excavators, prospectors, and mining engineering technologists/technicians and there are many institutions capable of providing such vocations.

Many Vocational Institutes provide introductory courses such as an Introduction to the Mine Life Cycle, Mine Geology, Mineral Processing, Underground Mining Methods, and Mine Safety, which require a total of 180 hours to be covered in six weeks. Course delivery will have a theoretical as well as practical component. Students will be able to experience many of the practical specialties of the industry and from this they would be able to select

those industry professions and occupations that best suit their personal profile and skills. Upon completion, students will be able to confidently consider enrolling in the 14-week Underground Miner Training Program. (2015) which is a more advanced vocational course compared to surface mining.

There is also a continuing education program providing Certificate in Mining Studies (CMS) which is designed for those seeking professional development, career advancement, cross training in different disciplines, or just an introduction to mining. Such a continuing education program is important for vocational development of Ethiopian Mining skills but will be considered as a long term objective of the Mining and Exploration Institute to be established.

From the above explanation, it is seen that to be an underground miner it takes about 20 weeks in Canada. Depending on the experience of Canada and Australia and considering the efficiency of our performance in running institutions an average of 40 to 45 weeks of duration may be applicable to our situation for surface mining vocations. It is to be recalled that underground mining has not yet developed in the country.

2.10.3 Experience from Africa

In assessing the skill condition of African countries through the internet , I have observed that the skills gap that South Africa, Mozambique and Namibia face in the mining sector is addressed by a special program called Further Education and Training (FET) colleges and it is observed that every mining operator in these countries is encouraged to have a FET Mining School in cooperation with the principal mining investors (Cawood, 2013).

Regional governments are stepping up activities, through FETs, to assist with the supply of artisan-type skills that are required for mechanization. This will not only assist in securing the future of these countries mining industry but will also support the entire economy because of the transportability of such skills to other sectors of the economy (Cawood, 2013). It is my opinion that Eastern African countries like Ethiopia, Rwanda and Congo which have a huge mining potential should learn from the Southern African countries in expanding practical training for artisan miners and technical personnel in the mining career. Similarly, the mining companies found in Ethiopia can also be coordinated and encouraged to form further training centers that can train youths completing or dropping from schools at least at a lower level skill. This is a variation to establishment of a formal TVET center as

this study is considering. Thus ,it is also possible to organize such type of colleges as an alternative choice.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 Research Design

According to Creswell (2003), in a research there are three framework elements being considered which are philosophical assumptions about what constitutes knowledge claims, general procedures of research called strategies of inquiry and detailed procedures of data collection, analysis, and writing called methods. Qualitative, quantitative, and mixed method approaches frame each of these elements differently (Creswell, 2003). The research problem that I am trying to find a solution is a kind of issue that can be addressed using both qualitative and quantitative data types (mixed data approach) as it is a feasibility study of establishing and managing a vocational training institute that requires a survey and an interview discussion on feasibility parameters. The research has relied on opinions of different officials who have link to the establishment and operation of the training institute such as EMDSC management personnel for establishing and managing the institute, Ministry of Mines high officials (for strategic leadership and financing issues) and Federal TVET Agency regulating bodies. Such opinions, advices and suggestions can be obtained using qualitative method of data collection. In addition to this by using purposive sampling core employees of EMDSC whose number is 374 were selected as representative population. From this population, a sample was drawn and a rating scale survey was made to determine program area prioritization. The rating scale analysis was treated statistically and average and percentage type presentation was made to identify prioritization of program areas or vocational skills.

Thus from the nature of my research problem, which tries to study the actual condition of EMDSC and tries to recommend a suggestion on the establishment of a vocational training center, I found it appropriate to use both qualitative and quantitative research strategy that includes both quantitative and qualitative data collection and analysis. As to the method of data analysis, the qualitative data was analyzed on its own and similarly the quantitative data was analyzed separately using average and percentage tools. The information obtained from the quantitative data was used to set up a prioritization of the programs to

propose feasibility options and the information obtained from the qualitative data helped to portray the general picture of the institute with its organizational and legal conditions to be considered. The final results of the feasibility study will help EMDSC's management to make an informed decision.

3.2 Research Method

As Creswell (2003) indicates the third major element after knowledge and strategy that goes into a research approach is the specific methods of data collection and analysis. It is useful to consider the full range of possibilities for data collection in any study, and to organize these methods by their degree of predetermined nature, their use of closed-ended versus open-ended questioning, and their focus for numeric versus non-numeric data analysis. The choice of methods by a researcher turns on whether the intent is to specify the type of information to be collected in advance of the study or to allow it to emerge from participants in the project (inductive against deductive approach). Also, the type of data may be numeric information gathered on scales of instruments or more text information, or a recording and reporting the voice of the participants. In some forms of data collection, both quantitative and qualitative data are collected (Creswell, 2003 p. 17).

For this research which tries to collect information based on target customers, EMDSC employees and management and stakeholder organization as Ministry of Mines and Federal TVET Agency both qualitative and quantitative method of research becomes ideal to arrive at the feasibility decision.

Although the nature of this research problem is iterative and being a research as a partial fulfillment of a Master's Degree award leads the study to be conducted at one time as opposed to longitudinal surveys conducted at different points in time in order to study changes of research variables over an extended period of time. Thus, a cross-sectional survey has been used that studies the sample of a population under consideration at a single point in time. This research has employed rating scale inquiry, open ended and structured interviews to collect opinions about the organization, financing and legal requirements of the institute, to forecast on the feasibility of the vocational institute that EMDSC requires and come out on a decision of formation of such a training institute to fill the skill gap. As a whole, opinion and views such as course programs ratings, organization,

funding mechanism, legal and policy issues, accreditation and level of certification of the trainees has been studied using rating scale inquiry and interviews.

Both structured and open ended type of questions has been used in the interview. Open ended questions allow for a greater variety of responses from participants. In my opinion, due to the nature of this research, being analysis of feasibility study for a particular organization, both structured and open ended type of questions are more appropriate to determine the detailed requirements of establishing the training institute.

3.3 Sources of Data

Data refers to the information that is gathered to answer the research question. Two types of data are used in this research: Primary data and Secondary data. For the survey part of the research the primary data source is the sample of EMDSC's employees who provide a rating scale response on urgency of program areas that a training program should be established. For the qualitative type of data that is needed for this research the sources are: EMDSC' management members, Ministry of Mines Research and Education Officials and Federal TVET Regulating Bureaus, and one of the newly established Leather Vocational Institute (LLPTI) which are purposively selected and interviewed.

As a secondary source I will use documents related to my research work such as the Federal Proclamation Law , National TVET Strategy, EMDSC's minutes of meeting and down loaded documents showing the experience of Australia and Canada which have a well-established vocational training institutes specially in Mining and Exploration sector.

3.4 Data collection Instruments

There are many types of data collection instruments to consider in conducting a research be it for a thesis as a partial fulfillment of a course in a University or an actual research work emanating from real world. Two data collection instrument types used for this study are questionnaire and interviews.

3.4.1 Rating Scale questionnaire

Samples of employees were asked to rate the different fields of specialization that I have provided referencing EMDSC's current demand of vocations. Respondents were asked to

rate the degree of necessity of the vocation by selecting rating scales ranging from 3 to 1. By the rating scale point allocation, 3 would represent highest necessity, 2 represents an interest somewhere in the continuum and 1 would represent lowest necessity.

3.4.2 Interview

In this research structured and open ended interview questions were used to collect data using written interview questions. Top management members of EMDSC, Federal TVET Agency, Ministry of Mines senior official and Leather Technology Institute managing director were questioned by organizing interview questions about policy and legal matters, overall feasibility of a mining and exploration vocational institute, accreditation and accountability conditions. Upon reading the responses and taking notes of the in depth interview answers one by one, analysis was made to generate information about the feasibility of the institute.

3.4.3 Document survey

Documents obtained from EMDSC, Leather Technology Institute, Vocational Education Establishment Proclamation Law and down loaded documents on Australian and Canadian TVET System on Mining and Exploration were surveyed to generate information about the institute's building size, organizational setup, manpower requirement and funding conditions and competency details.

3.5 Population, sample Size and Sampling Technique

Sampling refers to the selection of people to participate in a research project, usually with the goal of being able to use these people to make inference about a larger group of individuals. The entire group of people that the researcher desires to learn about is known as the population, and the smaller group of people who actually participate in the research is known as the sample (Stangor, 1998 p. 100) .

According to information obtained from Personnel Department of EMDSC, currently there are 945 classified employees out of which 140 are professionals, 180 are semiprofessionals and 625 are nonprofessionals. Out of the total work force, 374 are core skilled workers, employees with exploration and mining skills, which makes the core group to be 40% of EMDSC's employees. Thus the relevant population of this study becomes to

be 374 and taking at least 10% of this determines the sample size which becomes to be 37. For contingency purpose 40 respondents were surveyed and with the help of Mining and Exploration Process Owner Head the survey was randomly distributed to 40 core business workers and collected for analysis.

3.5 Method of Data Analysis

In this study qualitative method of data analysis is employed where interview questions are analyzed by focusing on key terms that the interviewee have responded and interpreting the results to come to a certain conclusion about the variables of the research. Measures of distribution as mean and percentage are employed to determine the preference of different competency skills as required by EMDSC's core employees.

CHAPTER FOUR : PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

As explained in the design section of the research work, this study has used both qualitative and quantitative data in order to have a better outlook of the feasibility study. In this analysis rating scale and interview questions data were used.

4.2 Characteristics of Respondents

The interview question is supplied to five EMDSC top management staff who are all male and having more than fifteen years of experience working in the company. The rating scale questions were given to forty core employee workers out of which eight were women and 36 respondents have completed the rating questions.

