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Evidence of knowledge spillovers from the natural resources sector in least developed countries

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A research project submitted to the Gordon Institute of Business Science, University of Pretoria, in partial fulfilment of the requirements for the degree of Master of Business Administration.

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ABSTRACT

This research aimed to investigate the evidence of the existence of knowledge spillovers from the natural resources sector in least developed countries so as to .

Research model was defined through extensive literature review of prior studies on spillovers. Using a survey questionnaire developed by the researcher, an online survey together with email survey were administered to suppliers of a mining firm in Ghana, Mali, and Tanzania. The responses were then collected and analysed by means of non-parametric Chi-Square method to test ten hypotheses on knowledge spillovers.

The results of the study highlights that LDCs may not be as backward as the definition of LDCs make us to believe. The result showed that the technology gap between host country firms and the MNE was very small which was an indication that spillovers were likely to be present. With regard to spillovers it was found that spillovers through worker mobility were more likely through movement of workers between suppliers firms and less rom the MNE to suppliers firm. Regarding imitation by supplier firms, we found that supplier firms imitated each other as well as the MNE. Imitation of the MNE was more in the support functions such as management. Assistance from the MNE was not a high as expected but this is likely due to the higher than expected capacity of the country and suppliers firms.

KEY WORDS

Least Developed Country, Multinational Enterprise, Knowledge Spillovers, Foreign Direct Investment, Natural Resources

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfillment of the requirements for the degree of Master in Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

_____

Jacob Mbele

07th November 2012

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Chapter 1: Introduction to Research Question

1.1 Study Title

Evidence of Knowledge Spillovers from the Natural Resources Sector in Least Developed Countries.

1.2 Research Aim and Objectives

The primary objective of this research is to investigate the evidence of the existence of knowledge spillovers from the multinational enterprise (MNE) in the natural resources sector to host country firms in least developed countries (LDCs).

Secondary objectives of this research study are:

1. To gain better understanding of the research on knowledge spillovers undertaken to date in order to further build on this work.
2. To determine the extent to which the LDC capacity impacts on the host country firm's absorptive capacity and therefore the existence of spillovers.
3. To use channels through which spillovers occur to investigate the existence of spillovers between the MNE and its host country firms of suppliers in the natural resources sector in LDCs in Africa.
4. To determine if host country firms of suppliers benefit positively from the spillover channels.

1.3 Research Problem and Purpose

Economic development policies in most developing countries tend to focus on attracting FDI (Fan, 2002). It is believed that FDI is not just a source of economic development through direct channels such as employment, beneficiation, procurement, infrastructure and taxes but also a channel through which new technologies and knowledge from MNE's home countries can be transferred to host countries (Javorcik B. , 2008). It is for this reason that many of the countries including LDCs offer special incentives to foreign investors, such as tax holidays, tariff reductions or exemptions, and subsidies for infrastructure in return for investing in their industries (Liu Z. , 2008). The benefits of FDI to LDCs is of interest to host country governments, policy advisers, investors and development agencies as it is believed to be the key to sustainable economic development for these countries.

Firms expand their operations to other countries for one, or a combination, of the following reasons, resource-seeking, efficiency-seeking or market-seeking (Kinoshita & Campos, 2003). Expansion into natural resources endowed African LDCs is mostly resource-seeking. By its nature, resource-seeking investment tends to involve a large up front transfer of capital, technology and know-how (Nunnenkamp & Spatz, 2003). Resource-seeking FDI is often concentrated in foreign dominated enclaves with few linkages to the local product and labour markets (Nunnenkamp & Spatz, 2003). This therefore raises the question as to whether the promotion of FDI into LDCs through programmes like the Programme of Action of the Least Developed Countries is resulting in the expected benefits. The results of the studies undertaken to date on the benefits of FDI in the form of spillovers cannot be generalised as these results have been mixed. The majority of cases studied support the existence of spillovers to host country firms, but under certain circumstances such spillovers are said to be unlikely to take place.

The United Nations define LDCs as low-income countries suffering from structural impediments to sustainable development which manifests in a low level of human resource development and a high level of structural economic vulnerability (UNCTAD, 2011b). Low levels of human resource development and high levels of structural economic vulnerability in LDCs are synonymous with low productivity, lack of innovation, research and development. These country and firm limitations combined with the large FDI inflows from the highly capital intensive natural resources sector make LDC firms less likely to benefit from knowledge spillovers created by the MNEs. This research will therefore aim to test for the existence of spillovers in the natural resources endowed LDCs in Africa and the impact of country and or firm absorptive capacity on their existence or absence.

This research is therefore aimed at establishing or confirming the impact of absorptive capacity of LDCs on the benefits of FDI of spillovers. The research looks at whether the capacity of the LDC impact on the absorptive capacity of host country firms of suppliers. Detecting such effects would be consistent with the existence of vertical linkages spillovers. This study adds to the literature on spillovers by completing a firm level analysis based on a survey of suppliers of a MNE in the natural resources sector in LDCs which has not been done before.

1.4 Background and Scope

This subsection gives background on foreign direct investment trends in LCDs, research into spillovers and outlines the scope of the study.

1.4.1 Foreign Direct Investment in LDCs

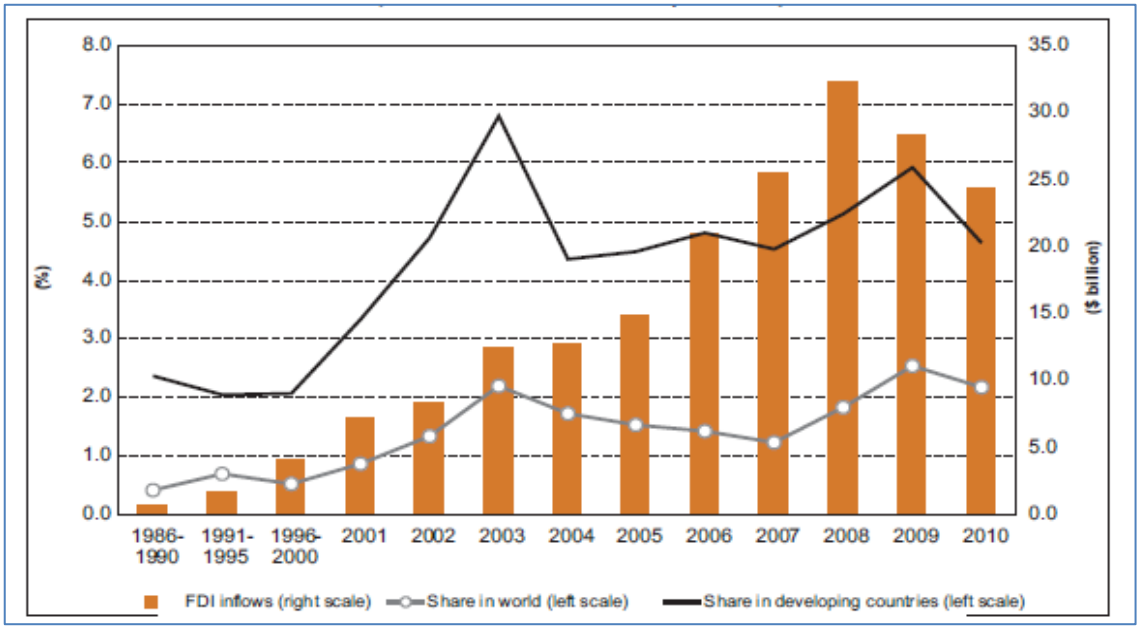
Adopted at the third United Nations Conference of the Least Developed Countries in 2001, the declaration on the Programme of Action of the Least Developed Countries for the Decade 2001-2010 stated that FDI was an

important source of capital formation, knowledge, employment generation and trade opportunities for LDCs and called for accelerating FDI inflows into these countries. Since 2001, both LDC governments and their development partners have pursued proactive FDI promotion policies (UNCTAD, 2011b).

The Global Investment Trends report (2011) by United Nations Conference on Trade and Development (UNCTAD) revealed that substantial shifts are taking place in world FDI patterns (UNCTAD, 2011a). The report also revealed that for the first time, developing and transition economies together attracted more than half of global FDI flows (UNCTAD, 2011a). FDI flow into LDCs is a major contributor to capital formation and this is because of its share in LDCs investment (UNCTAD, 2011b).

Figure 1 shows share of FDI of LDCs compared to total FDI flow.

Figure 1: FDI Inflows to LDCs, LDCs share in World FDI Inflows and LDCs share in Developing Country Inflows, 1986 – 2010 (Source: UNCTAD, 2011b)



FDI inflows in LDCs have risen across all regions between 2001 and 2008. The decline in flows, as a consequence of the global economic and the financial

crisis in 2009 was felt most by Asian LDCs, where FDI inflows were nearly halved (UNCTAD, 2011b).

FDI plays an important role in LDCs and this importance has grown over the past decade, as evidenced by the expanding presence of the largest MNEs, such as the Fortune 500 companies, in LDCs which doubled their presence in the past decade (UNCTAD, 2011b). There were 208 Fortune 500 companies in LDCs in 2010 compared to 108 companies in 2001. In recent years over 80 percent of the flows went to resource rich economies in Africa (UNCTAD, 2011b). The distribution of these FDI flows among LDCs is mainly towards LDCs in Africa and in the form of greenfields and expansion projects prospecting for reserves of base metals and oil (UNCTAD, 2011b).

Ownership of the natural resources in African countries is usually vested in the country's national government. To extract these resources, MNEs enter into an agreement in the form of concessions, licences or leases with the host country government.

1.4.2 Research in Spillovers

Studies in determining the evidence of the existence of FDI productivity spillovers dates back to the work of MacDougall in 1960, Corden in 1967 and Caves in 1974. Caves (1974) concluded in his study of FDI spillovers in the manufacturing sector in Canada and Australia that FDI may result in higher technical efficiency in competing domestic firms and speed the transfer of new technology.

The interest in FDI knowledge spillovers finds its origin in the economic growth theory, which suggests that technological progress is the main contributor to economic growth (Jabbour & Mucchielli, 2007). Theories of economic growth

refer to technological improvement as the driving force of the growth process as opposed to neoclassical models which emphasise capital accumulation (Ciruelos & Wang, 2005). MNEs generally possess non-tangible productive assets such as technological know-how, marketing skills, management skills and contacts or networks (Aitken, Hanson, & Harrison, 1997). Since these assets are non-tangible and almost always gained through experience, they cannot be easily transferred or licensed to host country firms (Aitken & Harrison). Transfer of these nontangible productive assets can be involuntary through means such as worker movement between the MNEs and host country firms or voluntary where the MNE formally shares its knowledge or technology with its host country suppliers or alliance partners (Na-Allah' & Muchie, 2009). The involuntary transfer or diffusion of these nontangible productive assets from MNEs to host country firms is generally known as knowledge spillovers.

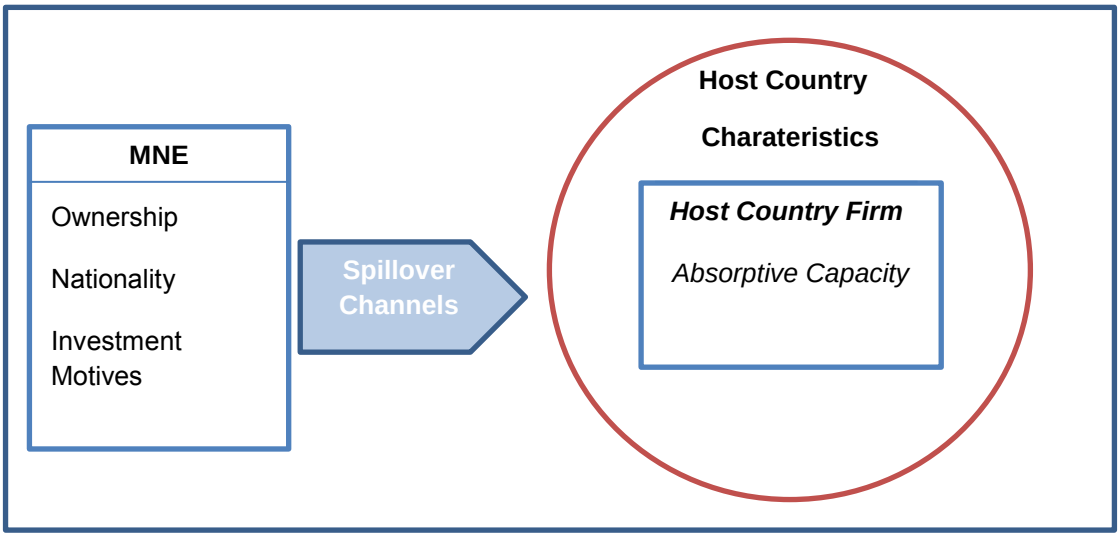
Early studies on FDI spillovers were conducted using a framework of econometric analysis in which labour productivity or total factor productivity in host country firms is regressed on a number of variables (Görg & Strobl, 2001). These studies used aggregate cross-sectional data at industry level to find evidence of positive spillovers, while later studies used aggregate panel data at firm level (Görg & Strobl, 2001). The use of firm level panel data is said to have addressed issues around the ambiguity of results due to data.

Subsequent research on knowledge spillovers has mostly focussed on attempting to generalise the existence of these spillovers and determining the conditions under which they are likely to exist (Javorcik B., 2008). Studies show that while many cases support the existence of knowledge spillovers, under certain circumstances such spillovers are unlikely to take place (Javorcik B., 2008). Some of these circumstances, as noted by Javorcik (2008), are the prevailing host country conditions, the MNE procurement structure and the maturity of the relationship between the MNE and host country suppliers. Previous studies also suggest that spillovers associated with FDI can cause a decrease in the productivity level of a host country firm in the short-term and an

increase in the long term (Liu Z. , 2008). The short term decrease associated with the negative level effect of spillovers highlights the fact that knowledge transfer does not occur automatically and is a time and resource consuming process (Liu Z. , 2008). The positive rate effect is said to be in accordance with the central thesis of the endogenous growth literature that identifies human capital or knowledge as the ultimate engine of economic growth (Liu Z. , 2008). This is also supported by the findings of Ciruelos and Wang (2005) who, in their research on international technology diffusion in 57 countries using data from 1988 to 2001, found that FDI from developed countries to LDCs does not promote technology improvement in host countries unless the human capital passes a certain threshold level (Ciruelos & Wang, 2005). Country absorptive capacity and firm country characteristics are therefore some of the factors that determine the existence of spillovers from MNEs to host country firms (Crespo & Fontoura, 2006). LDCs are known to have a very low level of human development and very low institutional development. The question therefore arises regarding the capacity of local LDC firms to absorb spillovers especially from the capital intensive natural resource MNEs.

One of the drawbacks of most studies on spillovers is that they treat the specific mechanisms by which the spillovers are supposed to occur as a black box and regress total factor or labour productivity of domestic firms on a number of covariates (Görg & Strobl, 2005). This, together with a measure of the extent of the MNE presence in an country or industry, is used to test for a positive and statistically significant coefficient on the variables and then interpreted to indicate the existence of spillovers (Görg & Strobl, 2005). According to Smeets (2008), the focus on studying spillovers is now moving to opening up the black box. As indicated in Figure 2, the black box refers to understanding the underlying issues that impact and determine the existence of spillovers. These include the type of FDI, mechanisms or channels through which spillovers occur, and the absorptive capacity of the host country or host country firm (Smeets, 2008).

Figure 2: FDI Knowledge Spillover Framework (Adapted from Smeets (2008))



The recent commodity boom together with the buoyant commodity prices have resulted in many governments looking at maximising the share of returns for their natural resources (International Finance Corporation, 2011). The focus has been on maximising the immediate monetary returns as evidenced by adoption of upward adjustments to royalty and tax rates and other regulatory changes. There has been less or no focus on the FDI externalities or spillovers which are the intangible indirect stimulation, development and growth of the local economy. Governments, academics and development agencies are currently grappling with the issue of whether the approach of maximising the monetary share of the returns is the correct approach and if there are indeed externalities associated with FDI in the LDCs as it is believed they lack absorptive capacity.

1.4.3 Scope of Study

The scope of this study was therefore limited to investigating the presence of spillovers and the impact of absorptive capacity on the presence or absence of spillovers. The focus was on vertical spillovers which are spillovers from MNE to its suppliers. The research did not look at the nature of the MNE including its ownership, nationality and investment motives.

The rest of this report is structured as follows:

- Chapter 2 covers the analysis and findings of the literature on spillovers. This section explains what is meant by spillovers and goes on to outline the main findings of studies done to date.
- Chapter 3 outlines the hypothesis that was tested in order to answer the research question and achieve the objectives of this study.
- Chapter 4 outlines the methodology followed in conducting the study.
- Chapter 5 outlines results of the survey conducted in this study.
- Chapter 6 discusses the results and outlines what the findings are in relation to the hypotheses outlined in Chapter 3.
- Chapter 7 outlines the conclusions and highlights the main findings, gaps and direction for future research.

Chapter 2: Literature Review

2.1 Introduction

The previous chapter focused on defining the purpose and the objectives of the research conducted. The purpose of the literature review is to present the theory on spillovers, an overview of spillovers research done to date and to highlight where the study focus is.

This chapter is divided into a number of subsections with the first subsection discussing the definition of knowledge spillovers. The second subsection looks at the definition of spillovers, the third subsection looks at determinant factors of spillovers, the fourth subsection looks at spillover channels and the fifth subsection looks at vertical linkage spillovers.

2.2 Definition of Spillovers

Knowledge diffusion can be either voluntary through direct technology and knowledge transfer arrangements or involuntary through indirect technology or knowledge spillovers (Görg & Stobl, 2005).

Knowledge spillovers are defined as *"the knowledge created by a MNE that is used by a host-country firm for which the host-country firm does not fully compensate the MNE"* (Smeets, 2008, p.109). Knowledge spillover is different from knowledge transfer, which is the purposeful or intended diffusion of knowledge from one firm to the other, which creates no externalities or third party benefits (Smeets 2008).

The two main theories on the impact of FDI and MNEs on host countries are the dependency theory and the industrialisation theory (Fan, 2002). The

dependency theory views FDI from developed countries as being harmful to their long term economic growth, while the industrialisation theory was initially based on the neoclassical financial theory which stated that capital flows from countries where returns are low to countries where returns are higher (Fan, 2002). The industrialisation theory was later adapted with attention shifting from simply seeing FDI as representing a transfer of capital to being an extension of the industrial organisation theory where FDI is seen as representing the transfer of a package in which capital, management and technology are all included (Fan, 2002).

It is from this industrial organisation theory that the interest in the study of knowledge spillovers originates. It is stated that when a MNE sets up a plant in a foreign country or acquires a foreign plant, it does so with the expectation of realising a higher rate of return than at home (Görg & Greenaway, 2004). The source of higher returns is said to be the capital, management and technology the MNE possess which allows the MNE to be more productive than the host country firms (Görg & Greenaway, 2004). The management and technology give the MNE a competitive edge which other firms would eventually want to emulate and use to improve their own firms. Emulation of the MNE competitive advantage can therefore be through direct acquisition of the MNE technology and associated management knowledge or indirect through imitation of MNE technology and associated management know-how. Görg and Greenaway (2004) found that foreign firms have an incentive to facilitate knowledge transfer to local supplier firms in order to enable them to produce the quality inputs these firms require and to do it more efficiently. There are therefore instances where MNEs will transfer knowledge or even technology to host country firms of suppliers to enable them to be more productive.

2.3 Evidence of Existence of Spillovers

The existing literature on spillovers is broken into three groups. The first group is comprised of case studies, which are based on specific countries and cannot therefore be easily generalised (Javorcik B. S., 2004a). The second group of studies is at industry level most of which show a positive correlation between the presence of FDI in a specific industry in a country and the average value added per worker in the sector (Javorcik B. S., 2004a). The third group of studies is based on firm level panel data, which examines whether the productivity of host country firms is correlated with the extent of foreign presence in their sector (Javorcik B. S., 2004a).

