The Role of Third Party Logistics Providers in Ethiopian Mining Industry: The Case of Selected Third Party Logistics Providers

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CERTIFICATE

This is to certify that the thesis entitles "*The Role of Third Party Logistics Providers in Ethiopian Mining Industry: The Case of Selected Third Party Logistics Providers*", submitted to Addis Ababa University college of commerce for the award of Master of Arts in Logistics and Supply Chain Management and is a record of bona fide research work carried out by Mr. Bereket Mengistu, under my guidance and supervision.

Therefore, I hereby declare that no part of this thesis have been submitted to any other university or institutions for the award of any degree or diploma.

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DECLARATION

I hereby declare that this thesis entitled "*The Role of Third Party Logistics Providers in Ethiopian Mining Industry: The Case of Selected Third Party Logistics Providers*", has been carried out by me under the guidance and supervision of Ayele Abebe (PHD).

The thesis is original and have not been submitted for the award of any degree or diploma to any university or institutions.

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Abstract

Ethiopia's mining sector is undergoing an enormous transformation with an increase in opportunities for investment. According to the publication by Embassy of Ethiopia to USA Economy and Business Section, (2008) wide variety of mineral resources are available in Ethiopia. 19 local companies and 11 foreign companies have been granted prospecting, exploration and mining licenses. These are for gold and base metals, platinum, industrial and construction minerals, notably, potash, diatomite and high-quality ceramics raw materials. The logistics challenges of mining companies are unique and complex. Despite this, investments in logistics people, processes and systems often take a back seat to core investments around finding, extracting and processing minerals. Logistics costs as a percent of a mining company's total operating costs may be small, but mining companies can uncover literally millions of dollars in hidden profits by reexamining how they address logistics challenges. Third party logistics providers (3PLs) who specialize in mining specific services can provide targeted solutions that reduce operating costs and improve service levels, while freeing mining companies' team to focus on strategic initiatives. The purpose of this thesis is to analyze the 3PL service providers' roles within Ethiopian mining industry supply chain by identifying how the expected roles are performed. The researcher observed that not much has been done on the role of 3PL service providers in the mining industry and in terms of academic contribution, this study aimed to fill a gap in the literature by producing an up-to-date knowledge. On the other hand, on a managerial or practical level, this study adds knowledge about the strategic benefit of logistics outsourcing for the mining companies. In this thesis, an inductive research approach is used and qualitative study has been carried out by applying multiple case studies as a research strategy. The empirical material is gathered from three 3PL service providers: Ardan Risk & Support Services Ltd, Quadrant Investment Group PLC, and Kal Logistic & Trading. Data was collected through semi-structured interviews with open-ended questions conducted at the three target companies and as the research is explanatory in nature, the findings have been analyzed using explanation building technique. The main conclusions from analyzing the role of 3PL service providers showed that 3PL service providers are able to perform their roles through an end to end solution provided to the mining companies from the provision of remote workforce accommodation and facilities management to logistics support including labour supply and waste management. The study also showed the challenges of 3PL companies in providing the service including the current business environment of the country, lack of adequate infrastructure, low level of performance from suppliers, security risks of cargos and lack of skilled manpower. Finally, the study showed the opportunities for new companies to join the market created due to lack of service providers in the industry.

***Key words**: Third party logistics, Mining logistics, end to end solution, outsourcing, 3PLchallenge.*

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Chapter 1 Introduction

1.1 Background of The Study

Increasing focus on global expansion in the market place has fostered greater attention on streamlining the supply chain management functions of business. Many companies choose to outsource part or all of their logistic functions to third parties in an attempt to achieve operational efficiencies within the supply chain. This also allows companies to concentrate on core business activities. Third-party logistics (abbreviated 3PL) providers are able to take over the supply chain functions of businesses and manage them better in many cases than what the companies could do on their own. (Green, F.B., Turner, W., Roberts, S., Nagendra, A. and Wininger, E., 2011).

Typically, a core company providing services or products is considered the first party; the customer (or customers) the second party. A third-party, then, is a firm hired to do that which neither the first or second party desires to do. A third-party logistics firm is a firm that provides outsourced or "third party" logistics services to companies for some portion or all of their supply chain management functions. 3PL typically specializes in integrated warehousing and transportation services that can be scaled and customized to customer needs based on market conditions and the demand and delivery service requirements for their products and materials (Skjoett-Larson, 2007). 3PL is evolving from a predominately transactional role to one that is more strategic in nature.

The outsourcing of logistics functions to 3PL companies has increasingly become a powerful alternative to the traditional company (Boyson, Corsi, Dresner & Rabinovich, 1999). There are a lot of benefits of outsourcing logistics activities to 3PL companies, and this is the reason why companies prefer to outsource more and more of their activities to 3PL providers. Some of the advantages offered by out-sourcing are: companies can reduce their costs, become more competitive and improve their customer service activities (Sinkovics & Roath, 2004). Moreover, according to Ansari and Modarress (2010), apart from cost reduction, cargo security is also an important reason to outsource logistics activities to 3PL providers. Furthermore, market knowledge, data access, improved expertise and flexibility are some other benefits (Aghazadeh, 2003).

The development of the 3PL industry can be divided into three main stages. The first one was in the early 1980's when only traditional logistics service providers existed such as transportation companies, warehouses, forwarders, shippers and agents. The second stage was in the early 1990's when network players, mainly parcel and express companies got involved in the industry. These were companies such as DHL, UPS and TNT. The third and the last stage of evolution started in the late 1990's, when companies from different sectors such as consulting, finance and IT companies entered the 3PL industry (Berglund, Laarhoven, Sharman & Wandel, 1999).

Nowadays, companies require more complex and advanced services from 3PL providers. Companies turn to 3PL providers asking for activities and services such as order fulfilment, consulting procurement, product labelling and packaging, reverse logistics and waste disposal activities, product returns and a wide variety of technology and integration systems (Commonwealth Business Media Inc., 2006). Furthermore, Ying and Dayong (2005) state that 3PL business processes suitable for supply chain should also include processes of customer relation management, customer service management, customer order fulfilment, structural logistics network design and stock management.

The 3PL industry has developed as a result of the emerging demand for advanced logistics services. The growth of the 3PL industry has caused many companies from different sectors and industries to enter this field (Hertz & Alfredsson, 2003). The 3PL industry has grown in Europe at an average annual rate of 10% (Common-wealth Business Media Inc., 2006). Many companies entered the business as subsidiaries of established transportation and warehousing companies. As an alternative to acquisitions, many 3PL providers have developed alliances and agreements with other 3PL or transportation and warehousing companies, in order to broaden their portfolio and their served area. Logistics alliance is the evolution of the traditional form of contract logistics services. Companies are increasingly forming alliances with 3PL providers in an attempt to improve their delivery services and to reduce their own logistics costs (Laar-hoven & Sharman, 1994).

Despite the importance and the rapid growth of the logistics industry, much has not been written on logistics service providers (Cui &Hertz, 2011). Most studies on logistics firms and logistics service providers centered on their services, skills, and the extent of their integration and relationships with customers (Cui and Hertz, 2011; Andersson, 1997). Besides, Fabbe-Costes,

Jahre and Roussat (2008) state that studies on third party logistics concentrate more on firm and shipper-provider relationship (Ajakaiye, O.I., 2012).

In mining industry, outsourcing has evolved from outsourcing peripheral activities like security or cleaning to more strategic activities like drilling, hauling, maintenance and even mining (Kenny & Bezuidenhout 1999). Therefore, this industry sector is offering interesting facets for outsourcing as a practice due to the remote locations, mine lifecycle, limited and specified supply market and challenging production.

In today's highly competitive mining environment, logistics plays a pivotal role. Customer focus is the prime priority. Mining companies are looking to move their volumes of produce in the most cost-efficient manner and also at the same time are looking for better logistical solutions. Companies are looking at idling capacity, lowering inventory costs, reducing freight costs, lowering risks and examine emerging opportunities. In many instances, 3PLs (third-party logistics providers) who concentrate in industrial freight can offer targeted solutions which reduce operating expenses or costs. Also, the mining-specific logistics management solutions they provide improves service levels and free the mining company's team to concentrate on the strategic initiatives (Isherwood G. 2013).

The Government has made development of Ethiopia's mineral wealth one of its leading economic objectives. Mining operations within the country are expected to be an important economic catalyst for the Government's export-orientated development strategy. The goal is to bring the minerals sector up to 10 percent of GDP within 10 years. Ethiopia currently enjoys the participation of both foreign and domestic investors in exploring and mining as a result of the conducive fiscal and legislative environment. 19 local companies and 11 foreign companies have been granted prospecting, exploration and mining licenses. These are for gold and base metals, platinum, industrial and construction minerals, notably, potash, diatomite and high-quality ceramics raw materials. (Embassy of Ethiopia Economy and Business Section, 2008). As a result, it is important to know what kind of logistics services the mining industry will demand in future.

1.2 Statement of the Problem

As the third party logistics (3PL) industry has continued to evolve, it has clearly become more global in nature. In responding to the needs of a customer base that is increasingly global in its sourcing, manufacturing, sales, and distribution, large 3PL service providers have been challenged to put global service networks in place. The providers have responded in a variety of ways that have included acquisitions in other countries, development of alliances with foreign providers, and initiating their own operations in new geographies. The task of designing, building, and effectively operating these broad networks around the globe is challenging, to say the least (Lieb, 2004). Therefore, companies should be aware of importance and benefits of 3PL. However, to fully tap these benefits, firms must manage the negative consequences of long supply chains; notably, the increased risk of disruptions from labor strikes, partner failures, natural disasters, wars, and terrorist attacks, among other events (Windle et al., 2008).

Despite the huge amount of literature advocating outsourcing of logistics the actual realization of potential benefits is far less well documented. In this respect the situation is similar to what has been observed concerning outsourcing in general, where it is claimed that cost savings and other benefits "tend to be taken for granted, but detailed analyses of actual outcomes and potential side effects are hard to find" (Berggren and Bengtsson, 2004). Within logistics there are numerous claims concerning the potential benefits of outsourcing arrangements (see for example, Bowersox, 1990; Tate, 1996; Bhatnagar and Viswanathan, 2000; Halldorsson and Skjoett-Larsen, 2004; Marasco, 2008). There is no doubt, however, that the outcome of third party logistics shows mixed results. Lambert et al (1999) conclude that while the benefits of 3PL are well documented, the pitfalls and problems have received less attention. Moreover, it is argued that there is clear evidence that in some cases "logistics outsourcing has become a source of corporate failure and disappointment" (Boyson et al, 1997). Their survey showed that a significant share of the respondents indicated that they had to make critical changes in the logistics arrangements and take previously outsourced functions back in-house. Other studies also indicate severe problems with outcome and so it is reported that 55% of logistics alliances were terminated after three to five years (Gulisano, 1997). Similar results were obtained by the Outsourcing Institute which found that more than half of third-party partnerships had failed (Foster, 1999). Among the problems leading to these consequences can be mentioned "service performance, disruption to inbound

flows, inadequate provider expertise, inadequate employee quality, sustained time and effort spent on logistics, loss of customer feedback and inability of 3PL-providers to deal with special product needs and emergency circumstances" (Selviaridis and Spring, 2007).

According to the study made by PLS Logistics Services (2015), the logistics challenges of mining companies are unique and complex. Despite this, investments in logistics people, processes and systems often take a back seat to core investments around finding, extracting and processing minerals. The paper discusses five 3PL related challenges faced by mining companies. The first challenge is mining sites are usually located in areas where there are minerals, mostly in remote areas. On the other hand, carrier pools are usually located in areas where businesses and the people are. It is not abnormal for the nearest carriers to remote sites to be two hundred or even more miles away. This is so unless it is expressly formed to serve that particular mine. Some of the problems created by lack of a nearby carrier capacity include: insufficient capacity, inconsistent service and higher transportation costs. Rail equipment management is a hard and time consuming challenge. When railroads are used, `free running` does not mean zero cost. Generally, this is a challenge facing 3PL service providers especially those who lack the processes and systems which are required. Risk management is also a difficult challenge facing 3PL companies as far as freight is concern. This is because of broker reliance, remote locations and lack of time to collect documents.

While 3PL in recent years has received certain attention from researchers, some research directions have been more preferred than others have. As stated by Maloni and Carter (2006) in their literature reviews, research in third party logistics area is necessary from the perspectives of both buyers and providers. Most of the previous research has focused on the buyer perspective. This is supported also by Berglund (1999). Further on it is pointed out that the main part of the studies previously conducted are surveys providing a macro view of the 3PL field (Maloni & Carter, 2006; Selviaridis & Spring, 2007). This makes deeper qualitative study with provider focus of a particular interest in providing more detailed view of the 3PL phenomenon. The researcher observed that not much has been done on the role of 3PL service providers to the mining industry and in terms of academic contribution, this study aimed to fill a gap in the literature by producing an up-to-date knowledge. It is not only the gap in this aspect that is a motivating factor to the researcher, but his interest in knowing the role of the third party service providers in the logistics performance of mining industry is another factor.

For the case of the 3PL service in Ethiopia, there are about 53 licensed freight forwarding firms and 21 Goods-Transit and shipping agents that are members of the Association of Ethiopian Forwarding Businesses (Debela, 2013). Even though there is a vast opportunity for 3PL companies to participate in supporting these mining companies, there are only few companies who are operating in the mining sector. In addition, these companies focused on specific services while mining companies require 3PL service provider who takes end to end control over shipments from the factory gate, reduce fragmentation in the process, and create visibility of the supply chain for the mine management. The purpose of this study is to analyze the 3PL service provider's role in the mining industry by exploring the current services they provide and challenges they face in the industry.