4.3 Rating Scale Data

Forty respondents from core departments, that is from professions directly related to the process of mining, exploration and laboratory analysis skills were asked to indicate the degree of their preference on the commencement of different vocational programs related to the mining and exploration vocations. From the forty respondents 8 were women and 36 respondents returned the survey. It was observed that all women respondents completed and returned the survey. The different programs to be rated were identified from the experience that I have as being an employee of EMDSC , and from previous Mining and Minerals Processing, Mineral Exploration and Development Drilling and Physicochemical Laboratory Operations competency framework prepared by Federal TVET Agency in collaboration with Ministry of Mines, see Figure 2.

Mineral Exploration, Mining and Mineral Processing Qualification Framework

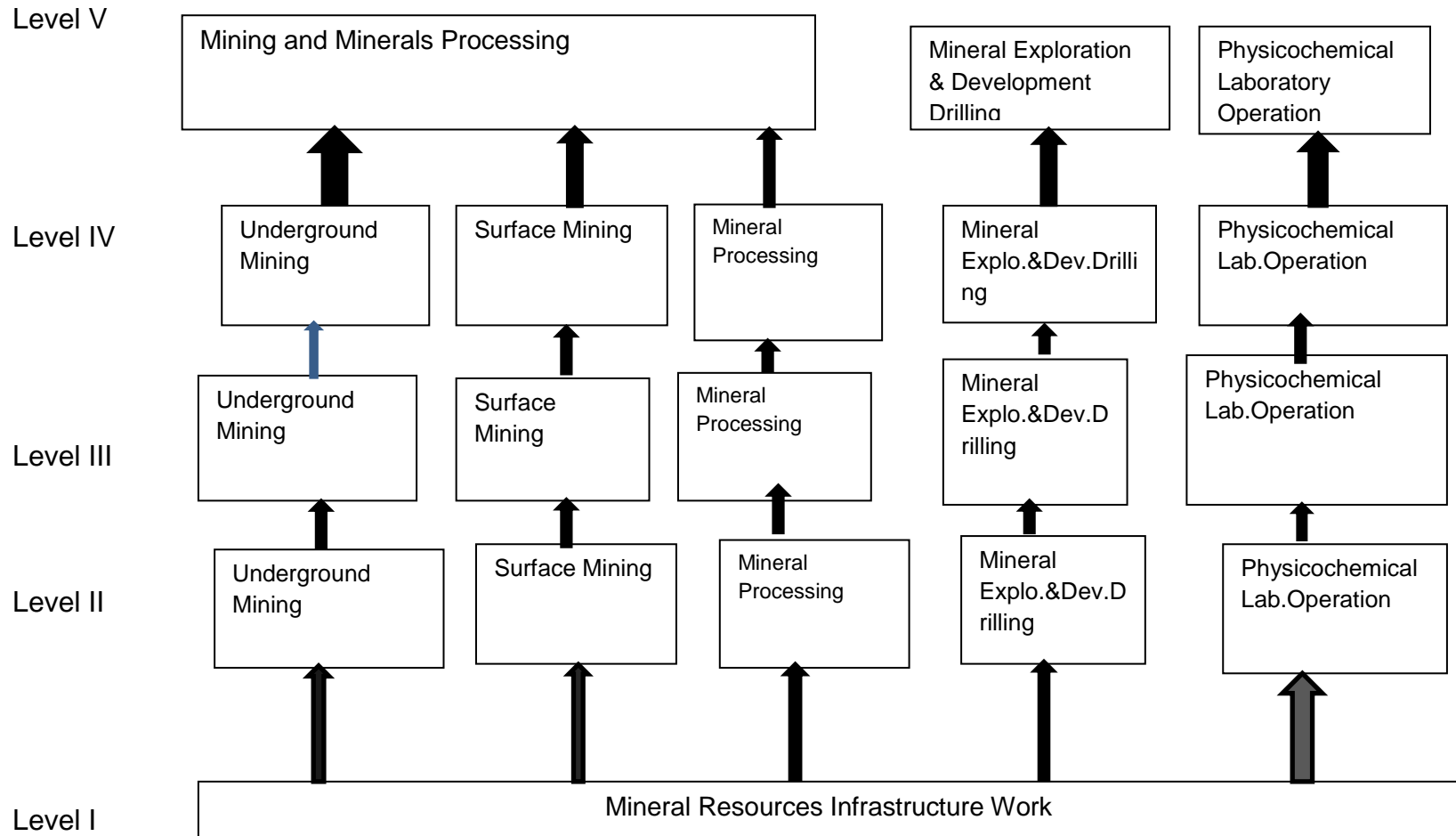


Figure 2 Mineral Exploration, Mining, Processing & Physicochemical Framework. Source: Federal TVET Agency

As observed from EMDSC's minutes of management review meeting, a joint study made by Federal TVET Agency, Ministry of Education and relevant mining and exploration companies has developed occupational standards for each Level for Mining, Exploration and Physicochemical vocations. The following section highlights some of the competencies corresponding to their levels.

Level I (Mineral Resource Infrastructure Work) which is common to all fields, has eleven competencies drafted as:

- | | |
|--|---|
| <ul style="list-style-type: none"> <i>i. Read and interpret plans and specifications</i> <i>ii. Handle resources and infrastructure materials and safely dispose of nontoxic materials</i> <i>iii. Work with Others</i> <i>iv. Develop Understanding of Entrepreneurship</i> <i>v. Use hand and power tools</i> | <ul style="list-style-type: none"> <i>vi. Operate small plant and equipment</i> <i>vii. Demonstrate work values</i> <i>viii. Apply kaizen's 5s procedures</i> <i>ix. carryout measurement and calculations</i> <i>x. Receive and respond to workplace communication</i> <i>xi. Apply quality standards.</i> |
|--|---|

Looking the above competencies, it is possible to conduct training on such competencies as there are professionals employed by EMDSC capable of delivering training and education when the institute is established according to this feasibility study.

Similarly for level II Mining /Exploration Operations vocations, sixteen different competencies are developed as:

- | | |
|---|---|
| <ul style="list-style-type: none"> <i>i. Work safety and follow OHS policies and procedures</i> <i>ii. Conduct field work</i> <i>iii. Maintain and monitor site quality standards</i> <i>iv. carry out operational maintenance</i> <i>v. participate in workplace communication</i> <i>vi. Apply continuous Improvement process</i> | <ul style="list-style-type: none"> <i>vii. Identify and assess environment and heritage concerns</i> <i>viii. Conduct local risk control</i> <i>ix. Operate personal computers</i> <i>x. Work in team environment</i> <i>xi. Operate in isolated and remote conditions</i> <i>xii. Collect routine site samples</i> <i>xiii. Operate and maintain a four wheel drive vehicle</i> |
|---|---|

xiv. *Operate and maintain instruments and field equipment*

xv. *Participate in environmentally sustainable work*

xvi. *Develop Business Practice*

For all the competencies, detail curriculum would be developed by industry professionals together with education professionals and it is possible to get instructors from EMDSC, State TVET Agencies and local Mining and Exploration Companies. In addition to this, a long term instructors' development program at local and abroad Universities should be developed. However, it is mandatory to have instructors who have been assessed and have obtained a National Occupational Qualification Certificate from the Federal TVET Agency. It is the responsibility of Ministry of Mines to organize Assessment Centers in cooperation with Large Scale Mining Companies as EMDSC and National Mining Company (Midroc Group) that can serve as assessment centers for both students and instructors or anyone related to the vocation.

Similarly all levels of competencies in the fields of mining, exploration, processing and physiochemical Analysis are developed by the Federal TVET Agency in conjunction with Ministry of Education, Ministry of Mines and Mining and Exploration Companies are annexed to this study (Annex IV).

Contextually fifteen vocations grouped into three major categories of Mining and Plant Operation, Exploration and Minerals Laboratory programs currently relevant to EMDSC as experienced by this researcher, were selected for rating as shown in Table 1, Rating Table Response for Mining & Plant Operations Program.

Before coming to the final rating scale form, a pilot rating scale was given to a group of EMDSC's employees and upon discussion a removal of a fourth degree of preference saying 'Not Necessary' was deleted from the rating table as all the vocations are considered necessary to the sector.

Each proposed program has been put to be rated as 'Very Necessary', 'Necessary' and 'Least Necessary' by a relative comparisons of the state of shortage of such skilled workers relative to EMDSC. For coding purpose the different ratings were given rating points from 3 to 1, where 3 represents highest necessity and 1 represents lowest

necessity. In the continuum of necessity rating scale a feeling of necessity in between highest and lowest necessity is given a point of 2.

Mining vocations are different skills related to the process of digging out the identified mineral by the process of exploration. The mined mineral should then pass through the process of cleaning, refining and packing by a relevant plant that requires the different levels of plant operation skills. The mined and processed mineral composition and quality is determined by minerals laboratory related skill that also requires different vocational Levels. The following skills define the different components of the above mentioned industry's vocations as currently practiced in EMDSC.

Table 1 :Rated Responses for Mining & Plant Operation Programs

Programs	Very Necessary (3)	Necessary (2)	Least Necessity (1)	Mean
Mine Sample Preparation Technician	15	10	11	2.11
Cartographer	10	11	15	1.83
Perforator Technician	25	8	3	2.61
Civil Explosive Technician	20	12	4	2.44
Blasting and Hole Drill Technician	25	10	1	2.67
Plant Operator	29	3	4	2.69

From Table 1, it can be seen that Plant Operator field has the highest average rating having 2.69 and Blasting and Hole Drill Technician vocation has a 2.67 out of maximum 3 average rating as rated by 36 respondents on the rating survey. Next comes Perforator Technician vocation having a 2.61 average rating. By this thesis work, these rating indicators are used for priority setting of different skills, where the institute will consider these courses for starting training as it cannot try to deliver training on all vocations from the beginning due to huge cost demand of equipment ,facility , availability of instructors and management complexity that is required. The fact that Cartographer vocation has the least average rating, 1.83, indicates that at the time of this research there is no immediate shortage of workers in the field but the skill is as important as all

other industry's vocations and will be considered in the overall program of mining and exploration skills.