The majority of spillover studies are based on measuring technology diffusion which is intangible and not practical to measure directly (Keller, 2010). The three indirect measures used in the studies on spillovers include measuring technology inputs which are research and development (R&D), measuring outputs which are patents, or measuring productivity improvements due to technology improvements (Keller, 2010). A drawback with R&D as a measure of technology diffusion is that it ignores the random nature of the process of innovation (Keller, 2010). The decision to patent is voluntary on the part of the firm, and a large set of innovations are never patented which mostly results in inaccurate records. Measuring labour productivity improvements is the widely used approach to determine existence of spillovers (Keller, 2010). The productivity improvements method uses total factor production (TFP) which is the measure of the efficiency of all inputs to a production process and it is computed from data on firm inputs and output (Keller, 2010).

Early studies on spillovers were conducted using a framework of econometric analysis in which labour productivity or total factor productivity in host country firms is regressed on a number of variables assumed to have a positive and statistically significant sign (Görg & Strobl, 2001). These studies used

aggregate cross-sectional data at industry level to find evidence of positive spillovers, while latest studies use aggregate panel data at firm level (Görg & Strobl, 2001). The results of these studies have generally been mixed and therefore cast doubt on the existence of positive spillovers from the presence of MNEs, especially in the developing countries (Javorcik B. S., 2004a). The picture is more optimistic in the case of developed industrialised countries (Javorcik B. S., 2004a). Görg and Strobl (2001) explain the lack of conclusive results as being due to methodological and measurement issues. Cross-sectional industry level studies are said to have found mostly positive associations between industry level productivity and presence of FDI while firm level panel analysis results are mixed (Javorcik B., 2008). The mostly positive results of the cross-sectional industry level studies are said to point to the inability of these studies to control for unobservable industry heterogeneity which panel firm level studies are able to address to some extent (Görg & Strobl, 2001). Studies using firm level rather than industry level data appear to be the most consistent in determining the existence of knowledge spillovers hence this study was also performed at firm level.

Knowledge spillovers can occur as a result of competition between firms which is commonly referred to as horizontal linkage spillovers or a result of a relationship between MNEs and host country firms of suppliers which is commonly referred to as vertical linkage spillovers (Girma, Görg, & Pisu, 2005). Vertical linkage spillovers can be backward or forward, where backward linkage is between the MNE and its suppliers and forward linkage is between the MNE and its customers. This study was focused on vertical linkage spillovers through backward linkages.

There are mechanisms or channels through which knowledge spillovers can occur and Crespo and Fontoura (2006) summarise these mechanisms or channels as demonstration or imitation effects, labour mobility, exports, competition, and backward and forward linkages. According to Javorcik (2004a), due to the relationships as a result of the vertical linkage between the

MNE and the host country firm, backward vertical linkage knowledge spillovers may take place through direct knowledge transfer from MNEs to host country firms of suppliers. Requirements for higher product quality and on-time delivery normally required by MNEs provide incentives to domestic suppliers to upgrade their production management and or technology (Javorcik B. S., 2004a).

Studies conducted to date have confirmed the existence of knowledge spillovers and there are factors that can affect the existence of these knowledge spillovers.

2.4 Determinant Factors of Spillovers – Absorptive Capacity

Not all firms can benefit from knowledge spillovers from MNEs as benefiting is dependent on the host country's relative backwardness and the capacity of the host country firms to assimilate the knowledge which is its absorptive capacity (Görg & Greenaway, 2004). Absorptive capacity is the ability of the host country firm to recognise, capture and use knowledge spillovers to improve the efficiency of its own operations (Crespo & Fontoura, 2006). According to Crespo and Fontoura (2006), this is the determinant factor of FDI spillovers that has been analysed in most detail together with the channels of spillovers.

Girma (2005), in a study of firms in the UK, concluded that high absorptive capacity generally speeds up the receipt of spillovers from MNEs and that there appears to be a minimum absorptive capacity threshold below which spillovers are non-existent or even negative. This points to the significance of host country conditions as determinants of the firms absorptive capacity and therefore the magnitude and scope of spillovers (Blomström & Kokko, 1998). Absorptive capacity of host country firms depends on a multiplicity of factors related to their own characteristics, the characteristics of the MNE and characteristics of the host country (Crespo & Fontoura, 2006). Havranek and Irzova (2011) in meta-

analysis on estimating vertical slipovers from FDI grouped these factors that impede or enhance spillovers into foreign firm characteristics, host country characteristics and host country firm characteristics.

2.4.1 Host Country Characteristics

There is some level of consensus amongst researchers that host country characteristics that attract FDI depends on the motives of foreign investors in undertaking those investment projects (Kinoshita & Campos, 2003). As mentioned earlier in this report, FDI into the natural resource sector in LDCs in Africa is resource seeking. The extent to which MNEs transfer modern technology and know-how to their foreign affiliates depends on these investment motives and host country institutional development (Nunnenkamp & Spatz, 2003). Resource seeking FDI tends to involve a large up front transfer of capital, technology and know-how (Nunnenkamp & Spatz, 2003). As indicated in sections earlier, investment in the natural resources sector is resource seeking and therefore expected to bring capital, technology and knowledge into the host county

2.4.1.1 Technology Gap

Technology gap refers to the difference in the knowledge, exposure and practices of host country firms as compared to that of the MNE. Early studies suggested that the greater is the development distance between the MNE home country and the less developed host country, the greater the backlog of available opportunities to exploit (Görg & Greenaway, 2004). Similarly, there will be great pressure for change and therefore more rapid uptake of new technology (Görg & Greenaway, 2004). Technology transfer will be rapid if the MNE quickly establishes vertical networks, which will expose host country supplier firms to new technology and therefore promote its diffusion (Görg & Greenaway, 2004). This model of rapid transfer of technology assumes the MNE is voluntarily sharing its technology or knowledge with the host country firms of suppliers and therefore capacitating them.

Technology gaps may constitute an obstacle to spillovers as the technology from developed countries may be less suited for conditions in developing countries (Sjöholm, 1999). Empirical studies indicate that in situations where host country firms are much less advanced than the MNEs or their foreign competitors, there will be little scope for interaction and therefore the ability to learn may be limited as the MNE may opt to source inputs from foreign firms (Smarzynska, 2002).

The technology gap can also result in least advanced technology being applied by the MNE which will lower the potential of the host country to benefit from spillovers (Görg & Greenaway, 2004). From the study using a cross-section of firm level data for Uruguay, there is evidence of productivity spillovers to host country firms with moderate technology gaps but not for firms which use considerably lower levels of technology (Girma & Görg, 2003). This is therefore evidence that the larger the technology gap between the MNEs and the host country firms, the less likely the potential for spillover benefits (Girma & Görg, 2003).

In the same token, if host country firms are more or equally productive as their foreign counterparts, there may be little room for learning from the MNE as the technology may already be very similar or they may generally be no incentive to learn new things (Smarzynska, 2002).

The technology gap between host country firms and the MNEs or foreign owned competitors in LDCs is expected to be large. Host country firms are likely to be using very backward technology combined with low skilled workers who will need to improve their skills if they are to adopt the new technology.

2.4.1.2 Distance from MNE country of origin

The distance to a MNE country of origin has a significant effect on the spillovers. Theoretical model of Rodriguez-Clare (1996) indicates that positive backward spillovers are more likely to occur when the costs of communication between the MNE host country and its country of origin are high and when the variety of intermediate goods produced between the two countries is close. The costs of communication between the MNE host country and its headquarters is approximated by the distance between the two countries (Rodríguez-Clare, 1996). The share of inputs sourced by the MNEs from a host country is likely to increase with the distance between the MNE host country and the MNE country of origin (Javorcik B. , 2008).

MNEs from distant countries are likely to use more local inputs since it is expensive for them to import inputs from their home countries (Havranek & Irsova, 2011). Import sourcing, however, may not be economical as MNEs may find it difficult to manage and monitor cross-border supply chains and would therefor prefer acquiring inputs locally (Liu B. J., 2011). The challenge is that host country firms are often unable to produce goods that comply with the quality standards of the MNEs and for these reason MNEs, at times, get involved in the development of host country supplier firms (Havranek & Irsova, 2011). MNEs may encourage their long-term suppliers or other established firms from their home country to establish local facilities (Liu B. J., 2011).

MNEs tend to source inputs internationally in their early stage of establishment, due to a lack of established and readily available networks in the host country (Liu B. J., 2011). Over time potential host country suppliers become available as they enhance and improve their production capabilities through observing and emulating the activities of the MNE foreign suppliers (Liu B. J., 2011). A higher share of local inputs into the MNEs processes indicates more linkages with host country firms and a greater potential for knowledge transfer (Havranek & Irsova, 2011).

Smaller MNE affiliates have been found to source more locally than larger MNE affiliates (Liu B. J., 2011). Reasons given for this include the ability of larger firms to adapt to new conditions, weak organisational strength of small MNE

affiliates, global sourcing by large MNEs and the inability of the host country suppliers to supply large MNEs (Liu B. J., 2011).

Natural resource MNEs are large and in order to support the large capital equipment they possess, they tend to rely on foreign suppliers who overtime establish local operations. The entry of foreign owned firms of suppliers into LDCs is likely to lead to improvements in the host country firms of suppliers as foreign supplier's technology and the ways of doing business spillover to host country firms.

Distance to MNE's country of origin plays a role in the MNE's decision regarding where to source inputs or products. This aspect of the host country characteristics was not explored further in this study but helped in the understanding of the ownership structure of host country firms.

2.4.1.3 Trade Openness

Trade openness helps countries benefit more from FDI and therefore allows host country firms to explore and get exposure to international markets (Havranek & Irsova, 2011).

Trade openness is considered important as foreign direct investors are said to increasingly pursue complex integration strategies which require the unrestricted import of intermediate goods at all stages of the production process (Nunnenkamp & Spatz, 2003). Firm motive entry for efficiency-seeking is dependent on open trade regime, while resource-seeking motive is likely to ignore high trade barriers (Lesher & Miroudot, 2008). This is the case with natural resources sectors firms. It implies that these MNEs bring into the host country the technology, products or services that increase exposure for host country firms. Depending on the absorptive capacity of the host country firms, these complex integration strategies could negatively impact the host country firms.

Barriers to entry make markets less competitive, generating inefficiencies in the market (Lesher & Miroudot, 2008). With trade and FDI liberalisation, markets are contestable and incumbent firms have to rely on innovation and efficiency gains to maximise profits (Lesher & Miroudot, 2008). Preferential trade agreements between host country and other countries is likely to affect the sourcing patterns of MNEs and increase the likelihood of spillovers to host country firms (Javorcik B. , 2008).

Lesher and Miroudot (2008) found that the existence of backward linkages and the positive impact of trade openness on productivity spillovers are consistent with the assumption that efficiency seeking FDI is more conducive to spillovers than resource-seeking or market-seeking FDI.

2.4.1.4 Financial Resources

Lack of financial resources makes it hard and at times impossible for host country firms to access the capital required to develop and reduce the technology gap or to even take advantage of spillovers. The inflow of FDI helps the host country by bringing in the much needed capital which could ease credit constraints and allow the domestic firms to react fast and flexibly to MNE's demands which strengthens the linkages required for spillovers (Havranek & Irsova, 2011).

Lack of financial resources will therefore hamper the ability of the host country firms to improve their operation and benefit from spillovers.

2.4.1.5 Intellectual Property Rights

From the study done by Javorcik (2004) on composition of FDI and protection of intellectual property in transition countries, results indicate that investors in the sectors relying heavily on protection of intellectual property are deterred by a weak intellectual property rights in a potential host country. Results also indicate

that the lack of intellectual property rights protection deters investors from undertaking local production and encourages them to focus on distribution of imported products (Javorcik B. S., The composition of foreign direct investment and protection of intellectual property rights: Evidence from transition economies, 2004).

Havranek and Irzova (2011) find, in their study, that the protection of intellectual property rights is insignificant for the magnitude of spillovers as intellectual property rights matter at the point of multinational entry. Lack of intellectual property rights is therefore a huge determinant of the kind of technology or business processes MNEs deploy in foreign countries (Havranek & Irsova, 2011). MNEs are likely to deploy less advanced technology into countries where their intellectual property rights are not guaranteed. Main technology used in the natural resources industry is common across the different sectors. The application of the technology and the associated processes is what differentiates best firms from the rest of the industry. Host country firms can therefore still learn directly or indirectly, in the form of spillovers, these best practices.

2.4.2 Host Country Firm Characteristics

Host country firms already exposed to foreign competition are said to have a greater capacity not only to absorb foreign technology but also to counter the competition provided by the multinational presence in the local market (Crespo & Fontoura, 2006). The level of competition in the firm's industry is therefore a factor to be aware of but this assumes that host country firms have the capacity to react to competition.

The size of host country firms has also been linked to their capacity to exploit benefits associated with the presence of MNEs in their country. Small host country firms in terms of employment or production may be less capable of

competing with foreign owned firms of suppliers who come into their country to supply the MNEs (Aitken & Harrison, 1999). Host country firms may not have sufficient production scale to imitate some of the technologies introduced by MNEs. Larger host country firms can therefore be expected to benefit more from the presence of foreign firms (Crespo & Fontoura, 2006).

The type of business the firm is in seems to have an impact on the magnitude of spillovers according to the findings of Havranek and Irzova (2011). Their study showed that there is a smaller effect on spillovers from host country firms in the service sector as compared to those in the manufacturing sector (Havranek & Irsova, 2011). This finding makes sense as the service industry is highly dependent on the individual employees' capability and their capacity to capture the spillover whereas in the manufacturing industry part of the spillovers is in the form of technology.

According to Havranek and Irzova (2011) host county characteristics which influence its absorptive capacity include the technology gap, the distance from MNE's originating country, trade openness, the level of financial development and the protection of intellectual property rights.

2.4.3 Foreign-firm Characteristics

According to Havranek and Irsova (2011), foreign firm characteristics are about the degree of ownership of the MNE.

Fully owned MNEs are unlikely to create spillovers as compared to partially owned MNEs who have linkages with host country suppliers (Havranek & Irsova, 2011). Fully owned MNEs are likely to use more advanced technology which increases the technology gap and reduces the chance of spillovers (Havranek & Irsova, 2011).

2.5 Spillover Channels

The existence and strength of channels through which spillovers occur together with the absorptive capacity of the host country will determine the existence and the magnitude of spillovers from the MNE to its host country suppliers. There are a number of channels of spillovers and they are discussed in below.

2.5.1 Demonstration Effect

Demonstration is one of the channels through which spillovers from the MNE to host country firms can occur. Demonstration is the imitation or the reverse engineering of the multinational technology, processes or products by a host country firm. The demonstration effect arises from arm's length relationships between MNEs and host country firms, which enables host country firms to learn and adopt superior production technologies, managerial and organisational skills (Smeets, 2008). There are not many studies or publications on demonstration effects or hypothesising on how they take place (Smeets, 2008).

According to Crespo and Fontoura (2006), due to the cost inherent in acquiring knowledge and the uncertainty of the results that may be obtained, the introduction of a new technology into an industry or market may be too expensive and risky for a host country firm to undertake. The relevance of this effect increases with the similarity of the goods produced by the firms involved (Crespo & Fontoura, 2006). There are however cases where similarity of products may not be important such as in the imitation of management and marketing technology (Crespo & Fontoura, 2006). Success of a technology or process at a MNE will therefore increase its chance of being imitated and adopted by a host country firms.

The majority of the studies that looked at demonstration effects focus on horizontal linkages. Blomström and Kokko (1998) assert that spillovers as a results of demonstration effects or imitation are due to increased competition between the MNE and host country firms. Quoting a study of FDI in a Kenyan soap firm as an example, Blomström and Kokko (1998) report that host country firms introduced mechanised production when they found themselves unable to sell handmade soap following the entrance of a MNE in the industry. Changes in the production techniques of the Kenyan footwear industry as a result of the entry of a multinational are also mentioned as further examples of imitation induced by increasing competition (Blomström & Kokko, 1998). These are examples of imitation due to increased competition in a horizontal linkage. The same could be said for imitation in vertical linkages as it is expected that the entry of the MNE will spark competition between host country firms of suppliers and therefore imitation between these firms. Impact of entry of MNEs on competition between host country firms of suppliers is discussed in detail under the section on competition as a channel for spillover.

2.5.2 Worker Mobility Channel

Spillovers through worker mobility can arise when workers receive training or accumulate experience while working for the MNE and then move to host country firms or setup their own firms (Görg & Strobl, 2005). This channel differs from others because technology moves across firms through the physical movement of workers who have been exposed to the technology (Glass & Saggi, 2002).

The existence of a firm specific advantage and evidence of actual mobility of workers suggest that a potential for spillovers through worker mobility exists (Balsvik, 2011). Keller (2010) confirmed that if workers learn about the MNE technology through on job activity or training, then once they leave the MNE they may be able to transfer their knowledge to a host country firm or start their own firm. A MNE's early stages in a new country rely intensively on expatriates,

but overtime these expatriates tend to be replaced with host country workers who have been properly trained (Fosfuri, Motta, & Rønde, 2001). According to Görg and Strobl (2005), trained workers who are employed by the MNE experience more rapid wage growth than workers trained in domestic firms which signifies that training provided by foreign firms is more productive than that of domestic firms. Higher wages together with better working conditions may discourage the MNE workers from moving to other firms (Fosfuri, Motta, & Rønde, 2001). According to Glass and Saggi (2002), these wage differentials are usually larger in less developed countries, where multinationals are more advantaged relative to host firms. Worker movement from MNEs to host country firms is important in developing countries where host country workers receive training and experience from MNEs (Görg and Strobl, 2005). Using a Ghanaian firm level dataset covering the years 1991–1997, Görg and Strobl (2005) related firm level productivity to the owner of a domestic firm's previous experience in a MNE and concluded that firms run by owners who are former employees of MNEs in the same industry or sector before opening their own firm are more productive than their competitors (Görg & Strobl, 2005). No such evidence is found for firms run by owners who worked for MNEs in other industries (Görg & Strobl, 2005). This finding implies that the presence of worker mobility does not guarantee that the firm the worker has moved to will benefit from this worker joining their firm. The finding is in reference to horizontal linkages but the same should be expected for vertical linkages where employees of the MNEs start their own firms to become suppliers to the MNE. Worker mobility is a channel for knowledge spillover and workers with MNE experience contribute substantially to the productivity of their new firms (Balsvik, 2011).

Worker mobility can also negatively affect host country firms as employees of host country firms may leave to join MNEs where they can earn better salaries (Crespo & Fontoura, 2006). This could have negative spillovers as host country firms may struggle to retain their human resources so losing key resources and therefore the knowledge base.

MNEs in the natural resources sector in LDCs tend to initially bring in expatriate labour to perform the complex technical tasks while they train host country employees. Overtime these workers are replaced with trained host country employees. In the early days of the MNE in a host country, worker mobility is therefore likely to be from host country firms to MNEs due to likelihood of higher salaries and personal growth opportunities. This is likely to change when these employees have acquired the knowledge and become a scare resource. They are therefore likely to be attracted by other firms at higher salaries or they may even leave to start their own firms.

2.5.3 Competition

Empirical studies do not appear to have explicitly studied the effect of host-sector competition on knowledge spillovers from FDI (Smeets, 2008). Competition in the domestic economy between MNEs and host country firms is an incentive for the host country firm to make a more efficient use of existing resources and technology or even to adopt new technologies (Kokko, 1996).

Results of the study on Indonesia by Sjöholm (1999), show that high competition between firms in the host country increases the potential for spillovers. The findings of this study indicate that the degree of competition affects and influences the choice of technology to be used by the MNE at entry in order to be competitive (Sjöholm, 1999). This choice of technology presents an environment for new knowledge diffusion and therefore spillovers (Sjöholm, 1999). Higher level of competition in a host country forces MNEs to frequently update their technology in order to remain competitive, which then presents increased scope for spillovers (Sjöholm, 1999).