1.3 Basic Research Questions

1. How do 3PL service providers fulfill their expected roles in Ethiopian mining industry?
2. What are the types of services that 3PL service providers assume in the management of their client's logistics systems?
3. What are industry related challenges in the provision of 3PL Services?

1.4 Objective of the Study

1.4.1 General Objective

The purpose of the thesis is to analyze the third party logistics providers' role in Ethiopian mining industry by explaining the current services they provide and challenges they face.

1.4.2 Specific Objectives

1. To assess the role of 3PL providers in Ethiopian mining industry.
2. To assess the types (or categories) different services that 3PL providers can assume in the management of their client's logistics systems.
3. To examine industry related challenges in the provision of 3PL Services.

1.5 Significance of the Study

On a managerial or practical level, this study adds knowledge about the strategic significance of logistics outsourcing for the mining companies directed at 3PL service providers. For 3PL service providers, it will be important to understand the practices, trends, issues involved in the industry including different end to end services that are feasible and what this can contribute to the logistics performance. Secondly according to Belda,(2006) the new economic policies initiated by Ethiopian government have created a much improved investment climate for mining companies which created opportunities for foreign 3PL service providers to join the industry and this study will explore the international knowledge these companies brought for the development of Ethiopian logistics system. For the mining companies, this study will show the benefits that they can get by outsourcing their logistics management which reduce operating costs and improve service levels, while freeing their core team to focus on strategic initiatives.

This study can be used as a starting point for future researchers who are interested to work on the logistics outsourcing in the mining industry and the impact of 3PL services on logistics performance from mining companies point of view as it is made on an area where there is lack of researches and aims to explore the different services that 3PL service providers assume in performing their expected role in the industry.

1.6 Delimitations

In order to make the study more feasible, as 3PL is a broad perspective in logistics and due to the unique nature of mining companies logistics, the researcher focuses on 3PL service providers operating in Ethiopian mining industry. Furthermore, the network of the 3PL service providers with the other logistics firms (such as carrier and logistics intermediary firm) and impact of 3PL services on logistics performance treated generally without discussing the downstream and upstream differently. The researcher has no intention to compare the networks of the interviewed companies. This study only focuses on the role from the 3PL providers' point of view by identifying the value adding services they provide. None of the mining companies interviewed.

1.7 Limitations of the study

This study focuses on 3PL services and challenges to Ethiopian mining industry from the perspective of services providers only. More over the study employed judgmental sampling technique which is more subjectivist than objectivist approach and is not a generalized study. Due to lack of studies on the area, the study is limited to external secondary data (company websites) for the identification of end to end logistics services.

1.8 Organization of the Research Report

The first chapter introduces the reader to the subject by stating the background of the thesis. Further, the problem formulation of the thesis is presented, followed by the purpose. The chapter ends with research questions, delimitation and outline of the thesis. The second chapter includes the theories related to the research subject. The frame of reference focuses on the theories that are seen as important to better understand 3PL service providers and the development of such services. The third chapter among other things the research approach and strategy, the collection of data and sampling, sources and instruments of data collection, reliability and validity, procedures of data collection are discussed. The chapter ends with discussion of the data analysis method of the thesis. The fourth chapter presents the data collected from the conducted interviews at the three target companies. For each company the empirical findings are presented under the sub headers; general company information and the services that 3PL companies provide. Interpretation of the findings derived from the study in association with the theory presented in the frame of reference. The fifth chapter presents analysis of services between the three companies, the challenges that are unique to the mining industry, the conclusion of the thesis and the main findings from the analysis to answer the purpose of the thesis. The ideas for future research suggested.

Chapter 2 Review of Related Literature

2.1 Introduction

As a result of the fast growth in the use of outsourcing and the robust competition between the various third-party companies, there are now many different distribution and distribution-related services on offer. It is useful to be aware of the breadth of services that are available and to be able to select those that are most appropriate for a user company. As well as the standard types of operations involved in the warehousing and the transport of goods, such as storage, picking and final delivery, there are also many other operations that can be outsourced, such as the repacking of goods or a returns operation. One very important decision that must be made by any company that is contemplating outsourcing as an option is whether to outsource a part of the operation or the complete operation as a whole (Rushton & Walker, 2007).

Mining, minerals and commodity industries generally are (as of 2015) in a bearish market. For various reasons, from Eurozone problems to the refocusing of the Chinese economy, demand is down significantly. The effects on global shipping, where mineral-related trade is dominant, and other logistics aspects are profound, as new investment is cancelled or postponed and existing assets and routes curtailed or withdrawn. Since new investment will inevitably lag any market upturn, in some cases by years, difficult supply chain conditions are likely to continue even into a more bullish commodity market place. Meanwhile, it is imperative that miners maintain sites in production, but this depends on the reliable arrival of capital and investment equipment, spare parts and consumables, and other stores. Neither suppliers nor mine owners are necessarily best placed to achieve the most reliable and cost-effective supply chains to mine sites. There is a role for third party logistics providers to create and use visibility and control in the supply chain, to ensure on time in full delivery of supplies, at optimal cost, to mine sites around the world, using techniques of vendor, carrier and cargo management (Thuynsma, 2015).

2.2 Role of 3PL Service Providers

According to the American Heritage Dictionary of English Language, (2000) the word “role” was first used as an English word in the year 1606, and it originated from the old French word (Rolle) meaning “a part one has to play” especially in the theater. The theatrical meaning of the word was

later generalized to include parts played outside the theatre stage (off stage). The dictionary further refers to role as the actions and activities assigned to or required or expected of a person or group. Also, the Shorter Oxford English Dictionary, states that role refers to "the characteristics or expected function of a person or thing in a particular setting or environment" (Shorter Oxford English Dictionary, 2002).

The structuralist sees role in terms of playing activity which means that the one occupying a position is required to live up to the expectation of other people. The interactionist does not only see role as playing activity but views role as the product of actors. They conclude that role and position cannot be separated. Role therefore means the ability of one in a position to be able to interpret situations, and being able to make meaningful use of that situation by being creative and innovative. Using role in a sense of relationship or network, it implies that whatever happens in a relation-ship or network depends on the activities or the roles of the actors. Besides, they believe the subsequent activities in a network or relationship depends on the interpretations of those in positions and the ability to make meaningful use of the situation (Ajakaiye cited in, Aderson, Havila, Andersen & Halinen, 1998). The researcher of this study sees role as the activities that are expected of the 3PL service providers.

The role of the third party logistics services provider was limited in the 80s because at that time third party logistics was still an infant industry. From that period onwards, its growth became rapid, and contributes to the effectiveness of the supply chain (Maloni & Carter, 2006). There have been changes in its role in accordance with the growth in logistics services. For instance, it evolved from offering only traditional services (e.g. transportation and warehousing) to include other services such as inventory management, cross docking, technology management, and a host of other services. Presently, the role has evolved to order fulfilment, consulting procurement, product labelling and packaging, reverse logistics and waste disposal activities, product returns and a wide variety of technology and integration systems.

2.3 Logistics Outsourcing

When a company considers the organization of its logistics functions, it is faced with three basic options. According to Razzaque and Cheng (1998), a company can provide the function in-house by making the service, own logistics subsidiaries through setting up or buying a logistics firm,

and/or outsource the function and buy the service.

As 3PL firms are professional service providers in a business-to-business context, outsourcing decision is important for 3PL business as a decision of 3PL providers' customers to employ 3PL providers for providing of necessary services. Outsourcing is defined by Sanders, Locke, Moore and Autry (2007) as choosing a third party or an outside supplier to perform a task, function or process, in order to gain business-level benefits. Kasper et al. (2006) states that reasons for organizations to buy services can be divided into three main groups: the buying organization lacks the capability to effectively perform service in required quality, the buying organization does not have the scale or ability to perform the service efficiently and there is lack of capacity in the buying organization to perform the service. Sanders et al. (2007) however, divide outsourcing reasons in financial, resource based and strategic reasons where financial reasons focus on minimizing the costs. Resource based reasons include the lack of expertise and the lack of assets to perform the task in-house while strategic reasons concentrate on gaining strategic advantage through outsourcing.

Sanders et al. (2007) argue that outsourcing is an umbrella term that includes a range of sourcing options that are external to the firm. They divide all external sourcing options into four groups depending on the scope of the outsourcing arrangement. The first is out-tasking, when only one specific task is outsourced. For example, supplier can be assigned to take care of customer's return items, arranging them for disposal or restocking. Co-managed services involve assigning to the supplier the task or function of larger scope, however, under direct client control. Client and supplier share the task managing responsibility. Managed services often involve design, implementation and management of end-to-end solution for a complete solution done by supplier, like for example, complete management of client's goods transportation. A supplier is responsible for all aspects in performing assigned function. Full outsourcing is the situation when the supplier has a total responsibility for the outsourced function, which often involves also making strategic decisions. The services provided by supplier are typically highly customized. An example could be the complete outsourcing of the whole logistics function to the third-party logistics provider.

A part from the scope, criticality of the outsourced task also needs to be taken into consideration. Criticality refers to the extent to which the task potentially outsourced impacts the organization's performance on its core competencies (Sanders et al., 2007). Taking into consideration scope and

criticality Sanders come up with four groups of possible client-supplier relationships. Nonstrategic transactions involve outsourcing arrangements of purely transaction character where tasks of low criticality and small scope are outsourced. Products in question are typically standardized and available from many suppliers. Contractual relationships comprise certain dependency between supplier and client and often mean moderate levels of communication between partners. The scope of outsourced tasks is higher than in nonstrategic transactions but of low criticality. Partnerships are characterized by the outsourcing of critical tasks or functions, but in limited scope. Partnership means strong trust and commitment between parties but interaction can be infrequent. An example for such a relationship arrangement could be outsourcing of just-in-time replenishment of a critical manufacturing component. Alliances comprise both strong trust and commitment and frequent communication. Tasks outsourced are critical and of wide scope (Atkacuna and Furlan , 2009).

Although there is no doubt about the rising importance of logistics outsourcing in business practice, different drivers of this development have been identified in research. According to Hill (1994), Lieb (1992), and Sheffi (1990), the main goals of outsourcing logistics functions to third parties are the need to develop competitive advantage through a growing emphasis on providing good customer service effectively and efficiently and the strategic value of focusing on core businesses and re-engineering.

2.4 Third Party Logistics

2.4.1 Definition

The term “third party logistics” actively began to appear in academic literature year 1989 (Maloni & Carter, 2006). The expression is associated with the practice of contracting-out (outsourcing) some of the company’s logistics activities to a third-party and there are numerous other terms referring to the same phenomenon, such as logistics alliances, operation alliances in logistics, contract logistics, contract distribution and logistics outsourcing (Atkacuna & Furlan cited in Berglund et al., 1999, Selviaridis & Spring, 2007).One of the earlier 3PL definitions of functional character is provided by Andersson and Sjöholm (1992, cited in Skjott-Larsen, Halldorsson, Andersson, Dreyer, Virum & Ojala, 2003). The authors state that 3PL is a situation “where a third party takes responsibility for primary transport and warehousing activities, but also related services such as consolidation, order administration and simple assembly.”

One comparatively simple 3PL provider's definition is supplied by Coyle et al. (2003): "An external supplier that performs all or part of a company's logistics functions". Wisner, Leong and Tan (2005) also provide relatively simple 3PL firms' definition: "companies that are providing outsourced supply chain management activities".

However, definition of more functional character provided by Van Laarhoven et al. (2000) can be considered in some cases. 3PL according to the authors are: "activities carried out by a logistics service provider on behalf of a shipper and consisting of at least management and execution of transportation and warehousing. In additional, other activities can be included, for example inventory management, information related activities, such as tracking and tracing, value-added activities, such as secondary assembly and installation of products, or even supply chain management. Also, we require the contract to contain some management, analytical or design activities, and the length of the cooperation between shipper and provider to be at least one year, to distinguish third-party logistics from traditional "arm's length" sourcing of transportation and/or warehousing."

2.4.2 Growth and Types of 3PL Service Providers

There are different ways 3PL service providers can be classified. Various types of names have been used to signify logistics service providers and different authors classified it in the following way:

Skjott-Larsen et al. (2007) deal with the growth and types of third party logistics firms in the following way:

Asset-based logistics providers: The origin of the group can be traced to early 1980s, and is regarded as the first wave. This group of operators either owned the logistics as-sets like trucks, airplanes, warehouses, terminals and container themselves or leases them from other sources. For instance, transport management, distribution centers, and information services may be provided by a transport and freight forwarding company to a shipper (Skjott-Larsen et al., 2007). Falling profits margin and tough competition in the traditional transport market sector are some of the reasons propelling these companies into third party logistics business.

Network logistics providers: This group of providers commenced as couriers and ex-press parcels companies in the 1990s, but had to get involved in global transportation and communication

networks for effective discharge of duties. Examples of companies in this group are DHL and Maersk logistics. The group concentrates more on time-sensitive and high value products such as electronics, pharmaceutical and spare parts as the perspective of third party logistics services it offers. Companies in this group do offer services that provide-proof of delivery, track and trace of goods on transit, and so on (Skjott-Larsen et al., 2007).