Next comes rating analysis of vocation related to Exploration vocations. Table 2 shows data obtained by the survey for this group of competencies.

Table 2: Rating for Exploration Programs

	Very Necessary (3)	Necessary (2)	Least Necessity (1)	Mean
Geology Technician	28	6	2	2.72
Geophysics Technician	18	10	8	2.56
Geochemist Technician	10	20	6	2.11
Drafts Man	12	10	14	1.67

From the rating table of Exploration Programs current highest demand is on Geology Technician vocation having 2.72 on average. The next being Geophysics Technician vocation having an average score of 2.56. Thus, more attention will be given to the above high rated vocations during the commencement of the institute.

Table 3: Rating on Minerals Laboratory Analysis Programs

	Very Necessary (3)	Necessary (2)	Least Necessity (1)	Mean
Geochemical analysis technician	28	5	3	2.69
Sampler	19	12	5	2.39
Weight Assay technician	10	15	11	1.97
XRF analysis technician	30	4	2	2.78
Fire Assay technician	12	8	16	1.89

Considering Table 3, from Minerals Laboratory Analysis field, X-Ray Fluorescence (XRF) Technician vocation has a 2.78 average rating showing a highest need of training delivery by the institute to be established. On the priority list ,vocations as Geochemical

Analysis and Sampler are prioritized having a rating of 2.69 and 2.39 respectively and are found to be next to XRF vocation.

As explained in the sample and population section of the study, forty employees of EMDSC were asked to indicate their preference on different mining, exploration and minerals laboratory vocational skills by indicating the level of necessity of the skill at this time of the study depending on their personal feeling. Out of the 40 sampled employees 36 returned a completed rating scale form which indicates a 90 % response rate showing a successful return.

In order to have a better view of the rating, the frequency response of the three categories of vocations: Mining and Plant Operation, Exploration and Minerals Laboratory Analysis with the " Very necessary" scale is summarized as in Table 4 ,Frequency of Rating Scale Response of Mining, Plant Operation related skills as rated Very Necessary.

Table 4 Frequency of Rating Scale Response of Mining & Plant Operations skills as Rated very Necessary

Vocations	mine sample preparation technician	Cartographer	Perforator technician	Civil Explosive technician	Blasting and Hole drill technician	Plant operator
Frequency	15	10	25	20	25	29
%	41.67	27.78	69.44	55.56	69.44	80.56

From Table 4, it can be seen that Plant Operation, Blasting and Hole Drilling and Perforator Technician vocations have been selected by more than 20 respondents with “ very necessary” selection compared to other skills listed in the table. Plant Operation has 80.56% demand while Blasting and Perforation skills have both equal demand of 69.44%.

This study assumes that at least the first, second and third highest demanded skills of each category of vocation be launched or prioritized in the beginning of the institute program.

As the survey shows, Plant Operation skill has the highest rating which implies that this vocation be given at most priority by the institute. Both Hole Drilling and Perforator Technician skills are categories of Mining Vocations which require also the launching of these vocations' training together with Plant operations skills training program. Information obtained from Federal TVET Agency demands that, any new institute to be established must conduct vocational programs starting from Level I up to any Level it thinks that it can manage where the maximum Level is Level V. The Agency demands that at least 50% of the trainees should pass assessment examinations of each completed level for the institute to be accredited for the next vocation level.

Table 5 shows the frequency response of Mining and Exploration vocations as rated necessary on the rating scale continuum.

Table 5 Frequency of Rating Scale Response of Mining and Plant Operation skills as rated Necessary

Vocations	mine sample preparation technician	Cartographer	Perforator technician	Civil Explosive technician	Blasting and Hole drill technician	Plant operator
Frequency	10	11	8	12	10	3
%	27.78	30.56	22.22	33.33	27.78	8.33

From Table 5, it can be seen that Civil Explosive, Cartographer, Mine Sample Preparation and Blasting and Hole Drilling vocations are selected as necessary skills having 33.33%, 27.78% and 27.78% selections respectively. These skills can be regarded as secondary choices compared to the very necessary selection.

Least Necessity Selection

All vocations surveyed to be rated are important for the company but the rating is only to see those skills which have highest priority to be launched in the beginning of the institute operation and to start programs rated as least necessary at a later stage of operation say after two years of establishment of the institute.

Table 6 Frequency of Rating Scale Response of Mining & Plant Operation Skills as Rated Least Necessary

Vocations	mine sample preparation technician	Cartographer	Perforator technician	Civil Explosive technician	Blasting and Hole drill technician	Plant operator
Frequency	11	15	3	4	1	4
Percentage(%)	30.56	41.67	8.33	11.11	2.78	11.11

The fact that skills as Cartographer and Mine Sample Preparation Technician are rated as least necessary implies that in EMDSC and at this time of the study, there is not an acute shortage of workers in such skills. However, as an institute, programs for such types of skills should be included in the later operation of the training center.

Table 7 Combined Rating Table of Very Necessary & Necessary Categories of Mining and Plant Operations Programs

Vocations	mine sample preparation technician	Cartographer	Perforator technician	Civil Explosive technician	Blasting and Hole drill technician	Plant operator
Frequency	25	21	33	32	35	32
%	69.44	58.33	91.67	88.9	97.22	88.9

By combining 'Very Necessary' and 'Necessary' rating observations made by the survey, a Combined Rating Table is obtained.

From the combined rating table, it can be seen that Blasting and Hole Drilling, Perforator Technicians and Plant Operation and Civil Explosive skills have been rated both as very necessary and necessary by more than 85% of the respondents and this study recommends these skills get priority and should be started by developing detail curriculum for such vocations. It is to be noted that this feasibility study will not enter into the development of curriculum as it is beyond the limitation of the research but will recommend a further study to be conducted on the details of curriculum content, instructional hours, type of tests and the application of different and suitable pedagogical methods. Thus four skills, Blasting and Hole Drilling, Perforator Technicians, Plant

Operation and Civil Explosive have been found as very important in the category of Mining & Plant Operation programs and should be launched in the start of the training institute.

Exploration Program Rating Analysis

In a similar manner, by combining ‘Very Necessary’ and ‘Necessary’ rating findings of Exploration vocation Programs, Table 8, Combined Rating Table of Exploration Programs is obtained.

Table 8 Combined Rating Table of 'Very Necessary, and 'Necessary' Categories of Exploration Programs

Vocations	Geology technician	Geophysics Technician	Geochemist Technician	Drafts Man
Frequency	34	28	30	22
%	94.44	77.78	83.33	61.11

From Table 8, it can be seen that by combining the ‘Very Necessary’ and ‘Necessary’ ratings, Geology Technician and Geochemist Technician vocations have high priority and the institute will prioritize such skills. Skills rated by more than 80% (own reference) could be given priority of launching such programs. Thus skills as Geology Technician and Geochemist Technician would be given priority from the Exploration Programs category.

Minerals Laboratory Programs Rating Analysis

Using table 9, Rating Table for Minerals Laboratory Analysis a combined rating table showing the total frequency and percentage of ‘Very Necessary’ and ‘Necessary’ ratings is prepared.

Table 9 Combined Rating Table of 'Very Necessary' and 'Necessary' Categories of Minerals Laboratory Programs

Vocations	Geochemical Analysis	Sample r	Weight Assay	XRF Analysis Technician	Fire Assay Technician
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	Technician		Technician		
Frequency	33	31	25	34	20
%	91.67	86.11	69.44	94.44	55.56

From Table 9, it can be seen that Geochemical Analysis and XRF Analysis Technician and Sampler programs have more than 80% demand and this feasibility study considers the development of such programs be made in the initial phase.

As a whole, from the combined analysis four vocations from Mining and Plant Operation, two vocations from the Exploration Program, and three vocations from Minerals Laboratory Analysis and in total nine vocations are surveyed to have priority of launching training by this feasibility study.

From this analysis, the researcher proposes two options to be considered for starting training and education upon establishment of the vocational institute.

Option I: Start delivering vocational training considering the nine prioritized vocations and thus avail the necessary budget, educational facilities, instructors' and corresponding management staff.

Option II: Start delivering vocational training considering all vocations identified as essential for EMDSC by this research work, and thus avail the necessary educational facilities, instructors budget, and corresponding management staff.

4.4 Interview Analysis

4.4.1 Interview Response from EMDS's Managing Staff

Five senior managing staffs of EMDSC were asked identical structured interview questions and upon an appointment the researcher had a discussion with each staff. Upon listening and taking notes of the responses, analysis of each interview question was made. Each question was considered sequentially while the five responses were read in parallel to come into an average response by focusing on key words given in the response.

The first question was to see if the company faces a lack of vocational level workers in the mining, exploration and minerals laboratory analysis skills. All the five respondents coded as P1, P2, P3, P4 and P5 for confidentiality purpose responded that there has been such a shortage of vocational skilled workers for long time. This shows the rationale of this feasibility study that there is a definite need of having a center that can fill this gap.

Next the staff was asked to indicate the source of current vocational level skilled force that the company employs. The response was identical from all the respondents indicating that there are no sources of vocational workers in the mining and exploration sector. They said,

“The company employs hard skill TVET graduates and provide them orientation and practical training to use them as mining and exploration workers. This, lack of mining and exploration workers deficiency has affected the performance of the company. We had been looking for a solution but till now the problem is not solved.”

The management was then asked to indicate efforts made by the company to overcome problem of skilled workforce at a vocational level in the long run. As P1 and P2 said, a committee is formed to look for a solution in three directions:

P1 and P3 said, “Organize internal professional staff to provide an organized internal training program in different skills as minerals laboratory analysis, mining and exploration by providing a financial incentive to trainers.”

P2, P3 and P5 said, “Organize abroad short training programs in the fields of mining, exploration and minerals laboratory analysis.”

P2, P3, and P4 said, “Support and participate with stakeholders for establishing a Geoscience TVET Center that can provide a mining, exploration, minerals laboratory analysis training programs.”