Competition from MNEs can also restrict the market power of domestic firms or completely eliminate them if they do not have the capacity to respond to the entry of MNEs (Crespo & Fontoura, 2006). As indicated under the worker

mobility section, increased competition can lead to host country firm workers leaving their firms to join the MNE or majority foreign owned host country firms.

All studies done to date have looked at the spillovers as a result of increased competition with a focus on horizontal linkages. Entry of MNEs can spark competition between host country supplier firms when they try to win business from the MNE. The entry of the MNE in this case does not spark direct competition with host country firms but sparks competition between host country firms of suppliers. The entry of foreign owned supplier firms that are following the MNE is also expected to spark competition between supplier firms.

It is therefore expected that competition between suppliers of the MNE will have similar effects on spillovers as in the case of competition between MNE and host country firms in the same industry.

2.5.4 Exports Channel

According to Aitken, Hanson and Harrison (1997), the potential for spillovers from MNE's exports follows from the fact that MNEs have a multi-market presence. MNEs are a natural conduit for information about foreign markets and technology, and a natural channel through which host country firms can also distribute their goods outside of the host country (Aitken, Hanson, & Harrison, 1997).

Access to information of MNEs, imitation of MNEs and competition with MNEs enhance the export prospects of host country firms (Görg & Greenaway, 2004). By collaboration or imitation of export processes of MNEs, host country firms may benefit from reduced entry costs into the foreign market (Crespo and Fontoura, 2006). Exporting firms are generally found to be more productive, anda positive relationship is consistenty found between trade openness and higher firm productivity controlling for foreign presence in the sector (Lesher & Miroudot, 2008). Export-oriented firms, including export-oriented foreign

affiliates, tend to be larger because they produce for the world market, rather than exclusively for the local market (Lesher & Miroudot, 2008). A consequence of this is that they likely offer more opportunities for host country suppliers to benefit from economies of scale in production (which boosts productivity) (Lesher & Miroudot, 2008).

Firms in the natural resources sector naturally export to the developed countries the resources they extract for processing, which is generally a bulk export process. Commodity export is highly specialised and regulated and there is therefore very little host country firms can directly learn from the MNE export process. The opportunity for learning or knowledge spillover lies in other foreign firms operating in the suppliers industry. These foreign firms import technology and equipment used by the MNE. Host country firms in LDCs are therefore unlikely to benefit from export spillovers from the multinational since they do not have the capacity to do international business. This channel was therefore not evaluated in this study.

2.6 Vertical Linkage Spillovers

Early empirical studies on knowledge spillovers tested the presence of spillovers in horizontal linkages, and often ignored vertical linkages between MNEs and their host country firms of suppliers (Reganati & Sica, 2007). It is onlyrecently that studies were undertaken to look at the vertical linkage spillovers (Smeets, 2008).

Host country firms benefit from the presence of MNEs in their country when the entry of these MNEs increases the demand for local inputs (Blomström & Kokko, 1998). Where this has occurred, there is a tendency for the MNE's share of local inputs to increase over time as the MNE expands and adds further production capacity (Blomström & Kokko, 1998). As indicated earlier, the

increased demand together with requirements for higher product quality and on-time delivery normally required by the MNE will incentivise host country firms of suppliers to upgrade their production processes and or technology (Javorcik B. S., 2004a). MNEs may sometimes want to voluntarily pass knowledge to their suppliers in order to ensure reduced input costs or improved input quality (Javorcik B. S., 2004a). This knowledge passing may be in the form of employee training, technology support, financial support, management and marketing support (Crespo and Fontoura, 2006). Pack and Saggi (2001) show in their study that the knowledge passed to suppliers by the MNE can benefit both the MNE and the host country firm of suppliers. There is a possibility of knowledge passed on to the supplier industry by the MNEleaking to other suppliers in the host country and resulting in increased competition in the supplier industry (Pack & Saggi, 2001). In order to protect their trade secrets, MNEs are likely to try to prevent knowledge leakage to their competitors through formal protection of their intellectual property, trade secrets, paying higher wages to prevent employees moving to competitors or locating in countries or industries where domestic firms have limited imitative capacity (Javorcik B. S., 2004a). In the case of the natural resources industry in LDCs, it is likely that the passing of knowledge will make the host country supplier industry more competitive and enable host country firms to extend services or products to other MNEs operating in their country.

The discussion, so far, in this section has focussed on knowledge transfer which is direct or voluntary transfer of knowledge by MNEs to host country firms of suppliers. Indirectly, the presence of MNEs has a chance of increasing the efficiency of host country firms through imitation of MNE's business processes by host country firms, through the movement of workers from MNE to host country firms and through host country firm access to information about foreign markets (Lea & Pomfret, 2011). According to Reganati and Sica, (2007), the entry of a MNE can provide a stimulus for host country firms to expand their services or products to supply the MNE which is an unintended benefit and therefore a spillover. There are a number of mechanisms through which the indirect diffusion of knowledge or spillovers can occur and these are discussed

in detail later in this chapter. There is evidence supporting the existence of vertical linkage spillovers from MNEs to host country firms of suppliers. The studies include recent studies by Javorcik (2004) of Lithuanian firms, Javorcik and Spatareanu (2008) of Romanian firms, Javorcik (2008) of Czech and Latvian firms and Blalock and Gertler (2008) of Indonesian firms. Recent studies on spillovers in LDCs in Africa include a study by Bwalya (2006) on evidence of spillovers in Zambian manufacturing firms and Görg and Strobl (2005) on worker mobility in Ghana.

A study by Javorcik (2008) in the Czech Republic and Latvia indicate that the scope for spillovers to upstream sectors may be limited in situations in which the supplier industry in the host country are underdeveloped or the MNE has very specialised input needs or relies on centralised input sourcing**.** The study also finds that even if MNEs source inputs in the host country, it may buy them from other MNEs operating there as it is common for producers of large equipment, parts and components to follow their clients to a new host country (Javorcik B. , 2008). According to Smarzynska (2002), FDI spillovers through backward linkages have a larger impact on host country firms than on the firms with foreign capital.

The natural resources sector is a highly capital and technology intensive industry and likely to heavily rely on centralised product or service sourcing in order to benefit from wholesale discounts, uniform quality and effective support. The majority of suppliers for critical services or products will be majority foreign owned as they would have followed the MNE into the new host country. Host country firms are likely to be suppliers of non-critical products or services. Where they supply technical products or services, it is likely that they are receiving some form of direct assistance from the MNE or they are in partnership with a foreign firm.

Chapter 3: Research Hypotheses

The previous chapter discussed the theory on spillovers and the findings of the empirical studies performed by various researchers to date. Following from literature review, the following are the hypotheses to be tested in this study.

3.1 Hypotheses on Absorptive Capacity of Host Country Firms of Suppliers in LDCs

The following hypotheses relate to the absorptive capacity of the host country firms.

- Research Hypothesis 1a
  Host countries that are classified as LDC lack the capacity to support the local firms of suppliers.
- Research Hypothesis 1b
  Host country firms of suppliers to the MNE in the natural resources sector in the LDCs lack the capacity to take advantage of spillovers.

3.2 Evidence of Existence of Spillovers

The following hypotheses relate to the evidence of the presence of spillovers in the LDCs where the study survey respondents operate from.

3.2.1 Hypotheses on Evidence of Worker Mobility

- Research Hypothesis 2a
  There is evidence of worker mobility from the MNE to host country firms of suppliers to the natural resources sector in LDCs.
- Research Hypothesis 2b

There is evidence of worker mobility between host country firms of suppliers to the natural resources sector in LDCs.

- Research Hypothesis 2c
  Evidence of worker mobility is more prevalent between host country firms of suppliers than it is from the MNE to host country of suppliers to the natural resources sector in LDCs.

3.2.2 Hypotheses on the Evidence of Imitation

- Research Hypothesis 3a
  There is evidence of imitation of the MNE by host country firms of suppliers in the natural resources sector in LDCs.
- Research Hypothesis 3b
  There is evidence of imitation between host country firms of suppliers in the natural resource sector in LDCs.
- Research Hypothesis 3c
  Evidence of imitation by host country firms of suppliers is more prevalent towards the MNE than it is between host country firms of suppliers in the natural resources sector in LDCs.

3.3 Hypothesis on the Evidence of MNE Direct Support of Host Country Firms of Suppliers

- Research Hypothesis 4
  There is evidence of host country firms of suppliers receiving assistance from the MNE in the natural resources sector in LDCs.

3.4 Hypotheses on the Evidence of Value Achieved by Host Country Firms

- Research Hypothesis 5a

  The evidence of additional value obtained due to the assistance by the MNE is more prevalent than evidence of additional value due to the existence of worker mobility.

- Research Hypothesis 5b

  The evidence of additional value obtained due to the assistance by the MNE is more prevalent than evidence of additional value due to existence of imitation by host country firms of suppliers.

Chapter 4: Methodology

The previous section outlined the hypotheses tested in the study and this section outlines the research methodology followed in conducting this study and testing the hypotheses on spillovers.

4.1 Introduction

Measuring labour productivity improvements is the widely used approach to determine the existence of spillovers (Keller, 2010). Labour productivity data is correlated with data on the inflow of FDI into the host country where strong positive correlation will confirm the existence of spillovers (Keller, 2010). Early studies on spillovers relied on World Bank Enterprise data gathered through Enterprise Surveys as a source of input data to use in the analysis. These studies used aggregate cross-sectional data at industry level, while latest refined studies use aggregate panel data at firm level (Görg & Strobl, 2001).

World Bank Enterprise data is not ideal for studying spillovers to host country firms suppliers in one sector or industry as productivity improvements due to spillovers may be from other sectors or industries the supplier firm supplies. Another source of data mostly used in previous studies is the host country government and non-governmental institutions that monitor and collect data on the countries industry and economy. For obvious reasons, such as a lack of institutional capacity in LDCs, obtaining information from such institutions was not even considered.

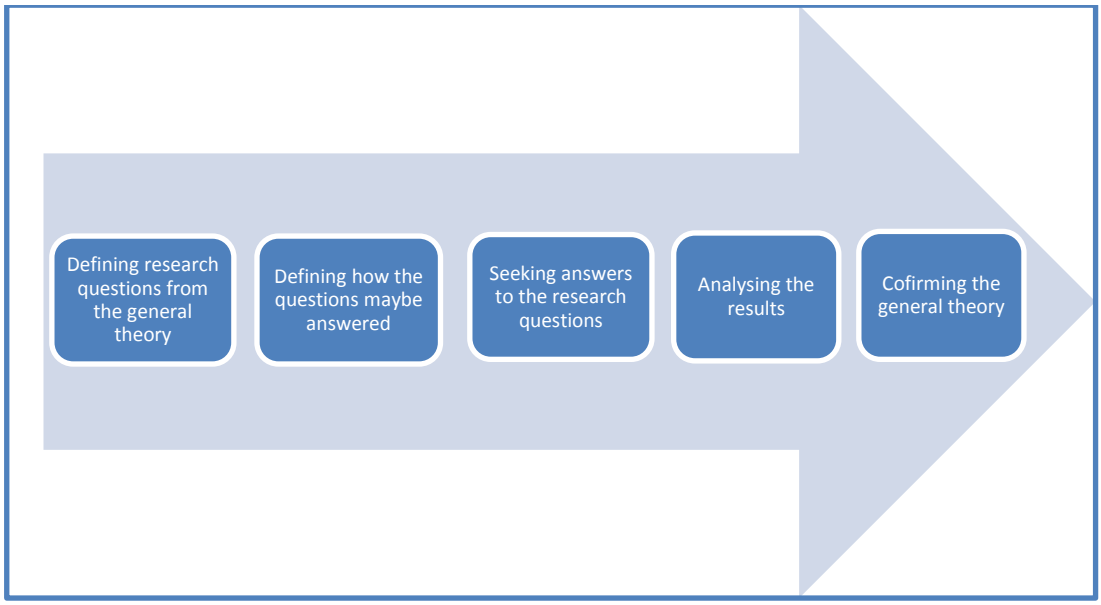
For the purpose of this study, it was decided to gather the necessary data by conducting a survey amongst host country firms who are suppliers to the MNE operating in the natural resources sector.

4.2 Research design

Research design constitutes a blue print for the collection, measurement and analysis of data and it is the plan and structure to obtain answers to the research question (Cooper & Schindler, 2003). This section therefore defines how data was collected in order to test the research hypotheses and achieve the overall research objectives.

The study was deductive by design and it followed the general path depicted in the diagram below (Saunders & Lewis, 2012):

Figure 3: (Source: Saunders & Lewis)



The general literature on FDI and knowledge spillovers was explored in order to unpack and understand the theory behind knowledge spillovers. Exploratory study of literature allowed for the clear development of concept, establishment of research area priorities and crystallisation of the research question by developing hypotheses (Cooper & Schindler, 2003). The overall research question in this case was whether there is evidence of knowledge spillovers from MNEs to host country firms of suppliers in the natural resources sector in

LDCs and whether host county firm absorptive capacity had any impact on the presence or absence of spillovers.

In order to be able to test the hypothesis, cross-sectional data was collected through a survey from suppliers of a mining MNE in Ghana, Mali and Tanzania (Saunders & Lewis, 2012). The survey was administered to participants through email providing a link to an online survey instrument (Surveymonkey) and attaching a soft copy of the survey for those who did not want to complete the survey online.

The study was descriptive and predictive where statistical analysis methods were used to analyse data collected and the theory used to unpack and explain the results. Descriptive analysis defines or describes the sample data collected but the findings do not have the potential for drawing powerful inferences about the population where the sample was obtained (Cooper & Schindler, 2003). Predictive analysis aims to generalise from the sample data analysis by predicting certain phenomena on the basis of hypothesised, general relationships (Cooper & Schindler, 2003).

4.3 Scope, unit of analysis and population

The scope of this study was to investigate the presence of knowledge spillovers using evidence of spillover channels as an indicator of the existence of spillovers and to determine the extent to which host country and host country firm characteristics impact the presence or absence of spillovers in the natural resources sector in LDCs. The study was based on suppliers of a single mining MNE with operations in LDCs in Africa. The countries originally included in the study were Ghana, Mali, Tanzania and Guinea. Guinea was later left out of the study due to challenges explained later in this report.

A short research period as well as the need for research consent from the MNEs made using a single MNE a logical choice. The study therefore focused on suppliers of a South African mining enterprise in LDCs in Africa. The enterprise has its headquarters in Johannesburg and the researcher had access to corporate office personnel as well as site personnel in the least developed African countries studied.

The unit of analysis for this research was the host country firms in Ghana, Mali and Tanzania who are suppliers to the mining MNE. The unit of analysis refers to the level of aggregation or grouping of data during its subsequent analysis.

The population for this study of knowledge spillovers from MNEs in the natural resources sector included all host country firms who are suppliers to the MNEs in that sector in LDCs.

4.4 Sampling

It is not always practical to collect data from the whole population and hence it is sometimes collected from a sample of the population (Saunders & Lewis, 2012). General reasons for using sample data instead of the whole population include financial constraints, time constraints and limited availability of population elements (Cooper & Schindler, 2003). A good sample is accurate which implies that it is free from bias and is precise (Cooper & Schindler, 2003). The location and proximity to countries used for the study made it impractical to identify the entire population of host country firms of suppliers to natural resources MNEs from where a sample could be obtained. It was therefore decided to use single MNE suppliers as they could be identified and access to their contacts details could be obtained. The sampling frame was therefore the mining MNE host country firms of suppliers in Ghana, Mali and Tanzania.

There are two types of sampling designs,probability and nonprobability sampling (Cooper & Schindler, 2003). Probability sampling is based on the concept of random selection and nonprobability sampling is arbitrary and subjective (Cooper & Schindler, 2003).

The approach taken in this study was to apply a census which is to send the survey to all firms in the database provided by the MNE personnel. The reasons for going for a census instead of a sample are as outlined below.

- Lists of host country firms provided by the MNE personnel where not too long to warrant sampling. The list for Ghana contained 37 firms, for Mali it contained 53 firms and for Tanzania it contained 324 firms.
- Lists provided contained web based email addresses such as gmail and yahoo which provided no guarantee that it would reach the firm concerned as these are usually not managed and can therefore go unchecked.
- Contact details belonged to mostly sales and front desk personnel and there was no guarantee that the survey email to would reach the correct senior personnel in the firms.
- To increase the hit and response rate and to reduce the need for follow up as proximity to these firms and the financial constraints limited the survey follow up communication to email.

The survey was therefore sent to all host country firms on the lists provided by the MNE personnel. Snowballing or referral was also used to try to reach more suppliers who may not have been on the original lists or may not have been reached due to incorrect contacts in the lists provided by the MNE personnel (Saunders & Lewis, 2012).

The concern regarding the use of public domain email addresses was confirmed when a number of email responses where received where

respondents indicated they had left the company and gave forwarding addresses.

Table 1 below summarises the response rate from the three countries surveyed.

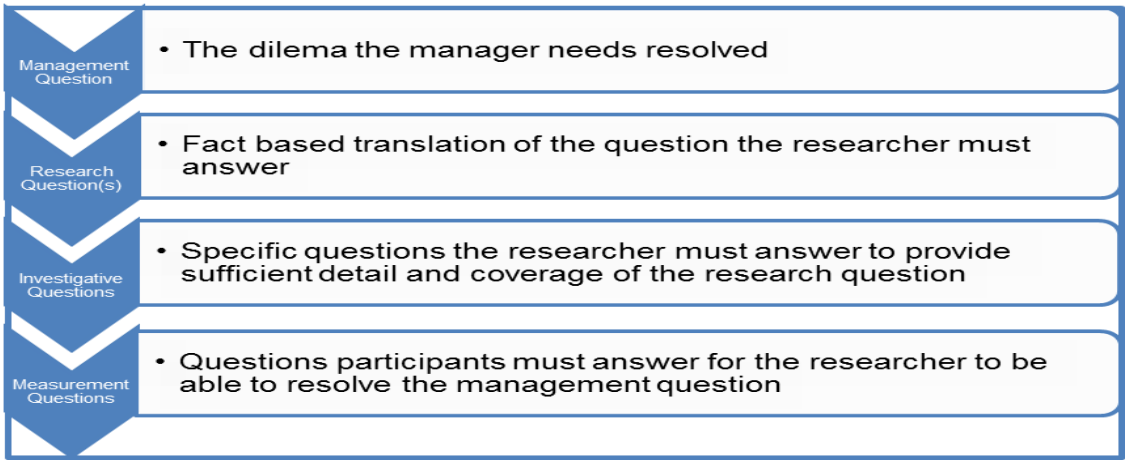
Table 1: Summary of response rate per country

Country	Total Mail Sent	Error Returned Mail	Successful Mail Sent	Survey Responses Received	Response Rate
Ghana	39	6	33	8	24%
Mali	51	5	46	4	9%
Tanzania	228	17	211	25	12%
Overall	318	28	290	37	13%

4.5 Instrument Design

The survey instrument was designed based on research questions and the literature review conducted. The approach taken in working out the measurement questions for the instrument followed the research question development hierarchy by Cooper & Schindler (2003) which is summarised in Figure 4. A copy of the four levels of questions is included in appendix A1.

Figure 4: Research Question Development Hierarchy (Adapted from Cooper & Schindler (2003))



The instrument was designed to collect categorical quantitative data (Saunders & Lewis, 2012). Categorical data can be either as descriptive or ranked (Saunders & Lewis, 2012). The instrument used in this study contained questions that collected both descriptive and ranked data.

Due to the official business language in Mali being French, the pretested English version survey instrument was translated to French by a translation services organisation. The translation service is done under oath which guaranteed that the document was a reflection of the English version.

4.5.1 Sections of the Instrument

The instrument comprised three sections, namely the demographics, the evidence of spillover channels and the absorptive capacity. These sections of the instrument are discussed below and copies of the English and French instruments are attached in appendix A2 and A3 respectively.