Skill-based logistics: This is the third wave and it started towards the end of the 1990s. The group has not got its own physical logistics assets but engages in the provision of services in the areas such as consultancy and finance, information technology, management skills, and so on. These service providers do go into joint efforts with players from other waves or engage them as subcontractors. An example is Maersk logistics which provides customized solutions for supply chain management, warehousing and distribution, as well as sea and airfreight transport (Skjott-Larsen et al., 2007).

Hertz and Alfredsson (2003) also categorize third party logistics providers based on their ability to adapt to individual customers and their general ability to provide solutions to problems.

The standard 3PL provider: This group supplies the standardized third party logistics services such as warehousing, distribution, pick and pack, etc. to their customers.

The 3PL as service developer: This category provides advanced value-added services which are differentiated depending on the need or demand of each customer. Thus the services are in the form of specific packaging, cross-docking, pick and pack, special security systems, and so on with the aim of creating economies of scale and scope.

The customer adapter: This is referred to as the type of third party logistics firm that is seen as the part of the customer organization, and totally committed to developing solution of basic services for respective customer. For instance, the third party logistics firm can take over customer warehouses and logistics activities. Moreover, they do have few but close customers.

The customer developer: This is regarded as the most advanced 3PL firm which has to do with developing advanced customer solution for every customer. It also concerns high integration with its customer, and ready to take over its whole logistics activities (Hertz & Alfredsson, 2003).

Despite the fact that most firms claim to be providers of varieties of logistics services, they can still be categorized in several ways (Coyle et al., 2003).

Transportation based: As the name implies, the major activity of this category is transportation. However, some firms in this category could operate on leverage, utilizing the assets that belong to different companies, while others are non-leveraged in that they have their own assets or use the transportation based-assets of their parent companies. It should be realized too that some firms are subsidiaries or large divisions of well-established large transportation firms. Examples of the transportation based firms are Schneider Logistics, FedEx Logistics, and UPS logistics. However, these transportation firms also engage in other logistics services apart from the transportation services (Coyle et al., 2003).

Warehouse/ Distribution-based: The traditional functions of the firms in this group are inventory management, warehousing, distribution and so on. Although, most ware-house/ distribution based logistics suppliers are engaged in public or contract ware-housing business, they extend their services to include broader range of logistics services. Examples are DSC Logistics, USCO, and Exel. For instance, in 2000, Exel logistics (a warehousing/ distribution-based firm) and MSAS (good in forwarding and ocean shipping areas) decided to merge (Coyle et al., 2003).

Forwarder based: Firms in this category are non-asset owners. They carry out a range of supplies of logistics services in order to satisfy their customers' needs. Examples of companies in this group include Fritz, and Hub Group. These companies are again engaged in other logistics services different from their original roles as forwarders and / or brokers (Coyle et al., 2003).

Financial based: The firms in this group offer services like freight payment and auditing, cost accounting and control. Such firms can as well engage themselves in other logistics services like providing logistics tools used for managing inventory, monitoring shipment on transit, tracking and tracing, and so on. Examples of companies belonging to this group are Cass information systems and Commercial traffic Corporations (Coyle et al., 2003).

Information based: Firms in this group could be regarded as innovative form of logistics service providers, especially as they form alternative means for those who purchase transportation and logistics services. The following are examples of firms in this category. Transplace Company is a web-enabled platform which aims at bringing together shippers and carriers in the entire world so that they can collaborate in transportation perspectives for effective and efficient operations (Coyle et al., 2003).

2.4.3 Classification of 3PL Services

The third party logistic companies are offering a number of services to the companies like public warehouse, dedicated warehouse, distribution and total logistic, (Tompkins Associates, 2009). Traditionally 3PL providers have been providing asset based services to the companies like warehousing, transportation, freight forwarding or customs brokerage. Latter on they emerged-one that is not asset based and is capable of creating an optimal solution in a global environment, (Sowinski, 2000). There is a vast range of different operations that are provided by 3PL service companies. Some companies tend to specialize in certain types and styles of operations, rather than trying to offer all of the many alternatives that are available.

There are several ways to classify the activities provided by 3PL providers. Delfman et al. (2002) suggest a classification based on the degree of customization among standardizing, bundling and customizing logistics service providers.

Meier and Andersson (2003) claim that 3PL service offerings can either cover a wide range of services or be more limited in scope. Unfortunately, providers have different ways of presenting their services which can create some confusion when trying to describe and classify them. Meier and Andersson (2003) have categorized 3PL service offerings into seven groups. Two of the three most popular groups are transport planning, management, warehousing and inventory management, which can be considered as traditional activities of 3PL companies. Information technology services are also popular and mostly involve tracking and tracing. 3PL companies' clients can also perform different operations electronically, such as booking, arranging of pick-ups and analyzing in detail all available data. Forwarding and customs activities, which too can be considered as a traditional activity of 3PL are also popular and are provided by more than 80% of the 3PL companies (Meier & Andersson, 2003). Meier and Andersson (2003) state that 80% of companies studied have knowledge in product related services, from which most frequently provided are labelling, product assembly and configuration, and product return. However, they do not go deeper in how important role such services play for the 3PL firms' business. The final two categories of 3PL services are consulting and financial services which are provided by only few companies. Consulting involves project management, training of employees and other advisory services while financial services can be cargo insurance and factoring (Meier & Andersson, 2003).

Bask (2001) argues that 3PL services can be segmented into three categories: routine 3PL services, standard 3PL services and customized 3PL services. Routine services are simple and without any specific arrangements. They are volume-based and include all types of basic transportation and warehousing services. Services are based on loose relationships between the customer and the 3PL firm and where the most important decision making focuses on competitive price, ease of service procurement, reliability and requested transport time. Standardized 3PL services involve easy customized types of operations, such as standard service in transportation with a terminal service and sorting of products. Other examples could be special transportation where products need to be cooled or heated. Such services involve a moderate level of co-operation between the customer and the 3PL firm and can take advantage of economies of scale and scope. Customized 3PL services require closer relationships, just a few service providers and in many cases open information exchange. There is a possibility for customers to influence the flexibility of service and the way a service is performed. This type of service can mean high transaction costs because of necessary investments in IT systems, information flows, coordination of work, joint planning and more. Examples of customized 3PL services include postponement services such as final assembly of the product, packing of products by country/specific customer requirements, repair services and after sales services. Customized 3PL services can also include consultation services. However, most parts of the service can be standardized (Bask, 2001).

Logistics practitioners Ahl and Johansson (2002) divide 3PL services into four parts: basic services which are used by almost all customers and can be used to achieve economies of scale, value-added services connected with physical handling of the goods, administrative services (inventory management, customer service, different kinds of rapports etc.) and IT services (for example, electronic data interchange (EDI)). Value-added services are further on divided into value-added services which are included in the contract (i.e. labelling, adding advertising material in the package, assembly, etc.) and value-added services such as exception handling (i.e. dealing with problems related to damage to goods during transportation, incorrect quantities sent by supplier etc.).

The 2016 20th Annual Third Party Logistics Study has mentioned the most common logistics services. Essentially, and with some relatively minor variations, 2016 results are numerically and directionally similar to those from recent years. The most frequently outsourced activities are

domestic transportation (80%), warehousing (66%), international transportation (60%), freight forwarding (48%) and customs brokerage (45%).The less frequently outsourced activities continue to be those that are more strategic, customer-facing and IT intensive. Examples include: service parts logistics (12%), fleet management (12%), IT services (11%), supply chain consultancy services (11%), customer service (7%) and lead logistics partner/3PL services (6%). The following table shows the percentages of shippers outsourcing specific logistics activities (Langley et al. 2016).

Outsourced Logistics Services	Percentages of Users	Outsourced Logistics Services	Percentages of Users
Domestic transportation	80%	Inventory management	25%
Warehousing	66%	Product labeling, packaging, assembly, kitting	22%
International transportation	60%	Order management and fulfillment	19%
Freight forwarding	48%	Service parts logistics	12%
Customs brokerage	45%	Fleet management	12%
Reverse logistics (defective, repair, return)	34%	Information technology (IT) services	11%
Cross-docking	33%	Supply chain consultancy	11%
Freight bill auditing and payment	31%	Customer service	7%
Transportation planning and management	28%	LLP / 4PL services	6%

Table 1: 3PL logistics services. Source: (Langley et al. 2016).

2.4.4 Advantages and Disadvantages of Using 3PL Service Providers

Lau et al. (2006) summarized some common key factors that motivate organizations to use 3PL companies. These factors were broadly categorized as economic, strategic, and environmental perspectives. Solakivi et al. (2011) agree outsourcing logistics activities to 3PL companies can make the cost reduction, cost saving and capital investment reduction. According to those factors, it can improve profitability, efficiency, return on assets and add value to product. Brewer et al. (2013) state, for strategic factors, it can make companies focus on core competence, acceleration of business process re-engineering and enhancement flexibility. Influenced by those factors, 3PL can improve performance, competitiveness and achieve competitive advantages. Meanwhile, companies can leverage the organization's skills and resources and improve business focus. Finally, it can reduce organization's own productive capacity, increase responsiveness to market change and reduce risks. For environmental factors, it refers to IT development, globalization and

capability of supplier. The IT development can meet increasing demand and manage resources more efficiently and economically (Christopher, 1993). The globalization can help companies gain global competitive advantage. The capability of supplier enables partnering to improve service quality and customer service.

However, there have some problems for outsourcing logistics to 3PL companies during it provide convenience for organizations. Lau et al. (2006) also summarized the drivers against 3PL usage. Kumar et al (2012) agree there are many potential problems of using 3PL companies. The loss of control made the companies loss core competencies and alienating customers. The loss of critical skills made organizations loss of competitive advantage and increased number of competitors. The low capabilities of 3PL providers made organizations loss of market share. The loss of flexibility reduced responsiveness for the fast changing market. Failure to realize hidden costs of contract increased operating cost. Indecisiveness on which activities to outsource and less support from organization increased chances of failure. The fear of job loss increased resistance to change and lower staff morale.

To sum up, the advantages of using 3PL companies are to gain service improvement cost saving and operation efficiency. The disadvantages are there are risks of loss of control, loss of critical skills, loss of flexibility and less support from organization which increased the operating cost, increased chances of failure and loss of competitive advantage. However, it does not mean 3PL is negative. Outsource logistics activities to 3PL providers have more advantages than disadvantages. Choose an outstanding partner reasonably and successfully will help organization achieve competitive advantages.

2.4.5 Impact of 3PL Services on Logistics Performance

Undoubtedly, the ultimate goal of logistic outsourcing is improving logistic performance. This therefore calls for logistic outsourcing firms to keep track of their logistic performance starting with whether 3PLs deliver up to, below, or above the expected level and whether a firm experiences any significant progress from its outsourcing strategy. How to determine the extent that this goal is reached and whether using 3PL providers is an appropriate strategy is therefore an important challenge to be addressed. Different authors have the viewpoint that it is the fact that Logistics Service Providers can improve quality, speed, service level, cost, performance and contribute to savings and benefits in the supply chains (Fabbe-Costes et al, 2009).

Customers rely on third party logistics providers because they have indirect relationship with the suppliers. So third party logistics providers handle all the activities which complete the whole logistic flow and control and deal with performance of different suppliers. The performance of these multiple suppliers has direct effect on the efficiency of complete supply Chain (Xiao et al, 2009).

Logistics Outsourcing has received increasing attention from researchers and practitioners in recent times. Outsourcing companies act as third party service providers, and help to increase the efficiency and effectiveness of a company's logistics function (Christopher, 1993). Third party logistics (3PL) is defined as the outsourcing of logistics activities to other companies, such as transportation, warehousing, inventory management, distribution, and other value-added services (for example, pick-and–pack, assembly, repairs, and reconditioning) (Lau, 1999).

McMullan (1996) provides some important performance measurements that can be used as both, input for quantitative measurements and parameters for qualitative opinion by logistic executives. These are: Inventory accuracy, number of on-time shipments, Number of incidences of customer complaints, Number of incidences of backorders, Warehouse cycle time, Number of kilos/unit shipped; and Number of dollars shipped.

According to Berglund et al. (1999), 3PL industry has increased importance for companies being supply chain management more efficient. Logistics Service Providers can enhance the performance partly because they are possessed with an ability to cooperate both up and down with supply chain partners as well as parallel with other Logistics Service Providers (Ha°kansson & Persson, 2004; Mason et al., 2007; Persona et al, 2007).

Since the 1980s, along with the trend to outsource non-core activities (Sink and Langley, 1997), companies have increasingly turned to third-party logistics providers (3PL) both in the USA (Lieb and Randall, 1996) and in Europe (Van Laarhoven et al., 2000). 3PL services help to achieve the strategic objectives by concentrating more on core competency of the main business. The study by Sahay and Mohan, (2006), has cited substantial growth in various financial indicators using services of 3PL, for instance, various improvements in sales revenue by 13.5%, working capital by 12.3%, returns on assets by 10%, capital assets reduction by 10%, production cost reduction by 10.5%, labor cost reduction by 10.0%, and logistics cost reduction by 15%. 3PL users depend on

service providers to secure capacity and gain agility (Hannon, 2005) who not only provide core services like supplying right quality product.

In a semi annul survey of third party logistics practices Lieb et al. (1993) and Randall (1996) stated that service offered by third party have incorporated services in their range of service portfolio are final congregation, then packaging and management of inventory. Establishing Cross docking facilities help logistics services providers to erase excess of unwanted inventories and higher customer service quality level can be achieved by redesigned distribution network (Berglund et al, 1999).Progressed Inventory return/turnover rate and reduction in unnecessary inventory through outsourcing is done by an improving coordination between production and shipping schedules (Richardson, 1990; 1995) which produces results of fast transit time, reduced damage and fewer paper work .