As the above explanation shows, EMDSC has been making an effort to tackle the research problem, establishing and managing a vocational training institute from its own perspective. This research making feasibility analysis for the establishment of a

vocational training institute in the mining and exploration vocation is thus not only useful but is also timely.

Next, officials of the company were asked to provide their opinion on this particular research making a feasibility study to establish a mining, exploration and minerals laboratory analysis and all of them supported the idea of making such a research and further commented that, “the feasibility study will be very useful in solving the problem of having a skilled vocational workforce in the mining and exploration field”.

As to the placement of the institute, they commented that the center could be in the EMDSC’s premises and the top management of the company will be ready to organize the management of the institute by appointing an Institute Director accountable to the company CEO in operation matters and accountable to the Ministry of Mines in strategically and policy matters.

The managing staffs were then asked to give their opinion about teaching facilities as class rooms for the training center for judging the possibility of sharing some rooms from the new four story company building to be constructed in the company’s premises by 2016. P2, P3 and P5 agreed on the idea while P1 and P4 proposed to use old office rooms as class rooms when company’s employees are transferred to the new building. In either case, this shows that there is a possibility of organizing class rooms either in the new building or in the old office rooms. This research proposes that the management allows the new class rooms from the new building as EMDSC is highly interested in the establishment of the vocational center.

As to supporting the institute by providing company’s professionals as part time instructors, all agreed on the idea and further indicated that the company would also provide teaching aid equipment relative to the vocations from its inventory.

Next, the staff were asked if the newly to be built institute can share some of the company’s resources as ware house, security, telephone service, cafeteria and IT facilities and P1,P2,P3 and P5 were positive and further conformed, the support will continue until the institute strengthens and stands by itself. This condition will be helpful for the feasibility study as it decreases the investment cost of the above mentioned facilities or resources.

The staff was then asked to indicate the types of skills requiring program development and all indicated that Mining, Exploration and Laboratory Analysis skills at different Levels with Assistant, Junior and Senior qualification levels are very necessary for the company. From this it is seen that, Vocational programs at different levels should be given by the institute to satisfy the different vocational demands that the company requires.

Finally the company's managing staffs were given the option to suggest any thing about the feasibility study and all of them ascertained that the company is urgently in need of such an institute and commented that with the direct assistance of the government by allocating an annual budget for the institute, it is possible to organize and manage such an institute that can be beneficial to EMDSC in the short term and to other public and private mining and exploration companies in a long term.

4.4.2 Interview Response from Leather & Leather Products Technology Institute Senior Managing Staff

A Senior Managing staff of Leather and Leather Products Technology Institute (LLPTI) was presented with interview questions and a discussion with the researcher was made in order to benchmark on legal and training matters, facilities and budget related issues that the institute experienced during establishment. Concerning the organization and establishment of the institute, the interviewee explained that the institute is accountable to the Ministry of Industry and the House of Representatives (Parliament). It was noted that the budget is allocated from the Ministry of Finance upon an annual Operational and Capital budget requirement submitted by the institute. Since establishment, it is found that the budget is increasing annually as the technology is developing and requiring new teaching machines and recent technology owner instructors both from foreign and domestic. According to the senior Managing Staff, the annual budget has now reached about Birr 10,000,000 out of which 70% is allocated to the Capital Budget.

From the experience of LLPTI we can learn that the Mining and Exploration Institute will be appointed to the Ministry of Mines by reporting to the House of Representatives Parliament and budget allocation will be from Ministry of Finance once the institute is approved for establishment by the counsel of Minsters. Concerning training area matters, trainees are selected by Federal TVET Agency and depending on their score of School

Leaving Certificate Examination, they are assigned to study in one of the Levels I to V. Upon finishing the assigned level the trainee can either continue to the next higher level or join the world of work or create his/her own micro enterprise in the vocation of Leather or Shoe manufacturing vocation. From such explanation, this project can learn that students will be assigned by Federal TVET Agency to the Mining and Exploration Institute.

Concerning the source of instructors, LLPTI used foreign and local instructors working in the sector and has also sent young Ethiopians for abroad training. It is also understood that the institute has sponsored students at Addis Ababa University for education at a PhD level in leather technology to educate and train them as future instructors for the Institute. Parallel to this the Mining and Exploration Institute can also employ some foreign instructors, local professionals working in the mining and exploration industry. Also launching an instructors development program as LLPTI practiced is essential.

As to the Institute's building infrastructure, class rooms and offices , LLPT institute was endowed such a building by the government. From the discussion ,it was understood that the building was constructed for Food Corporation which the government latter banned and transferred the building to the Institute as the Leather sector was demanding a highly skilled work force and the government gave it priority.

Comparatively and as explained in the interview analysis of EMDSCs Staff, the building and class rooms for this Mining and Exploration Institute can be obtained from EMDSC'S building to be built in 2016 in the premises of Ethiopian Minerals Development Share Company. For future development, a new and separate building design and construction can be thought for expanding programs and admitting a higher number of trainees. Concerning equipment required for conducting vocational training, the interviewee explained that detail list of educational equipment and laboratory materials was prepared as aid package by the Italian Government in conjunction with local professionals and the training materials were delivered by Italian Government.

From this experience, the Mining and Technology Institute can make some connection with Australian Government which has a well-developed Mining and Exploration TVET

programs and experience in managing such institutions. EMDSC's Management will take this task to be put in practice in consultation with the Ministry of Mines.

4.4.3 Interview Response from Federal TVET Agency

The researcher has contacted officials from the Federal Technical and Vocational Education and Training Agency located around Gergi area near Imperial Hotel to identify legal and policy issues in the process of establishing a new vocational institute. Two offices especially related to the research question: Institutional Capacity Building and Occupational Standard Development Department were contacted for having information about vocational institute development.

The Institutional Capacity Building Department Head was asked to provide his view on general conditions expected to establish a vocational training center. He explained that any private or public institute is highly encouraged to establish vocational institute as long as there is the need for such skills and the occupational standards of such skills have been developed. Further he recommended to check the availability of the occupational standards and as noted in section 4.1 of the survey analysis, the occupational standards of Mining, Exploration and Physicochemical vocations are already prepared by the Agency. This condition fulfills one of the most important policy issue of the Mining and Exploration institute establishment. Further he explained that his office will provide free advice in the establishment process.

Next he was asked to describe the steps required to accreditation and licensing of the vocational institute and recommended to review the TVET Strategy and Proclamation to Provide For the Organization of a Technical and Vocational Education and Training System documents supplied by his office. From the document, it is observed that Federal TVET Agency is responsible in developing an accreditation framework and conduct the accreditation of the institute upon functioning. It is further noted that the main purpose of the accreditation process is to maintain quality delivery of vocational training where the Agency will provide assistance to institutions in their endeavor of obtaining accreditation. Referring to Proclamation No 391/2004, Proclamation to Establish a Technical and Vocational Education and Training System, a pre accreditation license or an accreditation certificate will be provided by the appropriate accrediting Authority, the

Federal TVET Agency. Thus , when the institute is ready to commence the provision of training, the institute management will apply to Federal TVET Agency for a pre accreditation service according to Article 34 of the proclamation. A detail of application for obtaining a pre - accreditation license is annexed in Annex III.

During the interview, the official noted also that apprenticeship should be included in addition to common courses such as Mathematics, English, Civics and Entrepreneurship. EMDSC can provide an apprenticeship program using its mining sites where mining, exploration and plant processing activities are exercised. For managing common courses a common course unit is formed in the proposed organizational structure Fig. 5

4.4.4 Interview Response from Ministry of Mines High Officials

An official from the Ministry was asked to indicate previous efforts on establishing TVET centers on Mining and Exploration Vocation and explained that the Ministry has been trying to organize such centers by coordinating relevant stakeholders in the sector although it has not yet been materialized. Then, he was asked to give his opinion on a feasibility study of establishing a Vocational institute in Ethiopian Minerals Development Share Company and explained that companies are welcomed to do so as long as they fulfill to run vocations as identified by the industry and the Federal TVET Agency and also stressed that supporting training and research is one of the Ministry's mandate.

Later he was asked as to how will the Ministry cooperate to fund such an institute to be organized under the Ministry?. The official replied that if the establishment is accepted by the government there is a possibility of getting government fund in the initial phase, but the institute will be expected to generate income to cover its expenses at later stages.

Finally, he was asked to indicate on a possible organization structure of such an institute and he iterated that Mining and Exploration Institute's higher body will be the Ministry and lower level organization scheme could be customized to suit the anticipated institute.

4.5 Document Review

Proclamation on TVET passed in 2012 , section 26 shows that:

- i. Any public training Institution which is accountable to any organ of the Federal Government shall be established by a Regulation to be issued by the Council of Ministers.
- ii. Any public training institution which is accountable to any organ of a state shall be established by the state legislature.

Thus, for the institute of this research, Ministry of Mines is the Federal Organ related to this Exploration and Mining Institute and all legal procedures will be accomplished through it.

The proclamation also shows the requirement of being a trainer, the composition of training institution staff as this research work has developed in Chapter Five and conditions on joint employment of professionals which allows a qualified professional in addition to his regular post may be employed by a training institute as a trainer. This legal condition allows EMDSC's and other mining company professionals to fill the trainer's gap of the institute.

Article 49 declares about source of fund stating that the source of fund of every public training institutions shall be annual budget and subsidy allocated by the Government, training institution fee collected from trainees, the institutions internal income as well as donations and assistance the institution may receive. Referring this article the Mining and Exploration Institute will charge some amount of money, the quantity to be determined during bankable feasibility study to be conducted upon appraisal of this first feasibility work. The proclamation has also indicated that the institution to be established should keep the records and documents of its head, trainers and trainees and following this a record office is included in the proposed organizational structure.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMENDATION

5.1 Summary of Findings

As Ethiopian Mineral Development Share Company is expanding the volume of its operation and as the old staff is retiring, the company is faced with severe shortage of workers, especially in vocational level mining, exploration and minerals laboratory analysis skills. Thus, it has become very essential to have a training institute that can supply lower and middle level vocational employee's recruitment. Rating scale survey, interview questions and relevant document survey conducted by the researcher indicate that there are favorable legal, managerial and organizational and program areas condition to establish a vocational level Mining and Exploration Institute for EMDSC.