4.7.2.1 Demographic Information

The list of suppliers obtained from the MNE personnel did not contain much apart from the company name and the contact details. There was a need to gather more information from the MNEs suppliers in order to better understand who the respondents were. The information gathered included composition of ownership, type of service or product offering to the MNE and the type business relationship with the MNE.

4.7.2.2 Evidence of Spillover Channels

A combination of ordinal and nominal categorical variables was used in the instrument (Albright, Winston, & Zappe, 2009). This section tested for evidence of spillovers by testing for the presence of spillover channels as identified in the literature review. The instrument specifically tested for the presence of

competition, presence of worker movement between host country firm and the MNE and between host country firm and its competitors, imitation of MNEs or competitors by host country firms and any direct assistance received by the host country firms from the MNE. The instrument also tested the perception of the firms as to whether there has been value added to their firmsas a result of the presence of these spillover channels.

4.7.2.3 Firm and Host Country Factors

This section used ordinal categorical variables to measure and test the perception of host country firms regarding their own capacity to maximise on the opportunities created by the presence of the MNE. It also tested the perception of host country firms on the impact of the host country firm to maximise on the opportunities created by the presence of the MNEs.

4.5.2 Instrument Pretesting

Pretesting an instrument is an established practice to discover errors before it is sent out to participants (Cooper & Schindler, 2003). There are a number of reasons an instrument is pretested and in this study the instrument was tested for the following (Cooper & Schindler, 2003):

- Participant's reaction to the questions. Whether participants found the questions stimulating enough to want to complete the entire questionnaire.
- To test if the questions evoked the same meaning as that intended by the researcher.
- To test if there was continuity in the flow of the questions.
- To test the length and duration of the instrument.

Instrument pretesting requires that the questionnaire be field tested by sample participants or participants with characteristics and backgrounds similar to the desired participants (Cooper & Schindler, 2003). The location of firms to be surveyed made it impractical to test the instrument using sample participants.

The study instrument was pretested using three colleagues from the GIBS MBA class and two colleagues from the mining MNE who are based in two of the LDC countries being studied. The participants were chosen on the basis that they resembled the target audience in the sense that they are in senior positions in their organisations and therefore understand their own firm's business dynamics.

Adjustments were made to the instrument as per the feedback received from these colleagues.

4.6 Data Collection

A survey was chosen as a data collection method for this research because of the proximity of potential participants to the researcher. This provided the least expensive and fastest method of reaching participants. The instrument was designed as an online survey using SurveyMonkey which is an online surveys website and tool.

The link to the survey together with a soft copy of the survey instrument in Adobe Acrobat format was then sent to the suppliers of the MNE via email. Since the email addresses were for use by the MNE procurement department, it was very likely that the recipient of the email at the host country supplier firm was also in a sales or procurement role. It was therefore stipulated in the email note and on the survey instrument that the survey must be completed by a senior manager or owner of the firm.

Obtaining email addresses for suppliers was initially a challenge as the lists received from the MNE personnel in Ghana, Mali, Tanzania and Guinea did not contain email addresses for all firms on the lists. After a number of iterations

between the researcher and the MNE personnel, email addresses were obtained with the exception of Guinea where it was indicated that the MNE does not have them. The following became apparent during the process of trying to gather host country firm email details:

- The MNE does not have a formal database for suppliers across its operations.
- Communication between the MNE operations and its host country suppliers is done mostly telephonically.
- Most host country firms rely on public domain email addresses which, at times, are personal rather than for business and may therefore no longer be functional.
- Due to close the proximity of Bamako, the capital of Mali, than to Conakry which is the host country capital, MNE operations in Guinea source most of its supplies from Mali. For this reason and others such as unavailability of email addresses of host country supplier firms, Guinea was leftoff the list of countries studied.

To try and improve the response rate, a reminder was sent two weeks after the initial emails and this was followed up by two weekly reminders . The survey was open for two months and during this period recipients received four emails requesting them to participate in the survey.

4.7 Data Analysis

The customary first step in the analysis of data is to prepare and edit the raw data to detect if there are any errors and or omissions (Cooper & Schindler, 2003).

4.7.1 Data Preparation

Data preparation was undertaken to ensure accurate, consistent and complete data that is ready for analysis. Data was transferred from the online survey tool onto an excel spreadsheet and all manually submitted forms were captured into the same spreadsheet. Responses from Mali which were in French were translated into English to ensure uniform data. Data editing showed that three out of the total 37 respondents who started the surveydid not complete it beyond section one. These three incomplete instruments were removed from the data collected before analysis and the total respondents wasthen reduced to 34. The responses from the open ended questions were captured and used during the results analysis.

During statistical analysis, coding was done for some of the responses to allow easy classification and categorisation. Coding involves assigning numbers or symbols to answers so the responses can be easily grouped into limited numbers, classes or categories (Cooper & Schindler, 2003).

4.7.2 Descriptive Statistics

Descriptive statistics were used to categorise and describe the basic features of the data collected (Web Center for Social Research Methods). Categorisation helped summarise, in a sensible way, the data collected. Descriptive statistics were used to describe the data collected and to present the characteristics of the respondents to the administered questionnaire.

Descriptive statistics analysis covered the host country firm's demographic analysis as well as the analysis of the firm's response to evidence of the existence of spillover channels.

4.7.2.1 Demographics numbering

Demographic analysis provides simple summaries about the characteristics of the respondent firms. The analysis includes host country firm ownership, firm offering to the MNE and the type of commercial relationship with the MNE. This information helped the researcher to better understand who the respondents are.

4.7.2.2 Evidence of Spillovers

The data collected on the evidence of spillover channels was analysed and summarised to understand the prevalence of the existence of the different channels of spillovers in the natural resources sector. The data was also analysed to find out if there is evidence of host country firms benefiting from spillover channels through added value.

4.7.3 Factor Analysis

Factor analysis is a generic name given to a class of multivariate statistical methods whose primary purpose is to define the underlying structure in a data matrix (Hair, Anderson, Tatham, & Black, 1998). Factor analysis can be exploratory or confirmatory (Hair, Anderson, Tatham, & Black, 1998). Exploratory factor analysis is used in searching for structure among a set of variables or as a data reduction method (StatSoft Electronic Statistics Texbook, 2012). Confirmatory factor analysis is used when testing the degree to which the data meets the expected structure (Hair, Anderson, Tatham, & Black, 1998).

The main applications of factor analysis techniques are to reduce the number of variables and to detect structure in the relationships between variables (StatSoft Electronic Statistics Texbook, 2012).

A large number of variables increases the possibility that groups of variables may be interrelated to the extent that they are all representative of a more general concept (Hair, Anderson, Tatham, & Black, 1998). In order to reveal factor structure and for the results to be reliable or replicable if the analysis is repeated using an impendent sample, there is a need to have at least five variables for each proposed factor (Grimm & Yarnold, 1994). The analysis must be based on a minimum of a 100 observations regardless of subjects to variables ratio (Grimm & Yarnold, 1994).

The number of observations for this study was 37 which did not meet the minimum 100 observations. Factor analysis was therefore not performed.

4.7.4 Instrument Reliability

Reliability is an assessment of the degree of consistency between multiple measurements of a variable (Hair, Anderson, Tatham, & Black, 1998). According to Cooper and Schindler (2003), reliability can be estimated in a number of ways.

- Test-Retest: This type of reliability test is used to assess the consistency of a test across time. The test assumes that there will be no change in the quality or construct being measured.
- Inter-Rater: This type of reliability is assessed by having two or more independent judges score the test and the scores are then compared to determine the consistency of the raters estimates.
- Parallel-Forms: This determines the degree to which alternative forms of the same measure produce the same or similar results.
- Internal Consistency: This is the common measure and is used to judge the consistency of results across items on the same test. It tests the degree to which instrument items are homogenous and reflect the same underlying constructs.

Chronbach's coefficient alpha is the most common measure used to assess the internal consistency of results across items (Cooper & Schindler, 2003). This is

the reliability assessment method used in this study and the generally agreed upon lower limit for Chronbach's alpha is 0.7 (Hair, Anderson, Tatham, & Black, 1998). Using this method, internal consistency of an instrument can be improved by excluding data from analysis drawn from measurement questions eliciting extreme responses (Cooper & Schindler, 2003). This is done by removing items one at a time and reassessing the Chronbach alpha to determine if it has increased above the lower limit.

4.7.5 Test for Normality

Univariate or multivariate analysis requires that the assumptions underlying the statistical techniques be tested (Hair, Anderson, Tatham, & Black, 1998). The most fundamental assumption in univariate or multivariate analysis is normality which implies that the data obtained comes from a normal distributed population (Hair, Anderson, Tatham, & Black, 1998). Normality is required to use parametric statistics such as the F and t statisics (Hair, Anderson, Tatham, & Black, 1998).

Testing for normality involves two measures and they are kurtosis and skewness (Hair, Anderson, Tatham, & Black, 1998). Kurtosis refers to the peakedness or flatness of the distribution compared with the normal distribution, while skewness refers to the center of the distribution relative to that of the normal distribution (Hair, Anderson, Tatham, & Black, 1998). The two most common statistical test methods for normality are the Kolmogorov-Smirnov test and the Shapiro-Wilks test (Hair, Anderson, Tatham, & Black, 1998).

Due to the small sample size, the data was treated as not being normally distributed and therefore nonparametric tests were applied. No tests for normality were therefore conducted.

4.7.6 Hypothesis Testing

Hypothesis testing was performed to confirm the statistical significance of what the data collected reveals. The testing was done to determine if the results can be generalised to the entire population of host country firms of suppliers in the natural resources sector.

The two most elementary formal properties of every relation between variables are the relation's magnitude or size and its reliability or truthfulness (StatSoft Electronic Statistics Texbook, 2012). Magnitude or size of the relation between the variables is easy to measure and the reliability pertains to the representativeness to the population of the result found in a specific sample of the population (StatSoft Electronic Statistics Texbook, 2012). This therefore talks to the probability that a similar relation would be found if the study was replicated with other samples drawn from the same population. The reliability of a relation between variables observed in the sample can be quantitatively estimated and represented using a standard measure technically called p-value or statistical significance level (StatSoft Electronic Statistics Texbook, 2012).

The statistical significance of results is the probability that the observed relationship between variables or the difference between means in a sample occurred by pure chance, and that in the population from which the sample was drawn, no such relationship or differences exist (StatSoft Electronic Statistics Texbook, 2012). In simple terms, finding that an effect is statistically significant signifies that the effect is real and not due to chance.

There are two general classes of significance tests and they are parametric and nonparametric (Cooper & Schindler, 2003). Parametric tests data is derived from interval and ratio measurements while nonparametric tests are used to test hypotheses with nominal and ordinal data (Cooper & Schindler, 2003). Parametric techniques are the tests of choice if their assumptions are met

(Cooper & Schindler, 2003). The assumptions for parametric tests include that observations must be independent, observations should be drawn from normally distributed populations, populations should have equal variances and measurements should be interval (Cooper & Schindler, 2003). Nonparametric tests do not require data to be from normal distributed populations or homogeneity of variance and are the only ones usable with ordinal data (Cooper & Schindler, 2003).

Due to the small sample size and the data being ordinal and nominal, nonparametric testing was employed in this study. Single sample Chi-square and McNemar Chi-square were used.

4.6.5.1 Single Sample Chi Square and McNemar tests

The test checked for the split in the proportions of the responses as indicated below. Rejecting the test null hypothesis meant that we accept the test alternative hypothesis that there difference is significant. Using the frequency count of the responses, if the count was in agreement with the research hypothesis then we would not reject the research null hypothesis. This method is like testing for humidity to make inference of the rain.

The test null and alternate hypotheses were as follows:

H_0: $P_{split} = 50\%$

H_a: $P_{split} < 50\%$ or $P_{split} > 50\%$

4.8 Methodology limitations

Limitations based on the intended scope and designs of the research inquiry were as follows:

- Unavailability of complete host country firm list.
- Use of free web based email accounts (gmail).
- Reliance email account owners to pass the instrument to the relevant person.
- Proximity by the researcher to the suppliers may resulted in low response rate which may impact on the representativity and validity of the findings.
- The use of cross-sectional data may not necessarily reflect other dynamics in the industry being studied.
- The survey required senior individuals to participate. There is no guarantee the survey was completed by the correct person.
- Access to electronic communication such as the internet to complete the survey automatically excluded some of the suppliers.

Chapter 5: Results

The previous chapter discussed the methodology used in designing and conducting the study. The purpose of this chapter is to present the results of the analysed data collected as part of the study. The presentation of the data is divided into three sections which are descriptive statistics, instrument reliability analysis and hypothesis testing.

5.1 Descriptive Statistics

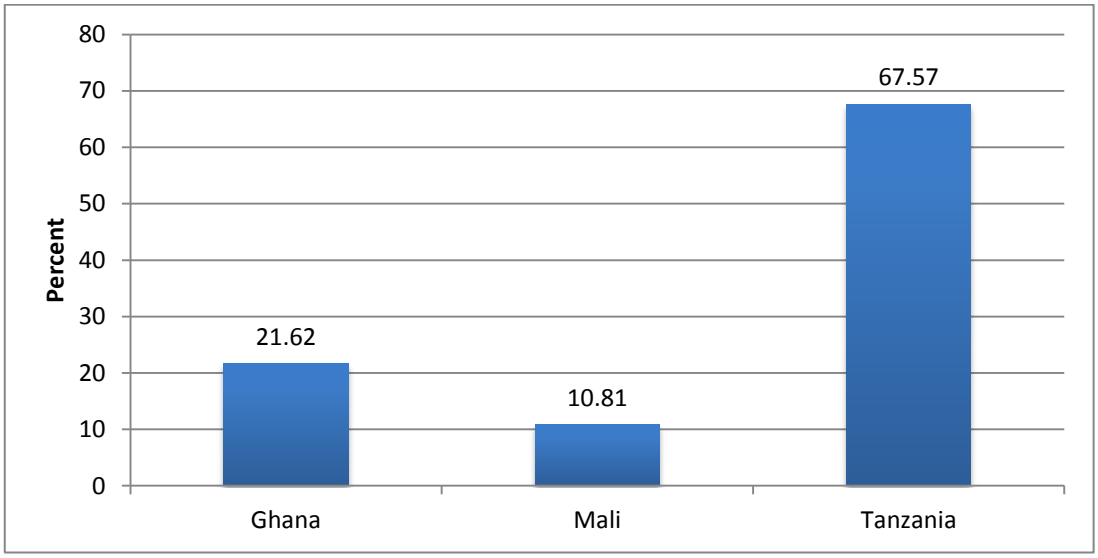
This section presents the results of the study describing some of the characteristics of the respondents.

5.1.1 Demographic Information Results

5.1.1.1 Host Country and Firm Ownership

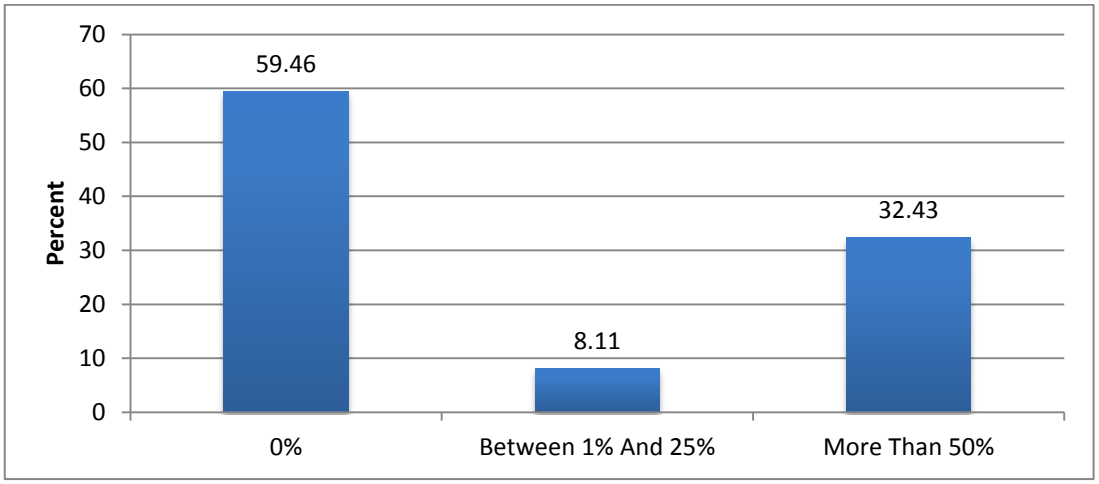
As shown in Figure 5, the majority of respondents in the survey study were from Tanzania followed by Ghana and then Mali.

Figure 5: Percentage Distribution of Survey Respondents per Country



67.6% of the respondent's firms are majority locally owned as shown in Figure 6. Majority locally owned firms are classified as all the firms with foreign ownership of less than 50%.

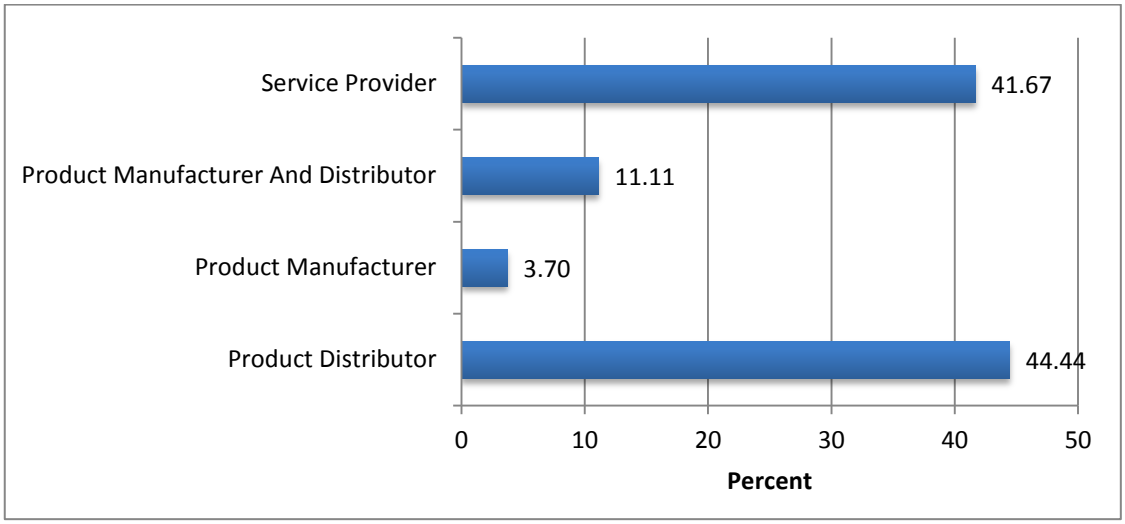
Figure 6: Percentage Distribution of Host Country Firm Ownership



5.1.1.2 Supplier Firm Offering to the MNE

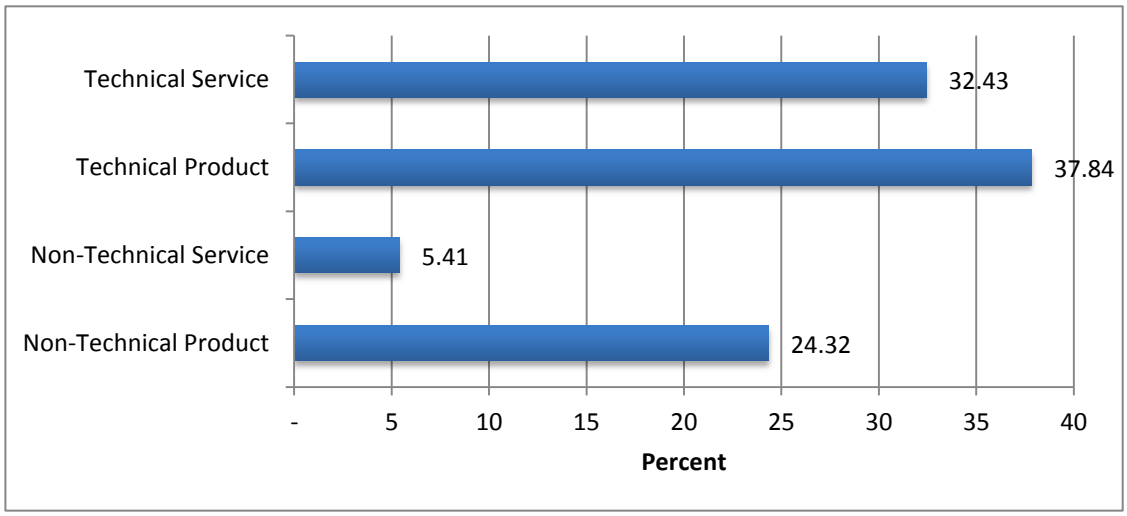
Host country firms that participated in the survey are mostly in service or product provision as shown in Figure 7. In line with what is considered the norm for LDCs, about 15% of the responding firms are in the field of manufacturing of products.