According to Razzaque & Sheng (1998) in a Purchasing Magazine Survey, it is cited that there are 50 percent or more contract logistics are cutting cost associated with distribution network and internal administration, decreasing staff volume while keeping focus on core business activities, which make third party logistics more reasonable to use. Many other reasons cited include getting outside, external expertise, combining services, raising customer satisfaction and service quality, elucidating whole logistics process, saving expense on capital, usage of logistics information systems, gaining output and decline in service providers.

Results and findings of the 20th annual 3PL study (2016) shows continued collaborative and positive relationships between shippers and third-party logistics providers, which have been developing since the study began 20 years ago. This year's survey suggests 3PLs and their customers are becoming more proficient at what they do, individually as well as together, which is improving the quality of their relationships. Both parties 93% of 3PL users and 94% of 3PL providers reported that their relationships are successful and that their work is yielding positive results. The study also state that 70% of those who use logistics services (shippers) and 85% of 3PL providers said the use of 3PL services has contributed to overall logistics cost reductions, and 83% of shippers and 94% of 3PL providers said the use of 3PLs has contributed to improved customer service. Moreover, the majority of both groups 75% of shippers and 88% of 3PL providers said 3PLs offer new and innovative ways to improve logistics effectiveness.

2.5 Mining Companies Logistics

2.5.1 Mining Industry

Mining exists in many countries. London is known as the capital of global "mining houses" such as Rio Tinto Group, BHP Billiton, and Anglo American PLC. The US mining industry is also large, but it is dominated by the coal and other nonmetal minerals (e.g., rock and sand), and various regulations have worked to reduce the significance of mining in the United States. In 2007 the total market capitalization of mining companies was reported at US$962 billion, which compares to a total global market cap of publicly traded companies of about US$50 trillion in 2007. In 2002, Chile and Peru were reportedly the major mining countries of South America. The mineral industry of Africa includes the mining of various minerals; it produces relatively little of the industrial metals copper, lead, and zinc, but according to one estimate has as a percent of world reserves 40% of gold, 60% of cobalt, and 90% of the world's platinum group metals. Mining in India is a significant part of that country's economy. In the developed world, mining in Australia, with BHP Billiton founded and headquartered in the country, and mining in Canada are particularly significant. For rare earth minerals mining, China reportedly controlled 95% of production in 2013 (MacDonald A, 2002).

The increasingly competitive nature of global business environment such as the mining industry has great influence on business activities. In the face of such fierce competition, supply chain then becomes a key business process model for organizations to be able to compete favorably in the business environment, both locally and internationally (Ou, Liu, Hung and Yen,2010; Baharanchi, 2009). The roles SC plays include, but not limited to, coordination in the supply network, alignment with customer satisfaction and sustainability of the overall competency throughout the supply chain to ensure efficient and effective business performance (Faisal, Banwet and Shankar, 2006; Chopra and Sodhi 2004). To realize these objectives, the mining sector, just like other industries, requires close and seamless coordination among all the members of the supply chain.

Logistics as part of supply chain has to do with planning, implementing and controlling the efficient and effective forward and reverse flow and storage of goods, services and associated flow of information between the point of origin and point of consumption such that customer satisfaction can be met (Council of Supply Chain Management Professionals (CSCMP), cited in

Jonsson, 2008). According to CSCMP, logistics activities include inbound and outbound transportation management, warehousing, material handling, inventory management, planning and management of third party logistics services, supply and demand planning, sourcing and procurement, production planning, customer service among others. These logistics activities are typical of that within the mining SC. They thus constitute essential part of mining operations. The purpose of logistics in organizational activities, including mining firms, is to ensure that efficiency and effectiveness are improved through effective management of material and information flows in order to enhance performance and competitive advantage. Logistics system has influence on customs service, cost, flexibility, time and environment (Jonsson, 2008; Tilamus, 1997; Tseng, Yue and Taylor,2005). Logistics service influences customer service by creating goods delivery, services and ensuring information flow. Effective handling, movement and storage of materials as well as management of inventory reduce tied-up capital and logistic cost. Similarly, effective logistics planning creates flexibility and reliable delivery time for the customer. Water pollution, land destruction, noise from transportation, emission, poor handling of waste from mining operations and high energy consumption which are examples of environmental impact of logistics and supply chain activities,(especially within the mining sector) can be minimized through a well-planned logistics system.

2.5.2 Stages in the Life of a Mine

The overall sequence of activities in modern mining is often compared with the five stages in the life of a mine: prospecting, exploration, development, exploitation, and reclamation. Prospecting and exploration, precursors to actual mining, are linked and sometimes combined. Geologists and mining engineers often share responsibility for these two stages geologists more involved with the former, mining engineers more with the latter. Likewise, development and exploitation are closely related stages; they are usually considered to constitute mining proper and are the main province of the mining engineer. Reclamation has been added to these stages since the first edition to reflect the times. Closure and reclamation of the mine site has become a necessary part of the mine life cycle because of the demands of society for a cleaner environment and stricter laws regulating the abandonment of a mine. The overall process of developing a mine with the future uses of the land in mind is termed sustainable development. (Hartman and Mutmansky, 2002).

Newman et al, (2010) also agree with the stages of activities and states in the first phase, geologists use visual inspection and physical measurements of the earth's properties to discover mineral deposits. In the exploration phase, geologists determine the value of the deposit by drilling holes to estimate the mineral concentration and its variability throughout the orebody. Interpolation techniques such as kriging and simulation techniques provide tonnage-grade curves representing the potential benefits of exploiting the orebody for a given set of economic parameters. The third stage, development, consists of obtaining rights to access the land and preliminarily preparing it to be mined by removing overlying waste by sinking shafts below the earth's surface. The development stage translates mine planning studies into mine design by (1) determining the mining method, which consists of the geometrical arrangements of infrastructure; (2) estimating production capacity and infrastructure capital; and (3) performing detailed engineering design. In the exploitation stage, the mineral is removed from the ground via surface and (or) underground mining methods. It is transported to the surface in trucks via haulage ramps or in shafts. From there, it may be stockpiled (and eventually sent to a processing plant), sent directly to a processing plant, or taken to a dump. Finally, the fifth stage, reclamation, consists of restoring the area in which mining occurred to its natural state to the extent possible.

2.5.3 Logistics Challenges of the Mining Industry

Supply chain in the mining sector is becoming increasingly complex. This complexity has increased the vulnerability and exposures of mining operations to many internal and external challenges that have the potential to cause huge distraction to the operations of SC activities. As a result, most businesses have realized the need for mechanisms to identify these challenges and risks in early stages and then manage them in the most effective way to survive the adverse consequences that may come about. Also, the large number of links that need to be created between members of the SC in the mining operations have increased the challenges facing the sector such that even small incident in one distant area can lead into adverse consequences for other associates within the SC (Christopher et al., 2006, Otchere et al., 2013; Faisal, Banwet and Shankar, 2006; Chopra and Sodhi, 2004). SC challenges varies with type of industry and the level of complexity of the SC network, however, it could be seen that most of the SC associated challenges are common in most industries including mining. The mining SC, for example, is characterized with frequent occurrence of natural disasters, labour disputes, and uncertainty in supply and demand, supplier

bankruptcy, political changes, and terrorism among others (Anane, 2011; Akabzaa and Darimani, 2001; Tsikata, 2007).

Thuynsma, I., 2015 argues that typical challenges faced include late and/or short deliveries, in response to which it becomes necessary to build up excess inventory at the mine site. Incorrect documentation can delay customs clearance, lead to the wrong duties being paid, and may even conceal the fact that the delivery is short or otherwise in error. These may include late or incorrect production, but also late and incorrect booking of transport and shipping, faulty preparation of documentation, late, short or inaccurate shipments (even if production has been correct, it doesn't mean an accurate order is always shipped), and poor product quality. Some of these are supplier issues – in manufacturing the answer may be to change supplier, although given the specialized nature of much mining equipment this may not be possible. But many of these problems are caused by a lack of control of the whole shipment process. The mine management, somewhere far way, lacks meaningful control because there are multiple parties involved – suppliers, (who may be manufacturers, but may equally be dealers or other middlemen), freight forwarders, shipping and other contractors and agents, outbound and inbound port services, official bodies and so on. That may to some extent be inevitable although there is considerable scope to simplify the way in which this multiplicity of parties dealt with. There may also be the problem of multiple, inappropriate, or even outdated Incoterms being applied in contracts, which leave most or all of the responsibility for shipping with the supplier. Mining companies may understandably wish to leave the risks and liabilities of the shipping operation with suppliers. However, in doing so, they leave themselves with no control, scattered visibility, and fragmented distribution.

Isherwood G. (2013) summarizes the mining supply chain consists of a complex series of interrelated activities spanning operations, logistics, and marketing functions. Planning, budgeting, and executing activities across these functions is critical to ensuring maximum efficiency and profit. In order to successfully accomplish this Herculean task, it is imperative to address the major challenges associated with optimizing the supply chain from "pit" to the point of export, import, or consumption. Three out of four mining and metals supply chain executives cite supply chain visibility as their top challenge. If the right hand doesn't know what the left is doing, it becomes virtually impossible to make sound business decisions, achieve efficient operations, generate accurate forecasts, and respond to supplier, market, and customer events in a timely manner.

Spreadsheets are not appropriate for managing and optimizing the complex activities across an end-to-end mining supply chain. Studies by independent academics show that as many as 94% of complex spreadsheets contain errors including input errors, logic errors, interface errors, and incorrect cell range errors . These errors, even significant ones, often go undetected because spreadsheets are usually created by non-programmers who don't perform formal testing. Because of this, many mining companies using spreadsheets function without the knowledge that a problem even exists, giving them a completely inaccurate picture of day-to-day operations and affecting all aspects of the supply chain. Without the necessary data validation and control, errors spread throughout key corporate processes that control hundreds of millions of dollars of inventory, putting the entire company at significant operational risk. As throughput volume grows, so do the challenges associated with maintaining a streamlined supply chain. Insufficient infrastructure and process management systems that are not equipped or optimized to handle high volume throughputs can cause supply chain bottlenecks that impede fulfillment of contractual requirements. Implementing a grade control system across the entire supply chain is critical to ensuring optimal resource utilization and minimizing contractual quality penalties. However, many mining companies forego these systems, relying instead on spreadsheets that are scattered throughout various departments to try and figure out what grades exist where, and how much of each grade is scheduled to be produced. This makes it extremely difficult to determine with any accuracy what will end up shipped to the customer, resulting in considerable contractual quality penalties penalties which, in some instances, can amount to tens of millions of dollars per year.

In summary, the above authors identified mining company's logistics challenges of natural disasters, labour disputes, uncertainty in supply and demand, supplier bankruptcy, political changes, terrorism, late and/or short deliveries, lack of control, lack of visibility, inaccurate data, managing high volume throughputs, and ensuring grade control.

2.5.4 End-to-End Logistics Solutions for the Mining Industry

Thuynsma, I., (2015) proposes end to end control over shipments from the factory gate, reduce fragmentation in the process, and create visibility of the supply chain for the mine management which is currently applied by most 3PL service providers in the industry. Enabling control of the process has three principal components: vendor management, carrier management, and cargo management.

Vendor management starts with applying KPIs (Key Performance Indicators) to all Purchase Orders. POs are sent by EDI (Electronic Data Interchange) or email to the 3PL's operations office. They verify with the supplier that the PO has been received and accepted, and the expected ready date for collection ex-works or delivery into the 3PL network. This information, and any alterations, is shared up to the mine site, again by email or ideally by EDI to their ERP (Enterprise Resource Planning) system, on a daily basis. The mine's managers and purchasing officers constantly know the status of the order. The 3PL will be continually interacting with the supplier to ensure the ready date is going to be met, and if problems do become apparent, can work with the mine management to influence the vendor to push the order up the production priorities, or change the mode of transport to recover lost time, as economically and operationally appropriate. Active vendor management thus gives the mine management visibility and control over transport and the ability to decide, in good time, whether it is necessary, for example, to spend a few thousands on air freight to save hundreds of thousands through shutdown, or whether there is another work-around available.

Carrier management involves, firstly, forecasting the demand for volumes, dates and routes. Often the 3PL will be able to combine the requirements of several or many suppliers and recipients. A 3PL may be in a position to see all the flow from a supplier to different mines in a region, or alternatively, all of a mine's demand from different vendors in a supply area. The 3PL will negotiate with the various carriers who can or could offer a suitable service and determine the options based on price and service level (express – e.g. air freight or a fast direct shipping service – or a more economic, slow-steaming or multi-destination service). The 3PL will then make the booking with the carrier. Again, all the relevant information is recorded and made visible in the system to the mine management by email or EDI. The 3PL will be charting carrier performance historically and in real time, monitoring adherence to lead times and identifying problems and their possible knock-on effects in the supply chain, and seeking the root causes of anomalies – some of which, such as port congestion, may be outside the carrier's control. Again, reports enable mine management to be part of an agile supply chain, which can plan round problems and make necessary changes in real time as conditions change.