This feasibility study prepared for establishing a vocational Level Mining and Exploration Institute in Ethiopian Minerals Development Share Company allows it to have a sustainable vocational level skilled manpower supply to run its business effectively so that it becomes profitable and continue to be a source of foreign currency generation for the country. In the long run, the institute will also be a source of such skilled workforce supply for similar mining and exploration companies found in the country. By the information obtained from EMDSC management officials, it is understood that the company faces problem of having vocational workers in the field of mining and exploration as currently there are no such vocational level training institutes. Information obtained from the company has indicated that a committee has been formed to put in practice a succession plan for key employees by reinforcing the already started effort of forming TVET center and organizing trainings.

Data collected during the research leads to the decision that, it is possible to establish such an institute in EMDSC as there is a proof of need, a capability to manage the institute, a place to construct the training center and a legal ground to set up such a vocational institute by the proclamation No. 391/2004, a proclamation to establish a technical and vocational education and training system.

As being the first public Mining and Exploration Vocational Level Training Institute, the training center will also be a source of vocational level skilled manpower for other public

and private mining and exploration companies such as Adola Mining Company (a public enterprise), and National Ethiopian Mining Company (a private holding), Ezana Mining Development PLC, and Ethio Pack Coal Mining Plc which are licensed as large scale mining and exploration companies to operate in the country. An informal discussion with Adola Mining senior staff showed that they support the establishment of such an institute and they even demanded fields such as Placer Gold mining skills to be included in the program. Data collected and analyzed show that it is feasible to establish the institute in EMDSC. Thus, the following sections show the overall picture of the institute as proposed by this study.

Vision

The vision of the institute is to be a source of Mining and Exploration Vocational Level competent skilled work force for EMDSC in short term and to be a source of such a skilled vocation for the Mining and Exploration Industry of the country in the long term.

Mission

To train mining, exploration and minerals laboratory vocational Level skill workers needed by EMDSC in short term and other public and private Mining and Exploration Companies found in the country in the long term.

The feasibility study for the establishment of such a technical and vocational education center addresses two major issues: policy and delivery issues. The first issue concerns requirements such as legislation, structure, and target population, while the second concerns the educational content and all that make it relevant and productive, such as types of skills to train, duration of courses, level of certification, staff development and management of the institute.

5.1.2 Educational Content Aspect

Courses to be offered will satisfy the country's current proportionality scheme which is 70% for practice and 30% for theoretical education. Using the vocations currently practiced in EMDSC and referring to the qualification frame work of the sector prepared by Federal TVET Agency, the different vocational programs as shown in Annex V will

be provided by the institute from Level I to Level V, showing the award and admission criteria of each skill. The institute would prepare training materials and instructors to conduct the different skills corresponding to each category of vocation and level. This research proposes three possible scenarios or options for starting the training program.

Option I

In this option the institute is designed to run programs that are rated by the survey as "Very Necessary and Necessary" in combination for the three different categories of vocations; Mining and Plant Operation, Exploration and Minerals laboratory Analysis .By the survey, nine different vocations have got prioritization having a rating of more than 80 % and the institute is expected to run the programs by arranging relevant teaching facilities and instructors. These programs are:

- i. Blasting and Hole drilling
- ii. Perforator Technician
- iii. Plant Operators
- iv. Civil Explosive
- v. Geology Technician
- vi. Geochemist Technician
- vii. Geochemical Analysis
- viii. XRF Analysis
- ix. Sampler

Option II

In this option all Level I vocations in the twelve fields of Mining, Exploration and Minerals' Laboratory Analysis as identified by the researcher are to be delivered by the institute. This option will be more costly as it includes more vocations demanding more instructors, teaching facility, budget and administration capability.

Option III

There is also a possibility of out sourcing the establishment of the institute to one of the already functional institutes or public TVET polytechnics found in the country. This by itself requires a research but as a researcher, I recommend to exploit this option too.

From my project experience, this study is a first feasibility study and could not show the details of cost breakdown and budget requirement for all scenarios which would be known by a detail feasibility study commonly called Bankable Feasibility Study (BFS) in Project management terms. According to this research work this initial feasibility study has found the project of establishing and managing the mining and exploration institute feasible and it is the responsibility of EMDSC management to appraise it and contract out a detail feasibility study based on the recommendations of this study for actually launching the establishment of the institute.

5.1.3 Program Integration

Students admitted to the institute from high schools and upon selection by Federal TVET Agency will join the level I, II, III, IV, or V, depending on their score of School Leaving Certificate Examination.

Upon completing Level I a trainee can either go for work in EMDSC or continue for the next level of training. Students placed at any other level say II, III, IV, V will have to study all previous levels in order to be qualified. That is to say a student placed at say Level IV would have to study Levels I to III before commencing training on Level IV competencies. Thus the institute management has to be aware of this mandatory step as required by TVET agency. EMDSC should provide an attractive package to attract the trainees during recruitment in addition to sponsoring trainees during their stay in the institute.

Once the trainees have completed all levels of the institute and upon fulfilling University Admission criteria, the Level five completing students can either be employed by EMDSC or join the University for a Degree Program in the mining and exploration fields (Figure 4.1). The current federal TVET Policy allows this condition.

As seen in Figure .4, the institute's programs are all linear as the field's skill requirement is based on previous and corresponding skill capacity due to the nature of the field but any level graduate can either go to work or continue to the next higher level of education depending on his choice. From documents survey of EMDSC, these different levels of

skills have positions in the manpower plan of the company and from a related information other mining and exploration companies too require similar type of skills.

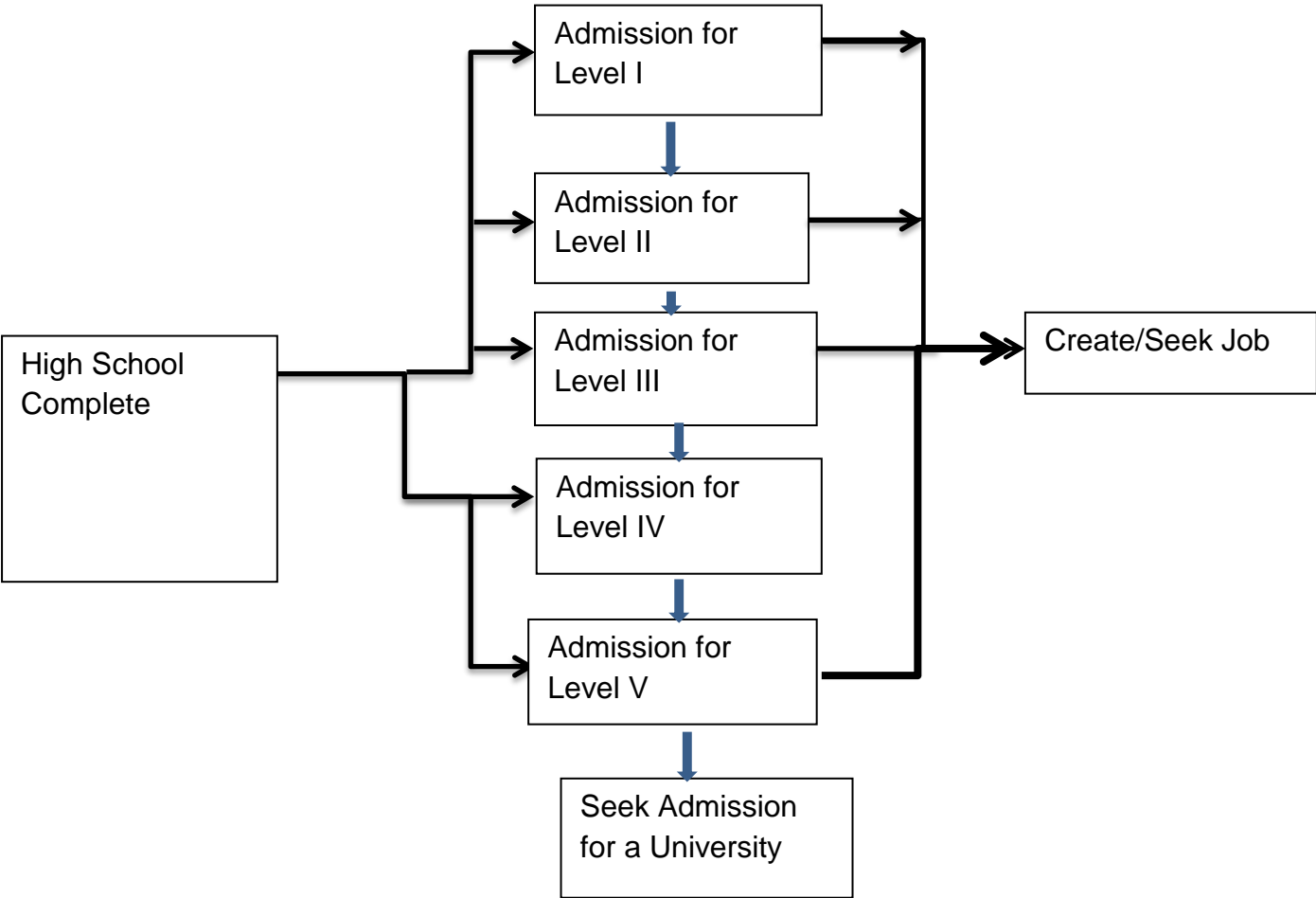


Figure 3 Skill Progression Diagram (Own Work)

5.1.4 Organizational Structure

As introduced in the literature review section, the country has recently developed different vocational institutes as Textile Development Institute, Food, Beverage and Pharmaceutical Industry Development Institute, Leather and Leather Products Technology Institute, and Chemicals and Construction Materials Corporation Institute.