Figure 7: Percentage Distribution of Host Country Offering



In line with lack of capacity and resources in LDCs, it was expected that the offering of host country firms of suppliers in LDCs would be mostly of a non-technical nature such as stationery and cleaning services. The products and services offered by these host country firms are mostly of a technical nature as shown in Figure 8.

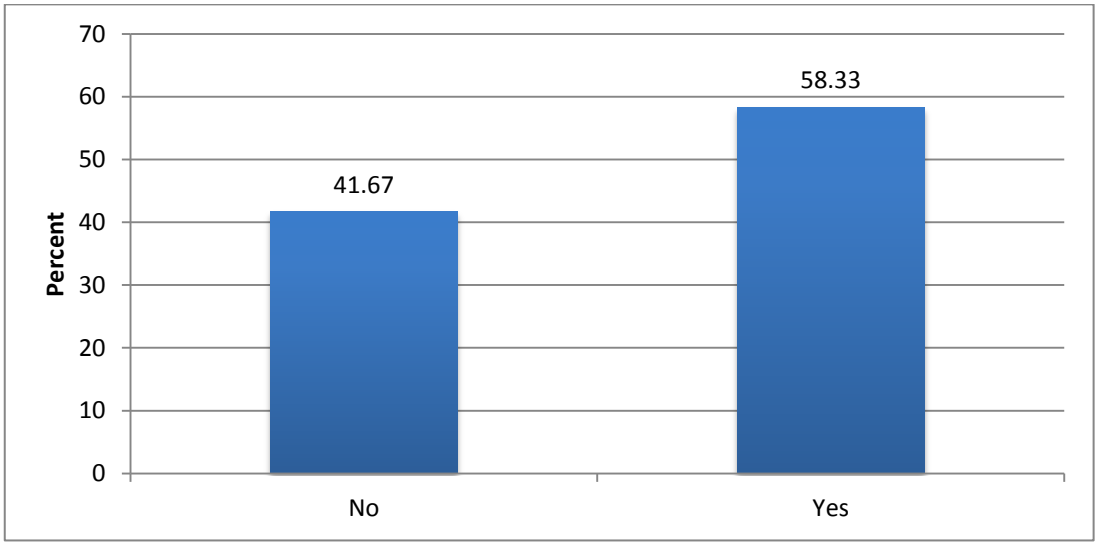
Figure 8: Percentage Distribution of Technical and Non-Technical Offering



Analysis of respondents' responses as shown in Figure 9 show that the majority of firms that responded to thesurvey had some form of agreement with foreign

firms. These tie up, to some extent, to the finding that the majority of these firms are in service and product distribution.

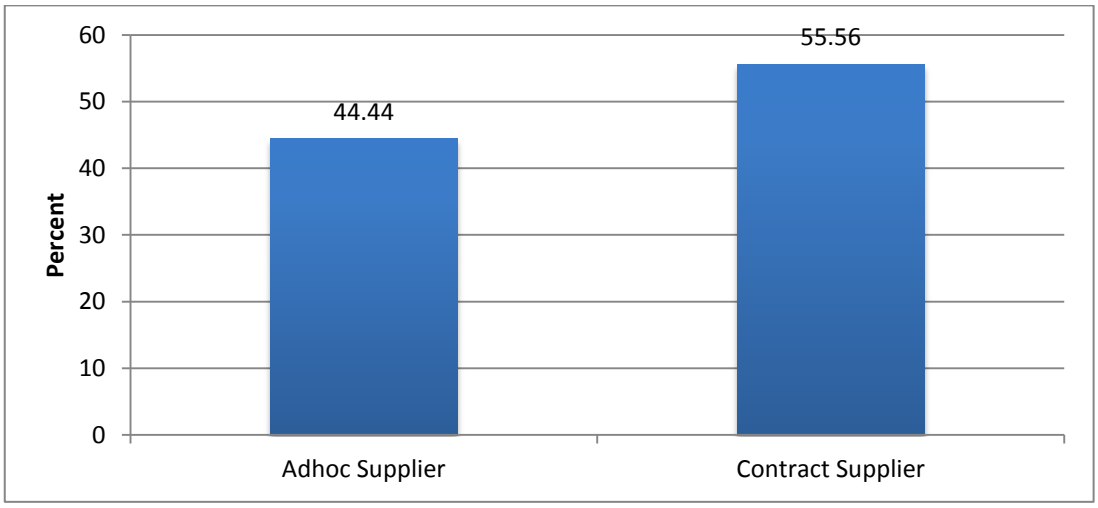
Figure 9: Percentage Distribution of Host Country Firms Indication of Trade or Licencing Agreements with Foreign Firms



5.1.1.3 Commercial Relationship with MNE

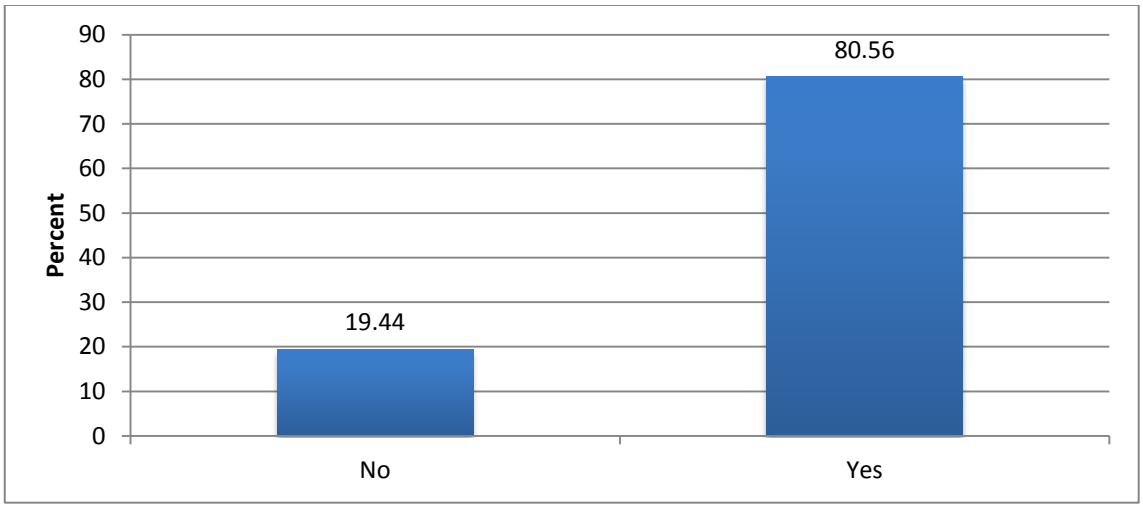
There was an almost equal split in the number of respondents regarding their commercial relationship with the MNE firm. Around 56% of host country firms of suppliers have reported that they have a contract relationship with the MNE with the rest reporting ad-hoc relationships.

Figure 10: Percentage Distribution of Host Country Firm's Commercial Relationship with the MNE



Over 80% of the respondents as shown in Figure 11 also indicated that they do business with more than one MNE in the natural resources sector. This could be an indication that, despite lack of capacity in LDCs, LDC firms are able to rise above country constraints, develop internal capacity and meet the requirements of the MNEs.

Figure 11: Percentage Distribution of Firm Doing Business with other mining MNEs



5.1.2 Absorptive Capacity

This section outlines the results of the responses received on country and firm factors that give an indication of the absorptive capacity of the LDCs studied which are Ghana, Mali and Tanzania.

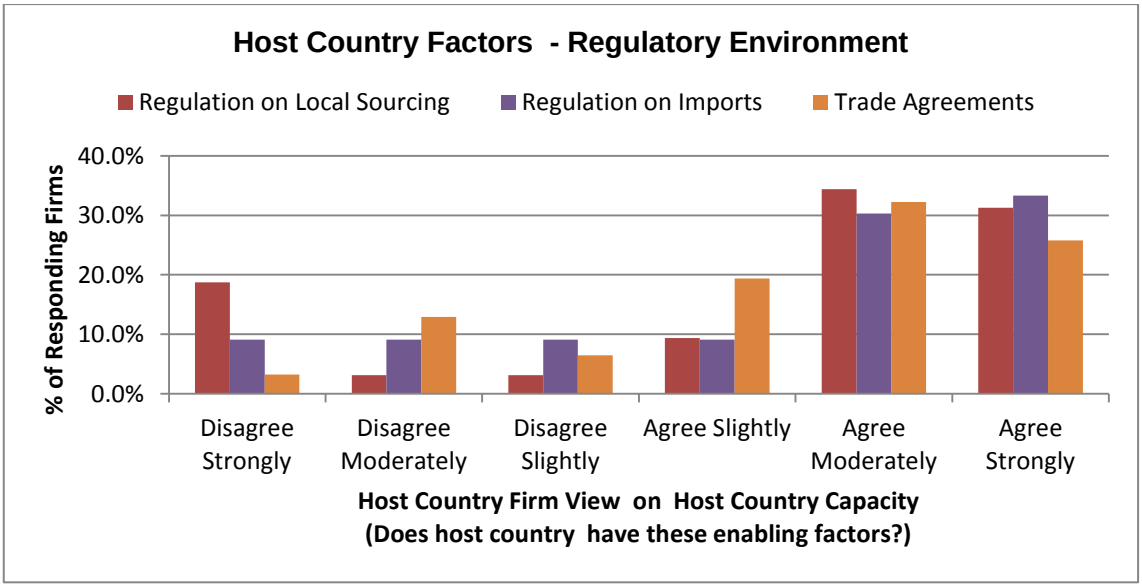
5.1.2.1 Country Factors

The results of the study on the country factors that could potentially impact on spillovers are outlined below.

- Regulatory Environment

Regarding local sourcing regulations, import regulations and trade agreements, over 60% of responding host country firms indicated that they believe their country has in place, and is supportive of, the host country industry. The largest proportion of respondents is in the moderately and strongly agreed categories as shown in figure 12.

Figure 12: Distribution of Responses for Host Country Factors – Regulatory Environment

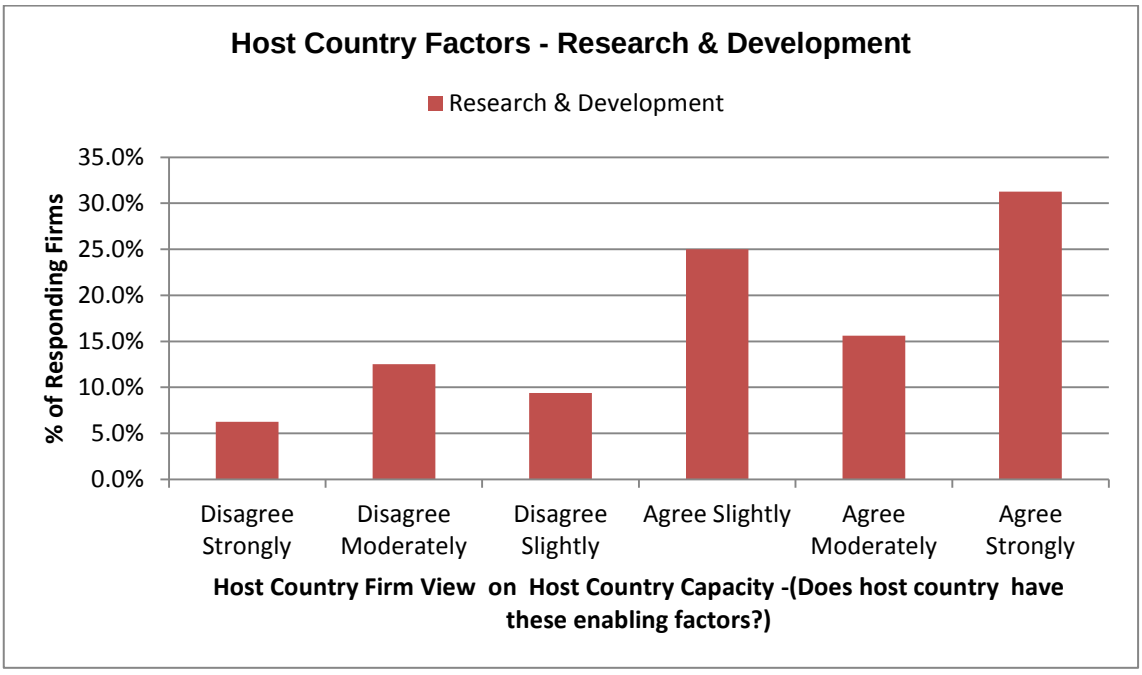


- Research And Development

Regarding the existence of research and development policies in host countries, around 70% of respondents indicated that they believe their country has these policies to support host country firms. Figure 13 show the distribution of the responses.

This kind of response is not in line with what is expected for LDCs as they are said to lack the capacity for research and development.

Figure 13: Distribution of Responses for Host Country Factors – Research & Development

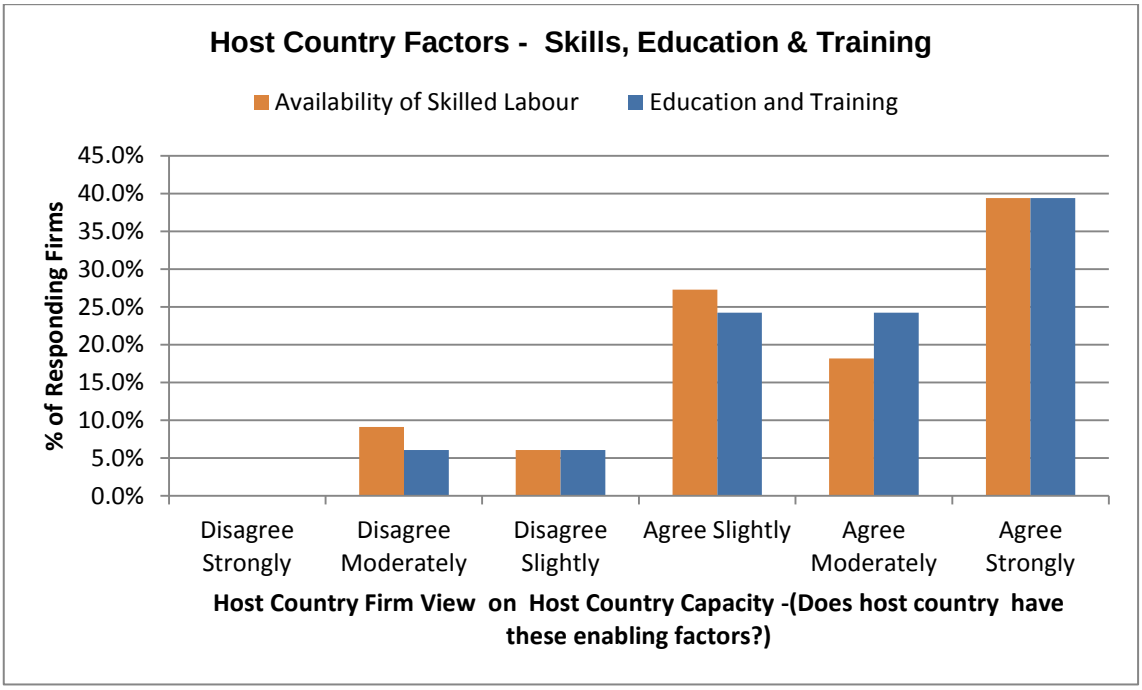


- Education and Training

Regarding skills, education and training, over 85% of responding host country firms indicated that they believe their country has sufficient skilled labour together with education and training support to develop a future skills pool. The results are shown on Figure 14.

The responses are contrary to what to expect in LDC but is an indication that spillovers due to MNEs are likely especially due to worker mobility.

Figure 14: Distribution of Responses for Host Country Factors – Skills, Education and training

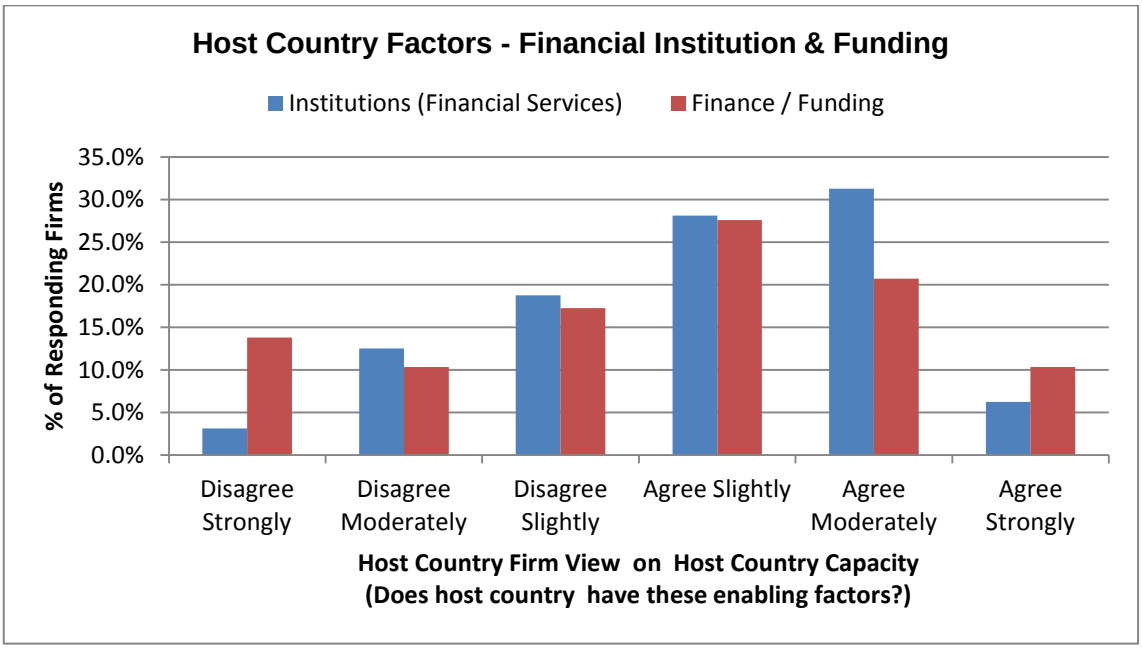


- Institutions and Funding

Distribution of responses for funding institutions and funding itself deviates from all other responses. While 65% agree that the country financial services are well developed and 56% indicate that these institutions make funding available to them, the proportion strongly agreeing is significantly lower than for others factors discussed earlier. The results are shown on figure 15

The responses are contrary to what was expect in LDCs but is an indication that spillovers due to MNEs are likely especially due to worker mobility.