The third component for enabling control of the process is cargo management. A 3PL will be seeking to consolidate cargos as far as possible to reduce unit costs (there are many costs that are

relatively independent of volume or tonnage) and achieve economies of scale. At the same time, the 3PL will, with the mine management, be alert to the occasions when a direct, if more expensive, shipment is appropriate, for example if there is a risk of a production halt. It is a general truth that the cheapest price does not necessarily yield the lowest cost of ownership. Within such constraints the 3PL will be constantly looking to configure cargos and shipments so as to optimize logistics and transport costs. Consolidation, when appropriate, should occur as close to the supplier base as possible, to yield the greatest economies (in, for example, inland transport legs as well as in port and ocean operations). There will be a need for intermediate storage facilities at consolidation centers to aggregate goods for optimal loading on a specific shipment. Overall, the aim as in any industry sector is to work as far as possible to pull-based lead times – the JIT principle. This is not always as easy to achieve in say Africa as it is in the First World (not that it is necessarily simple there either) but that doesn't mean that the ambition has to be abandoned. The strategy is to build a supply chain through from the point of origin that takes into account all the variables that may influence stock and inventory levels, and works to mitigate as much of the risk as possible. The objective of the 3PL on behalf of both mine owner and supplier is to create and use visibility and control to ensure on-time, in full delivery at optimal cost. This is a basic and universal supply chain aim, but it takes a lot of attention to resolve the many challenges.

According to Kenny & Bezuidenhout (1999) an example of 3PL activity in mining is subcontracting non-core functions, like cleaning, catering and security. Subcontracting has taken place both on the surface and underground mining. In the surface mining, typical non-core functions such as catering, cleaning, security, and maintenance of hostels have been subcontracted. Construction work has also been subcontracted. Traditionally certain specialized underground work has also been subcontracted, for instance, the sinking of shafts and other forms of underground construction.

An end to end solution for the mining companies includes different range of services which is applied by different world wide 3PL companies for example according to the information gathered from companies website, MIQ Logistics (2016) provides mining specific end to end services of complete project management, export packing & crating , heavy-lift and out-of-gauge shipment handling, international freight forwarding, charter & part-charter transportation, multi-modal transportation, transportation management, truckload services, customs clearance & documentation, export/import compliance, and security. On the other hand, Toll Holdings Limited

(2016) provides: food catering, remote supply chain management, warehousing & asset management, fleet management, waste recycling & environmental management, and medical services. The third company (Agility Global Integrated Logistics, 2016) logistics plans and site surveys, heavy haul/ out-of-gauge transportation, air, sea and road transport, customs clearance, secure cargo monitoring, line item materials tracking, country specific export compliance, camp management and catering service, state of the art warehousing, export packing and staging facilities.

2.5.5 Application of Outsourcing in the Mining Industry

In mining and mineral business the worldwide usage and importance of outsourcing has grown dramatically over the last decades. According to a survey conducted by Fraser Company (2013), the mining companies worldwide will increase their procurement spending at least 15% during the next 2 years and most of it to outsourcing business services.

Mine sites are usually located in rural areas and isolated from big cities and economical areas. This can affect the outsourcing decision in several ways. There might be geographic dispersion with the location of service providers, which can cause problems with availability, applicability and flexibility. For example, rapid capacity-related needs can be problematic to fulfill, if there are not enough operators nearby, for example skill-full workforce or additional transportation. However, keeping additional capacity in-house "just in case" cannot be seen as a very cost-effective arrangement (Hanlin & Hanlin 2012).

Transactional cost theory and the drive for efficiency has long been the dominant reason for outsourcing (Holcomb and Hitt, 2007). Any organization, but particularly commodity organizations like mining companies, strives to minimize production and transaction costs. Companies sometimes outsource a function to convert a fixed-cost operation into a variable-cost operation (Freytag et al., 2012), thereby minimizing the risk of a negative profit margin under low production volumes. In addition to minimizing low volume risk, companies prefer to outsource functions that depend heavily on fixed investment in order to avoid spending large amounts of capital (Quelin and Duhamel, 2003). In mining operations, for example, conducting the function in-house means that the company needs to invest capital at start-up in order to acquire a mining fleet (trucks, excavators, dozers, etc.) and then periodically replace these assets as they age, which requires additional capital. A mining contractor will model this, and build the capital requirement

into their variable rate; thereby smoothing cash flow and converting capital spent into a variable operational expenditure.

Mining is an industry with a number of variable influences, from geology and labour conditions to the seasons and commodity prices. Flexibility-based factors historically come second only to cost when outsourced mining is motivated, with various aspects to be analyzed. Each mining project is unique, and presents its own unique complexities and challenges. Kirk (2010) suggests that projects with a relatively short life-of-mine (five years or less) and with widely varying mining rates will be suitable candidates for outsourced mining. Holcomb and Hitt (2007) indicated that flexibility-based factors become a higher priority in organizations operating in a market where technology is the basis of competitive advantage, and with significant technological uncertainty. In the mining industry, the tendency is to move from labour-dependent, largely manual technologies to automated methods, resulting in mining contractors partnering with equipment suppliers to enable them to access new technologies.

Outsourcing in mining industry is not a commonly investigated topic in academic literature, but some studies can, however, be found especially from the "old" mining locations. For example, Kenny and Bezuidenhout (1999) investigate the changing nature of subcontracting in the South African mining industry and Hanlin & Hanlin's (2012) article represents the younger research stream within same geographical location. Their study investigates the linkages between local suppliers and the mining company in South African gold mine. Stacey et al. (1999) investigate the outsourcing of professional services in mining industry. According to them, several benefits can be assessed through outsourcing in mining industry, such as quality improvements, reduced overhead costs, substitutability of vendors, and continuity (long-term "partnering relationships). In contrast, possible risks of outsourcing in mining industry were regarded to be availability problems, confidentiality issues, unrealistic cost targets and perceived lack of accountability and commitment (supplier opportunistic behavior).

Cristin Baptista (2013) looked into the development of the relationship between customers and suppliers of capital equipment in the mining industry in Portugal. According to her study, the inter-organizational relationships were characterized with three sets of variables: context, task characteristics and interaction process. Understanding the context, within which a buyer and seller operate allows the identification of issues that are specific to the evolvement of a particular

relationship. Furthermore, she found that mine cycle- stage was one of the variables which can describe the context in a more insightful way.

2.6 Conceptual Framework

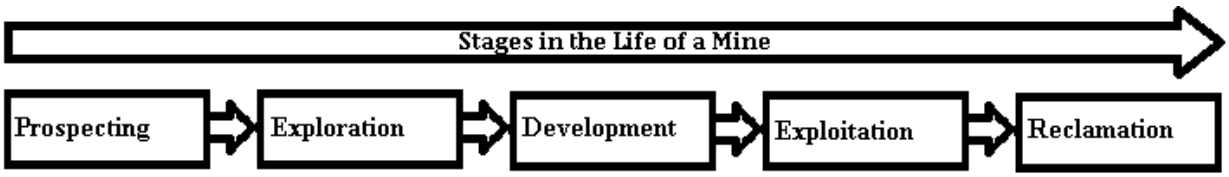
From the literatures reviewed, the whole study is summarized in a conceptual framework below which is comprised of key parameters such as: stages in the life of a mine, standard services offered by 3PL, and end to end logistics solutions to solve the challenges.

As it is discussed above from literatures of (Hartman and Mutmansky, 2002) and (Newman et al, 2010), Mining has five stages: prospecting, exploration, development, exploitation, and reclamation. Prospecting is the process of searching the region for mineral deposits. Historically, prospectors would explore a region on foot with a pick and shovel. Modern prospecting uses a variety of geological methods. The second stage of mining is called exploration, where experts use additional techniques to determine the possible size and value of the mineral deposit discovered during prospecting. The third stage Development involves extensive pre-development planning and paperwork. The fourth stage is exploitation, in which the mineral is extracted or recovered from the earth in large quantities as the mine begins producing. The last stage is reclamation which is about things that must be considered when planning a mine closure, and those include: long-term physical, chemical, biological and social/land-use effects on the surrounding natural systems.

Generally, the scope of services offered by third party providers may range from a relatively limited set of services to a comprehensive, fully integrated set of logistics activities on the literature review, Delfman et al. (2002) suggest a classification based on the degree of customization among standardizing, bundling and customizing logistics service providers. Meier and Andersson (2003) claim that 3PL service offerings can either cover a wide range of services or be more limited in scope and they have categorized 3PL service offerings into seven groups. Bask (2001) argues that 3PL services can be segmented into three categories: routine 3PL services, standard 3PL services and customized 3PL services. On the other hand, logistics practitioners Ahl and Johansson (2002) divide 3PL services into four parts: basic services, value-added services, administrative services, and IT related services. The 2016 20th Annual Third Party Logistics Study also mentioned 18 most common logistics services.

An end-to-end service offering to the mining industry is a service that third-party logistics providers (3PLs) who specialize in industrial freight can provide targeted solutions that reduce

operating costs and improve service levels, while freeing company's team to focus on strategic initiatives. A service offering to the mining industry that includes outbound and inbound logistics, as well as the ability to use additional external capacity in a managed logistics environment, reflects 3PL service providers commitment to customizing its vast experience in outsourced value chain management for the benefit of each one of its clients, in order to most effectively drive their competitiveness (Wyngaardt, 2014). The services that are mostly applied to the mining industry stated on the conceptual frame work.



Standard 3PL services	End to end 3PL service offering
Transportation	Project management and catering service
Warehousing	Logistics plans and site surveys
Inventory management	Heavy haul/ out-of-gauge transportation
Freight forwarding	Warehousing & asset management
Customs brokerage	Fleet management
Packaging and labeling	Waste recycling & environmental management

Figure 1: Conceptual framework. Source: Own model

Chapter 3 Research Design and Methodology

3.1 Research Paradigm

In research paradigms, there are three guiding elements: ontology, epistemology and methodology. Ontology is the "reality" that researcher look into, epistemology is the relationship between the researcher and that reality and finally, methodology is the technique that is used to investigate the reality. According to Perry (1998) positivism usually requires an observable phenomenon, which is not possible in this research. Realism researchers believe in turn, that there is a real world to discover. Even if it is only imperfectly understandable and more as a researcher's own perception. Realism is more suitable for qualitative case study, when the research phenomenon is contemporary and pre-paradigmatic such as inter-organizational relationships (Healy & Perry 2000).

The research paradigm in this study is realism. Realism is valid for this research since the 3PL service is understood as a set of pre-arranged activities between two or more organizations. In addition, realism was chosen since it is the closest to the researcher own view of the world.

3.2 Research Approach

In the research methodology literature, the deductive and the inductive approach is commonly used as two different alternatives to construct theories. The deductive approach process begins with development of a theory and a hypothesis, followed by information collection and a research strategy to test the hypothesis. The conclusion is drawn out of logical reasoning (Saunders et al., 2003). Within the deductive approach, facts are gathered to confirm or disprove the hypothesis that has been deducted from earlier theories or propositions. The inductive approach is opposite, as it is based on empirical evidence and is considered to be one of the first steps in scientific methods where the researchers observe facts to generate a theory which is consistent with the facts (Ghauri & Grønhaug, 2005). By applying this approach, the researcher collects data and develops theory as a result of the data analysis (Saunders et al., 2003). In this Study an inductive approach is used since the researcher start the research process with ideas and facts that leads to theories.

3.3 Exploratory, Descriptive and Explanatory Studies

Saunders et al. (2003) divide enquiries into three groups: exploratory, descriptive and explanatory studies. Ghauri and Grønhaug (2005) describe exploratory research as most appropriate for situations when a research problem is insufficiently understood and of an unstructured nature. Saunders et al. (2003) add that this type of study helps to get new insights and is flexible enough to allow changes of direction when new data appears. In short, it is used to explore previously unexplored areas. In descriptive research, the problem is structured and well understood. The key characteristics of descriptive research are structure, precise rules and procedures. To sum up, the descriptive study is an accurate description of situations or objects investigated. Explanatory study (causal research) involves explaining causal relationships between variables (Saunders et al., 2003). The problems under explanatory research are also structured but instead of merely describing a situation, the researcher needs to deal with "cause-and-effect" problems as well (Ghauri & Grønhaug, 2005).

In this Study the researcher applied explanatory type. The reasons for this is certain confusion and gaps in theory about the unique 3PL services provided to mining companies which was necessary to clarify to be able to undertake a study of more explanatory type regarding the research subject.

3.4 Qualitative or Quantitative Research

According to Kumar (1999) research can be classified as quantitative or qualitative depending on the purpose of the study, how the variables are measured and lastly how the information is analyzed. Most often the research problem determines which approach to use. The main differences between quantitative and qualitative research is the research process, the emphasis and the objectives of the study (Saunders et al., 2003). If the purpose of a study is to describe a situation or phenomenon and the information is gathered by using variables measured on a qualitative measurement scale and are further analyzed in the situation by establishing the variation in it without quantifying it, then the study is classified as qualitative. If on the other hand the information is gathered about variation in a situation or in a phenomenon by using quantitative variables, then the study is classified as quantitative (Kumar, 1999).

The key concept in the quantitative approach is the quantity, expressed as information about the world in form of numerical data (Punch, 2000). A survey is an example of research design providing a quantitative or a numeric description of trends or opinions of a population by studying a specific sample of the population and as a conclusion generalize the sample result to the whole population. The possibility to generalize results is the strength of the quantitative method. Usually questionnaires or structured interviews are applied to collect data. Experiments are another example of strategy to gather data (Creswell, 2002).