Among these the Leather Industry Development Institute is a highly successful institute in developing the leather technology and vocational skilled workers as commented by the institute's Director during an interview with the researcher. I have contacted the Director General and asked him the secret of this success and told me that the success emanates from the proper feasibility study made and the continuous improvement practiced on organizational structure laid which resulted in a proper coordination for managing the institute. During the interview, he further elaborated that the current structure is a result of a fine tuning of a previous organizational structure, which paved the way to meet the institute's mandate. This research, in consultation with the Ethiopian Minerals Development Management Officials has thus adopted the Leather Institute's current organization structure with contextual modification and has proposed the following structure for the anticipated Exploration and Mining Institute (EMI).

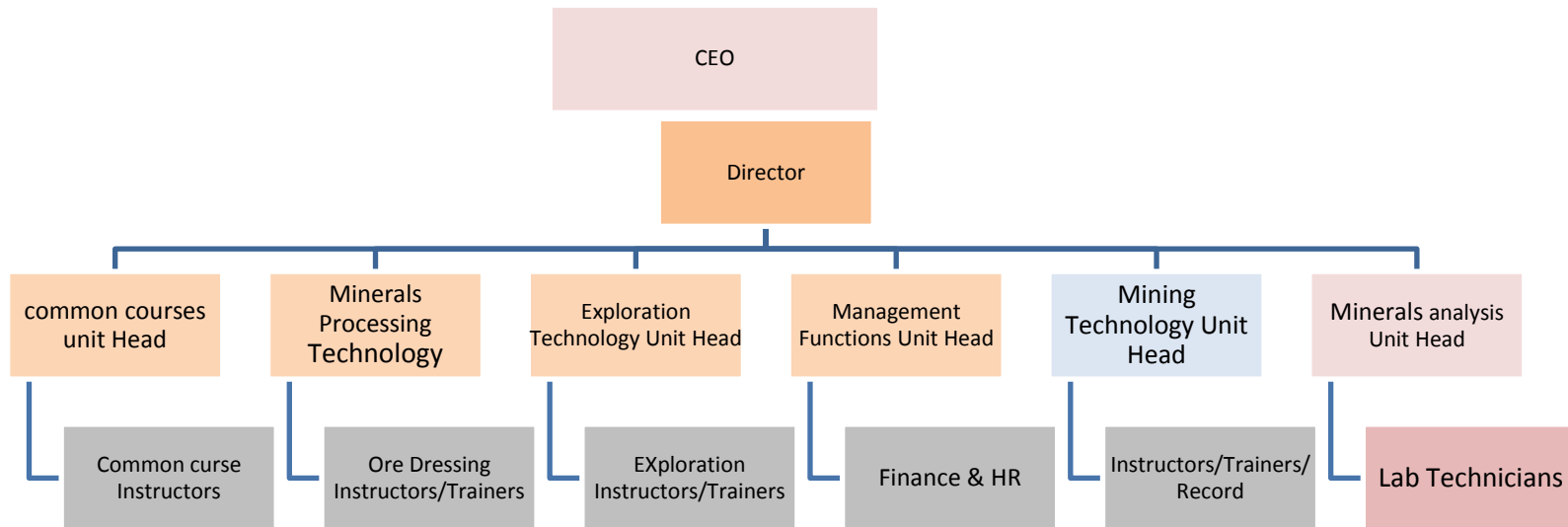


Figure 4 Proposed Organizational Structure of EMI

According to the proposed structure of Figure 5, the Exploration and Mining Institute is led by an Institute Director, who would be responsible for the overall function of the institute in meeting the mandate of the vocational and training center through effective functioning of the institute. The Institute Director will be accountable to the Chief Executive Officer of EMDSC who will also be reporting to the Ministry of Mines in terms of the Institute's functionalities. In order to minimize cost of operation, the institute's organization has been simplified consisting of six units: Exploration Technology Unit, Mining Technology Unit, Minerals Analysis Unit, Common Courses Unit, Record unit and Finance and Human Resource Unit. The human resource has staffs as instructors, lab technicians, recorders and personnel officers. This structure can be used to launch the institute's operation and latter could be updated to suit situations. The following table shows the anticipated staffing plan

Table 10 Proposed Staffing Schedule

S/No	Man Power	Qualification and Experience	posts	Salary/Month in Birr	Remark
1	Institute Director	Phd/MSc in Vocational management/Mining/ Exploration/Engineering with at least 8 years of service in the field.	1	15,000	Currently available in EMDSC
2	Exploration Technology Unit Head	MSc in Minerals Exploration with at least 6 years of work in the field.	1	13,000	Currently available in EMDSC
3	Mining Technology Unit Head	MSc in Minerals Mining with at least 6 years of work in the field.	1	13,000	Currently available in EMDSC
4	Minerals Laboratory Unit Head	BSc in minerals laboratory analysis with at least 6 years of work in the field.	1	10,000	Currently available in EMDSC
5	Ore Dressing Unit Head	MSc in Minerals Processing	1	13,000	Currently available in EMDSC
	Common Courses Unit Head		1	10,000	To be hired
6	Finance and	MSc/ BSc in Business			To be hired

	HR Unit Head a	administration.	1	12,000	
7	Finance and Hr Staff	BA/Diploma in Management/Accounting and 4 years of experience	3	5000	Available
8	Exploration vocation Instructors	BSc in minerals Exploration	3	7000	Currently available in EMDSC
9	Mining Technology Instructors	BSc in Mining Engineering	2	7000	Currently available in EMDSC
10	Ore Dressing Instructors	BSc in Ore Dressing	2	7000	Currently available in EMDSC
11	Common courses Instructors	BA in ICT, Mathematics,English,Civics Ethics or Entrepreneurship	5	5000	To be hired
12	Recorder	BA/Diploma in Management	1	3000	To be hired
		Total	23	178,000	

The salary scale is based on the current salary scale of EMDSC as studied by professional consultants.

Other support units such as IT section, Store Specialists, Library Units, Drivers, Guards, and Runners would be obtained from current EMDSC employees and would be assigned an additional task until the operation of the institute stabilizes.

5.1.5 Facilities Requirement

Training class rooms would be obtained from EMDSC's new building to be constructed in 2016. The company is ready to support the the company to provide relevant training equipment from its inventory as much as possible but more materials should be obtained by aid or purchase through a joint cooperation with countries as Australia and Canada which have a well-established Mining and Exploration Training Institutes as studied in this research. The company's newly built laboratory building and analysis equipment will also be used for training.

In considering facilities adequate space and relevant resources should be included to support digital technology infrastructure. Digital technology and mechanical technology as drilling and exploration machines demand that trainees and instructors remain proficient with the latest trend and equipment. Provision for information and communication technologies should be included to diversify and maintain vocational skill quality, which has become normative job criteria. Such appropriations should be organized in a way to maintain and support rapidly changing advancement and learning area requirement.

5.1.6 Trainee Input and Projection

As observed in the second five years strategic plan (2015-2019) of Ethiopian Minerals Development Share Company, the company has planned to expand its processing plant capacity by 100% to support the second GTP with respect to mining and exploration. This entails additional mining employees to support the expansion. From the company's internal project document, it is observed that 38 new mining and 183 plant operators are required in 2018, which makes a total of 221 new vocational employees at different levels. In addition to this it requires at least 20 new employees to maintain the current working staff. Considering possible dropouts and demand by similar companies, about 250 trainees would be required and be admitted in the beginning. As noted earlier, EMDSC should design a sponsoring mechanism for the trainees so that they join the company on a contractual basis until its satisfies its vocational workers shortage.

Although exact data is not available Ministry of mines has noted in its web site that there is a high rate about 10% of increase of new companies investing in mining and exploration sector. This research work has thus assumed a 10% annual increase of companies which is correlated to 10 % of increase in vocational employees. Thus starting with 250 trainees as initial input and with 10% annual increase the following trainee input projection is proposed by this study in order to satisfy both EMDSC's and other Mining and Exploration companies demand.

Table 11 Trainees Input Projection

Year	2017	2018	2019	2020
No of Trainees	250	275	303	334

5.1.7 Legal and accreditation conditions.

Proclamation No 391/2004, Establishment of TVET systems , shows the legal ground to be referenced for the establishment of the Mining and Exploration Institute. According to the proclamation this training institute will be established and managed under the category of vocational level Technical and Vocational Education and Training Program as described in section 3 of the proclamation. EMDSC should apply for a pre-qualification license for this category of training.

The institute administration will coordinate with Federal TVET Agency for getting trainees to be admitted in the institute. This condition is feasible as there are enough high school graduates in the country looking for training and also for work.

In addition, the following are conditions to be fulfilled to start the training center and all of them are achievable by EMDSC upon forming a project implementation team and by appraising the study;

- i. Be able to provide certificate for assistant level skills and diploma for technician level skills.
- ii. Obtain a pre accreditation license to start training from TVET Sector of the Ministry of Education, the Accreditation Authority.

As the National Technical & Vocational Education and Training (TVET) Strategy prepared by Ministry of Education, August 2008 depicts that there is a favorable policy for establishing TVET institutions by any private or public institution as long as the training is outcome based. The vocations proposed by this study are specific vocations of mining, exploration and minerals laboratory analysis. These vocations will be made outcome based by applying the competencies shown in the study. The task of developing the curriculum and details of lessons is out of the scope of this study and would be the next phase of the feasibility study. Thus, this study has identified the existence of a conducive environment considering legal and policy matters for establishing the institute.

Information obtained from Federal TVET Agency officials through an interview encourages EMDSC to go on the feasibility as assumed in the study and confirmed that they will provide assistance in the detail program development, accreditation and developing the details of Occupational Standards relative to the mining and exploration vocations by organizing relevant professionals from the mining and exploration industry and educational experts. From this, it can be said that legal and policy issues of the country favor the feasibility of establishing and managing tailored vocational training institution as this Exploration and Mining Institute of EMDSC.