Figure 15: Distribution of Responses for Host Country Factors – Institutions and Funding



5.1.2.2 Firm Factors

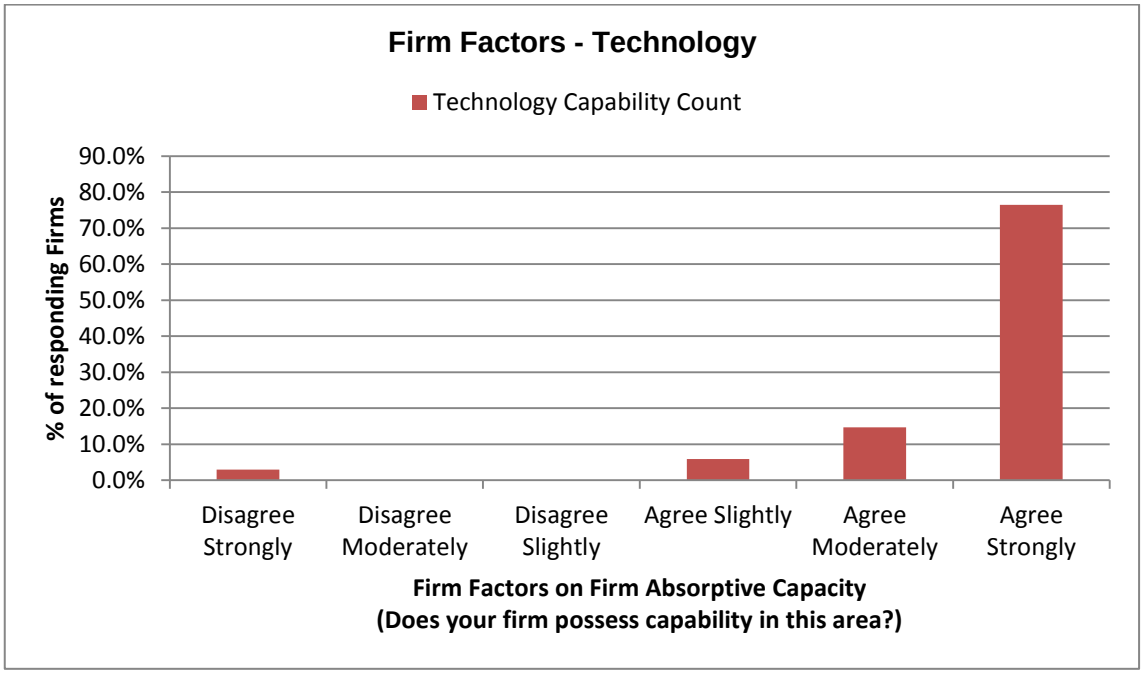
The results of the study on the firm factors that could potentially impact on spillovers are outlined below.

- Technology

Host country firms responses on their possession of technology that enables them to provide services and products within specification to the MNE were overwhelming, as 97% indicated they do. Of these, 77% were in strong agreement.

Considering that some of the firms that responded are majority foreign owned, it was expected that there would be firms that possess the technology but the extent to which this was true was a surprise. The high responses in agreement could be due to a number of factors including attention bias.

Figure 16: Distribution of Responses for Firm Factors – Technology

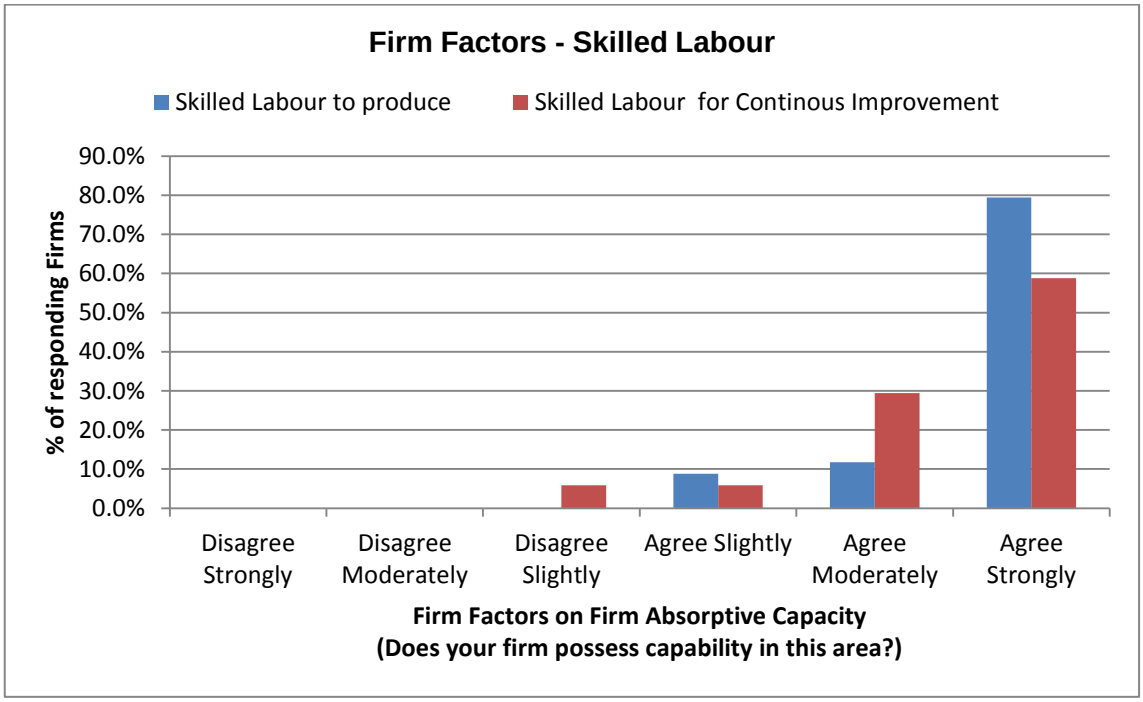


- Skilled Labour

As in the case of technology, 100% of respondents indicated that firms have the skilled labour to provide the MNE with products and services within specification while 94% indicated that they have the skills to continuously improve their products or services to meet changing MNE needs.

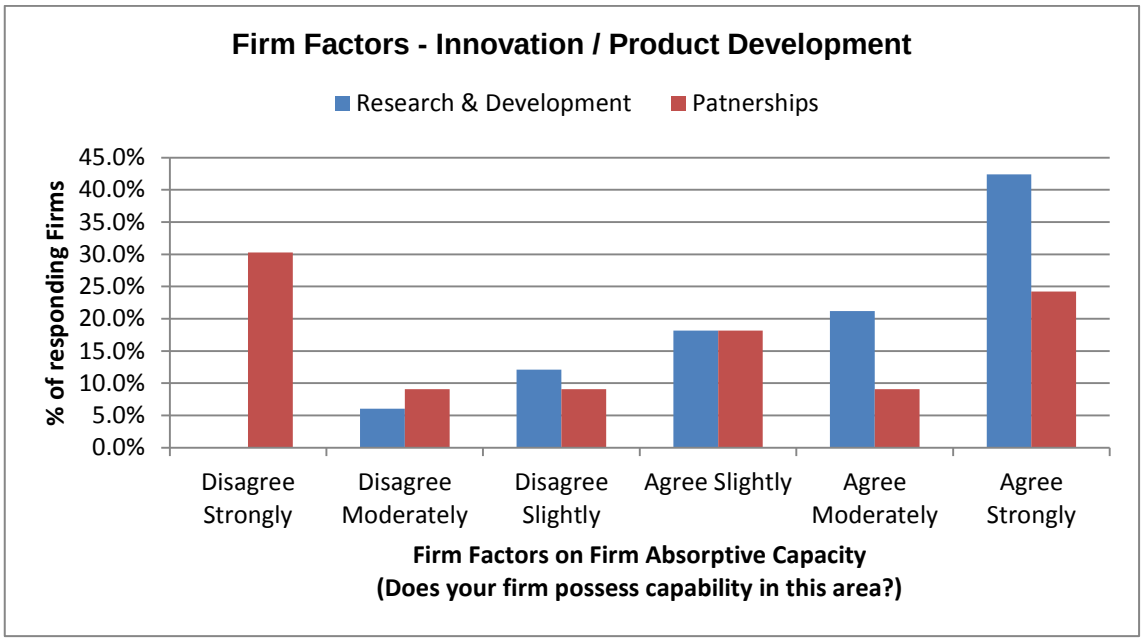
The responses to this question are also likely affected by attention bias as the expectation based on the definition of LDCs is that they lack human development.

Figure 17: Distribution of Responses for Firm Factors – Technology



- Innovation / Product Development

Figure 18: Distribution of Responses for Firm Factors – Innovation / Product Development

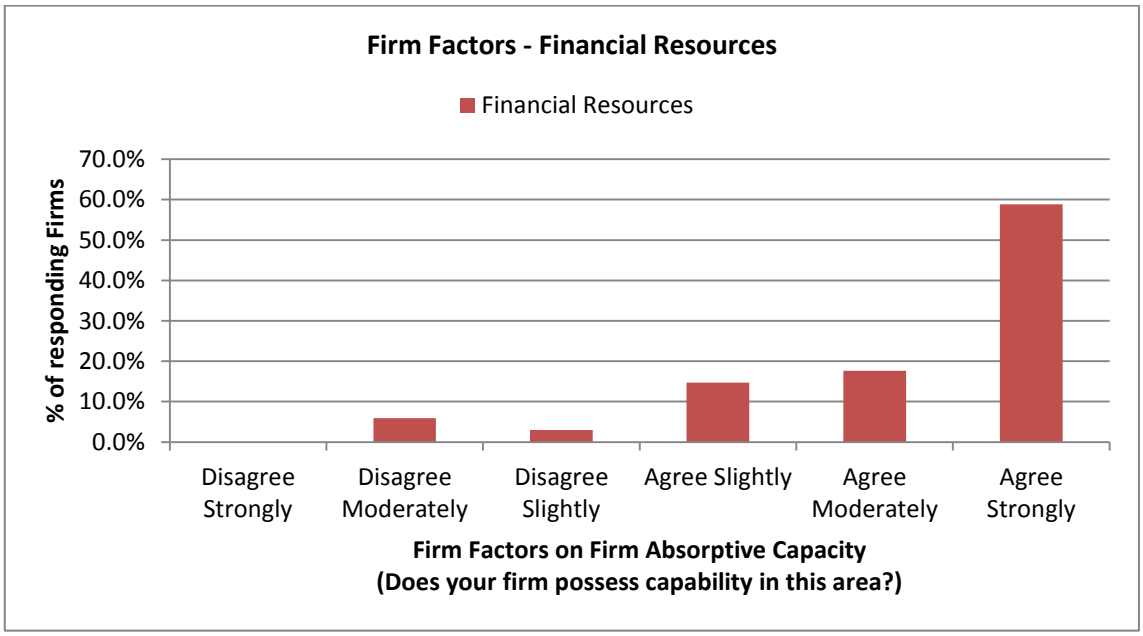


- Financial Resources

Host country firm's responses on their possession of technology that enables them to provide services and products within specification to the MNE were overwhelming, as 97% indicated they do. Of these, 77% were in strong agreement.

Considering that some of the firms that responded are majority foreign owned, it was expected that there would be firms that possess the technology but the extent to which they did was a surprise. The high responses in agreement could be due to a number of factors including attention bias.

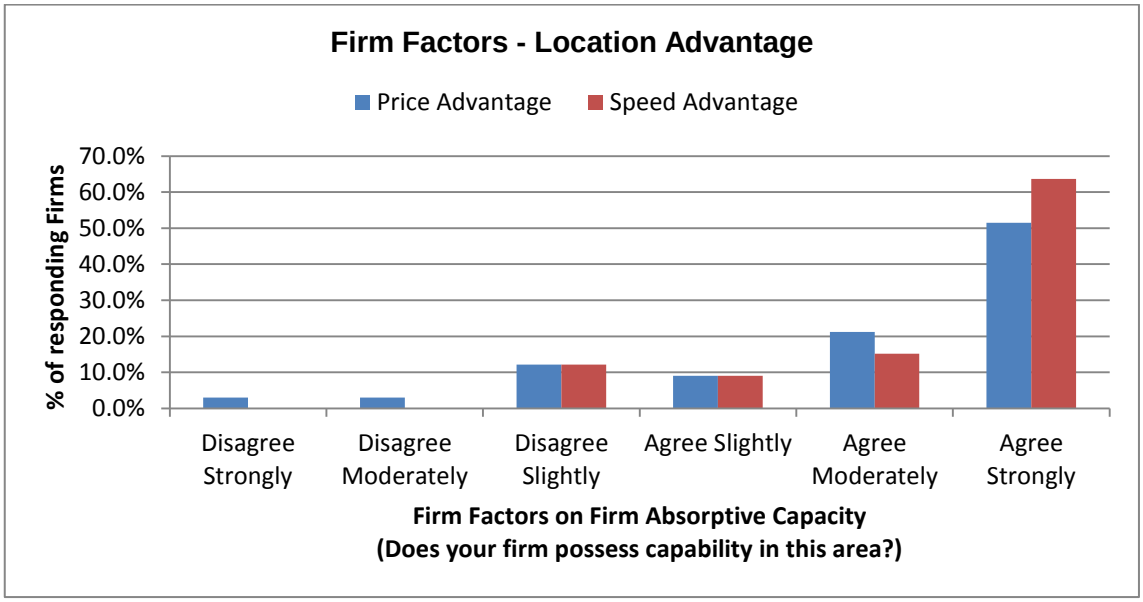
Figure 19: Distribution of Responses for Firm Factors – Financial



- Location Advantage

Host country firm's responses on their ability to provide the MNE at cheaper prices than as well as faster delivery times possession of technology that enables to provide services and products within specification to the MNE were overwhelming as 97% indicated they do. Of these 77% were in strong agreement.

Figure 20: Distribution of Responses for Firm Factors – Location Advantage



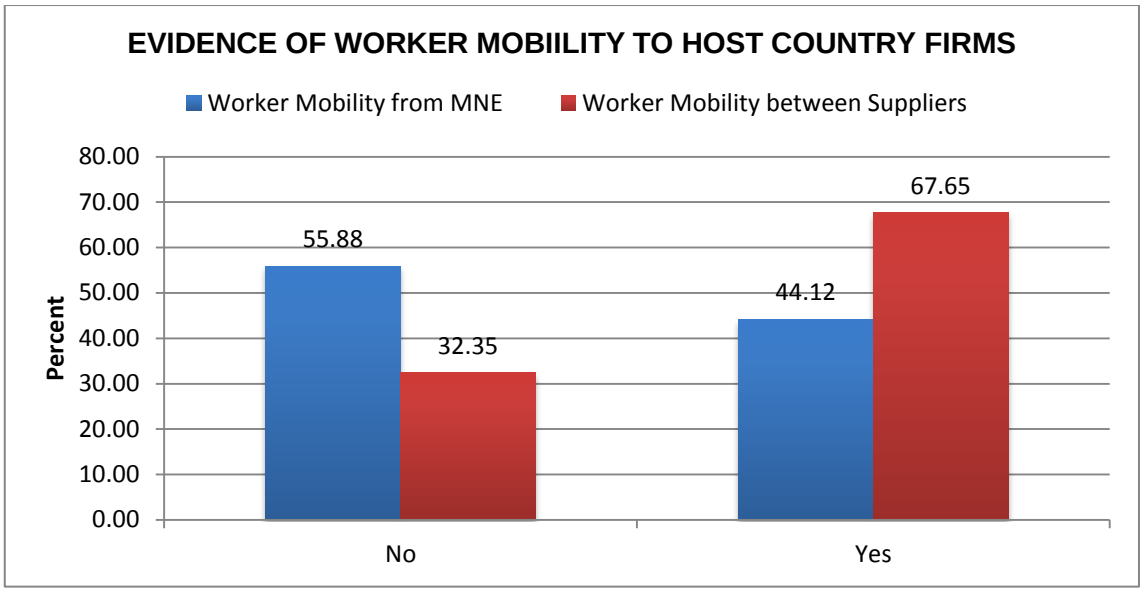
5.1.3 Evidence of Existence of Spillovers Results

5.1.3.1 Worker Mobility

Figure 12 show the summary results of the evidence of worker mobility from the MNE to host country firms as well as worker mobility between the host country firms of suppliers. Out of all the firms that participated in thesurvey, 40.5% of these firms confirmed that some of their employees have worked for a MNE in the natural resources sector prior to joining their firm. Responses collected show that these employees worked in various roles such as human resources, technical management and engineering. 62% of the same respondents' survey indicated that some of their employees have worked for their competitors before joining their firm. These employees are said to have worked in areas such as engineering, sales and management.

The results of evidence of worker mobility depicted in Figure 11 seem to suggest that that there is higher worker mobility between host country firms of suppliers than there is worker mobility from the MNE to host country firms of suppliers in LDCs.

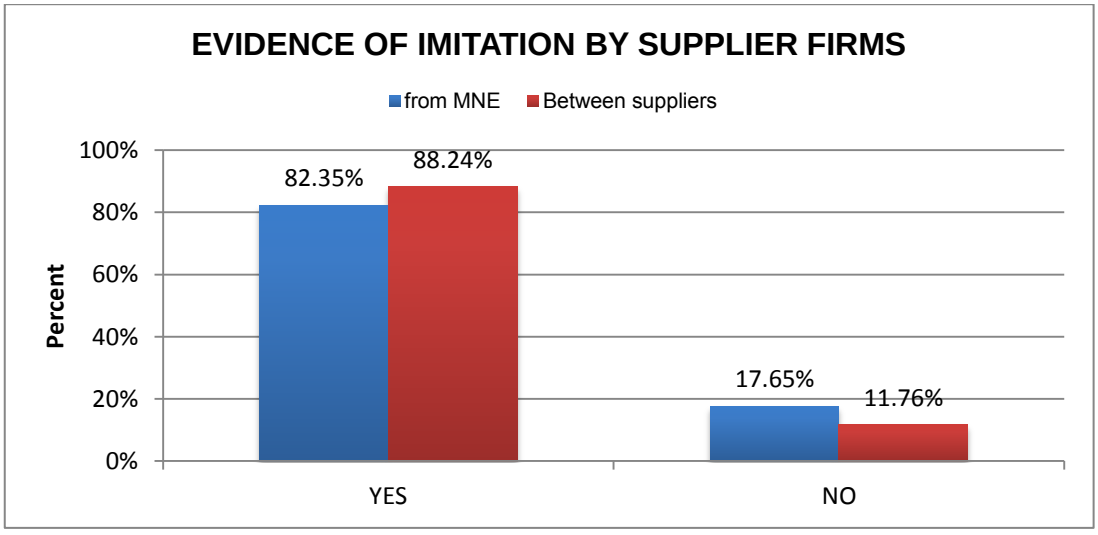
Figure 21: Percentage Distribution of Firms Experiencing Worker Mobility



5.1.3.2 Imitation Effect

Figure 12 show the summary results of the evidence of imitation of the MNE by host country firms as well imitation between host country firms of suppliers. For both imitation of MNE and imitation between host country firms of suppliers, the prevalence is above 80%. The results seem to suggest that the prevalence of imitation by host country firms of suppliers is the same for both imitation of the MNE and imitation between the host country firms of suppliers.