Qualitative research has its strength in showing the total situation. Such an overall picture makes it possible to explore and increase the understanding of social processes (Holme & Solvang, 1997). According to Merriam (1998) the key concept is to understand the phenomenon of interest from the participants' perspective, not the researcher's. By definition, qualitative data is empirical information about the world, mostly expressed in words (Punch, 2000). In the broadest sense, qualitative refers to research that produces descriptive data such as observable behavior or people's written or spoken words. Qualitative studies are characterized by a flexible research design in opposite to the quantitative studies which follow a structured research design (Taylor & Bogdan, 1984).

This study uses qualitative research methods, since the aim of the research is to analyze the role of 3PL service providers in the mining industry. Therefore, the qualitative research is suitable for this purpose since this research provide its reader a new and deeper way to comprehend the complex phenomena.

3.5 Research Strategy

According to Saunders et al. (2003) there are several possible research strategies, such as experiment, survey, case study, grounded theory, ethnography, and action research. This research is conducted as a multiple case-study with three research cases from a specific industry.

3.5.1 Case Study

A case study is used in a research method when the aim of the research is to understand complex phenomena. Yin defines case study as follow, "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between

phenomenon and context are not clearly evident" (Yin, 2003). The purpose of the case study is to describe the real world phenomena, rather developing normative decision models. Therefore, the research problems addressed are more descriptive than prescriptive and the research problem is usually a "how do?" problem than a "how should" problem (Perry 1998).

Case study is also a commonly used mechanism in qualitative researches, because it provides a possibility to describe the reality from the participants' points of view (Salla, cited in Koskinen et al. 2005). It enables to understand the research subject in its real context. In this study, cases itself are in the centrum of the research problem, since the aim of the research is to provide information from the role that 3PL service providers play in the specific business environment as mining industry. Therefore, the phenomenon as a whole is an important factor in this research, containing both, the theoretical knowledge of the research and the industrial context around it.

3.5.2 Multiple Case Selection

Similar to a statistical sampling, case selection is an important and difficult part of the research design. However, the objective of the case selection is not to achieve a statistical generalization that generalizes theory from a studied sample of a large population. In a case study, it is not necessary to find a representative case or a set of cases. The aim of the case selection is to determine the minimum size, through which the research can achieve a satisfactory level of confidence in the results (Angot & Milano, 2001).

Case studies can be single or multiple-case designs. The current study is designed as a multiple cases study. According to Yin (2003), a single case is often used where it represents a critical case or, alternatively, an extreme or unique case. Conversely, a single case may be selected because it is typical or because it provides an opportunity to observe and analyze a phenomenon that few have considered before. Inevitably, an important aspect of using a single case is defining the actual case. A case study strategy can also incorporate multiple cases, that is, more than one case. The rationale for using multiple cases focuses upon the need to establish whether the findings of the first case occur in other cases and, as a consequence, the need to generalize from these findings. For this reason, Yin argues that multiple case studies may be preferable to a single case study and that, where if the researcher choose to use a single case study, there is a need to have a strong justification for this choice.

Mining industry is chosen to be the case environment for this study. There are four major reasons for that: First, the mining industry covers almost all the different phases of basic production, such as mining, ore processing, enrichment and product distribution. Therefore, most of the activities in mining value chain are conducted inside the mine, which is not common in other industries. Second, since the variety of demanded services and products are broad, it provides very interesting environment for 3PL research. Third, as mentioned earlier mines are located in remote areas and the production is highly dictated by geological factors. Fourth, currently Ethiopian government gave much attention to the industry to be an important economic catalyst for the Government's export-orientated development strategy.

3.6 Sample and Sampling Techniques

Kumar (1999) defines sampling as "the process of selecting a few (a sample) from a bigger group (the sampling population) to become the basis for estimating or predicting a fact, situation or outcome regarding the bigger group." According to Merriam (1998) in a qualitative research the sample selection is usually non-random, small and purposeful as opposed to a larger, more random sampling in a quantitative research. Kumar (1999) distinguishes between two sampling types. One is random/probability sampling where probability for each sample element to be chosen is the same (i.e., equal) and independent (the choice of one element is not dependent on the choice of the other element). The second sampling type is non-random/non-probability sampling which is used when it is not possible to specify probability that any case will be included in the selected sample (Saunders et al., 2003). Non-random sampling is characterized by the fact that a sample is not chosen at random, i.e., it can be chosen deliberately based on a certain set of desirable characteristics. Judgmental sampling involves selecting cases which by the judgement of researcher can be the best to provide information necessary to meet the research objectives (Kumar, 1999).

Non-probability sampling used in the study. There are 74 companies with logistics related licenses which are members of the Association of Ethiopian Forwarding Businesses (Debela, 2013). Three case companies namely Ardan Risk & Support Services Ltd, Quadrant Investment Group PLC, and Kal Logistic & Trading selected using judgmental sampling technique. Originally, five different 3PL service providers were contacted to request for an interview, but only three of them responded. The criteria for selection was the companies' operation mainly in the mining industry and willingness to participate in the study.

The respondents from 3PL service provider companies selected using purposive (judgmental) sampling technique as this enables the researcher to get the information from the appropriate person. Ten participants from three 3PL companies selected. The criteria for selection was their knowledge and experience of the area, and their availability for an interview. The respondents are top and middle level managers of the case companies located in Addis Ababa. They represent the decision makers in both, strategic and operational level of the company and are likely to have a sufficient overall picture of the firm's activities. The interviewed managers had several years of experience from the industry or/and from the case companies. The following table shows the sample selection for interview.

Population	Ardan	Quadrant	Kal	Total
Total employees at head office	26	20	14	60
Top and middle level managers	7	6	5	18
Selected sample for interview	4	3	3	10

Table 2: Population and sample selection for data collection, Source: own model

3.7 Source and Instruments of Data Collection

The unique strength of the case study strategy is its ability to deal with a full variety of evidence. Yin (1993) identified that the use of multiple sources of evidence is a critical principle for data collection in case studies. The multiple sources of evidence allow investigators to address broader range of historical, attitudinal, and behavioral issues. The most important advantage of using multiple sources of evidence is to help the investigators to deal with the problems of establishing the validity of their case studies. The best way to gaining multi-sources evidence is to combine data collection methods such as archive searching, interviews, questionnaires and observations (Collis & Hussey, 2003).

Under the qualitative research paradigm, the data collection in this study certainly focused on qualitative data, and both primary data and secondary data was gathered. To take the advantage of using multiple sources of evidence, the data collection of present study was designed to use the combination of the following two instruments: semi-structured interview and archive searching.

3.7.1 Primary Data- Interview

This is the type of data or information collected directly from first-hand experience through sources such as observation, experiments, surveys or questionnaires, and interviews by the person doing the research. Although primary data are costly and time consuming to collect, they still prove to be more consistent with the research at hand being that the information is collected directly for the specific purpose (Ghauri & Gronhaug, 2010).

Merriam (1998) states that interviewing is a common mean of collecting qualitative data. According to Yin (2009), interviews are important sources of information in case studies. This is agreed by Thietart et al. (2001) emphasizing data collection as an essential and critical point in the research process. Interviews are a way of collecting primary data and therefore a source of primary data (Ghauri & Gronhaug, 2005). Kvale (1996) states that the qualitative research interview is "a construction site of knowledge". He further on defines the interview as "an interview, an inter change of views between two persons conversing about a theme of mutual interest". There are different types of interviews used for different purposes. By characteristics and aims of the interview process, interviews can be classified as "formative", for example, informal interviews and life histories, and "mass" which includes most of the large-scale surveys (Madge, 1965, cited in Holstein & Gubrium (1997). However, as argued by Saunders et al. (2003), one of the most popular ways to distinguish between interview types is to look at the degree of their formality and structure and by doing so dividing them into structured, semi-structured and unstructured interviews. According to Morse & Richards (2002), in semi-structured interviews, open-ended questions are prepared for the interview. Unstructured questions can also be asked. Questions are framed in a logical way to cover all that the researcher wants to know. It also permits versatility, flexibility and richness for the interview situation, which suits well for the style of the qualitative method.

The researcher of this thesis used semi-structured interviews with open-ended questions. The researcher considered it appropriate to use semi-structured interviews because the interviewees are given the freedom to express their views in their own terms. Besides, the interviewee is allowed to ask the interviewer questions in order to clarify interview questions that are unclear, and in that process the researcher can gather more information.

3.7.2 Secondary Data

Secondary data is data that already exist, may easily be obtained and has historical value. The data is considered overall to be useful when establishing comparisons and evaluating data. Secondary data is divided into internal and external secondary data. Internal secondary data is data that has already been produced by organizations and private individuals and gathered to constitute a veritable data source. External secondary data are studies that have been published or are in the process of being published within the studied research area and is indispensable to the spread of the specific knowledge and evolution of the research (Thietart, 2001). Moreover, secondary data has been developed to help to solve the problem in hand and should therefore be relevant, accurate and available. Looking at secondary data is useful not only to find information but also to better understand and explain the research problem. Examples of information being viewed include books, journal articles, online data sources and webpages of firms (Ghauri & Grønhaug, 2005). In this thesis, the secondary data collected mainly from the internet. The researcher has gathered the secondary data from the official website of the case companies and some other related websites. The e-newspapers, e-journals and e-books have also been used to collect data.

3.8 Procedures of Data Collection

The primary data for this study collected through semi-structured interviews with selected 3PL service provider companies and both first hand and second hand accounts of other people referred. The interviews done through face to face and email based on the preference of interviewees. Since qualitative research does not aim at generalizing the results statistically (Salla, cited in Koskinen et al. 2005) consequently the main concern is not in the amount of interviews. In these cases the focus is in the quality and richness of the content they can provide.

Yin (2003) notes that key informants are often critical to the success of the case study, the participant's role is considered to be more "informant" than just a "respondent". So a lot of attention should be given to the selection of interviewees. Selecting the interviewees will be guided by the nature of previous research streams in the outsourcing literature which contains both, strategic and operational approach towards 3PL service. Therefore, top level managers and middle managers of the case companies selected as interviewees. The interviews lasted from 60 to 90 minutes to ensure that neither the interviewer nor the respondent lose their concentration.

The following steps followed for conducting the interview based on the guide line by Laforest, (2009):

- Respondents identified based on their position, experience and knowledge of the topic.
- Number of interviews planned depending on the availability of time and resource.
- Preparation for the interview made by contacting the respondent in advance and explain them the goal of the interview, obtain his/her permission, schedule an appointment and agree on where the interview will be held, prepare equipment for recording the interview (if required), and contact the respondent again to confirm the date and location of the interview.
- Interview guideline prepared to identify what should be said during introduction, number of general and second priority questions, and concluding statements.
- The interview conducted based on the plan of how to initiate, conduct and conclude.

3.9 Method of Data Analysis

According to Yin, the most important strategy is to follow the theoretical propositions or hypotheses that led to the case study. In other words, such propositions can help the analyst plan and focus on the most relevant data, organize the entire case study, and define alternative explanations. In the absence of any propositions/hypotheses, an alternative is to develop a descriptive framework (e.g., a draft table of contents) for organizing the case study, while not pre-empting outcomes before the data has been fully analyzed. Such a framework can help the analyst with organizing the data as well as with developing a story line. In addition, there are five analytical techniques that can be used to analyze the case study evidence: pattern matching, explanation building, time-series analysis, logic models, and cross-case analysis (Yin, 2003). For the purpose of this research, explanation building technique used.

Explanation building aims to analyze the case study data by building an explanation about the case. In this context, explaining refers to the process of building a set of causal links about how or why something happened. The process is usually iterative and involves making initial predictions, and comparing them against the case study evidence. Then, based on any variances, the initial predictions are revised and compared against additional evidence and/or cases. The procedure is mainly relevant to explanatory case studies (Yin, 2003).

Yin, (2003) stated that the explanation-building process, for explanatory case studies, has not been well documented in operational terms. However, the eventual explanation is likely to be a result of a series of iterations:

- Making an initial theoretical statement or an initial proposition about policy or social behavior;
- Comparing the findings of 'an initial case' against such a statement or proposition;
- Revising the statement or proposition;
- Comparing other details of the case against revision;
- Comparing the revision to the facts of a second, third or more cases;

These activities were adopted for this study in the data analysis process. The researcher data analysis process was based on adopting relevant concepts that relate to the thesis and make comparison between the theories and empirical data obtained. In order to simplify things, the process of linking the theories to the empirical data and draw relevant conclusion was carried out by matching different theories and empirical data and then categorized them.

3.10 Validity and Reliability

The issue of reliability and validity is important for the objectivity and credibility of the research. Kirk and Miller (1986, p. 20, cited in Peräkylä, 2006) define reliability as "the degree to which the finding is dependent of accidental circumstances of research". The reliability describes whether the researcher would expect to obtain the same finding if he or she tried again in the same way (Peräkylä, 2006). Kumar (1999) describe reliability as the ability of an instrument to produce consistent measurement. The instrument is considered to be reliable if the same set of information is collected more than once by using the same instrument under the same or similar conditions getting the same and similar result. According to Silverman (2001, cited in Peräkylä, 2006) reliability is closely related to assuring the quality of recordings and transcriptions and the reliability of the analytic research. The reliability issue when dealing with data gathered through interviews are closely connected with bias. Saunders et al. (2003) mention several forms of bias which can influence the quality of the data. Interviewer bias means certain behavior from the side of the interviewer which can influence received answers. Interviewee or response bias involves unwillingness of the interviewee to disclose some information which in turn can result in

incomplete picture about the research topic. Bias can occur also from improperly done sampling (Saunders et al., 2003). In this thesis the researcher tried to minimize interviewee bias by choosing for case companies which were willing to participate in it and therefore comparatively willing to disclose information. Interviewer bias minimized by behaving as neutral as possible and to give the time for interviewees to answer the question uninterrupted.