5.1.8 Budget, Capital and Operational Expenditure

As this institute is a public TVET institute, financing would be from the Government under the guidance and control of Ministry of Mines. At the latter stage the institute will have financial sources of its own to support the Government by providing short term training for different mining and exploration field workers and from laboratory service of the institute. As the country policy requires, students will be trained by the cost sharing scheme that can also be an additional source of finance. The details of expenditures will be developed in the Bankable Feasibility Study as explained above. However the cost structure would include the following break downs.

Initial phase cost

This cost includes cost of establishing the institute and operational costs.

Cost of establishing the Institute.

This includes expenses, in particular investment that occur in the initial phase, such as: preparation of facilities, furniture and office equipment and information and communication technology.

Operational Costs

Cost of operating the Institute comprises expenses required for capital goods and operational cost for execution of its programme, as well as expenditure for staff and support services.

5.1.9 Institute's commencement

Considering the time required for feasibility appraisal and conducting a detail feasibility study, this research work assumes that the Mining and Exploration Institute would be operational in the beginning of 2017 by employing a fast track project management scheme and starting of 2018 vocational trained employees would be available.

5.2 Conclusion

This study has concluded that there is an obvious need of a vocational institute as proved by minutes of meeting and interviews obtained from EMDSC and also by the researcher's personal experience.

Based on results of interview questions and survey made, this feasibility study has shown that all information about legal conditions, program areas, organizational and managerial issues related to the establishment and management of the vocational Mining and Exploration Institute assumed to be established for EMDSC are practical to accomplish which finally answers the research question, 'Is it feasible to establish and manage a Mining and Exploration Vocational Institute in EMDSC?', affirmatively. As this study is based more on qualitative data source using semi structured with open ended interview technique, the bias from both the respondents and the researcher may have a subjective effect on the finding of this research which may cast a shadow of validity and reliability on the findings.

5.3 Recommendation

Upon establishment of the training institute, this research work recommends to start delivery of training with option I scenario as this is less expensive in terms of operating and capital expenditure requirement and also allows the institute management to have an experience before running a full-fledged training institute. As noted on the literature review section about quality measures of an endeavor, the institute should be expandable to accommodate the interests of all mining and exploration companies accommodating their vocational requirements. This can be made by adding additional skill programs in the delivery which proves the quality measure of 'Expandability' which assess the degree to which the proposed endeavor is feasible for a bigger or different group of users as there is a similar vocational skill demand by mining and exploration

companies. EMDSC as the main stakeholder of this study is expected to unleash all its capacity with full willingness and commitment for the realization of the institute as without such a commitment the endeavor is likely to fail. Last, it is suggested that EMDSC conducts a Bankable Feasibility Study, the next stage of the scoping study, to arrive at a final decision on the institute's establishment and management endeavor.

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ANNEX I Rating scale survey Format

Introduction

A feasibility study for Establishing and Managing of a Mining and Exploration Institute for Ethiopian Minerals Development Share Company is being conducted as an academic requirement for an award of a Master's Degree in Management of Technical and Vocational Education. To this end, a survey is being made on the relative need urgency of the different vocations that the company practices by assessing the view of EMDSC 's employees. You are then asked to select 'Very necessary', 'Necessary' or 'Least necessary' for the type of Mining and Plant Operator skills listed below by deciding on the need urgency of the skill.

If you think the vocation is urgently needed and requires an immediate training, select 'Very Necessary' which is allocated a point of 3. If you think the vocation training program can be started latter in the progress of the institute, select 'Least Necessary' with a rating point of 1. If your view is in between, select 'Necessary' with a rating point of 2.

Career: _____ Gender: _____

1. Mining and Plant Operation Vocations Rating Scale

skill	Very Necessary (3)	Necessary (2)	Least Necessity (1)
Sample Preparation Technician			
Sampler			
Operator Technician			
Explosive Technician			
Hand Hole Drill Technician			
Operator			

2. In a similar manner select Very necessary, Necessary or Least Necessary for the type of Exploration skills listed below.

skill	Very Necessary (3)	Necessary (2)	Least Necessity (1)
Technician			
ics Technician			
mist Technician			
lan			

3. In a similar manner select Very necessary, Necessary or Least Necessary for the type of Minerals Laboratory Analysis skills listed below.

Type of skill	Very Necessary (3)	Necessary (2)	Least Necessity (1)
Geochemical Analysis Technician			
Sampler			
Weight Assay Technician			
XRF analysis Technician			
Fire Assay Technician			

ANNEX II: Interview Questions for Ethiopian minerals Development Institute Managing Staff

Position: _____

Gender: _____

These questions are used as an input data to the ***Feasibility Study for Establishing a Mining and Exploration Institute in EMDSC*** that can serve both EMDSC and other similar mining and exploration companies. The identity of the interviewee is strictly confidential and the interview is only for academic purpose as a partial fulfillment of a thesis work. You are kindly asked to fill the questions and have an additional discussion with the researcher.

1. Do you have a shortage of vocational level skilled work force in the mining, exploration, and mineral laboratory analysis?

2. What is the current source of mining and exploration vocational level skilled work force?

3. If there are no sources for question 2, what are EMDSC's efforts to overcome the problem?

4. As a fulfillment of thesis work, a feasibility study to establish a mining and exploration public institute to be spire headed by EMDSC is being conducted, will this study be helpful to EMDSC?

5. The center of the institute is to be in EMDSC premises and the top management is to lead the establishment, organization and management of the institute. How is this plan seen?

6. It is known that EMDSC has the plan to build a four story building for its operation and is it possible to get rooms for classes and offices for the institute?

7. Will EMDSC's mining, exploration and minerals laboratory experts found in the Head Office be assigned to train students on a part time basis?

8. The institute's director is to report to the CEO of EMDSC will this be possible?

9. Will EMDSC be volunteer to provide some training materials for the institute?

10. Will the current company staff assist the new institute in matters as warehouse, security, telephone service, IT service and cafeteria service for the institute?

11. What are the specific type of skills that require program development?

12. Any suggestions that can be added?

Best Regards

H M Tamiru

ANNEX III: Interview Questions for Leather & Leather Products Technology Institute Senior Managing Staff

Position: _____

Gender: _____

This interview question is prepared for an academic research purpose with the objective of making **a feasibility study to establish a Mining and Exploration Vocational Institute** that can produce vocational level (Level III to Level V) Skilled workers for Ethiopian Minerals Development Share company(a public company) and other private and public Mining and Exploration companies. You are kindly asked to fill the questions and have an additional discussion with the researcher.

The purpose of the interview is to learn from Leather and Leather & Leather Products Technology Institute (LLPTI) experience in establishing and managing the institute on Legality, Budget, Organizational and Management issues that could help to develop the feasibility study of this research. I would like to note that the interviewee identity will be kept secret and only information obtained will be used for the study.

1. Policy and Legal Matters

1.1 How can we see the Government 's desire in developing Vocational Institutes?

1.2 Who allocates budget for the Institute?

1.3 To which government organ is LLPTI appointed?

1.4 How was the establishment of the institute original initiated?

1.5 Does the institute have an internal income generation mechanism? From what and how?

2 Training and Program Areas

2.1 How and by whom were the training programs selected and determined in the beginning?

2.2 What are the different skill levels provided by the institute and how was such skill levels determined?

2.3 What is the number of annually trainee inputs and from where?

2.4 How many trainees are now found with respect to different categories?

2.5 Where do you get instructors and what is the plan to develop instructors?

2.6 How do you assess the impact of the graduates on their performance?

3. Facilities

3.1 How were the assumptions for land, building size, class rooms number and the likes determined?

3.2 How was training equipment list determined?

4 Budget

4.1 How large is the annual operation budget?

4.2 Estimation of Capital expenditure for establishing the institute?

5. Any Additional Suggestion

Best Regards

H M Tamiru

ANNEX IV: Interview Questions for For Federal TVET Agency

Position: _____

Gender: _____

These questions are used as an input data to the **Feasibility Study for Establishing a Mining and Exploration Institute in EMDSC** that can serve both EMDSC and other similar mining and exploration companies. The identity of the interviewee is strictly confidential and the interview is only for academic purpose as a partial fulfillment of a thesis work. You are kindly asked to fill the questions and have an additional discussion with the researcher.

1. What are the general conditions expected to establish a vocational training center?

2. What are the specific steps of accreditation and licensing?

3. Any comment on the development of a new vocational institute.

Best Regards

H M Tamiru

ANNEX V: Interview Questions for Ministry of Mines High Officials

Position: _____

Gender: _____

These interview questions are used as an input data to the ***Feasibility Study for Establishing a Mining and Exploration Institute in EMDSC*** that can serve both EMDSC and other similar mining and exploration companies. The identity of the interviewee is strictly confidential and the interview is only for academic purpose as a partial fulfillment of a thesis work. You are kindly asked to fill the questions and have an additional discussion with the researcher.

1. Please indicate previous efforts made on establishing a TVET center on Mining and Exploration Vocations?

2. As an academic work, a feasibility study to establish a Mining and Exploration Institute in Ethiopian minerals Development Share Company is being conducted. How do you see the feasibility of this study?

3. How will the Ministry fund such an institute to be organized under it?

4. How would be the organization structure of such an institute?

Best Regards

H M Tamiru

ANNEX VI: CONTENTS OF APPLICATION FOR A PRE-ACCREDITATION LICENSE

An application submitted pursuant Sub- Article (1) of Article 33 of this Proclamation

Shall contain:

- a) The proposed name and chief address of the training institution, and the area of training and programs intended to be undertaken;
- b) The name and address of owners of the training institution;
- c) The name and address of the organ to which the training institution is accountable;
- d) The organizational set up regarding the management of academic & administrative affairs;
- e) The admission criteria applicable to new trainees;
- f) The details of the training institution's training facilities and equipment, library, furniture
and other amenities, equipment and implements and ownership thereof;
- g) The number and qualification of trainers and technical support staff of the training institution available and intended to be employed;
- h) The training institution's three-year's plan.