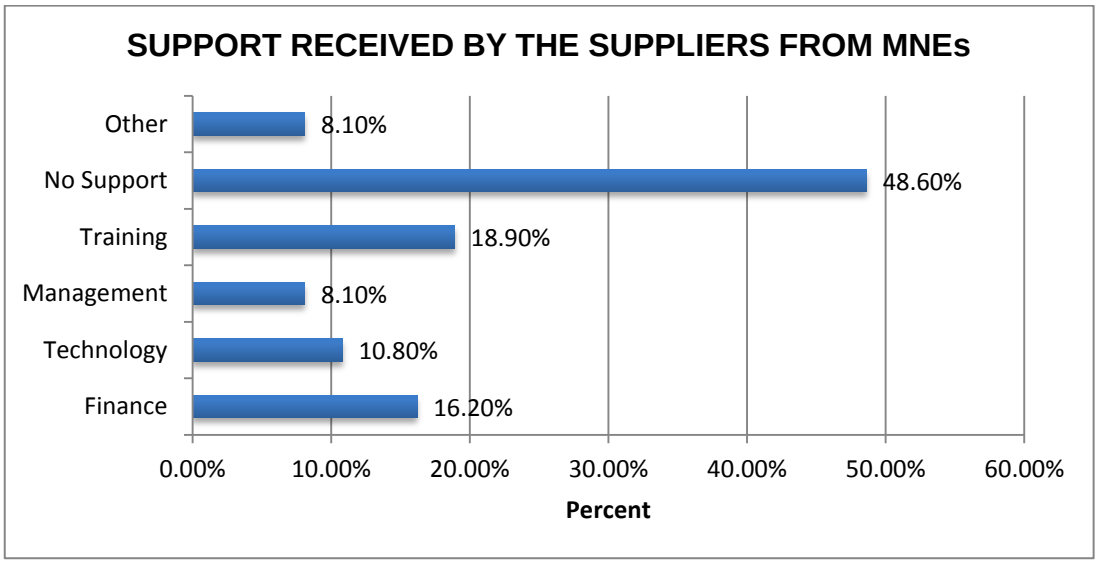
Figure 22: Percentage Distribution of Evidence of Imitation by Firms



5.1.3.3 Voluntary Assistance from the MNE

Figure 13 shows the results of the responses regarding the support host country firms of suppliers received from the MNE. Just over 50% of the firms that responded to the survey indicated that they have received some form of support from the MNE they are suppliers to. Further analysis of the data indicates that the majority of these firms that received assistance have majority local ownership. Assistance of host country firms by the MNE is expected as it assures the MNE that the host country firms can deliver products or services required and that the quality is within specification. Most of the support was in the form of training and finance followed by technology and management.

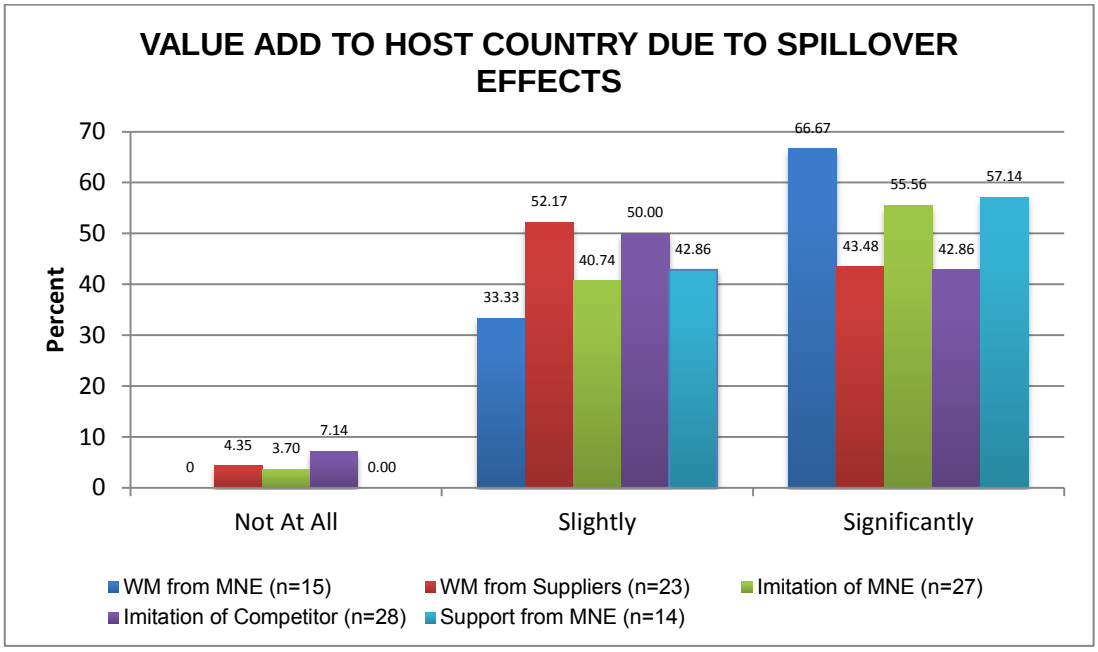
Figure 23: Percentage Distribution of Firms Support from the MNE



5.1.3.4 Evidence of Value from Spillovers

Firms that confirmed evidence of worker mobility, imitation of other firms or receiving direct assistance from the MNE, confirmed that they have mainly benefited from these spillover channels. Figure 14 shows the distribution of the frequency of responses regarding perception of host country firms on the value add they obtained through these spillover channels or having received direct assistance from the MNE.

Figure 24: Evidence of value add to host country firms due to spillovers



5.1.4 Conclusions

From the analysis of the demographic data, the information can be summarised as follows:

- The majority of responding firms were from Tanzania.
- The majority of responding firms were locally owned.
- The majority of responding firms were in technical services and product distribution.
- The majority of responding firms have some form of trade arrangement or partnership with foreign firms. There are therefore very few firms in product manufacturing.
- The number of responding firms who have contracts with the MNE is almost equal to that of responding firms who do ad-hoc business with the MNE.

On the evidence of the existence of spillovers, descriptive analysis of the data collected shows evidence of existence of spillovers through worker mobility and through imitation by host country firms. The analysis also shows evidence of assistance of host country firms to suppliers by the MNE. Host country firms

responses indicate that these firms have seen value added by this through these spillover channels.

These findings cannot as yet be inferred to the entire population of host country firms of suppliers in the natural resources sector since they have not yet been tested for statistical significance. Significance test analysis results are under the section on hypothesis testing.

5.2 Instrument Reliability Test Results

This section outlines the results of the instrument reliability tests. The test was performed on the data in section three of the research instrument, which was the section on firm and country absorptive capacity. The absorptive capacity section of the instrument contained questions that gathered responding firm's perceptions of the firm and country factors which reflect the absorptive capacity in the host country.

5.2.1 Country Factors

Table 2 summarises the Chronbach's Alpha coefficients and inter-item correlations for each country factor.

Table 2: Country Factors Cronbach's Alpha

Country Factors	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Regulations on Sourcing	.438	.886
Import Regulations	.650	.861
Trade Agreements	.581	.868
Innovation, Research & Development Policies	.808	.842
Skilled Labour	.682	.858
Education and Training	.574	.869
Institutions (Financial Services)	.720	.855
Funding / Finance	.720	.853

All inter-item correlations are above 0.3 which is the recommended minimum. The overall standardised Cronbach's alpha for the eight country factor items is 0.729 and it is greater than the 0.7 limit. The country factor scale is therefore reliable.

5.2.2 Firm Factors

Table 3 summarises the Chronbach's Alpha coefficients and inter-item correlations for each firm factor.

Table 3: Firm Factors Cronbach's Alpha

Firm Factors	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Technology Availability	.557	.680
Skilled Labour	.475	.707
Skilled Labour for Continuous Improvement	.571	.684
Financial Resources	.590	.669
Cost Advantage	.120	.765
Speed Advantage	.564	.679
Research & Development	.506	.683
Partnerships	.378	.743

All inter-item correlations are above 0.3 which is the recommended minimum. The overall standardised Cronbach's alpha for the eight country factor items is 0.877 and it is greater than the 0.7 limit. The firm factor scale is therefore reliable.

5.2.3 Conclusion

From the results of the Chronbach's Alpha tests, it is concluded that the absorptive capacity section of the survey instrument is reliable.

5.3 Hypothesis Testing Results

The hypothesis testing methods chosen to test for hypothesis were nonparametric Fisher's exact test and the Mann-Whitney U test. The results of the analysis are detailed below.

5.3.1 Absorptive Capacity of Host Country Firms of Suppliers in LDCs numbering in the rest of the section

The following hypotheses relate to the absorptive capacity of the host country firms.

- **Hypothesis 1a**

  Research Hypothesis: Host Country firms of suppliers to the MNE in the natural resources sector in LDCs lacks the capacity to take advantage of spillovers.

  Table 4 below contain the results of a Chi Square test.

  Table 4: Chi-Square Results for Hypothesis 1a

	Observed N	Expected N	Residual
Agree	34	34.0	0.0
Total	34[a]		

a. This variable is constant. Chi-Square Test cannot be performed.

The Chi-Square test could not be performed because all responses agreed with the hypothesis.

All respondents indicated they have the capacity to take advantage of the spillovers. Chi-Square goodness fit test was therefore not performed for this hypothesis. The null research, null hypothesis was rejected. Host country firms do not lack the capacity to take advantage of spillovers.

- **Hypothesis 1b**

Research Hypothesis: Host Country factors in LDCs limit the capacity of the host country firms of suppliers to take advantage of spillovers.

Using Chi Square goodness fit test, the study evaluated whether the frequency of the negative responses (f = 4) and the frequency of the positive responses (f = 29) on host country factors impact of supplier firms is equally split at 16.5.

Table 5 shows the Chi-Square test results for hypothesis 1b.

Table 5: Chi-Square Test Results for Hypothesis 1b

	Observed N	Expected N	Residual
Disagree	4	16.5	-12.5
Agree	29	16.5	12.5
Total	33		

	[R] Country Factor
Chi-Square	18.939[a]
Df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.5.

The null hypothesis was rejected, $X^2(1, N = 33) = 18.939$, $p = 0.000$ at 5% significance level.

Rejecting the test null hypothesis implied that there was strong evidence in support of the test alternative hypothesis. The difference in the split of the responses is in favour of the country factors not limiting the capacity of host country firms of suppliers which contradicts the research null hypothesis that the host country's factor limits the capacity of host country firms of suppliers. The research null hypothesis is therefore rejected.

5.3.2 Evidence of Spillovers Channels

5.3.2.1 Hypotheses on Evidence of Worker Mobility

- **Hypothesis 2a**

Research Hypothesis: There is evidence of worker mobility from the MNE to the host country firms of suppliers to the natural resources sector in LDCs.

Using Chi Square goodness fit test, the study evaluated whether the frequency of firms with evidence of worker mobility to MNE (f = 15) and the frequency of firms with no evidence of worker mobility (f = 19) is equally split at 17.

Table 6 below contains the results of a Chi Square test.

Table 6: Chi-Square Test Results for Hypothesis 2a

	Observed N	Expected N	Residual
NO	19	17.0	2.0
YES	15	17.0	-2.0
Total	34		

	Results
Chi-Square	.471[a]
Df	1
Asymp. Sig.	.493

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0.

The test null hypothesis was not rejected, $X^2(1, N = 34) = 0.471$, $p = 0.493$ at 5% significance level.

Not rejecting the test null hypothesis implied that there was not enough evidence in support of the test alternative hypothesis. The research null hypothesis that there is worker mobility from MNE to host country firms of suppliers was therefore inconclusive. The research null hypothesis was therefore rejected.

- **Hypothesis 2b**

Research Hypothesis: There is evidence of worker mobility between host country firms of suppliers in the natural resources sector in LDCs.

Using Chi Square goodness fit test, the study evaluated whether the frequency of firms with evidence of worker mobility to MNE (*f* = 23) was and the frequency of firms with no evidence of worker mobility (*f* = 11) is equally split at 17.

Table 7 below contains the results of a Chi Square test.

Table 7: Chi-Square Test Results for Hypothesis 2b

	Observed N	Expected N	Residual
NO	11	17.0	-6.0
YES	23	17.0	6.0
Total	34		

	Results
Chi-Square	4.235[a]
Df	1
Asymp. Sig.	.040

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0.

The null hypothesis was rejected, $X^2(1, N = 34) = 4.235$, $p > = 0.040$ at 5% significance level.

Rejecting the test null hypothesis implied that there was strong evidence in support of the test alternative hypothesis. The difference in the split of the responses is in favour of the evidence of worker mobility between host

country firms of suppliers which confirms the research null hypothesis. The research null hypothesis is therefore not rejected.

- **Hypothesis 2c**

Research Hypothesis: Evidence of worker mobility is more prevalent between host country firms of suppliers than it is from the MNE to host country of suppliers in the natural resources sector in LDCs.

Using McNemar test, the study tested for movement or change between the respondents' responses on worker mobility from the MNE to host country firms and worker mobility between host country firms of suppliers to see if one is more prevalent than the other.

Table 8 below contain the results of a Chi Square test.

Table 8: McNemar Chi-Square Test Results for Hypothesis 2c

			Worker mobility between supplier firms.		
			NO	YES	Total
Worker mobility from the MNE.	NO	Count	8	11	19
		% of Total	23.5%	32.4%	55.9%
	YES	Count	3	12	15
		% of Total	8.8%	35.3%	44.1%
	Total	Count	11	23	34
		% of Total	32.4%	67.6%	100.0%

	Value	Exact Sig. (2-sided)
McNemar Test		.057[a]
N of Valid Cases	34	

a. Binomial distribution used.

The null hypothesis was not rejected, $p = 0.057$ at 5% significance level.

Not rejecting the test null hypothesis implied that there was no strong evidence in support of the alternative test hypothesis. The research null hypothesis that worker mobility is more prevalent between host country firms

of suppliers than it is from the MNE to host country of suppliers was therefore inconclusive. The research null hypothesis was therefore rejected.

5.3.2.2 Hypotheses on Imitation / Demonstration

- **Hypothesis 3a**

Research Hypothesis: There is evidence of imitation of the MNE by host country firms of suppliers in the natural resources sector in LDCs.

Using Chi Square goodness fit test, the study evaluated whether the frequency of firms with evidence of imitation of the MNE (f = 27) was and the frequency of firms with no evidence of imitation of the MNE (f = 6) is equally split at 16.5.

Table 9 below contains the results of a Chi Square test.

Table 9: Chi-Square Test Results for Hypothesis 3a

	Observed N	Expected N	Residual
NO	6	16.5	-12.5
YES	27	16.5	12.5
Total	33		

	Results
Chi-Square	13.364[a]
Df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.5.

The test null hypothesis was rejected, $X^2(1, N = 33) = 13.363$, $p = 0.00$ at 5% significance level.

Rejecting the test null hypothesis implied that there was strong evidence in support of the test alternative hypothesis. The difference in the split of the responses is in favour of evidence of imitation of the MNE by host country firms of suppliers which confirms the research null hypothesis. The research null hypothesis is therefore not rejected.

- **Hypothesis 3b**

  Research Hypothesis: There is evidence of existence of imitation between host country firms of suppliers in the natural resources sector in LDCs.

  Using Chi Square goodness fit test, the study evaluated whether the frequency of firms with evidence of imitation of its competitors (f = 29) and the frequency of firms with no evidence of imitation of its competitors (f = 4) is equally split at 16.5.

  Table 10 below contains the results of a Chi Square test.

Table 10: Chi-Square Test Results for Hypothesis 3b

	Observed N	Expected N	Residual
NO	4	16.5	-12.5
YES	29	16.5	12.5
Total	33		

	Results
Chi-Square	18.939[a]
Df	1
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.5.

The null hypothesis was rejected, $X^2(1, N = 33) = 18.939$, $p = 0.000$ at 5% significance level.

Rejecting the test null hypothesis implied that there was strong evidence in support of the test alternative hypothesis. The difference in the split of the responses is in favour of evidence of existence of imitation between host country firms of suppliers which confirms the research null hypothesis. The research null hypothesis is therefore not rejected.

- **Research Hypothesis 3c**

Research Hypothesis: Evidence of imitation by host country firms of suppliers is more prevalent towards the MNE than it is between host country firms of suppliers in the natural resources sector in LDCs.

Using McNemar test, the study tested for movement or change between the respondents' responses on imitation of the MNE by host country firms and imitation between host country firms of suppliers to see if one is more prevalent than the other.

Table 11 below contains the results of a Chi Square test.

Table 11: McNemar Chi-Square Test Results for Hypothesis 3c

			Imitation between host country firms of suppliers		
			NO	YES	Total
Imitation of the MNE	NO	Count	3	3	6
		% of Total	9.1%	9.1%	18.2%
	YES	Count	1	26	27
		% of Total	3.0%	78.8%	81.8%
	Total	Count	4	29	33
		% of Total	12.1%	87.9%	100.0%

	Value	Exact Sig. (2-sided)
McNemar Test		.625[a]
N of Valid Cases	33	

a. Binomial distribution used.

The null hypothesis was not rejected, p = 0.625 at 5% significance level.

Not rejecting the test null hypothesis implied that there was no strong evidence in support of the alternative test hypothesis. The research null hypothesis that imitation by host country firms of suppliers is more prevalent towards the MNE than it is between host country firms of suppliers was therefore inconclusive. The research null hypothesis was therefore rejected.

5.3.3 Evidence of the Existence of MNE Direct Support of Host Country Firms of Suppliers

- **Hypothesis 4**

Research Hypothesis: There is evidence of host country firms of suppliers receiving assistance from the MNE in the natural resources sector in LDCs.

Using Chi Square goodness fit test, the study evaluated whether the frequency of firms with evidence of assistance from the MNE (f = 14) and the frequency of firms with no evidence of assistance from the MNE (f = 19) is equally split at 16.5.

Table 12 below contains the results of a Chi Square test.

Table 12: Chi-Square Test Results for Hypothesis 4

	Observed N	Expected N	Residual
NO	19	16.5	2.5
YES	14	16.5	-2.5
Total	33		

	Results
Chi-Square	.758[a]
Df	1
Asymp. Sig.	.384

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.5.

The test null hypothesis was not rejected, $X^2(1, N = 33) = 0.758$, $p = 0.384$ at 5% significance level.

Not rejecting the test null hypothesis implied that there was not enough evidence in support of the test alternative hypothesis. The research null hypothesis that there is evidence of host country firms of suppliers receiving assistance from the MNE was therefore inconclusive. The research null hypothesis was therefore rejected.

5.3.4 Evidence of Value obtained by Host Country Firms

- **Hypothesis 5a**

Research Hypothesis: The evidence of additional value obtained due to the assistance of the MNE is more prevalent than evidence of additional value due to the existence of worker mobility.

Using McNemar test, the study tested for movement or change between the respondents' responses on additional value obtained due to assistance from MNE and additional value due to the existence of worker mobility to see if one is more prevalent than the other.

Table 13 below contain the results of a Chi Square test.

Table 13: McNemar Chi-Square Test Results for Hypothesis 5a

			Value from presence of employees with mining firm experience		
			NOT AT ALL/SLIGHTLY	SIGNIFICANTLY	Total
Value from support received from MNE	NOT AT ALL/SLIGHTLY	Count	1	2	3
		% of Total	14.3%	28.6%	42.9%
	SIGNIFICANTLY	Count	1	3	4
		% of Total	14.3%	42.9%	57.1%
Total		Count	2	5	7
		% of Total	28.6%	71.4%	100.0%

	Value	Exact Sig. (2-sided)
McNemar Test		1.000[a]
N of Valid Cases	7	

a. Binomial distribution used.

The null hypothesis was not rejected, p = 1.00 at 5% significance level.

Not rejecting the test null hypothesis implied that there was no strong evidence in support of the alternative test hypothesis. The research null hypothesis that value obtained through assistance by MNE is more prevalent than value obtained through worker mobility. The research null hypothesis was therefore rejected.

- **Hypothesis 5b**

  Research Hypothesis: The evidence of additional value obtained due to the assistance of the MNE is more prevalent than evidence of additional value due to existence of imitation by host country firms of suppliers.

Using McNemar test, the study tested for movement or change between the respondents' responses on additional value obtained due to assistance from MNE and additional value due to the existence of imitation to see if one is more prevalent than the other.

Table 14 below contain the results of a Chi Square test.

Table 14: McNemar Chi-Square Test Results for Hypothesis 5b

			Value from presence of Imitation		
			NOT AT ALL/SLIGHTLY	SIGNIFICANTLY	Total
Value from support received from MNE	NOT AT ALL/SLIGHTLY	Count	1	2	3
		% of Total	11.1%	22.2%	33.3%
	SIGNIFICANTLY	Count	1	5	6
		% of Total	11.1%	55.6%	66.7%
Total		Count	2	7	9
		% of Total	22.2%	77.8%	100.0 %

	Value	Exact Sig. (2-sided)
McNemar Test		1.000[a]
N of Valid Cases	9	

a. Binomial distribution used.