Several factors affect the reliability of a qualitative research; the wording of questions, the physical settings, the respondent mood, the nature of interaction and the regression of the instrument. The wording of questions and statements can affect the reliability since the respondents may interpret the questions differently at different times which may result in different responses. The physical setting refers to the change in the settings at the time of the repeat interview which may affect the responses and the overall reliability. The mood of the respondents when responding to the questions may also affect the reliability. Furthermore, the interaction between the interviewer and the interviewee can affect the responses and the respondent's attitude towards an issue may affect the reliability (Kumar, 1999). For each company included in this study, more than one person interviewed and therefore the possibility that a respondent's personality, mood or specific interpretation of the questions having a significant influence on the gathered data reduced.

Another test of the quality of the research is validity. Generally, validity refers to the question whether the research is conducted with the right indicators for the chosen research questions (Yin 2003). In simple terms, the concept of validity can be divided into internal and external validity, however, internal validity is more suitable for the explanatory studies, for example to explain causalities in certain conditions.

Internal validity in case studies is usually related to the concept of triangulation, which refers to the data collection from a diverse range of individuals and settings, using variety of methods (Koskinen et al. 2005). In this study, multiple sources of information have been used when designing the theoretical framework and empirical research in order to provide accurate findings and conclusions from the research.

External validity concerns the level to which study findings can be generalized beyond the immediate case study (Yin 2003). The problem of generalization is the biggest in a single case study (Koskinen et al. 2005) and in multiple case studies the problem is smaller. Some researchers

argue that the term of validity is not suitable for qualitative studies, because it cannot produce statistical generalizations (Koistinen 2005) Because of that, an analytic generalization is more valid a concept in the context of case study (Yin 2003). Analytic generalization is more related to the generalization of produced theoretical models and investigated concepts, than to individual theoretical results. Moreover, according to Stake (1995) by using case study method it is possible to produce theoretical generalizations, but the main purpose for using case study method is to produce unique and specific information from the actual research phenomenon. The objective of this study is to describe the third party logistics providers' role in mining industry, which combines the previous 3PL literature together with the industrial factors concerning the mining industry.

3.11 Ethical Issues

In the context of research, ethics refers to appropriateness of researchers' behavior which related to the rights of those who are the study subjects, or those who are affected by the study or results. Researchers need to consider ethical issues throughout the research process and remain sensitive to the impact of the study and its results on those who participate and supporters to the study (Saunders et al. 2003).

Research as any other human activity can involve direct (or indirect) fraud, lies and wrong-doing. Misconduct in science has serious consequences. Therefore, normative guidelines and a code of ethics and rules are needed in order for academic institutions and organizations to monitor the integrity of science endeavors and to create ways to handle mistakes (Eriksson & Kovalainen 2008).

As a part of consideration to ethical issues, the respondents in this study given the right either to participate or not. The researcher explained the purpose of the study and considered confidentiality by not sharing the names of respondents. In addition, there was no compensation to be paid for any of the participants and the researcher has no conflict of interest with the findings of the research.

Chapter 4 Description of Case Organizations

4.1 Ardan Risk and Support Services

4.1.1 Company Background

Ardan Risk and Support Services Ltd (Ardan) is a medium sized business, which specializes in providing support services to the oil and gas industries. The company originally formed in the mid 1990's as a small family owned business and grew steadily with operations expanding from Africa in to the Middle East in 2003.

In 2006, Ardan set up a separate company in East Africa. Headquartered in Nairobi, Kenya, since incorporation has been on supporting operations in South Sudan, Kenya and Ethiopia, and also the company worked in the Democratic Republic of Congo, Zimbabwe, Mozambique, Tanzania and Madagascar. The Middle East Company was sold in October 2011 so that it can concentrate on its existing east and central African operations. The company has grown to become the region's market leader in remote site support services with its current main focus of operations in Kenya and Ethiopia. The business grew by targeting niche opportunities and is now considered to be a leading provider of quality turn-key support services and logistics solutions to international companies operating on the African continent.

Ardan has been working in Ethiopia and in particular the Dallol Region, where the company managed several projects since 2008 on behalf of Yara Dallol BV, Allana Potash and BHP Billiton. Ardan currently provides support services at Yara's existing 200-man Potash project camp.

4.1.2 Third Party Logistics Services Provided by Ardan

Ardan provides a range of products and services, from the provision of remote workforce accommodation to facilities management and medical support, as described in more detail below and services multiple industry sectors and has been involved with projects ranging from oil and gas exploration and drilling programs in Sudan, Somalia, Kenya and Ethiopia, to the largest geothermal project in the rift valley and potash and gold development in the Danakil region of Northern Ethiopia.

The three main divisions of Technical, Services and Logistics offer clients a wide variety of services, but also mutually support each other to allow the company to provide turnkey support services solutions, enabling its clients to operate efficiently and maximize their performance.

- Logistics – Procurement, Transportation, Fuel solutions and distribution, Storage and warehousing, Freight forwarding, Fleet and journey management.
- Technical – Civil Engineering & Construction, Workforce Accommodation
- Services – Facilities Management, Medical Services, Risk Management, Project Management

By having all its assets in-house, and with inventory on the ground and readily available, Ardan controls the supply chain. Furthermore, with no onward subcontracting and just one point of contact for all customer requirements, The Ardan Turn-key End-to-end Solution allows its clients to operate more cost-effectively and with greater efficiency. Potential services offered by Ardan includes the following: -

I. Logistics

Ardan offers clients a broad range of logistics based services including procurement and warehousing, and transport of high value and oversized goods (such as large construction machinery and oil rigs). The company has the benefit of having long standing relationships with the insurance industry ensuring efficient communication between all appropriate parties to expedite a client's project.

Ardan established a logistics hub in Northern Kenya, which will be developed into the first of several planned logistics hubs to support Ardans' Technical Division and its expanding operations in the region. These logistics hubs will provide warehouses and infrastructure for fuel distribution, cold storage and fleet maintenance to enable Ardan to meet the needs of companies in the region.

Ardan is fully self-sufficient and maintains its own fleet of transport and construction equipment as well as its own manufacturing yards in Kenya and Ethiopia, specializing in the construction of camps, and industry specific infrastructure. These in-house resources and capabilities allow it to maintain control of project delivery and consistently comply with HSE (Health, Safety and Environment) and quality control standards.

II. Technical

The Company has extensive experience in managing complex operations from initial planning stages through to site rehabilitation and recently focused on multiple projects involving road and air strip construction, well site construction and associated infrastructure, bridges, clinics, schools and water management installations. The team includes highly experienced internationally accredited professionals in the fields of civil engineering and surveying, design and fabrication, project management, logistics and environmental management.

Within Africa's varying and often remote and hostile terrain, Ardan recognizes the need to provide high quality safe accommodation for its client's personnel to ensure they can carry out their work objectives efficiently. Accordingly, the Company supplies multiple styled accommodations, ranging from state of the art modular containerized units to tented fly camps, all tailor-made to its clients' requirements. The Company's containerized accommodation solution provides fully air conditioned modular workforce accommodation units, plumbed with en-suite shower and lavatory, powered and furnished with full communication and satellite T.V. The units offer the occupants a high standard of comfort in all meteorological environments and the necessary privacy that a client's personnel require. When a situation is warranted, the Company also provides its clients with executive tent solutions that are fully air-conditioned, powered, cost effective and highly mobile.

III. Services

Ardan provides facilities management and catering to international and African based companies. The Company works to international HSE standards and employs highly experienced and qualified personnel to ensure a high quality service. On the catering side, Ardan prides itself on its reputation of providing food in all terrains. Three meals a day can be prepared as well as on-going refreshments on demand. Menus are varied and discussed with clients to ensure that the appropriate food is prepared to satisfy the client's tastes. Fresh produce is delivered regularly to all environments, ensuring quality and nutritional content.

In addition to catering services, a full same day laundry service is provided and a team of cleaning personnel ensure accommodation and other camp facilities are maintained and serviced to the highest internationally accepted standards. All Ardan sites have a minimum of Level 3 Food Safety

personnel involved in overseeing the food preparation, internationally certified health and safety personnel in attendance and our managers are all qualified in NEBOSH or other similar qualifications.

The Company offers turn-key medical solutions that include fully equipped and stocked on-site clinics and medical personnel, as well as evacuation planning and execution. In addition to this, country medical support, hospital, theatre admissions, doctor, dentist or medical specialist appointments and consultations.

Operating in Africa in what are often remote and hostile terrains, Ardan understands the various risks that businesses can encounter, ranging from political issues to security. In line with this, Ardan provides clients with an all-encompassing range of risk management services, including risk assessments, security planning, community outreach and engagement, strategic communications (local and national) and management of local security contractors.

The above services summarized below: -

(a) Logistics Planning and Management, Fleet Management including:

- Light vehicle operation, movement control and journey management
- Vehicle maintenance
- Defensive driver training
- Vehicle and machine rental (including heavy plants)
- Transportation
- Procurement
- Customs clearance
- Storage and warehousing

(b) Project Management including:

- Management consultancy activities (training and consultancy)
- Construction management consultancy
- Camping sites-remote locations, and other provision of short and long stay accommodation including camp rental

(c) Local Development activities including:

- Community outreach and engagement planning (community liaison)
- Environmental and Social Impact Assessments and Analyses
- Training

(d) Operational Life Support Services including:

- Remote camp management
- Catering, housekeeping, and camp management
- Fuel, water & waste management
- Camp maintenance (electrical, plumbing, welding, etc)
- Maintenance support and management (equipment and machinery installation and maintenance servicing)
- Security service (camp security service)
- Medical (supply of healthcare and trauma medics, ambulance services, emergency evacuation, and mobile clinics)

(e) Labour Broking (labour recruitment and provision of staff)

4.2 Quadrant Investment PLC

4.2.2 Company Background

Quadrant Investment Group PLC (Quadrant) is a privately owned local logistics and life Support Company founded in Ethiopia in 2010. The Group has developed a strong and young management team committed to work within established quality procedures to provide each customer with the most reliable personalized service and dedicated to continuous development of its services. The company brings a fresh and innovative approach to logistic services, acting as liaison between its customer and their clients.

Quadrant has been providing support services for companies operating in oil, gas and minerals exploration including PETRONAS, Africa Oil, Tallow Oil, BHP Billiton, UPSL, Poly-GCL, GBP. The group has an established client base and provides a full spectrum of products and services, ranging from the provision of workforce accommodation to facilities management and medical support. Quadrant services multiple sectors including oil & gas, mining, construction, engineering,

industrial, NGO and governmental, allowing its clients to operate seamlessly, develop their businesses and services efficiently and maximize their on-ground operational performance.

4.2.3 Third Party Logistics Services Provided by Quadrant

Quadrant is a company with "one-stop-solution" to meet all Logistic and life support requirements of its clients. Quadrant provides support services with dedication to serve the oil & gas, construction, mining and innovative solutions to the changing logistic requirements of the industry. Quadrants experience with Ethiopian business environment gives it understanding of the prevailing logistical bottlenecks, distinctive regulations, infrastructure, and customs of the country. The services offered by quadrant includes the following: -

- **Project management**: - Considerable experience in managing complex operations from initial planning stages through to site rehabilitation. Team includes highly experienced professionals in the field of civil engineering, security, risk assessment, logistics and environmental management.
- **Catering services: -** Quadrant offers camp catering service with the help of its well-established relationship with local suppliers.
- **Labor supply and management**: - Supply of qualified labor.
- **Camp Facilities Supply and Management**: - Containerized and tented camp facility units with experienced camp maintenance team.
- **Heavy and light vehicles Rental**: - Deployment of all types of standard vehicles for project purposes with fully equipped workshop and qualified personnel.
- **Transportation**: - consistently provide competitive vehicles in all facets of shipping, full truckload, to specialized freight needs.
- **Health, Safety and Environment**: - This commitment extends to ensuring that the company's operations do not place the local community at risk of injury, illness or property damage, and to ensuring its works are conducted in an environmentally sustainable and responsible manner.
- **Waste Management**: - Make sure that all wastes generated at the operation site, properly managed from sorting out to final disposal subject to types of wastes. Quadrant provide a complete waste management services such as providing water & sewerage systems, sewerage removal, trash collection and disposal and hazardous material handling.

- **Camp Construction & Management: -** Deliver, timely, quality & cost effective construction management in remote and challenging environments.

4.3 Kal Logistic and Trading

4.3.2 Company Background

Kal Logistic and Trading (Kal) is local licensed logistics and trading solutions company which is established by the professionals having experience in several international and local OIL, Gas, potash and Gold mining projects as well as deferent construction companies in sourcing / procurement, camping or safari administration and life support services with due considerations of HSEQ procedures of operating in different regions of Ethiopia.

The company established by professionals having more than 10 to 15 years of experience in the management of catering, overall life support, camp and safari establishment, planning and operating fleet and camp construction specially for oil, gas, mining and construction industry.

Kal is registered and licensed by appropriate Ethiopian authorities and institutions under the existing laws to provide logistics, machinery and vehicles rental, supply of food items and remote areas life support by availing materials and catering services, and other related services.

The company currently provides support services for Poly-Gcl oil and gas exploration filed by sourcing high and light vehicles, and several constriction companies by sourcing field and city vehicles and other mechanical and technical supplies.