ANNEX VII: UNITS OF COMPETENCIES STANDARD CHART

Occupational Standard: Resource Infrastructure Operations		
Occupational Code		
NTQF Level: I		
Read and Interpret plans and specifications	Use hand and power tools	Take measurements and calculations
Process and infrastructure materials and safely dispose of non toxic materials	Operate small plant and equipment	Receive and respond to work place communication
Work with others	Demonstrate work values	Apply Quality standards
Develop understanding of Entrepreneurship	Apply 5S procedures	

Standard: Mineral Production and Development Drilling		
Code		
Follow work place health, safety and environment procedures	Work effectively in the drilling industry	Work in team
Mobilize equipment and materials	Set up / pack up drill site	Drilling process
Assist air drilling	Assist raise boring	Operate hammer drilling
Assist top hole hammer drilling		Transport services vehicle underground
Setup and prepare for underground support	Follow underground health and safety procedures	Work place communication
Work in team environment	Develop business practice	Business improvement process (Kaizen)

Standard: Geotechnical Investigation
Code

ual excavation	compact materials manually	lated and remote situations
rational maintenance	nize daily work activities	workplace communication
environment	less practice	ous improvement process (Kaizen)

Standard: Mining Field/Exploration Operations		
Code		
nd follow OHS polices and	esses environmental and erns	lated and remote situations
work	risk control	site samples
Monitor site quality standards	haintain a four wheel drive	rational maintenance
haintain instruments and field	sonal computer	environmentally sustainable work
work place communication	environment	less practice
ous improvement Processes		

Standard: Mineral Exploration Drilling		
Code		
ace health safety and rocedures	ly in the drilling industry	ng team
ment and materials	drill site	g process
ng	ous flight auger drilling	tional core drilling

core drilling	ary drilling	cutting and welding
out prevention operations	bal seam gas control	workplace communication
environment	ness Practice	ous improvement (Kiazen)

Standard: Geotechnical Investigation		
Code		
/		
and protect under ground	ite	gical field assistance
maintain instruments and field	operations	c leveling
er civil construction sites	k in confined spaces	mentation of work plan/Activities
ontrol	ce communication	ams
ness practice	ty systems and continuous processes (Kiazen)	

Standard: Mineral Production and Development Drilling		
Code		
level III		
epare for drilling operations	eration	rational maintenance
mal on the job training	ness records	nd support operations
ment services vehicle	anical scaling	illing
boring	hole hammer drilling	ole hammer drilling
mentation of work	ontrol	ce communication
ams	ness practice	ty system and continuous processes (Kiazen)

Standard: Mining Exploration		
Code		
/		
undertake field trip	laboratory field work place safety	support services/ Assist with field
control requirements	the achievement of quality	logical field assistance
chemical samples and s	prepare samples for testing	ite
and maintain accurate	exploration site	and monitor environmentally work practices
ment and		mentation of work plan/Activities
control	ce communication	ams
ness Practice	ty system and continuous process (Kaizen)	

Standard: Mineral Exploration Drilling		
Code		
/		
prepare for drilling operations	operations	rational maintenance
ness Records	mal on the job training	g fluids and mud pits
systems	otfiring activities	illing
ventional core drilling	ine core drilling	rotary drilling
mentation of work	Control	ce communication
ams	ness practice	ty system and continuous processes (Kaizen)

Standard: Exploration / Development Drilling		
Code		
/		
outine, complex technical	ization of equipment and	e operations

ess or record system for a	control and blowout	g through instruction and of work skills
e coal seam gas control	. based learning	t prevention operational
g fluids and mud pits	bt firing activities	g through instruction and of work skills
nize work activities	y technology	ity standards
s and individuals	haintain Small/ Medium rations	uous improvement systems

Standard: Exploration / Development Drilling		
Code		
/		
ment maintenance	cial resources	tive team/ crew operations
	ets and financial plans	control and blowout
nal work priorities and evelopment	prevention operational	work place
rship in the work place	ctive work place relationships	t teams
ets and financial plans	capitalize on change and	ct quality
conduct Business relationship	efine systems for continuous n operations	

ANNEX VIII: Vocational Programs as required by EMDSC

Level I Programs.				
No	Vocational Skill	Level	Award	Admission
1	Plant Operator	I	Certificate of competency	10 th complete
2	Cartographer Technician	I	Certificate of competency	10th complete
3	Drilling Technician	I	Certificate of competency	10th complete
4	Mining Technician	I	Certificate of competency	10th complete
5	Perforator Technician	I	Certificate of competency	10th complete
6	Civil Explosive Technician	I	Certificate of competency	10th complete
7	Blasting and Hole drill Technician	I	Certificate of competency	10th complete
8	Geology Technician	I	Certificate of competency	10th complete
9	Geophysics Technician	I	Certificate of competency	10th complete
10	Geochemist Technician	I	Certificate of competency	10th complete
11	Weight and Fire Assay technician	I	Certificate of competency	10th complete
12	XRF Analysis Technician	I	Certificate of competency	10th complete

Level II Programs.				
No	Vocational Skill	Level	Award	Admission
1	Plant Operator	II	Certificate of Competency in Level II	Level I/10 th complete
2	Cartographer Technician	II	Certificate of Competency in Level II	Level I/10 th complete
3	Drilling Technician	II	Certificate of Competency in Level II	Level I/10 th complete
4	Mining Technician	II	Certificate of Competency in Level II	Level I/10 th complete
5	Perforator Technician	II	Certificate of Competency in Level II	Level I/10 th complete
6	Civil Explosive Technician	II	Certificate of Competency in Level II	Level I/10 th complete
7	Blasting and Hole drill Technician	II	Certificate of Competency in Level II	Level I/10 th complete
8	Geology Technician	II	Certificate of Competency in Level II	Level I/10 th complete
9	Geophysics Technician	II	Certificate of Competency in Level II	Level I/10 th complete
10	Geochemist Technician	II	Certificate of Competency in Level II	Level I/10 th complete
11	Weight and Fire Assay technician	II	Certificate of Competency in Level II	Level I/10 th complete
12	XRF Analysis Technician	II	Certificate of Competency in Level II	Level I/10 th complete

Level III Programs.				
No	Vocational Skill	Level	Award	Admission
1	Assistant Plant Operator	III	Certificate of Competency in Level III	Level II/10 th complete

2	Assistant Cartographer Technician	III	Certificate of Competency in Level III	Level II/10 th complete
3	Assistant Drilling Technician	III	Certificate of Competency in Level III	Level II/10 th complete
4	Assistant Mining Technician	III	Certificate of Competency in Level III	Level II/10 th complete
5	Assistant Perforator Technician	III	Certificate of Competency in Level III	Level II/10 th complete
6	Assistant Civil Explosive Technician	III	Certificate of Competency in Level III	Level II/10 th complete
7	Assistant Blasting and Hole drill Technician	III	Certificate of Competency in Level III	Level II/10 th complete
8	Assistant Geology Technician	III	Certificate of Competency in Level III	Level II/10 th complete
9	Assistant Geophysics Technician	III	Certificate of Competency in Level III	Level II/10 th complete
10	Assistant Geochemist Technician	III	Certificate of Competency in Level III	Level II/10 th complete
11	Weight and Fire Assay technician	III	Certificate of Competency in Level III	Level II/10 th complete
12	XRF Analysis Technician	III	Certificate of Competency in Level III	Level II/10 th complete

Junior Technician Level IV Training Programs.				
No	Vocational Skill	Level	Award	Admission
1	Junior Plant Operator	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
2	Junior Cartographer Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
3	Junior Drilling Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
4	Junior Mining Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
5	Junior Perforator Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
6	Junior Civil Explosive Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
7	Junior Blasting and Hole drill Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
8	Junior Geology Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
9	Junior Geophysics Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
10	Junior Geochemist Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III
11	Weight and	IV	Certificate of	Certificate of

	Fire Assay technician		Competency in Level IV	Competency in Level III
12	XRF Analysis Technician	IV	Certificate of Competency in Level IV	Certificate of Competency in Level III

Senior Technicians Level V Programs.				
No	Vocational Skill	Level	Award	Admission
1	Senior Cartographer Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
2	senior Drilling Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
3	Senior Mining Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
4	Senior Perforator Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
5	Senior Civil Explosive Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
6	Senior Blasting and Hole drill Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
7	Senior Plant Operator	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
8	Senior Geology Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
9	Senior Geophysics	V	Certificate of Competency in	Certificate of Competency in Level

	Technician		Level V	IV
10	Senior Gemologist Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
11	Senior Geochemist Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV
12	Senior Placer Gold Mining Technician	V	Certificate of Competency in Level V	Certificate of Competency in Level IV

Declaration

I, the undersigned, declare that this thesis is my original work and all sources of materials used in the thesis have duly been acknowledged.

Name: _____

Signature: _____

Date of
Submission: _____

Advisor's Approval

This thesis has been submitted for examination with my approval as a university advisor.

Name: _____

Signature: _____

Date : _____

**ADDIS ABABA UNIVERSITY SCHOOL OF GRADUATE STUDIES
COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES
CURRICULUM AND INSTRUCTION DEPARTMENT**

Establishing and Managing of a Mining and Exploration Vocational
Training Institute: A Feasibility Study for the Ethiopian Mineral
Development Share Company, Addis Ababa

A Thesis Submitted to the School of Graduate Studies of Addis Ababa
University in Partial Fulfillment of the Requirements for the Degree of
Master of Arts in Management of Vocational Education

BY

HAILE MICHAEL TAMIRU

Approval of Board of Examiners

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Advisor	Signature	Date

Examiners:

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Name	Signature	Date

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Name	Signature	Date