The null hypothesis was not rejected, p = 1.00 at 5% significance level.

Not rejecting the test null hypothesis implied that there was no strong evidence in support of the alternative test hypothesis. The research null hypothesis that value obtained through assistance by MNE is more prevalent than value obtained through imitation. The research null hypothesis was therefore rejected.

Chapter 6: Discussion of the Results

The previous chapter reported on the results of the study by describing the data collected and testing hypotheses outlined in chapter 3. The purpose of this chapter is to discuss the results in relation to the literature review.

This chapter begins with a discussion of the results on the capacity of the host country to support its local firms and the capacity of the host country firms to meet the requirements of the MNE. This is followed by a discussion on the evidence of spillovers, and ends with concluding remarks.

6.1 Evidence of Absorptive Capacity

6.1.1 Introduction

The importance of absorptive capacity as a determinant factor was extensively discussed in the literature review. In particular, the discussion focussed on the factors that can impede or enhance spillovers in a host country. Havranek and Irsova (2011) group these factors into MNE characteristics, host country firm characteristics and host country characteristics.

It is mostly agreed by scholars on spillovers that not all firms can benefit from knowledge spillovers from the MNEs as benefiting is dependent on the host country's relative backwardness and in turn the capacity of the host country firms to assimilate the knowledge it is exposed to due to the entry of the MNE (Görg & Greenaway, 2004). LDCs are known to suffer from structural impediments to sustainable development which manifest themselves in a low level of human resource development and a high level of structural economic vulnerability (UNCTAD, 2011b). The capital and technology intensive nature of the natural resources sector that dominates FDI into LDCs presents an opportunity for spillovers but the low level of development in LDCs makes them

unlikely to benefit. The hypotheses tested regarding the capacity of the host country were as follows:

- *Research Hypothesis 1a*
  Host countries that are classified as LDC lack the capacity to support the local firms of suppliers.
- *Research Hypothesis 1b*
  Host country firms of suppliers to the MNE in the natural resources sector in the LDCs lack the capacity to take advantage of spillovers.

6.1.2 Discussion of Results

The views of host country firms of suppliers on host country capacity as indicated in Figures 12 to 15 was found to be overwhelmingly positive regarding all country factors measured which included the regulatory environment, skills availability and development, research and development, level of development of financial institutions and the availability of funding for host country firms. The results of the hypothesis test as indicated in Table 4 were statistically significant and not in support of the hypothesis that host countries that are classified as LDC lack the capacity to support the local firms of suppliers. Regarding the views of host country firms on their own internal capacity, the firms as shown in Figures 16 to 20 also overwhelmingly reported that they have the capacity. Possession of technology and the skills required to meet the requirements of the MNE ranked very high. The results of the hypothesis test as indicated in Table 5 were statistically significant and did not support the hypothesis that host country firms of suppliers to the MNE in the natural resources sector in the LDCs lack the capacity to take advantage of spillovers.

Unpacking the results on the host country and host country firm capacity, together with the factors that influence these, the results indicate that the country and the host country firms have the capacity to meet the requirements of the MNE. This is indicative of a smaller technology gap between the MNE and host country firms of suppliers brought about by the vertical linkage. The higher than expected number of firms in technical services and products

provision to the MNE as shown in Figure 8, together with the number of firms that have term contracts with the MNE as shown in Figure 10, are another indication of the smaller technology gap between the MNE and host country firms of suppliers. According to Smarzynska (2002), the smaller technology gap could imply that the host country firm is equally productive as the MNE which may leave very little room for learning from the MNE by host country firms of suppliers. A smaller technology gap does not always imply that the country is getting the most spillovers benefits since the MNE may be applying the least advanced technology because it perceives the host LDC as lacking the necessary operations and support resources to service the advanced technology (Görg & Greenaway, 2004). This approach will always leave host country firms lagging behind their peers in the developing and developed world.

6.2 Evidence of Spillovers

6.2.1 Introduction

Hypotheses on the capacity of the host country and host country firm point to the capacity of the countries studied to be above the threshold level required for spillovers to exist.

The presence of channels of spillovers or mechanisms through which spillovers occur were used to indicate the presence of spillovers. Crespo and Fontoura (2006) list spillover mechanisms as imitation, labour mobility, exports, completion and backwards and forward linkages. Labour or worker mobility and imitation were the two channels investigated in this study and the hypotheses tested were as follows:

<u>Worker Mobility</u>

- *Research Hypothesis 2a*
  There is evidence of worker mobility from the MNE to host country firms of suppliers to the natural resources sector in LDCs.

- *Research Hypothesis 2b*
  There is evidence of worker mobility between host country firms of suppliers to the natural resources sector in LDCs.
- *Research Hypothesis 2c*
  Evidence of worker mobility is more prevalent between host country firms of suppliers than it is from the MNE to host country of suppliers to the natural resources sector in LDCs.

Imitation

- *Research Hypothesis 3a*
  There is evidence of imitation of the MNE by host country firms of suppliers in the natural resources sector in LDCs.
- *Research Hypothesis 3b*
  There is evidence of imitation between host country firms of suppliers in the natural resource sector in LDCs.
- *Research Hypothesis 3c*
  Evidence of imitation by host country firms of suppliers is more prevalent towards the MNE than it is between host country firms of suppliers in the natural resources sector in LDCs.

6.2.2 Discussion of Results

In line with the findings of absorptive capacity, the results in the previous chapter show that there is evidence of channels of spillovers from the MNE to host country firms as well as between host country firms of suppliers. Rønde (2001) confirmed in his study that the presence of spillovers increases with the degree of absorptive capability of host country firms.

Worker Mobility

Worker mobility from the MNE to host country firms could not be confirmed as the majority of responding firms indicated, as shown in Figure 21, and the hypothesis testing results were not significant. As for evidence of worker mobility between host country firms of suppliers, the majority of firms as shown

in Figure 21 confirmed worker movement with statistically significant hypothesis tests results.

The lack of conclusive results on worker mobility from the MNE to host country firm's suppliers could be related to the fact that the two firms are not necessarily in the same industry and the skills or knowledge of workers in the MNE is not necessarily transferable to supplier firms. The other reason, as stated by Fosturi, Motta and Rønde (2001), is that MNEs tend to pay their experienced employees a premium in order to discourage them from leaving the MNE. This wage premium can also affect the host country firms as it attracts experienced host country firm employees to the MNE and results in negative spillovers (Crespo & Fontoura, 2006).

Worker mobility between host country firms of suppliers was statistically significant as shown in Table 7. It is common for producers of large equipment, parts and components to follow their clients to a new host country (Javorcik B. , 2008). 41% of responding firms in this study, as shown in Figure 6, are majority foreign owned which is an indication that host country firms have foreign competition in the supplier industry. Worker mobility between firms of suppliers is expected as business with the MNE will generate competition between these firms. Competition between firms is said to be an incentive for the firms to make more efficient use of their existing resources and technology or even adopt new technologies (Kokko, 1996). The findings on worker mobility between supplier firms is therefore in line with the theory on spillovers.

The hypothesis test to test if the evidence of worker mobility between host country firms is statistically significant compared to worker mobility from the MNE were inconclusive at 5% significance level as shown on Table 8. Even though worker mobility between host country firms of suppliers is dominant, it cannot be conclusively said that this is the dominant worker mobility channel in the natural resources sector in LDCs.

- Imitation

The results of imitation of the MNE and imitation between host country firms of suppliers is overwhelming with just over 80% of respondents in both cases indicating imitation. The results are statistically significant at 5% significance level and this can be found in Table 9.

Imitation of the MNE by host country firms is a result of the vertical linkage between the two firms. According to Smeets (2008) host country firms are able to learn at arm's length about the MNE's superior technologies, managerial and organisational skills. According to the responses from the host country firms, technology and operations dominate as areas of imitation. This is in line with what Smeets (2008) stated above.

Imitation between host country firms that are in competition is common and expected. Crespo and Fontoura (2006) assert that the likelihood of imitation increases with similarity of goods or service offered by the firms involved. An example of this is the change in production technique by a Kenyan handmade soap firm after the entry of a MNE with automated systems (Blomström & Kokko, 1998). Crespo and Fontoura (2006) also assert that there may be cases where product similarity does not matter as imitation will be on soft or support functions such as management and marketing.

The tests also showed that imitation between host country firms is not more prevalent than imitation of the MNE.

6.2.3 Conclusion

Given the capacity of the country and the host country firms as indicated earlier, the evidence of spillovers through worker mobility and through imitation does

not come as a surprise as was the case with the results regarding the capacity of the country and the host country firms.

6.3 Evidence of MNE Direct Support of Host Country Firms of Suppliers

6.3.1 Introduction

According to Javorcik (2004a), demand for higher product or service quality and on-time delivery required by the MNE will incentivise host country firms to upgrade their production process or technology. MNEs may sometimes assist host country firms in order to ensure compliance to requirements (Javorcik B. S., 2004a). The hypothesis tested was as follows:

- *Research Hypothesis 4*

There is evidence of host country firms of suppliers receiving assistance from the MNE in the natural resources sector in LDCs.

6.3.2 Discussion of Results

52% of the responding firms confirmed receiving assistance from the MNE. These firms confirmed having mainly received assistance in the form of training and finance. The training received is in line with what Crespo and Fontoura (2006) found out in their study. The results of the hypothesis test were inconclusive which implies that even though the majority of respondents indicated having received assistance from the MNE, these results could have been by chance and a different sample of the population could show a different outcome.

According to Javorcik and Spatareanu (2009), for host country firms to obtain business from the MNEs these firms need to meet the stringent quality, technological sophistication, and on-time delivery requirements of the MNE. MNEs may also hold back on the technology they want to deploy as they have

no guarantee that host country firms will be able to support it or upgrade their own technology due to lack of finance (Solomon, 2011).

6.3.3 Conclusion

Evidence of the MNE providing assistance to host country firms even though not statistically significant is in line with expectation for conditions in LDC.

6.4 Hypotheses on the Evidence of Value Achieved by Host Country Firms

6.1 Introduction

Existence of channels of spillover is not sufficient evidence of spillovers as these may not necessarily add to the recipient firm productivity or value. This can be seen in a study by Görg and Strobl (2005) which found evidence of higher productivity in firms run by owners who were former employees of MNEs in the same industry but not in firms run by owners who worked for the MNE in other industries.

The hypotheses tested here were as follows:

- *Research Hypothesis 5a*
  The evidence of additional value obtained due to the assistance by the MNE is more prevalent than evidence of additional value due to the existence of worker mobility.
- *Research Hypothesis 5b*
  The evidence of additional value obtained due to assistance from the MNE is more prevalent than evidence of additional value due to existence of imitation by host country firms of suppliers.

6.2 Discussion of Results

As shown in Figure 24, responding firms seem to generally believe they have not seen as much value from worker mobility or imitation of other host country firms or competitors. There is almost an equal split in the proportion of the firms that believe value add was slight compared to those who believe value add was significant. The results of the hypothesis test were inconclusive which implies that even though the majority of respondents indicated having obtained value from the existence of spillover channels, these results could have been by chance and a different sample of the population could show a different outcome.

It is also noted that from Figure 24 that value obtained from MNE is generally perceived as being more significant that value obtained from competitors. This is likely due to the fact that there host country firms that have part foreign ownership do not necessarily benefit from spillovers from host country firms.

6.5 Concluding Remarks

The results of the study highlights that LDCs may not be as backward as the definition of LDCs make us to believe. The result showed that the technology gap between host country firms and the MNE was very small which was an indication that spillovers were likely to be present.

With regard to spillovers we found that spillovers through worker mobility were more likely through movement of workers between suppliers firms and less rom the MNE to suppliers firm. Regarding imitation by supplier firms, we found that supplier firms imitated each other as well as the MNE. Imitation of the MNE was more in the support functions such as management. Assistance from the MNE was not a high as expected but this is likely due to the higher than expected capacity of the country and suppliers firms.

The results also showed that host country firms obtained value from the presence of workers who have worked for the MNE or competitors and imitation of the MNE or competitors which an indication that there are positive spillovers.

Chapter 7: Conclusion and Recommendations

7.1 Introduction

Economic development policies in most developing countries tend to focus on attracting FDI (Fan, 2002). It is believed that FDI is not just a source of economic development through direct channels such as employment, beneficiation, procurement, infrastructure and taxes but also a channel through which new technologies and knowledge from MNE's home countries can be transferred to host countries (Javorcik B. , 2008). It is this notion that sparked the interest in the study of spillovers.

Understanding the existence of spillovers in LDCs is very important in influencing FDI policies of countries especially with regard to the exploration of their natural resources. Current policies are geared towards MNEs paying royalties or taxes to governments of which they do not end up creating sustainable development needed by these countries. This phenomenon of trying to get most monetary benefits out of the country's natural resources is not only prevalent in LDCs also in most developing countries including South Africa. The on-going nationalisation debate is a case in example where it is believed ownership is the key to sustainable economic development and spillovers are not even spoken off. Ii is therefore hoped that this study will start a series of similar studies in the natural resources sector to help resources endowed LDCs to get the most out of their resources in a sustainable way.

The study developed through existing literature developed a survey in order to test the existence of spillovers in LDCs. The survey aimed to establish the capacity of the country being studied and determine if under that capacity spillovers exist. Before continuing, it is better to revisit the objectives of the study.

7.2 Research Objectives

The following objectives were outlined at the beginning of the study:

The primary objective of this research is to investigate the evidence of the existence of knowledge spillovers from the multinational enterprise (MNE) in the natural resources sector to host country firms in least developed countries (LDCs).

Secondary objectives of this research study were:

1. To gain better understanding of the research on knowledge spillovers undertaken to date in order to further build on that work.
2. To determine the extent to which the LDC capacity impacts on the host country firm's absorptive capacity and therefore the existence of spillovers.
3. To use channels through which spillovers occur to investigate the existence of spillovers between the MNE and its host country firms of suppliers in the natural resources sector in LDCs in Africa.
4. To determine if host country firms of suppliers benefit positively from the spillover channels.

Literature review addressed the first objective, while objectives two to three were addressed through the analysis of the results.

The research objectives were therefore achieved.

7.3 Key Findings and Implications

This study highlighted some key findings with implications on stakeholders particularly governments, MNEs and host country firms.

1. There are spillovers to host country firms in the natural resources sector in LDCs.
2. Despite being classified as low-income country suffering from structural impediments to sustainable development which manifests in a low level of human resource development and a high level of structural economic vulnerability, it is likely that some of the LDCs possess the capacity to absorb spillovers. Business should therefore assess each country on its own merit before making investment decisions.
3. LDC firms doing business with MNEs in the natural resources sector are mostly into technical product and service distribution. This contradiction with what is expected for a LDC. Due to skills shortage and lack of other resources, LDC firms in business are expected to be into non-technical business such as stationery distribution and cleaning services.
4. In the natural resource sector, worker mobility is likely to take place between supplier firms than from MNE to supplier firms due to wage premium. The level of competition in the suppliers industry will therefore have an impact on vertical linkage spillovers. The higher the competition as a result of doing business with the MNE, the higher is the chance and magnitude of spillovers.
5. While smaller technology gap between host country firms and the MNE sounds good, in less developed countries this could mean that the MNE has deployed less advanced or outdated technology and therefore prevent the spillovers from advancing the host country firm to the level of firms in developing countries.
6. Technology gap is critical when which type of FDI to attract.
7. Reliance on assistance from the MNE by host country firms is dependent on the host country firm's links with other foreign supplier firms. As product or

service providers, host country firms are likely to have a closer relationship with their suppliers of the foreign firms they have licence with for equipment service.

7.4 Research Findings Limitations

While this study provides empirical insight into the question of existence of spillovers in the natural resource sector in LDCs, the findings are subject to some limitations.

- There may be other factors firm or country factors that influence the capacity of the host country but were not picked up in the literature and used to test the capacity of the country.
- The dominance of responses from Tanzania could have potentially skewed the results to reflect what the case in that country is more than what the case is for the three countries studied.
- The sample size may have an impact on the results and probably the reason some of the findings were not statistically significant.
- The sample size limited the study to being univariate and certain interactions could not be studied.
- The accuracy of the results and subsequent conclusions may have been affected by the likely response bias as the respondents might have assumed the information might be shared with the MNE. Even though this was stated in the questionnaire.
- Some of the respondents to this study are majority foreign owned firms and due to low response rate, these firms were not removed from the data since they are registered in the host country. The inclusion of these firms is likely who are likely to have skewed the results of the findings.

7.5 Future Research

Following from this study, the following areas are recommended for future research:

It may be worthwhile exercise to conduct similar studies with a large sample to that will allow for comparison on a number of factors such as:

- Multiple MNEs instead of one MNE.
- Different host countries.
- Host country firm level of ownership, that is majority foreign owned firms compared to foreign owned firms.
- Contract suppliers versus adhoc suppliers.

These studies will decouple from this study the influence of partially foreign owned firms in

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Appendices

Appendix A1 – Instrument Design Four Levels Questions

Management Question

- Do least developed countries benefit through knowledge spillovers from FDI in their natural resource sector?

Research Questions

- Is there evidence of existence of natural resource sector FDI knowledge spillovers from MNE to host country firms in least developed countries?
- Do host country and firm absorptive capacity in these least developed countries contribute to the existence or absence of natural resource sector FDI knowledge spillovers?

Investigative Questions

- Is there evidence of spillover channels that could signal evidence of spillovers?
    - Is or has there been worker movement from MNE to host country firm or from foreign owned suppliers of MNE? Did this movement of workers impact on the service or product you provide to the MNE? If so how?
    - By observing the MNE or its foreign owned suppliers, did you learn anything that helped you improve your service, product or the way you conduct your business in general? If so what observation did you make?
    - Since becoming supplier to the MNE, did you capture additional business from other MNEs including exporting your services or products to other countries? Would you credit your access to other markets to your link to doing business with the MNE? How did doing business with them help you capture more business?
    - Has competition in your industry changed? How has it changed? Would you associate the change in competition with the MNE? What is the association?
    - Is there voluntary exchange of information or assistance by the MNE? What kind of information or assistance is it? Has this information resulted in your product or process improvement and how?

- Which of the following factors have enables or impede your firm from taking full advantage of business opportunities with the MNE and how?
    - Distance of MNE from suppliers in its country of origin
        - Does being locally based supplier give your firm any advantage? Is your firm able to provide the MNE with product or service that meets its requirements, faster and cheaper than suppliers based outside of your country?
    - Technology gap between MNE and your firm
        - Do MNE specifications for the type service or product your firm supply require a certain level of human capital and technological knowhow?
        - Does your firm have these human capital and technological knowhow to supply the MNE with products or services to the required specification?
        - How did your firm acquire these human and technological knowhow?
        - Did the MNE assist your firm in any way?
    - Level of Country trade openness
        - Are there preferential trade agreements that compel the MNE to source from local suppliers?
        - Are there preferential trade agreements between your country and other countries that enable your firm to source technology, products or raw material for your firm in order to be able to supply MNE?
        - Are there preferential trade agreements that provide you an opportunity to be a supplier into other countries?
        - Is being a supplier to the MNE helping you take advantage of these trade agreements? How so?
    - Access to financial resources
        - Does your firm have access to financial capital needed by the business? What is the source of the capital?
        - Has the MNE financially supported your firm to enable it to improve its service or product? If so, how?

- Has the MNE made special financial arrangements (payments) in order to ensure your firm is able to deliver as agreed? What kind of arrangements?

- Intellectual property rights
  - Are there local intellectual property laws?
- Ownership of MNE (Independence from head office in country of origin)
  - Have you experienced difficulties in dealing with the local office of MNE due to instruction from the MNE head office?
  - Does your firm feel the local office is empowered enough to deal with your requirements?
  - Does your firm feel the MNE understands the local conditions and go an extra mile to accommodate them?
- The type of service or product required by the MNE

Appendix A2 – Survey Instrument: English

Appendix A3