4.3.3 Third Party Logistics Services Provided by Kal

Kal has the experience, team, local knowledge, understanding and ability to operate in Ethiopia, particularly in the oil, gas and mining industry. The following are list of services provided by the company: -

- Sourcing and procurement of catering, construction, row and processed materials
- Skilled and non-skilled manpower supply
- Rental service (constriction machineries, equipment's, and vehicles)
- Building and/or consultancy service on camp establishments
- HSEQ (Health, safety, environment, and Quality) services

- Sourcing water well drilling
- Waste treatment, management and transport
- Office, warehouse, guesthouse and residential rental service
- Sourcing first aid and firefighting trainings
- Fuel purchase and delivery for project sites
- Catering and housekeeping

Chapter 5 Analysis

5.1 Comparison of 3PL Services between Providers

The "value chain" in mining sector is made up of numerous actors who all participate in a range of activities to bring a particular product or service from extraction to production and from delivery to the final consumer (Hanlin & Hanlin 2012). The coordination of these chains is determined by the nature of chain governance. It is suggested that there are perhaps only two "core competencies" required for the mining industry financing and managing, and that all other activities could be outsourced (Stacey, Steffen & Barret 1999).

An end to end solution for the mining companies includes different range of services which is applied by different world wide 3PL companies. As it is stated on the literature review, according to the information gathered from companies website, most common services offered includes: logistics plans and site surveys, heavy haul/ out-of-gauge transportation, air, sea and road transport, customs clearance & freight forwarding, secure cargo monitoring, line item materials tracking, country specific export compliance, camp management and catering service, export packing and staging facilities warehousing & asset management, fleet management, waste recycling & environmental management, and medical services.

According to the empirical data collected from the three companies, there is a similarity of services provided to the mining industry due to the nature of operation. In comparing each of the providers' services, Ardan risk and support services provides services which is categorized in three main divisions Technical, Services and Logistics. On the other hand, Quadrant provides Project management catering services, Labor supply and management, Camp Facilities Supply and Management, Heavy and light vehicles Rental, Transportation, HSE (Health, Safety and Environment), Waste management, Camp construction & management. The third company Kal logistics provides Sourcing and procurement, Skilled and non-skilled manpower supply, Rental service (constriction machineries, equipment's, and vehicles), Building and/or consultancy service on camp establishments, HSEQ (Health, safety, environment, and Quality) services , Sourcing water well drilling, Waste treatment, management and transport, Office, warehouse, guesthouse and residential rental service, Sourcing first aid and firefighting trainings, Fuel purchase and delivery for project sites. The finding shows that Ardan owns its own kit for the

service provision while the other two companies sub contract most of the items from other companies. The following table shows summary of different services provided by the three companies.

Table3: Summary of 3PL services provided by the Three (3) 3PL service providers: source- won model.

Ardan Risk and Support Services Ltd	**Quadrant Investment Group PLC**	**Kal Logistic and Trading**
➢ **Logistics Planning and Management** Light vehicle operation Movement control Journey management Vehicle maintenance Defensive driver training Vehicle and machine rental Transportation Procurement Customs clearance Storage and warehousing ➢ **Project Management** Management consultancy Construction management consultancy Camping sites-remote locations ➢ **Local Development** Community outreach and engagement Community liaison Environmental impact Assessments ➢ **Operational Life Support Services** Remote camp management Catering and housekeeping Fuel, water & waste management Camp maintenance Maintenance support and management Security service ➢ **Medical support** Healthcare & Trauma Medics Ambulance Services Mobile Clinics Licensed Pharmacists Emergency Evacuation ➢ **Labour Broking**	➢ **Project management catering services** ➢ **Labor supply and management** ➢ **Camp Facilities Supply and Management** ➢ **Heavy and light vehicles Rental** ➢ **Transportation** ➢ **HSE (Health, Safety and Environment)** ➢ **Waste management** ➢ **Camp construction & management**	➢ **Sourcing and procurement** ➢ **Skilled and non-skilled manpower supply** ➢ **Rental service (constriction machineries, equipment's, and vehicles)** ➢ **Building and/or consultancy service on camp establishments** ➢ **HSEQ (Health, safety, environment, and Quality) services** ➢ **Sourcing water well drilling** ➢ **Waste treatment, management and transport** ➢ **Office, warehouse, guesthouse and residential rental service"** ➢ **Sourcing first aid and firefighting trainings** ➢ **Fuel purchase and delivery for project sites**

5.2 Challenges for the Provision of 3PL Services

The logistics challenges of mining companies are unique and complex. The study made by PLS Logistics Services, (2015) discusses five 3PL related challenges faced by mining companies: managing Logistics to and from remote locations, managing complex multi-modal freight requirements, asset utilization for railcar fleets, managing risk, and lack of dedicated resources. Anane, 2011; Akabzaa and Darimani, 2001; Tsikata, (2007) states challenges of frequent occurrence of natural disasters, labour disputes, and uncertainty in supply and demand, supplier bankruptcy, political changes, and terrorism. Thuynsma, I., 2015 argues that typical challenges faced include late and/or short deliveries, lack of control, lack of visibility, inaccurate data, managing high volume throughputs, and ensuring grade control.

According to the interview data collected from the three companies, they faced different challenges due to the nature of mining operations. Ardan risk and support services operates in remote areas of Danakil depression, Ogaden region, and remote West Ethiopia like Metekel. Due to the remoteness of mining operations the company faced different challenges which includes lack of nearby suppliers as the sites are located far from cities, delay in delivery of service due to poor road infrastructure and security risks of cargos. The other challenge raised by the respondents is, lack of skilled man power on the area which forced them to bring expat employees from different parts of the world. The third challenge comes from the legal requirement of Ethiopia which forces most of the services to be provided by fully Ethiopian companies which is not applicable in other African countries.

The interview data collected from Quadrant also showed different challenges which is mainly related to suppliers. Most mining companies have a high standard of service quality expectation and due to this the challenges they faced includes: finding a supplier who can provide quality items needed for the service provision, old vehicles for rental, and the low understanding of time management which resulted in delay of services. On the other hand, the same challenge of poor road condition and cargo security discussed.

The challenges raised on the interview with Kal logistics are also similar with the others which includes: poor quality supplies, lack of quality road condition, security risks, and lack of skilled man power. In addition, other challenges discussed includes lack of financial capability to own

their full kit for the service provision, the tendency of employees to prefer working in main cities, and the high standard service requirements of mining companies which is difficult to fulfil in Ethiopia.

5.3 Recommendations

From the interview on the three 3PL service providers, different challenges revealed and the researcher suggests the following recommendations as a solution based on each challenge.

Managing logistics to & from remote areas

The challenges in relation to remote locations are: luck of nearby supplier, low quality supplies and high transportation cost. In order to mitigate this, the service providers need to build a nearby warehouse or logistics hub which can able them to supply quality goods from major cities. On the other hand, they need to plan owning their own transport vehicles in order to reduce high transportation cost in the long run.

Poor road infrastructure

According to Afro Consult & Trading PLC, (2010). The development of road system in the country has been generally progressing on the basis of highway and road sector development programs. Apart from urban roads and rural trails and footpaths, the present road system could be generally divided into three hierarchical functional classifications: The Federal, Regional and Rural roads. The length of Federal and Regional road network is about 46,812 of which 6,938 is asphalt/concrete surfaced but still the road density is very low and in order to benefit from future investment opportunities in Ethiopia that hope to be of mutual benefit to the investors and the speedy socioeconomic development of the country, the government needs to give much attention for the road construction to support the industry.

Security risks of cargos

The service providers need to have a well-developed network of professional carriers which have been vetted and also approved based on their safety record, performance history, levels of insurance coverage, and operating authority.

Lack of skilled man power

The challenge in relation to lack of skilled man power is, even though there is an opportunity to get highly educated work force, there is a problem of finding workforce trained to the standard of mining company's needs. In order to alleviate this, the service providers need to invest on training local workforce which will able them to benefit in the long run.

Managing complex, multi-modal transportation requirements

In order to mitigate this challenge, the service providers need to improve service levels and also drive dramatic reductions in inventory, time, and transportation costs. Some of the strategies employed include applying JIT (just-in-time) service, securing the lowest rates without necessarily compromising safety and quality, optimizing modes, and taking control of the inbound supply chain

5.4 Conclusions

The purpose of the study was to analyze the third party logistics providers' role in Ethiopian mining industry by identifying how the purported roles are performed. Three research questions were formulated in order to achieve the purpose of the study.

How do the 3PL service providers fulfill their expected roles in Ethiopian mining industry?

What are the types of services that 3PL service providers assume in the management of their client's logistics systems?

What are industry related challenges in the provision of 3PL Services?

To answer the purpose of this thesis, the following points discussed in this study: -

- There was a necessity to clarify what role is and the study shows role as the activities that are expected of the 3PL service providers. The service that is expected from service providers explained as an end to end solution provided to the mining companies which is turnkey solution of from the factory gate, reduce fragmentation in the process, and create visibility of the supply chain for the mine management through over all control of vendor management, carrier management, and cargo management.

- The services include logistics plans and site surveys, heavy haul/ out-of-gauge transportation, air, sea and road transport, customs clearance & freight forwarding, secure cargo monitoring, line item materials tracking, country specific export compliance, camp management and catering service, export packing and staging facilities warehousing & asset management, fleet management, waste recycling & environmental management, and labour supply.
- This study also showed the comparison of service provided between the three companies and it is clearly seen that as an international company Ardan give more standardized services from provision of remote workforce accommodation to facilities management, project management and medical support, but this doesn't mean that the other companies are not efficient rather they have a lot to learn and upgrade their services to be more competitive for the mining companies as they will be forced to outsource this services from more international 3PL companies if they are not satisfied with the quality of the service from local service providers.
- The logistics challenges of 3pl companies in providing the service includes: managing logistics to & from remote areas, poor road infrastructure, security risks of cargos, lack of skilled man power, low level of performance from suppliers and managing complex, multi-modal transportation requirements.
- The other main point revealed from the study is even though the Government has made development of Ethiopia's mineral wealth one of its leading economic objectives where by mining operations within the country are expected to be an important economic catalyst for the Government's export-orientated development strategy with a goal to bring the minerals sector up to 10 percent of GDP within 10 years and there are 19 local companies and 11 foreign companies have been granted prospecting, exploration and mining licenses which shows there is a vast opportunity for 3PL companies to participate in supporting these mining companies, there are only few companies who are operating in the mining sector.

5.5 Ideas for Future Research

This study concentrated in an area where limited amount of research has been done previously, therefore quite a lot of possibilities for future research can be seen. The main recommendations for future research discussed below: -

- This study can be used as a starting point for future researchers who are interested to work on the logistics outsourcing in the mining industry and the impact of 3PL services on logistics performance from mining company's point of view.
- From the marketing point of view, it would be interesting to investigate the duality of supplier-service provider relationship, in cases where supplier's capabilities have had a clear impact on the client's outsourcing decision as one of the main challenges discussed is lack of Ethiopian suppliers' commitment.
- Furthermore, the network of the 3PL service providers with the other logistics firms (such as carrier and logistics intermediary firm) discussing the downstream and upstream differently can be researched.

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Appendices

Appendix 1 Interview Plan

I. Introduction of interviewer

Hello, my name is Bereket Mengistu, and I am working on my thesis entitled "The role and impact of third party logistics providers in Ethiopian mining industry: the case of selected third party logistics providers" as a partial fulfillment for MA degree in logistics and supply chain management.

During the interview, I would like to discuss the following topics: Role of 3PL service providers, Logistics challenges of mining companies, 3PL value added services, and your company role in mitigating the unique logistics challenges of mining companies. Your company is selected because of the experience that you have working with mining companies and your service standard.

II. Semi-structured interview questions

Main questions	Additional questions	Clarifying questions
I would like you to tell me about your position and responsibilities in the company.	• What is your position in the company? • What is your experience related to 3PL service providers? • What are your main responsibilities in the company?	• Can you expand a little on this? • Can you tell me anything else? • Can you give me some examples?
What are the roles of your company for its customers as a third party logistics service provider?	• Please describe your company's operations as 3PL service provider? • What kind of relationships do you have with your customers? • How do you work with your customers? • What are your company's core activities? • Which are your company's competitors? • In which ways does your company cooperate with other logistics companies?	
What are the logistics challenges that are unique to mining companies which drives them to use 3PL service providers?	• Why is it considered as a challenge? • What are the challenges related to remoteness of their operation? • What are risks they face related to their operation? • What are their unique unimodal and multimodal requirements?	
Apart from your traditional roles as	• What is the capacity requirement from	

a third party logistics service provider, what other additional or extra services does your company render to its customers in order to manage the challenges?	your company compared to 3PL companies in other industries? • How do you manage your service consistency? • What are the methods your company use to control its costs?	
What does your company do in order to satisfy its various customers' demands?	• How do you renew yourself to stay competitive on the market? • What do you do in order to improve your services for your customers? • Does your company render specific services for specific customers? • Does your company take on more advanced services for its customers? • How do you guarantee quality in the provided value-added services? • How do you as 3PL provider work together with your suppliers?	
What is your opinion about the development of 3PL service in Ethiopia?	• What are the problems that affect the development of services? • What is the effect of economic condition of the country on the development? • What are possible solutions you recommend to the development of services?	
Conclusion of interview		
Are there any issues that we have not discussed and you find worth discussing in relation to the title?		
Do you have any comment on the interview we had?		